

C A M B R I A

Mr. Barney Chan
Alameda County Health Care Services Agency
Environmental Health Services
1131 Harbor Bay Parkway, suite 250
Oakland CA 94612

SEP 24 2001

Re: **Remediation Workplan**
2662 Fruitvale Avenue
Oakland, California 94621

4457



Dear Mr. Chan:

Cambria Environmental Technology, Inc. (Cambria) is pleased to present this remediation workplan for the subject site. As you acknowledged in your March 9, 2001 letter to Mr. Joseph Cotton of the City of Oakland, you understand that the site is planned for residential housing, and sale and development of the property is contingent upon obtaining site closure or development clearance from your agency. The objective of the proposed remedial work is to facilitate site redevelopment and to obtain regulatory case closure in the near future. As part of the remedial work, a **Risk Management Plan (RMP)** would be prepared to address any residual contamination in the event of any future subsurface site construction or site use change. The site background, risk screening evaluation, and the remediation workplan are presented below.

SITE BACKGROUND

This site background is based on Cambria's review of the following reports: 1) September 1993 *Phase III Soil and Groundwater Investigation* by Baseline Environmental Consulting (Baseline), 2) September 1995 *Supplemental Groundwater Investigation* by Baseline, and 3) January 30, 2001 *Results of Semi Annual Groundwater Monitoring* by Innovative Technical Solutions, Inc. (ITSI). Previous consultant figures and tables presenting the investigation and analytical data reviewed by Cambria are included Cambria's *Risk Screening Evaluation* dated March 1, 2001 (Attachment A).


Site Location and UST Status: The Site is located on the southeast corner of Fruitvale Avenue and Davis Street in Oakland, California. Cambria understands that an automobile service station occupied the Site from the 1940s until 1978. The underground storage tanks (USTs), including three gasoline USTs and one additional UST (presumably used for waste oil storage), were removed from the Site in 1978. The City of Oakland purchased the property from Texaco in 1983.

Oakland, CA
San Ramon, CA
Sonoma, CA
Portland, OR

**Cambria
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Lithology: Vadose zone soils consist primarily of clays. Below approximately 8-10 ft bgs, sands and gravels are encountered. In the north-eastern portion of the site, sands were encountered between 1 and 4 ft bgs in borings MW-F1, F-11, and F-13. The City of Oakland 2000 *Oakland Risk-Based Corrective Action: Technical Background Document* provides three general categories for soils within the City of Oakland: Merritt sands, sandy silts, and clayey silts. Based on the boring logs included in the reports reviewed by Cambria and on the site location and regional geology, the site soil type is "clayey silt."



Groundwater Depth and Flow Direction: Depth to groundwater is approximately 8 to 11 ft below ground surface (bgs), and groundwater flows towards the west-southwest with an approximate gradient of 0.02 ft/ft.

Contaminants of Concern: Petroleum hydrocarbons have been detected in onsite and offsite soil and groundwater. The petroleum compounds of concern are benzene, toluene, ethylbenzene, and xylenes (BTEX). Lead has been detected in site soil. Tabulated data from the September 1993 *Phase III Soil and Groundwater Investigation Report*, the September 1995 *Supplemental Groundwater Investigation Report* and the January 30, 2001 *Results of Semi-Annual Groundwater Monitoring* are presented in Attachment A.

Contaminant Distribution: Consistent with leakage from former USTs and subsequent migration via groundwater, petroleum hydrocarbons in soil occur primarily at depths of 8 to 11 ft bgs. Potentially elevated concentrations of lead was detected in two shallow soil (0 to 3 ft bgs) locations (F-4 and F-6). In groundwater, petroleum hydrocarbons are primarily located offsite (downgradient) beneath the sidewalk (well MW-F4) and Davis Street (MW-13). Separate-phase hydrocarbons (free product) was detected at a thickness of 0.02 ft in offsite, downgradient well MW-13 in June 1997 and March 1998, but no measurable free product has been detected since. During the recent three semi-annual monitoring events, no petroleum hydrocarbons were detected in onsite groundwater.

Historical Site Remediation: Oxygen-releasing compounds (ORC) and hydrogen peroxide were introduced into the site subsurface in 1998 and in 2000, respectively. The ORC application was purportedly conducted via ten borings along Fruitvale Avenue and Davis Street. The hydrogen peroxide was introduced into site wells MW-F4 and MW-13 using 96-ounce volumes of 3% solution. Some areas experienced significant contaminant reduction, while other areas experienced less reduction. In general, the application of ORC and hydrogen peroxide showed promise as effective remedial techniques. Absorbent socks have also been used to recover residual free product in offsite well MW-13.

RISK SCREENING EVALUATION

Cambria conducted risk evaluations for residential site use using the City of Oakland Version 1999 and Version 2000 *Oakland Risk-Based Corrective Action: Technical Background Document*. Cambria's *Risk Screen Evaluation* dated March 1, 2001 is based on version 1999 and is included in Attachment A. To confirm that changes to 2000 version would not impact the results of Cambria's risk screening based on the 1999 version, Cambria updated the risk screening using the 2000 version. Cambria also calculated the site-specific target levels (SSTLs) using the minimum historical depth-to-groundwater of 8 ft. The hydrocarbon SSTLs concentrations for the revised risk screening were lower than the version 1999 screening in three cases, but in each case the maximum onsite and offsite concentration were still well below the potential health risk target level. The updated risk screening is shown below in Table A.



Table A - Results of Hydrocarbon Exposure Pathways (Residential)
Based on City of Oakland - Version 2000 - SSTLs for Clayey Silt

Exposure Scenario	Target Risk	SSTL	Maximum Site Concentration	Result
Benzene				
Volatilization from subsurface soil to indoor air	1x10 ⁻⁵	1.9 mg/kg	0.3 mg/kg (onsite) 1.7 mg/kg (offsite)	Potential health risk is below target level.
Volatilization from groundwater to indoor air	1x10 ⁻⁵	5.5 mg/l	<0.005 mg/l (onsite) 0.270 mg/l (offsite)	Potential health risk is below target level.
Ingestion/ Inhalation/ dermal contact with surficial soil	1x10 ⁻⁵	19 mg/kg	<0.2 mg/kg	Potential health risk is below target level.
Toluene				
Volatilization from subsurface soil to indoor air	1x10 ⁻⁵	930 mg/kg	3.7 mg/kg (onsite) 11 mg/kg (offsite)	Potential health risk is below target level.
Volatilization from groundwater to indoor air	1x10 ⁻⁵	>SOL	<0.005 mg/l (onsite) 0.035 mg/l (offsite)	Potential health risk is below target level.
Ingestion/ Inhalation/ dermal contact with surficial soil	1x10 ⁻⁵	7,100 mg/kg	0.75 mg/kg	Potential health risk is below target level.
Ethylbenzene				
Volatilization from subsurface soil to indoor air	1x10 ⁻⁵	SAT	8.8 mg/kg (onsite) 66 mg/kg (offsite)	Potential health risk is below target level.
Volatilization from groundwater to indoor air	1x10 ⁻⁵	>SOL	<0.005 mg/l (onsite) 1.1 mg/l (offsite)	Potential health risk is below target level.
Ingestion/ Inhalation/ dermal contact with surficial soil	1x10 ⁻⁵	3,900 mg/kg	3.4 mg/kg	Potential health risk is below target level.
Xylenes				
Volatilization from subsurface soil to indoor air	1x10 ⁻⁵	SAT	17 mg/kg (onsite) 230 mg/kg (offsite)	Potential health risk is below target level.
Volatilization from groundwater to indoor air	1x10 ⁻⁵	>SOL	<0.005 mg/l (onsite) 0.34 mg (offsite)	Potential health risk is below target level.
Ingestion/ Inhalation/ dermal contact with surficial soil	1x10 ⁻⁵	53,000 mg/kg	1.5 mg/kg	Potential health risk is below target level.
SSTL = Site-Specific Target Level SAT = SSTL exceeds saturated soil concentration of chemical >SOL = SSTL exceeds solubility of chemical in water				

To evaluate the risk posed by residual lead concentrations, Cambria compared analytic results to the EPA Region 9 Preliminary Remediation Goal of 400 mg/kg. Lead concentrations exceeded the PRG in one area (sample F4-2').

Table B - Results of Lead Exposure Pathways (Residential)
Based on Lead Concentrations using
EPA Region 9 Preliminary Remediation Goal

Exposure Scenario	Target Risk Level	SSTL	Maximum Site Concentration	Result
Lead				
Volatilization from subsurface soil to indoor air	1x10 ⁻⁵	NA	NA	NA
Volatilization from groundwater to indoor air	1x10 ⁻⁵	NA	NA	NA
Ingestion/ Inhalation/ dermal contact with surficial soil	1x10 ⁻⁶	400 mg/kg (EPA PRG)	480 mg/kg	Maximum site concentration exceeds SSTL.
SSTL = Site-Specific Target Level NA = Not applicable				

REMEDIATION WORKPLAN

To facilitate site development and case closure, Cambria offers the remediation workplan detailed below. And although the conservative risk screening evaluation suggests that there is no significant risk to human health or the environment from prior hydrocarbon releases, the City of Oakland proposes conducting supplemental remediation. The proposed remediation will further reduce offsite hydrocarbons in groundwater, accelerate natural attenuation, and minimize nuisance conditions in the site subsurface.

Task 1 – Utility, Conduit and Sensitive Receptor Survey

As requested in your March 9, 2001 letter, a utility, conduit and sensitive receptor survey will be conducted. The purpose of the survey is to clear locations of proposed remedial activities, to identify utility trenches that could be potential pathways for constituent migration, and to identify and safeguard any known sensitive receptors. To conduct the survey, Cambria will contact Underground Services Alert (USA) to mark subsurface utilities beneath public property in the subject area; subcontract a private utility locator to confirm and evaluate the presence and location of utilities and conduits; and review sewer, storm drain, and related maps at the City of Oakland Department of

Engineering. Cambria will also review other available City information concerning basements, buildings without foundations and other subgrade features, and will conduct a site visit to look for obvious indications of subgrade features. To identify potential wells in the site vicinity, well records from the Department of Water Resources (DWR) will be reviewed within ¼ mile of the site.

As we discussed on September 5, 2001, a door-to-door survey will be conducted to provide additional information about wells and subgrade features. A questionnaire will be left at establishments where no individuals are interviewed. A survey radius of 200 ft will be used, and appears well justified by site data. Site data indicates that the plume has not reached the two downgradient wells (MW-F5 and MW-F6) located approximately 100 ft away despite the age of the release (over 20 years since UST removal in 1978). The results of prior bioparameter sampling of site groundwater indicate that hydrocarbon degradation is occurring at the site, and that the groundwater system has additional capacity to bioattenuate offsite subsurface hydrocarbons (*Semi-Annual Groundwater Monitoring Report*, Innovative Technical Solutions, Incorporated, January 30, 2001).

Task 2 - Limited Soil Excavation Near Sample F4-2'

Soil excavation will be conducted near the middle of the site to target lead concentrations (480 mg/kg) detected at 2 ft below grade surface (bgs) in shallow soil sample F4-2'. The proposed remedial goal is the USEPA Preliminary Remediation Goal (PRG) of 400 mg/kg for lead remediation. Excavation in this area will also remove soil impacted by total petroleum hydrocarbons (TPH) (940 mg/kg TPH_{mo} was also detected in sample F4-2') that exceeded nuisance thresholds.

A certified excavation contractor will be directed to initially excavate an area 5 ft long by 5 ft wide by 3 ft deep (approximately 3 cubic yards of impacted soil) around sample location F4-2'. Field observations (odors, discoloration) will be used to determine the need for any additional immediate soil excavation. After initial excavation activities, confirmation samples will be collected from the limits of the excavation, and submitted for analysis as follows:

- One sample per sidewall, collected at the vertical midpoint of the sidewall (analyze composite);
- One excavation floor sample every 50 ^{SAY} cubic feet (equivalent to a 5 ft by 10 ft floor area);
- Analysis for lead by EPA Method 6010;
- Analysis for TPH_{g/k/mo} by EPA Method 8015; and
- Analysis for BTEX by EPA Method 8020.

Additional excavation will be conducted where soil concentrations exceed the following site-specific risk screening threshold values: 400 mg/kg lead, 1.9 mg/kg benzene, 930 toluene, 3,900 mg/kg

ethylbenzene, 53,000 mg/kg xylenes (these BTEX concentrations are the SSTLs established by Cambria's risk screening evaluation).

The excavation will be backfilled to grade with clean, imported fill/soil and compacted in 1-foot lifts. Impacted soil will be disposed offsite at an appropriate disposal facility. The proposed excavation location is shown on Figure 1.

Task 3 - Trench and ORC Use to Improve Groundwater Quality



To accelerate natural attenuation of residual petroleum hydrocarbons in the saturated zone downgradient and offsite of the subject site, approximately 500 pounds of oxygen releasing compound (ORC) materials will be installed within a trench located on site. The trench will be approximately 20 feet long, 2 feet wide and 10 feet deep, and will be located a few feet from the sidewalk. ORC material will be installed in the seasonal saturated zone/capillary fringe area, which is estimated to be approximately 8 to 11 feet bgs. The trenching activities include the removal and disposal of approximately 20 cubic yards of soil (30 tons), installing the ORC treatment material, and backfilling the excavation to grade.

The trench backfill materials are shown on Figure 1. Permeable, self-compacting backfill (crushed rock or pea-gravel) will be used in the bottom half of the trench (4 to 10 ft bgs) to facilitate dispersion of dissolved oxygen released from the ORC material. Low permeability backfill/soil (imported or shallow, non-hazardous site soil) will be used near the surface to avoid increasing the potential risk of vapor transport to the surface. Compaction will be provided at 1-foot lifts. To help prevent trench settlement, a geotextile membrane will be placed between the upper soil/fill and the lower self-compacting backfill. Traffic control will be used as required by the City of Oakland Building Department.

Task 4 - Hydrogen Peroxide Injection to Improve Groundwater Quality

Cambria proposes introducing hydrogen peroxide into site wells MW-F4 and MW-13 to chemically oxidize hydrocarbons and to supply oxygen to stimulate hydrocarbon biodegradation. Cambria proposes introducing hydrogen peroxide (7.5% solution) approximately once per week over four weeks. The volume and concentration of hydrogen peroxide proposed in this workplan represent a more aggressive approach than the prior use of 96-ounce volumes of 3% hydrogen peroxide solution.

Initial results of our utility/conduit study indicate that telephone, natural gas, water, and sanitary sewer conduits are present along the south side of Fruitvale Avenue and/or Davis Street. All of these utilities appear to be above the water table, although the sanitary sewer piping and conduit backfill material may be partially submerged during periods of high water table fluctuation. The results of the utility conduit study will be presented separately upon completion. Therefore, because of the high density of utilities near the site, Cambria recommends introducing hydrogen peroxide into existing wells rather than installing multiple temporary injection probes in close proximity to the utility network.

Task 5 - Remediation Report/Risk Management Plan



A remediation report will be prepared that documents the remedial field activities and findings. To safeguard human health during any site subsurface construction or site use change, a Risk Management Plan (RMP) will be prepared for the site. The RMP will be filed with ACHCSA and the City of Oakland Planning Department.

Task 6 - Well Decommissioning

Cambria formally requests permission to decommission onsite wells MW-F1, MW-F2 and MW-F3, which have historically contained only trace hydrocarbons and did not contain *any* hydrocarbons over the four most recent sampling events. Decommissioning of the site wells would facilitate site development. The three existing onsite wells will be decommissioned by pressure grouting. A brief letter report documenting the decommissioning will be prepared.

Decommissioning of the four offsite monitoring wells will be conducted after completion of proposed offsite remediation upon approval from the ACHCSA.

Remedial Contingency

In the event that the planned remedial activities do not reduce dissolved hydrocarbon concentrations, additional hydrogen peroxide treatment via wells MW-F4 and MW-13 may be warranted.

CLOSING

To facilitate site redevelopment, the City of Oakland would like the ACHCSA to prepare a 'letter of developability' stating that the site is suitable for residential development once the planned onsite excavation has been completed.

We understand that upon completion of the planned remediation activities the ACHCSA will require concurrence from the Regional Water Quality Control Board before granting full regulatory case closure. Please contact me at (510) 420-3303 if you have any questions or comments.



Sincerely,
Cambria Environmental Technology, Inc.

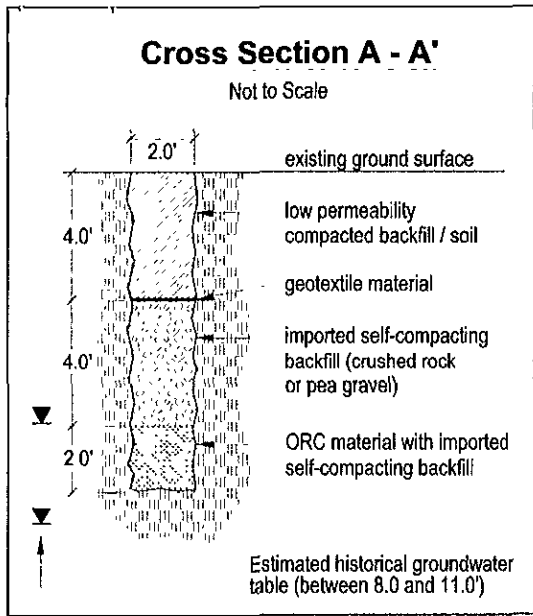
Bob Clark-Riddell, P.E.
Principal Engineer

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Attachments: A – Cambria's Risk Screening Evaluation dated March 1, 2001
B – Excavation Sampling Procedures

CC: Mr. Joseph Cotton
City of Oakland – Public Works Agency
Environmental Services Division – Dalziel Building
250 Frank H. Ogawa Plaza, Suite 5301
Oakland, California 94612-2034

CITY OF OAKLAND 2662 FRUITVALE AVENUE OAKLAND, CA 94612



Request closure approval

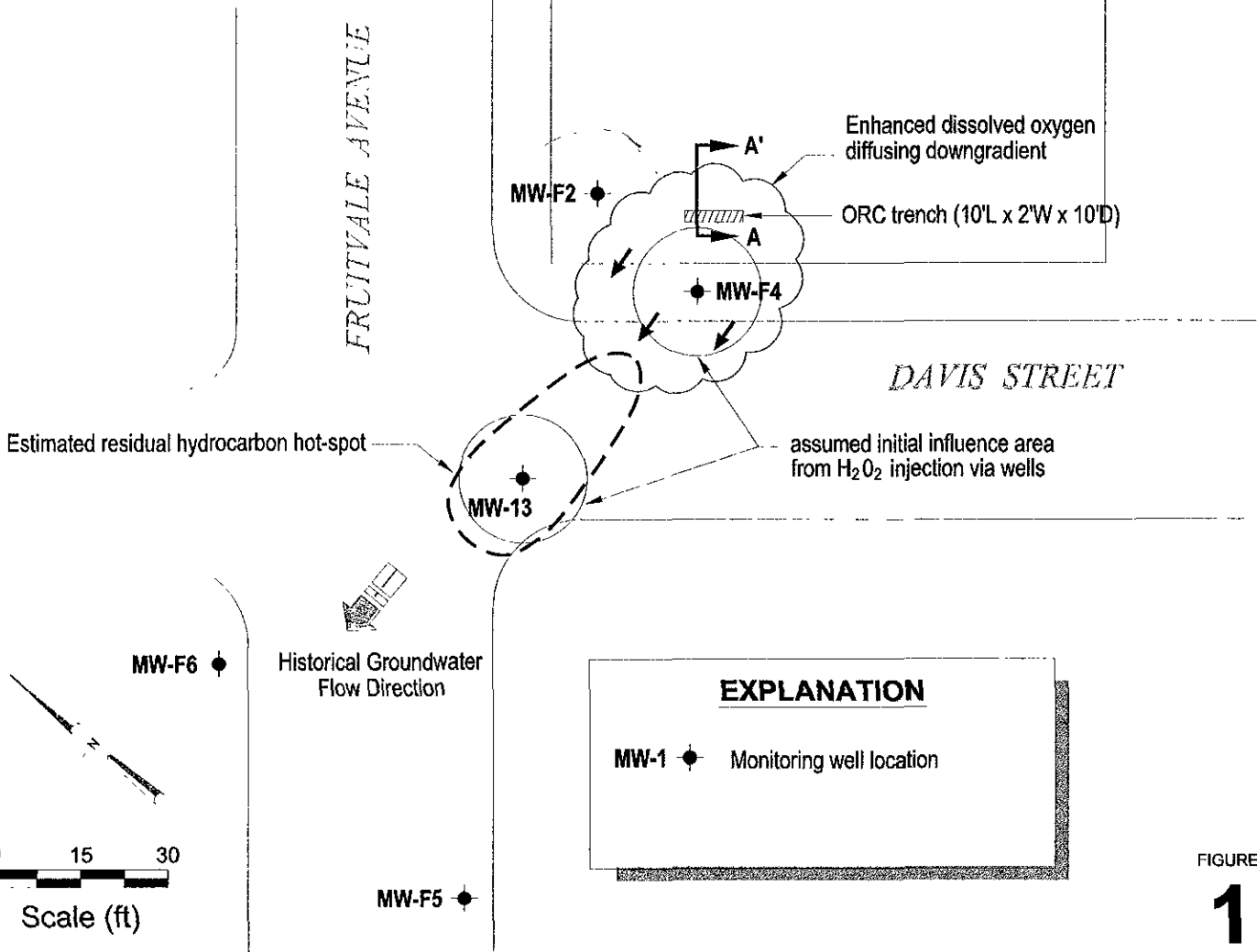


FIGURE 1



ATTACHMENT A

Risk Screening Evaluation

March 1, 2001

Mr. Joseph Cotton
City of Oakland -Public Works Agency
Environmental Services - Dalziel Building
250 Frank H. Ogawa Plaza, Suite 5301
Oakland CA 94612

Re: **Risk Screening Evaluation**
2662 Fruitvale Avenue
Oakland, California 94621

Dear Mr. Cotton:



Cambria Environmental Technology, Inc. (Cambria) is pleased to provide the City of Oakland (City) with this risk screening evaluation for subsurface compounds at the site referenced above (Site). We understand that the Site was previously occupied by a automobile service station and is to be redeveloped for residential use. This evaluation compares soil and groundwater concentrations primarily to risk-based screening levels in the City of Oakland May 17, 1999 *Oakland Risk-Based Corrective Action: Technical Background Document*. To evaluate lead concentrations in soil, lead concentrations were compared to screening levels in EPA Region 9 Preliminary Remediation Goals. Presented below are a site summary and our risk screening evaluation, conclusions, discussion and recommendations.

SITE SUMMARY

This site summary is based on Cambria's review of the following reports: 1) September 1993 *Phase III Soil and Groundwater Investigation* by Baseline Environmental Consulting (Baseline), 2) September 1995 *Supplemental Groundwater Investigation* by Baseline, and 3) January 30, 2001 *Results of Semi Annual Groundwater Monitoring* by Innovative Technical Solutions, Inc. (ITSI). Previous consultant figures and tables presenting the investigation and analytical data reviewed by Cambria are included as Attachment A.


Site Location and UST Status: The Site is located on the northeast corner of Fruitvale Avenue and Davis Street in Oakland, California. Cambria understands that an automobile service station occupied the Site from the 1940s until 1978. The underground storage tanks (USTs), including three gasoline USTs and one additional UST (presumably used for waste oil storage), were removed from the Site in 1978. The City of Oakland purchased the property from Texaco in 1983.

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Lithology: Vadose zone soils consist primarily of clays. Below approximately 8-10 ft bgs, sands and gravels are encountered. In the north-eastern portion of the site, sands were encountered between 1 and 4 ft bgs in borings MW-F1, F-11, and F-13. The City of Oakland May 17, 1999 *Oakland Risk-Based Corrective Action: Technical Background Document* provides three general categories for soils within the City of Oakland: Merritt sands, sandy silts, and clayey silts. Based on the boring logs included in the reports reviewed by Cambria and on the site location and regional geology, the site soil type is "clayey silt."



Groundwater Depth and Flow Direction: Depth to groundwater is approximately 8 to 11 ft below ground surface (bgs), and groundwater flows towards the west-southwest with an approximate gradient of 0.02 ft/ft.

Contaminants of Concern: Petroleum hydrocarbons have been detected in onsite and offsite soil and groundwater. The petroleum compounds of concern are benzene, toluene, ethylbenzene, and xylenes (BTEX). Lead has been detected in site soil. Tabulated data from the September 1993 *Phase III Soil and Groundwater Investigation Report*, the September 1995 *Supplemental Groundwater Investigation Report* and the January 30, 2001 *Results of Semi-Annual Groundwater Monitoring* are presented in Attachment A.

Contaminant Distribution: Consistent with leakage from former USTs and subsequent migration via groundwater, petroleum hydrocarbons in soil occur primarily at depths of 8 to 11 ft bgs. Potentially elevated concentrations of lead occur in two shallow soil (0 to 3 ft bgs) locations (F-4 and F-6). In groundwater, petroleum hydrocarbons are primarily located offsite (downgradient) beneath the sidewalk (well MW-F4) and Davis Street (MW-13). During the past year (three semi-annual monitoring events), no petroleum hydrocarbons were detected in onsite groundwater.

RISK SCREENING EVALUATION

For the purposes of this evaluation, Cambria assumes no restrictions on future siting of residential buildings within the Site. Areas not within the footprint of any future building are assumed unpaved. Cambria assumes that site groundwater is not a current or potential future drinking water source. This evaluation uses a 1 meter (3.3 ft) bgs cutoff point between surficial and subsurface soil, consistent with the City of Oakland May 17, 1999 *Oakland Risk-Based Corrective Action: Technical Background Document*.

Exposure Scenarios: Based on assumed future site use, potential future residential exposure scenarios would include inhalation of onsite indoor and outdoor air, direct dermal contact with surficial soil, and soil ingestion/particulate inhalation.

Risk Screening Levels: Cambria used risk screening levels for BTEX as published by the City of Oakland in its May 17, 1999 *Oakland Risk-Based Corrective Action: Technical Background Document*. The City of Oakland did not publish a screening level for lead, so we used the EPA Region 9 Preliminary Remediation Goal (PRG) as a screening level. The San Francisco Bay Regional Water Quality Control Board (RWQCB - SFBR) recently published RBSLs for soil and groundwater (August 2000 *Application of Risk-Based Screening Levels and Decision Making to Sites with Impacted Soil and Groundwater*, Interim Final) that cover the City of Oakland as well as the San Francisco Bay Area. Cambria confirmed with Dr. Roger Brewer of the RWQCB that the RWQCB-SFBR continues to endorse the City of Oakland risk-based screening levels (RBSLs) and site-specific target levels (SSTLs).

Representative Concentrations: Cambria used maximum detected concentrations for BTEX and lead within each onsite medium: surficial soil (0 to 3.3 ft bgs), subsurface soil (>3.3 ft bgs), and groundwater. The surficial and subsurface soil data sets include all analytical results for onsite soil samples in the reports reviewed by Cambria. The groundwater data set includes analytical results for samples collected from onsite monitoring wells during the past year (semi-annual monitoring events conducted on January 21, 2000, June 27, 2000 and December 22, 2000). To be additionally conservative, Cambria also used maximum concentrations for BTEX within soil and groundwater immediately adjacent the site (from offsite boring MW-F4 and offsite wells MW-F4 and MW-13). For offsite groundwater, Cambria used the maximum concentration detected within the past year (year 2000). Maximum hydrocarbon and lead concentrations are presented below in Tables A and B, respectively.

Comparison to Screening Levels: Table A below presents Cambria's comparison of screening levels and the maximum onsite and offsite hydrocarbon concentrations. Since screening levels for inhalation of indoor air are more restrictive than levels for inhalation of outdoor air, Cambria evaluated inhalation exposure to indoor air only. Table B below presents Cambria's comparison for lead concentrations.

Table A - Results of Hydrocarbon Exposure Pathways (Residential)
Based on Onsite and Offsite Concentrations using
City of Oakland Tier 2 SSTLs for Clayey Silt



Exposure Scenario	Target Risk Level	SSTL	Maximum Site Concentration	Result
Benzene				
Volatilization from subsurface soil to indoor air	1x10 ⁻⁵	3.3 mg/kg	0.3 mg/kg (onsite) 1.7 mg/kg (offsite)	Potential health risk is below target level.
Volatilization from groundwater to indoor air	1x10 ⁻⁵	1.4 mg/l	<0.005 mg/l (onsite) 0.270 mg/l (offsite)	Potential health risk is below target level.
Ingestion/ Inhalation/ dermal contact with surficial soil	1x10 ⁻⁵	19 mg/kg	<0.2 mg/kg	Potential health risk is below target level.
Toluene				
Volatilization from subsurface soil to indoor air	1x10 ⁻⁵	1,600 mg/kg	3.7 mg/kg (onsite) 11 mg/kg (offsite)	Potential health risk is below target level.
Volatilization from groundwater to indoor air	1x10 ⁻⁵	>SOL	<0.005 mg/l (onsite) 0.035 mg/l (offsite)	Potential health risk is below target level.
Ingestion/ Inhalation/ dermal contact with surficial soil	1x10 ⁻⁵	7,100 mg/kg	0.75 mg/kg	Potential health risk is below target level.
Ethylbenzene				
Volatilization from subsurface soil to indoor air	1x10 ⁻⁵	SAT	8.8 mg/kg (onsite) 66 mg/kg (offsite)	Potential health risk is below target level.
Volatilization from groundwater to indoor air	1x10 ⁻⁵	>SOL	<0.005 mg/l (onsite) 1.1 mg/l (offsite)	Potential health risk is below target level.
Ingestion/ Inhalation/ dermal contact with surficial soil	1x10 ⁻⁵	3,900 mg/kg	3.4 mg/kg	Potential health risk is below target level.
Xylenes				
Volatilization from subsurface soil to indoor air	1x10 ⁻⁵	SAT	17 mg/kg (onsite) 230 mg/kg (offsite)	Potential health risk is below target level.
Volatilization from groundwater to indoor air	1x10 ⁻⁵	>SOL	<0.005 mg/l (onsite) 0.34 mg (offsite)	Potential health risk is below target level.
Ingestion/ Inhalation/ dermal contact with surficial soil	1x10 ⁻⁵	53,000 mg/kg	1.5 mg/kg	Potential health risk is below target level.
SSTL = Site-Specific Target Level SAT = SSTL exceeds saturated soil concentration of chemical >SOL = SSTL exceeds solubility of chemical in water NA = Not applicable				

Table B - Results of Lead Exposure Pathways (Residential)
Based on Lead Concentrations using
EPA Region 9 Preliminary Remediation Goal

Exposure Scenario	Target Risk Level	SSTL	Maximum Site Concentration	Result
Lead				
Volatilization from subsurface soil to indoor air	1x10 ⁻⁵	NA	NA	NA
Volatilization from groundwater to indoor air	1x10 ⁻⁵	NA	NA	NA
Ingestion/ Inhalation/ dermal contact with surficial soil	1x10 ⁻⁶	400 mg/kg (EPA PRG)	480 mg/kg	Maximum site concentration exceeds SSTL.
SSTL = Site-Specific Target Level NA = Not applicable				



CONCLUSIONS

Petroleum hydrocarbon concentrations in site soil and groundwater do not exceed the site-specific target levels in the Oakland risk-based corrective action guidance document. This suggests that residual hydrocarbons onsite and immediately adjacent to the site do not pose a significant risk to human health. Lead concentrations, however, in one shallow soil sample (480 mg/kg in F4-2' located 2 ft bgs) slightly exceeded the EPA PRG risk screening criteria of 400 mg/kg.

DISCUSSION

Cambria's risk screen evaluation is based primarily on guidance provided by the City of Oakland. During a conversation on February 21, 2001, Mr. Roger Brewer of the RWQCB-SFBR suggested that Cambria use the May 17, 1999 *Oakland Risk-Based Corrective Action: Technical Background Document* for our risk screening. Dr. Roger Brewer is the author of the RWQCB-SFBR guidelines published in its August 2000 *Application of Risk Based Screening Levels and Decision Making to Sites with Impacted Soil and Groundwater*.

The Oakland guidance document, like the EPA Region 9 PRG document, does not include risk screen levels for total petroleum hydrocarbons (TPH). TPH is a combination of many specific compounds, including compounds like BTEX. Dr. Brewer stated that the TPH risk screening criteria in the RWQCB guidance document are flexible and also reflect nuisance concerns. It is Cambria's opinion that TPH as gasoline (TPHg) concentrations detected in deeper site soil (approximately 10 ft bgs) do not pose a significant human health risk since the BTEX concentrations are below risk screen levels. However, TPHg detected at a concentration of 940 mg/kg (at 2 ft bgs in boring F4), exceeds the TPHg ceiling value of 500 mg/kg, and may pose a potential nuisance. (Ceiling values for TPH in soil and groundwater are recommended to protect against nuisance odors). The detected TPHg in soil has likely partially or fully biodegraded. Residual TPHg could be removed during future site construction grading or foundation preparation. The 940 mg/kg TPHg concentration was detected in the same sample as the lead concentration of concern.

MDE P 19924
Table H-1


To provide a very conservative risk screening evaluation, Cambria used maximum concentrations in nearby offsite groundwater. A thickness of approximately 0.1 ft of free product has been observed in well MW-13, which is located approximately 40 ft hydraulically downgradient of the site. Free product is limited to offsite well MW-13.

HZ columns
1000 ppb - TPHg

RECOMMENDATIONS

Cambria recommends removal of shallow soil near sample location F4-2', where lead and TPHg were detected. The excavation and removal could be conducted during future site construction grading or foundation preparation. After removal of the shallow lead-bearing and TPHg-bearing soil, additional analyses are recommended to confirm that residual lead concentrations in soil are beneath human health screening levels, and that residual TPHg concentrations are below nuisance concern levels. The City may wish to conduct additional soil sampling for lead and other metals before or during future site development, especially for any unpaved areas.

C A M B R I A

Mr. Joseph Cotton
March 1, 2001

CLOSING

Cambria appreciates the opportunity to provide environmental consulting services to the City of Oakland. Please contact Bob Clark-Riddell at (510) 420-3303 if you have any questions or comments.

Sincerely,
Cambria Environmental Technology, Inc.



Robert W. Schultz, R.G.
Project Geologist

Bob Clark-Riddell, P.E.
Principal Engineer

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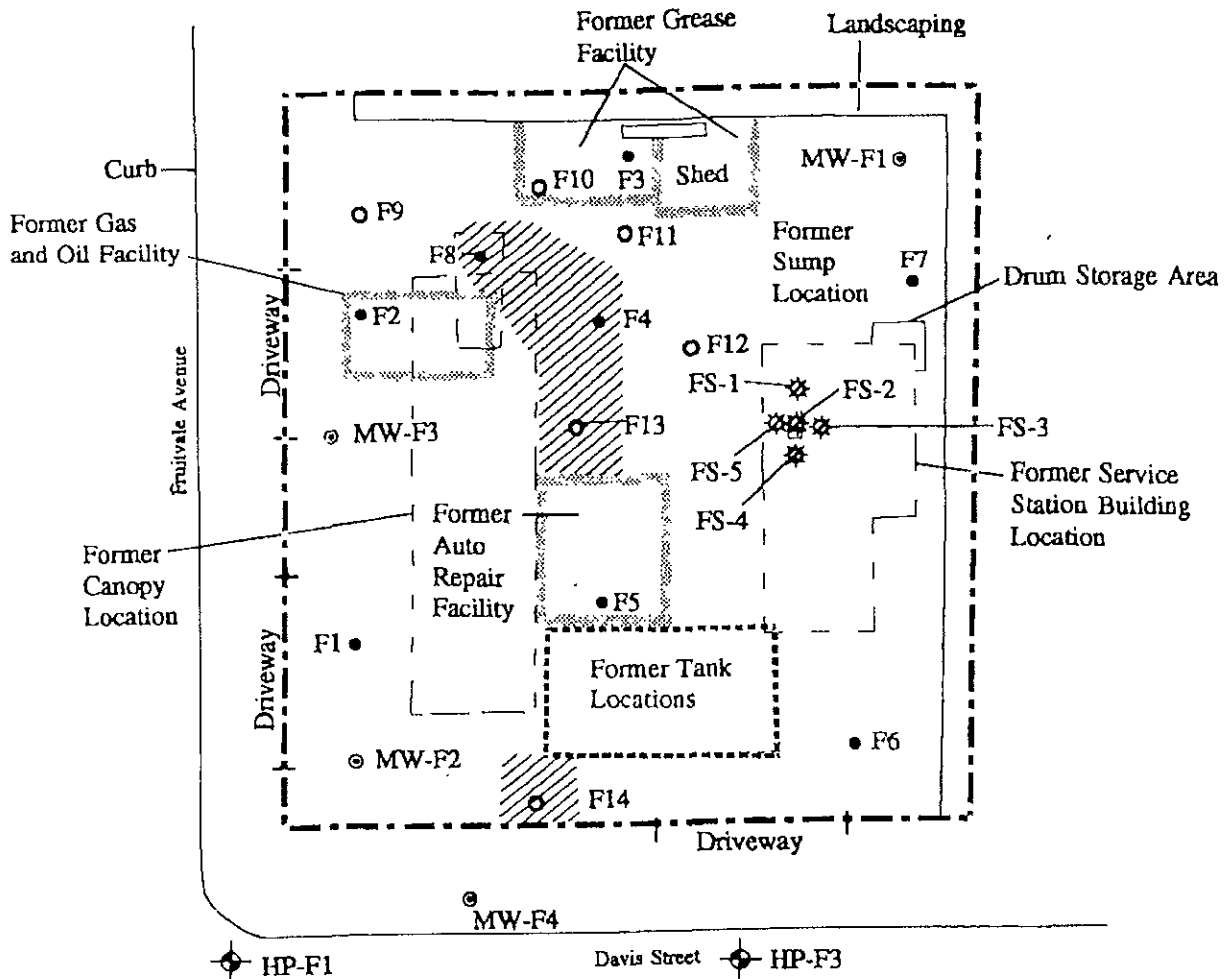
Attachment: A - Soil and Groundwater Data and Figures from Site Investigations

ATTACHMENT A

Soil and Groundwater Data from Site Investigations

Figure 2

SITE PLAN



Legend



Areas with Elevated TPH Concentrations

F1 to F8

• Soil Boring Location - Phase II

F9 to F14

○ Soil Boring Location - Phase III

FS-1

✱ Sump Area Boring Location

MW-F2

⊙ Monitoring Well Location

HP-F1

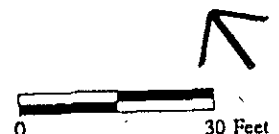


Temporary Well Location



Project Site Boundary

2662 Fruitvale Avenue Oakland, California



BASELINE

TABLE I
SUMMARY OF ANALYTICAL RESULTS, SOIL
2662 Fruitvale Avenue
Oakland, California
(mg/kg, unless indicated)

Sample Location	Sample Date	Depth (feet)	TPH as Gasoline ¹	TPH as Kerosene ²	TPH as Motor Oil ²	Total/ Nonpolar Oil & Grease ³	Benzene ⁴	Toluene ⁴	Ethylbenzene ⁴	Xylenes ⁴
<u>Soil Borings</u>										
F1	1-20-93	2.0 ⁵	<1	<1.0	<10	--	<0.005	<0.005	<0.005	<0.005
		9.5 ⁵	6	<1.0	<10	--	<0.005	<0.005	0.014	<0.005
		11.0 ⁵	66	<1.0	<10	--	<0.005	0.072	0.260	<0.005
F2	1-21-93	2.0 ⁵	<1	<1.0	11	--	<0.005	<0.005	<0.005	<0.005
		8.0 ⁵	1.1	<1.0	<10	--	<0.005	<0.005	<0.005	<0.005
F3	1-20-93	2.0	--	<1.0	<10	--/50	--	--	--	--
		8.0	--	<1.0	14	--/300	--	--	--	--
F4	1-20-93	2.0 ⁶	3.7	<5.0	940	--	<0.005	<0.005	0.0064	<0.005
		10.0 ⁵	15	<1.0	<10	--	<0.005	<0.005	0.320	<0.005
F5	1-20-93	2.0 ^{7,8}	<1	<1.0	<10	--	<0.005	<0.005	<0.005	<0.005
		8.0 ^{7,8}	<1	<1.0	<10	--	<0.005	<0.005	<0.005	<0.005
F6	1-21-93	2.0 ^{8,9}	--	<1.0	<10	--	<0.005	<0.005	<0.005	<0.005
		8.0 ^{6,8}	--	<1.0	<10	--	<0.005	<0.005	<0.005	<0.005
F7	1-20-93	2.0 ^{7,8}	--	<1.0	13	--	<0.005	<0.005	<0.005	<0.005
		8.5 ^{7,8}	--	<1.0	<10	--	<0.005	<0.005	<0.005	<0.005
F8	1-20-93	2.0 ⁵	220	<1.0	44	--	<0.005	<0.005	3.400	17.000
		8.5 ⁵	810	<1.0	<10	--	<0.005	<0.005	5.400	<0.005
F9	8-10-93	3.0 ¹⁰	<1	<1	<30	--	<0.005	<0.005	<0.005	<0.005
		9.5 ¹⁰	10	76	<30	--	<0.005	<0.005	0.052	0.042
F10	8-10-93	3.0 ¹⁰	<1	<1	<30	--/50	<0.005	<0.005	<0.005	<0.005
		10.0 ¹⁰	30	33	<30	--/50	<0.005	<0.005	0.073	0.250

(Continued)

02/04/01 14.11 PAA JLV 433 1409

Table I - Summary of Analytical Results, Soil (continued)

Sample Location	Sample Date	Depth (feet)	TPH as Gasoline ¹	TPH as Kerosene ²	TPH as Motor Oil ²	Total/ Nonpolar Oil & Grease ³	Benzene ⁴	Toluene ⁴	Ethylbenzene ⁴	Xylenes ⁴
F11	8-10-93	2.5 ¹⁰	<1	2	<30	--/<50	<0.005	<0.005	<0.005	<0.005
		10.0 ¹⁰	2	6	<30	--/<50	<0.005	0.012	<0.005	0.009
F12	8-10-93	2.5 ¹⁰	2	2	<30	--	<0.005	0.007	<0.005	<0.005
		9.5 ¹⁰	2	<1	<30	--	<0.005	<0.005	<0.005	<0.005
F13	8-10-93	3.0 ¹⁰	230	12	90	--	<0.030	0.75	0.55	1.5
		9.5 ¹⁰	1,500	650	<30	--	<0.200	3.7	8.8	8.1
F14	8-10-93	3.0 ¹⁰	<1	<1	<30	--	<0.005	<0.005	<0.005	<0.005
		10.5 ¹⁰	1,600	150	<30	--	0.3	3.1	5.7	6.0
F-S1	9-8-94	5.5	--	--	--	<50/<50	--	--	--	--
F-S2	9-8-94	6.0 ^{8,11}	<1	--	650	--/1,600	<0.005	<0.005	<0.005	<0.005
		11.0 ^{8,11}	<1	--	<10	--/<50	<0.005	<0.005	<0.005	<0.005
F-S3	9-8-94	5.5	--	--	--	<50/<50	--	--	--	--
F-S4	9-8-94	4.5	--	--	--	<50/<50	--	--	--	--
F-S5	9-8-94	5.5	--	--	--	210/200	--	--	--	--
<u>Monitoring Wells</u>										
MW-F1	8-11-93	3.0 ¹⁰	<1	--	<10	--	<0.005	<0.005	<0.005	<0.005
		10.0 ¹⁰	<1	--	<10	--	<0.005	<0.005	<0.005	<0.005
MW-F2	8-10-93	3.0 ¹⁰	<1	<1	<30	--	<0.005	<0.005	<0.005	<0.005
		12.0 ¹⁰	<1	3	<30	--	<0.005	<0.005	<0.005	<0.005
MW-F3	8-11-93	3.0 ¹⁰	<1	--	<10	--	<0.005	<0.005	<0.005	<0.005
		10.0 ¹⁰	33	--	<10	--	<0.015	<0.015	0.077	<0.005
MW-F4	9-7-94	5.5	<1	37 ¹³	<30	--	<0.005	<0.005	<0.005	<0.005
		11.0	2,100 ^{12,13}	420 ¹³	<300	--	1.7 ¹²	11 ¹²	66 ¹²	230 ¹²

(Continued)

02/02/01 14.11 FAA JULY 200 1200

Table 1 - Summary of Analytical Results, Soil (continued)

Sample Location	Sample Date	Depth (feet)	TPH as Gasoline ¹	TPH as Kerosene ²	TPH as Motor Oil ²	Total/Nonpolar Oil & Grease ³	Benzene ⁴	Toluene ⁴	Ethylbenzene ⁴	Xylenes ⁴
MW-F5	4-27-95	5.0 ¹⁴	<1	--	--	--	<0.005	<0.005	<0.005	<0.005
		9.5	<1	--	--	--	<0.005	<0.005	<0.005	<0.005
MW-F6	6-26-95	5.0	<1	--	--	--	<0.005	<0.005	<0.005	<0.005
		11.0	<1	--	--	--	<0.005	<0.005	<0.005	<0.005

Notes: <x.x = Compound not identified above detection limits.
 x.x = Bold values indicate compound identified above detection limits.
 -- = Compound not analyzed.
 TPH = Total Petroleum Hydrocarbons.
 Sample locations are shown on Figure 2.
 Laboratory reports for April and June 1995 samples are included in Appendix D.
 TTLC = Total threshold limit concentration.
 STLC = Soluble threshold limit concentration.

¹ Test Method = DOHS Method/LUFT, EPA 5030/8015.

² Test Method = DOHS Method/LUFT, EPA 3550/8015.

³ Test Method = SMWW 17:5520EF for total and 5520E&F for nonpolar.

⁴ Test Method = EPA 5030/8020.

⁵ Sample also analyzed for lead; lead concentration less than TTLC and less than ten times STLC.

⁶ Sample also analyzed for lead; lead concentration (480 mg/kg) less than TTLC, and greater than ten times STLC; soluble lead concentration (1.1 mg/L) less than STLC.

⁷ Sample also analyzed for Title 26 metals; all metal concentrations less than TTLC and less than ten times STLC.

⁸ Sample also analyzed for volatile organic compounds (EPA 8240); no compounds detected above reporting limits.

⁹ Sample also analyzed for Title 26 metals; lead concentration (120 mg/kg) less than TTLC, and greater than ten times STLC; soluble lead concentration (0.6 mg/L) less than STLC.

¹⁰ Sample also analyzed for halogenated hydrocarbons (EPA 8010); no compounds detected above reporting limits.

¹¹ Sample also analyzed for soluble lead; soluble lead not identified above reporting limits.

¹² Results obtained past the recommended holding time.

¹³ Sample chromatogram does not match the pattern of the standard.

¹⁴ Unknown compound (0.53 mg/kg) was identified outside the gasoline range, as reported by the laboratory.

TABLE 2
 SUMMARY OF ANALYTICAL RESULTS, GROUNDWATER
 2662 Fruitvale Avenue
 Oakland, California
 (mg/L)

Sample Location	Sample Date	TPH as Gasoline ¹	TPH as Motor Oil ²	Benzene ³	Toluene ³	Ethylbenzene ³	Xylenes ³
<u>Monitoring Wells</u>							
MW-F1	08-16-93 ⁴	<0.05	<0.5	<0.002	<0.002	<0.002	<0.002
	06-29-94	<0.05	--	<0.0005	<0.0005	<0.0005	<0.0005
	09-09-94	<0.9	--	<0.0009	<0.0009	<0.0009	<0.0009
	12-21-94	<0.05	--	<0.0005	<0.0005	<0.0005	<0.0005
	06-30-95	<0.05	--	<0.0005	<0.0005	<0.0005	<0.0005
MW-F2	08-16-93 ⁴	<0.05	<0.5	<0.002	<0.002	<0.002	<0.002
	06-29-94	<0.05	--	<0.0005	<0.0005	<0.0005	<0.0005
	09-09-94	<0.9	--	<0.0009	<0.0009	<0.0009	<0.0009
	12-21-94	0.096	--	<0.0005	<0.0005	<0.0005	<0.0005
	06-30-95	0.34	--	<0.0005	<0.0005	<0.0005	0.0005
MW-F3	08-16-93 ⁴	<0.1	<0.5	<0.002	<0.002	<0.002	<0.002
	06-29-94	<0.05	--	<0.0005	<0.0005	<0.0005	<0.0005
	09-09-94	<0.9	--	<0.0009	<0.0009	<0.0009	<0.0009
	12-21-94	0.13	--	<0.0005	0.0013	<0.0005	<0.0005
	06-30-95	0.11	--	<0.0005	<0.0005	<0.0005	<0.0005
MW-F4	09-09-94	3.4-3.5	--	0.029/0.028	0.0030/0.0028	0.038/0.033	0.094/0.099
	12-21-94	37	--	0.66	<0.1	2.3	5.9
	06-30-95	9.2	--	0.18	0.019	0.76	1.0
MW-F5	06-30-95	0.10	--	<0.0005	<0.0005	<0.0005	<0.0005
MW-F6	06-30-95	<0.05	--	<0.0005	<0.0005	<0.0005	<0.0005
MW-13	12-21-94	3.3	--	0.33	<0.013	0.024	0.24
	06-30-95	22	--	0.85	<0.0005	1.2	1.6

Table 2 - Summary of Analytical Results, Groundwater (continued)

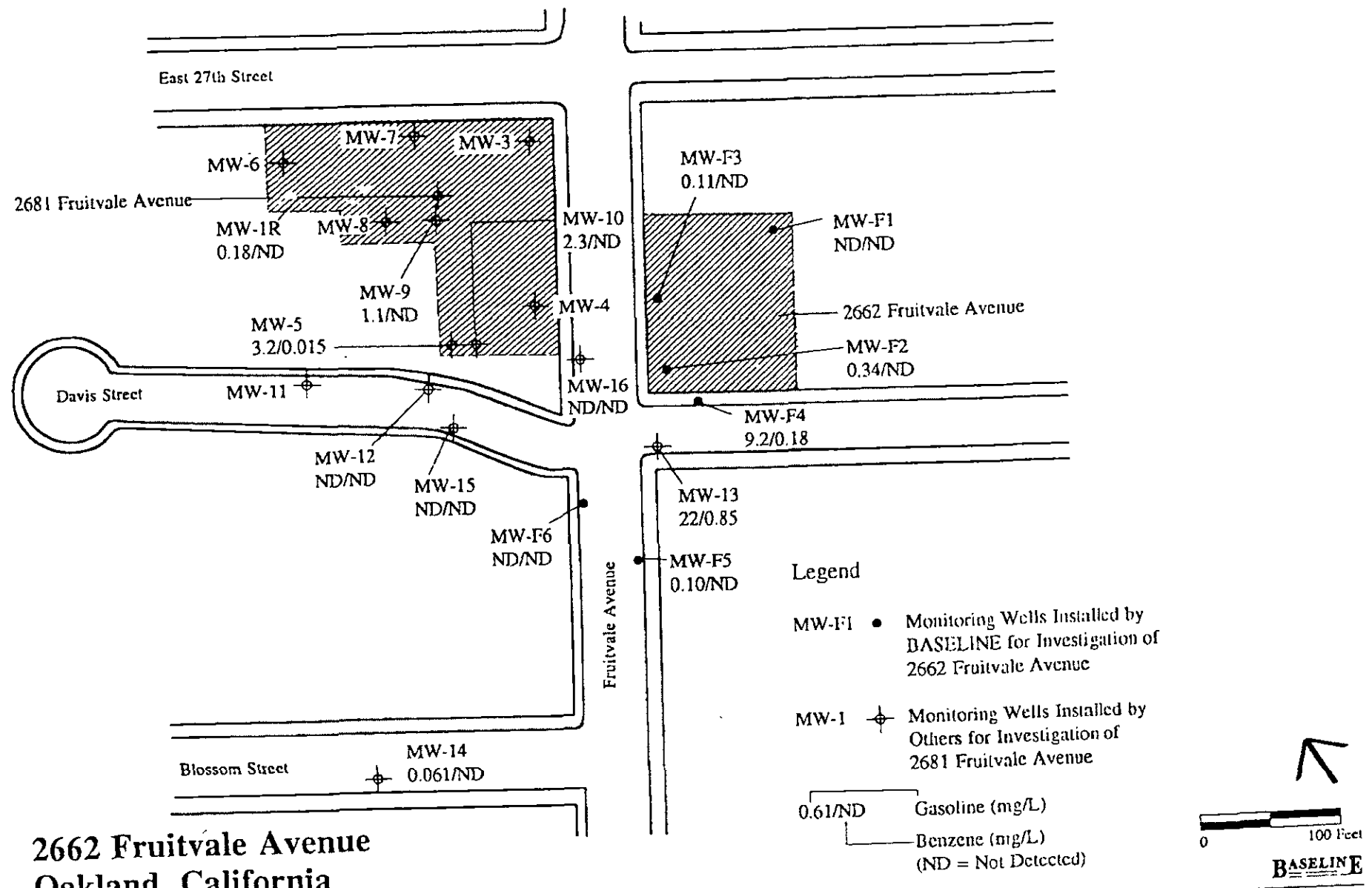
Sample Location	Sample Date	TPH as Gasoline ¹	TPH as Motor Oil ²	Benzene ³	Toluene ³	Ethylbenzene ³	Xylenes ³
<u>Soil Borings</u>							
F1 ⁵	1-20-93	13	<0.5	0.61	<0.018	0.83	0.046
F2 ^{5,6}	1-20-93	6.8	<0.5	0.011	<0.002	0.016	<0.002
F5	1-20-93	<0.05	--	--	--	--	--
F7	1-20-93	<0.05	<0.5	--	--	--	--
<u>Hydropunch</u>							
HP-F1	9-09-94	26	--	0.46	0.16	1.5	4.4
HP-F3	9-09-94	0.21	--	0.0009	0.0007	0.0049	0.02
<u>Wells Monitored by Others⁷</u>							
MW-1R	06-30-95	0.18	--	<0.0005	<0.0005	0.0026	0.00069
MW-5	06-30-95	3.2	--	0.015	<0.005	0.02	0.0073
MW-9	06-30-95	1.1	--	<0.002	<0.002	0.041	0.064
MW-10	06-30-95	2.3	--	<0.005	<0.005	0.013	0.011
MS-12	06-30-95	<0.05	--	<0.0005	<0.0005	<0.0005	<0.0005
MW-14	06-30-95	0.061	--	<0.0005	<0.0005	<0.0005	<0.0005
MW-15	06-30-95	<0.05	--	<0.0005	<0.0005	<0.0005	<0.0005
MW-16	06-30-95	<0.05	--	<0.0005	<0.0005	<0.0005	<0.0005

Notes: <x.x = Compound not identified above reporting limits.
x.x = Bold values indicate compound identified above reporting limits.
 x.x/x.x = Analytical testing results for duplicate samples.
 -- = Compound not analyzed.
 TPH = Total Petroleum Hydrocarbons.
 Sample locations are shown on Figures 2 and 3.
 Laboratory reports for June 1995 groundwater analyses are included in Appendix D.

- ¹ Test Method = EPA 5030/8015.
- ² Test Method = EPA 3510/8015.
- ³ Test Method = EPA 602 or 624.
- ⁴ Water collected from open boreholes in January 1993.
- ⁵ Sample also analyzed for Title 26 metals; all metal concentrations less than STLC.
- ⁶ Sample contained trans-1,3-dichloropropene
- ⁷ Samples collected by Blaine Tech Services, Inc. and analyzed by Sequoia Analytical.

Figure 4

PETROLEUM HYDROCARBON CONCENTRATIONS IN GROUNDWATER - 30 June 1995



**2662 Fruitvale Avenue
Oakland, California**

Source: Base Map - Modified from Groundwater Technology, Inc., 1993, Site Plan Map.

92404-DO 8/1/95 CADD File N

BASELINE

January 30, 2001

Project No: 97-037

Mr. Joseph Cotton
City of Oakland Environmental Services
250 Frank H. Ogawa Plaza, Suite 5301
Oakland, CA 94612

Results of Semi-Annual Groundwater Monitoring on December 22, 2000
2662 Fruitvale Avenue
Oakland, California

Dear Mr. Cotton:

Innovative Technical Solutions, Inc. (ITSI) is pleased to provide the results of the semi-annual groundwater monitoring performed on December 22, 2000 for the property located at 2662 Fruitvale Avenue in Oakland. Additionally, a discussion of the periodic application of hydrogen peroxide in selected monitoring wells from August through December is provided.

Figure 1 shows the site layout and approximate location of the monitoring wells sampled as part of this semi-annual groundwater monitoring event. The semi-annual groundwater monitoring included monitoring seven monitoring wells, MW-F1 through MW-F6 and MW-13, and sampling five monitoring wells, MW-F2, MW-F4, MW-F5, MW-F6, and MW-13. Monitoring wells MW-F1 and MW-F3 were removed from the semi-annual monitoring program as suggested in the November 18, 1999, letter from Alameda County. Monitoring well MW-F2 was retained to provide an upgradient "background" water quality sample.

The purpose of this groundwater monitoring program is to identify changes in shallow groundwater quality at the site over time, including an evaluation of groundwater conditions that may serve as indicators of intrinsic bioremediation of petroleum hydrocarbons occurring beneath the site. On October 31, 1998, oxygen-releasing compounds (ORC) were placed in the saturated zone along the downgradient property line to enhance natural biodegradation of the petroleum hydrocarbons, and a petroleum hydrocarbon-absorbent sock was placed in MW-13 to recover available free product during this monitoring event. These events were documented in the *Completion Report, Treatment of Groundwater Impacted with Petroleum Hydrocarbons Using Enhanced Natural Bioremediation*, (Innovative Technical Solutions, Inc., December 28, 1998).

Table 1

Groundwater Elevations
2662 Fruitvale Avenue
Oakland, California

Monitoring Well ID	Casing Elevation ¹ (feet)	Date Measured	Product Thickness (feet)	Depth to Groundwater (feet)	Groundwater Elevation (feet)	Note
MW-F1	104.41	08/16/93	-	11.13	93.28	1
		06/29/94	-	10.38	93.53	1
		09/09/94	-	11.56	92.85	1
		12/21/94	-	8.96	95.45	1
		06/30/95	-	10.49	93.92	1
		12/29/95	-	9.38	95.03	1
		06/27/96	-	10.69	93.72	1
		12/13/96	-	8.55	95.86	1
		06/26/97	-	11.23	93.18	
		03/11/98	-	8.73	95.68	
		12/11/98	-	9.38	95.03	
		06/29/99	-	10.87	93.54	
		01/21/00	-	9.42	94.99	
		06/27/00	-	9.92	94.49	
		12/22/00	-	9.91	94.50	
MW-F2	102.22	08/16/93	-	12.15	90.07	1
		06/29/94	-	11.74	90.48	1
		09/09/94	-	12.21	90.01	1
		12/21/94	-	10.34	91.88	1
		06/30/95	-	11.32	90.90	1
		12/29/95	-	9.94	92.28	1
		06/27/96	-	11.51	90.71	1
		12/13/96	-	8.62	93.60	1
		06/26/97	-	11.96	90.26	
		03/11/98	-	7.70	94.52	
		12/11/98	-	10.40	91.82	
		06/29/99	-	11.42	90.80	
		01/21/00	-	10.32	91.9	
		06/27/00	-	10.47	91.75	
		12/22/00	-	10.52	91.70	
MW-F3	102.42	08/16/93	-	11.99	90.43	1
		06/29/94	-	11.40	91.02	1
		09/09/94	-	12.39	90.03	1
		12/21/94	-	9.32	93.10	1
		06/30/95	-	11.14	91.28	1
		12/29/95	-	10.08	92.34	1
		06/27/96	-	11.31	91.11	1
		12/13/96	-	8.76	93.66	1
		06/26/97	-	11.85	90.57	
		03/11/98	-	8.82	93.6	
		12/11/98	-	9.61	92.81	
		06/29/99	-	11.25	91.17	
		06/27/00	-	10.28	92.14	
		12/22/00	-	10.24	92.18	

Table 1 (Continued)

Groundwater Elevations
2662 Fruitvale Avenue
Oakland, California

Monitoring Well ID	Casing Elevation ¹ (feet)	Date Measured	Product Thickness (feet)	Depth to Groundwater (feet)	Groundwater Elevation (feet)	Note		
MW-F4	101.56	09/09/94	-	11.21	90.35	1		
		12/21/94	-	8.00	93.56	1		
		06/30/95	-	10.08	91.48	1		
		12/29/95	-	8.52	93.04	1		
		06/27/96	-	9.75	91.81	1		
		12/13/96	-	6.61	94.95	1		
		06/26/97	-	10.94	90.62			
		03/11/98	-	8.40 ²	-			
		12/11/98	-	9.40	92.16			
		06/29/99	-	10.36	91.20			
		01/21/00	-	8.11	93.45			
		06/27/00	-	9.43	92.13			
		10/6/00	-	10.80	90.76			
		11/13/00	-	9.50	92.06			
		12/22/00	-	10.80	90.76			
MW-F5	100.32	06/30/95	-	11.09	89.23	1		
		12/29/95	-	9.37	90.95	1		
		06/27/96	-	11.33	88.99	1		
		12/13/96	-	8.72	91.60	1		
		06/26/97	-	11.61	88.71			
		03/11/98	-	8.79	91.53			
		12/11/98	-	9.62	90.70			
		06/29/99	-	11.07	89.25			
		01/21/00	-	9.39	90.93			
		06/27/00	-	10.29	90.03			
		12/22/00	-	9.99	90.33			
		MW-F6	100.11	06/30/95	-	10.96	89.15	1
				12/29/95	-	9.84	90.27	1
06/27/96	-			10.98	89.13	1		
12/13/96	-			8.44	91.67	1		
06/26/97	-			11.35	88.76			
03/11/98	-			8.60	91.51			
12/11/98	-			10.12	89.99			
06/29/99	-			10.96	89.15			
01/21/00	-			9.37	90.74			
06/27/00	-			10.12	89.99			
12/22/00	-			9.85	90.26			

Table 1 (Continued)

Groundwater Elevations
2662 Fruitvale Avenue
Oakland, California

Monitoring Well ID	Casing Elevation ¹ (feet)	Date Measured	Product Thickness (feet)	Depth to Groundwater (feet)	Groundwater Elevation (feet)	Note
MW-13	101.20	09/09/94	-	12.27	88.93	1
		12/21/94	-	9.32	91.88	1
		06/30/95	-	11.32	89.88	1
		12/29/95	-	9.00	92.20	1
		06/27/96	-	11.49	89.71	1
		12/13/96	-	8.28	92.92	1
		06/26/97	0.02	11.76	89.45 ³	
		03/11/98	0.02	8.11	93.11 ³	
		12/11/98	-	9.30	91.90	
		06/29/99	-	11.08	90.12	
		06/27/00	-	10.48	90.72	
		01/21/00	-	9.22	91.98	
		06/27/00	-	10.48	90.72	
		10/6/00	-	11.19	90.01	
		11/13/00	-	10.50	90.70	
		12/22/00	-	10.31	90.89	

¹ From Table 3, Groundwater Elevation and Gradient Determination Data, February 7, 1997, BASELINE.

² Depth to groundwater not stabilized.

³ Groundwater elevation calculated assuming a specific gravity of 0.75 for product.

Table 2

Summary of Laboratory Results for Groundwater Samples
2662 Fruitvale Avenue
Oakland, California

Monitoring Well ID	Date Sampled	TPHg (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethyl-benzene (mg/L)	Xylenes (mg/L)	Total Iron (mg/L)	Soluble Iron (mg/L)	Nitrate (mg/L)	Sulfate (mg/L)	Note
MW-F1	08/16/93	<0.05	<0.002	<0.002	<0.002	<0.002	-	-	-	-	1
	06/29/94	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	1
	09/09/94	<0.9	<0.0009	<0.0009	<0.0009	<0.0009	-	-	-	-	1
	12/21/94	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	1
	06/30/95	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	1
	12/29/95	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	1
	12/13/96	-	-	-	-	-	-	<0.10	8.5	38	1
	06/26/97	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.1	<0.10	7.7	38	1
	03/11/98	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.90	<0.10	11	38	1
	12/11/98	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	<0.10	7.1	38	1
06/29/99	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	<0.10	30	35	1	
No longer part of semi-annual monitoring program											
MW-F2	08/16/93	<0.05	<0.002	<0.002	<0.002	<0.002	-	-	-	-	1
	06/29/94	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	1
	09/09/94	<0.9	<0.0009	<0.0009	<0.0009	<0.0009	-	-	-	-	1
	12/21/94	0.096	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	1
	06/30/95	0.34	<0.0005	<0.0005	<0.0005	0.0005	-	-	-	-	1
	12/29/95	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	1
	06/27/96	0.064	0.0012	<0.0005	<0.0005	<0.0005	-	-	-	-	1
	12/13/96	0.06	<0.0005	<0.0005	<0.0005	<0.0005	-	0.24	0.20	8	1
	06/26/97	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.1	<0.10	<0.05	7.4	1
	03/11/98	0.20	0.00088	<0.0005	<0.0005	<0.0005	4.8	0.18	<0.05	7.1	1
	12/11/98	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.25	<0.10	<0.05	7.8	1
	06/29/99	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	<0.10	<1.0	<1.0	9
	01/21/00	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	<0.10	<0.2	9	2
	06/27/00	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	53	<0.10	<1.0	9.9	2
12/22/00	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	<0.10	<1.0	9.9	2	
MW-F3	08/16/93	<0.1	<0.002	<0.002	<0.002	<0.002	-	-	-	-	1
	06/29/94	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	1
	09/09/94	<0.9	<0.0009	<0.0009	<0.0009	<0.0009	-	-	-	-	1
	12/21/94	0.13	<0.0005	0.0013	<0.0005	<0.0005	-	-	-	-	1
	06/30/95	0.11	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	1
	12/29/95	0.35	0.0008	<0.0005	0.0012	0.0007	-	-	-	-	1
	06/27/96	0.088	0.002	<0.0005	<0.0005	<0.0005	-	-	-	-	1
	12/13/96	0.18	<0.0005	<0.0005	<0.0005	<0.0005	-	0.11	0.69	23	1
	6/26/97	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.46	0.16	0.70	23	1
	3/11/98	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.11	0.20	2.5	28	1
	12/11/98	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.31	0.12	0.97	30	1
6/29/99	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	<0.10	3	38	1	
No longer part of semi-annual monitoring program											

Table 2 (Continued)

Summary of Laboratory Results for Groundwater Samples
2662 Fruitvale Avenue
Oakland, California

Monitoring Well ID	Date Sampled	TPHg (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)	Total Iron (mg/L)	Soluble Iron (mg/L)	Nitrate (mg/L)	Sulfate (mg/L)	Note
MW-F4	09/9/94*	3.5	0.029	0.003	0.038	0.099	-	-	-	-	1
	12/21/94	37	0.66	28	2.3	5.9	-	-	-	-	1
	06/30/95	9.2	0.18	<0.1	0.76	1.0	-	-	-	-	1
	12/29/95	38	0.61	0.019	4.3	5.8	-	-	-	-	1
	06/27/96	6.2	0.081	0.14	0.52	0.29	-	-	-	-	1
	12/13/96	27	0.39	0.05	3.2	3.7	-	6.6	<0.05	<2	1
	06/26/97	6.2	0.16	0.018	0.71	0.32	2.4	3.1	<0.05	0.2	
	03/11/98	9.5	0.062	0.03	1.0	0.80	1.2	3.0	<0.05	<0.1	
	12/11/98	12	0.34	0.051	2.0	0.62	5.7	5.9	<0.05	1.5	
	06/29/99	10	0.23	0.032	1.8	0.30	0.93	0.90	<1.0	9	
	01/21/00	7.9	0.033	<0.005	1.0	0.25	13	2.7	<0.2	<1.0	
	06/27/00	10	0.08	<0.025	1.4	0.32	160	<0.10	<1.0	<1.0	
	10/6/00	3	0.011	0.0018	0.12	0.069	0.24	<0.10	2.1	38	
	11/13/00	3.9	0.039	0.016	0.8	0.30	0.14	<0.10	<1.0	13	
12/22/00	4.7	0.054	0.0096	0.8	0.34	0.32	0.17	<1.0	11		
MW-F5	06/30/95	0.10	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	1
	12/29/95	<0.05	<0.0005	<0.0005	<0.0005	0.0007	-	-	-	-	1
	06/27/96	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	1
	12/13/96	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	<0.10	6.6	45	1
	06/26/97	<0.05	0.0032	0.0064	0.00073	0.0042	0.21	<0.1	6.1	45	
	03/11/98	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	<0.10	6.1	45	
	12/11/98	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.58	0.19	6.0	41	
	06/29/99	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	<0.10	23	50	
	01/21/00	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.14	<0.10	5.2	42	
	06/27/00	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	60	<0.10	20	37	
	12/22/00	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	<0.10	23	56	
MW-F6	06/30/95	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	1
	12/29/95	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	1
	06/27/96	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	1
	12/13/96	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.10	0.44	39	1
	06/26/97	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.22	0.18	<0.05	47	
	03/11/98	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	<0.10	0.14	49	
	12/11/98	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.24	0.11	0.06	43	
	06/29/99	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	0.93	<1.0	54	
	01/21/00	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.11	<0.10	0.5	42	
	06/27/00	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	10	<0.10	<1.0	9	
	12/22/00	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	0.29	0.15	1.1	61	

Table 2 (Continued)

Summary of Laboratory Results for Groundwater Samples
2662 Fruitvale Avenue
Oakland, California

Monitoring Well ID	Date Sampled	TPHg (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethyl-benzene (mg/L)	Xylenes (mg/L)	Total Iron (mg/L)	Soluble Iron (mg/L)	Nitrate (mg/L)	Sulfate (mg/L)	Note
MW-13	12/21/94	3.3	0.43	<0.013	0.024	0.24	-	-	-	-	1
	06/30/95	22	0.85	<0.0005		1.6	-	-	-	-	1
	12/29/95	22	0.97	0.078		2.4	-	-	-	-	1
	06/27/96	18	0.63	0.026		1.0	-	-	-	-	1
	12/13/96	16	0.67	0.04		1.0	-	6.8	<0.05	<2	1
	6/26/97*	11	0.42	0.037	0.64	0.26	7.7	6.9	<0.05	0.3	
	3/11/98*	13	0.00	<0.025	0.89	0.51	4.3	6.7	<0.05	2.3	
	12/11/98	12	0.47	0.048		0.48	6.6	7.0	<0.05	16	
	06/29/99	7	0.24	0.13	0.44	0.11	1.3	1.3	<1.0	11	
	01/21/00	7.3	0.36	<0.005	0.62	0.22	7.3	6.9	<0.2	<1.0	
	06/27/00	6.1	0.11	<0.025	0.27	0.038	15	<0.10	1	2	
	10/6/00	4.6	0.10	<0.025	0.19	0.036	4.3	3.5	<1	5.4	
	11/13/00	6.0	0.32	0.035	0.47	0.12	4.5	1.4	1.1	1.7	
	12/22/00	9.2	0.27	0.033	0.53	0.12	6.7	6.7	1.0	<1.0	
MCL	-	-	0.001	0.150	0.700	1.75	-	-	-	-	

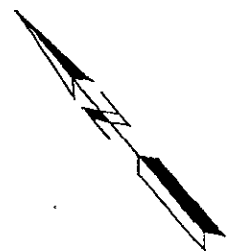
Note: Bold indicates detected concentrations. Shaded indicates concentrations exceeding MCLs.
 1 Historical laboratory data provided by Baseline Environmental Consulting
 * Higher concentration reported for either the sample or field duplicate sample (QC/1)

Table 3

Bioremediation Indicator Parameters
2662 Fruitvale Avenue
Oakland, California

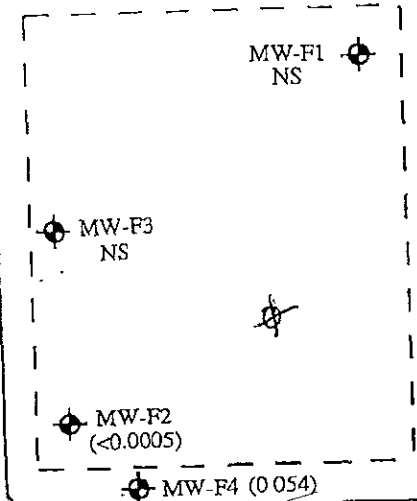
Monitoring Well ID	Date	Total Iron (mg/L)	Soluble Iron (mg/L)	Nitrate (mg/L)	Sulfate (mg/L)	Dissolved Oxygen (mg/L)	ORP (mV)
MW-F2	1/23/00	<0.10	<0.10	<0.2	9	8.63	121
	6/27/00	53	<0.10	<1.0	2	NA	130
	12/22/00	<0.10	<0.10	<1.0	9.9	9.12	155
MW-F4	1/23/00	13	2.7	<0.2	<1.0	9.19	81
	6/7/00	160	<0.10	<1.0	<1.0	NA	-57
	10/6/00	0.24	<0.10	2.1	38	17.37	283
	11/13/00	0.14	<0.10	<1.0	13	19.23	164
	12/22/00	0.32	0.17	<1.0	11	7.95	164
MW-F5	1/23/00	0.14	<0.10	5.2	42	8.53	189
	6/27/00	60	<0.10	20	37	NA	157
	12/22/00	<0.10	<0.10	23	56	9.69	95
MW-F6	1/23/00	0.11	<0.10	0.5	42	9.17	156
	6/27/00	10	<0.10	<1.0	9	NA	141
	12/22/00	0.29	0.15	1.1	61	8.82	100
MW-13	1/23/00	7.3	6.9	<0.2	<1.0	9.15	87
	6/7/00	15	<0.10	1.0	2	NA	-48
	10/6/00	4.3	3.5	<1.0	5.4	0.80	-36
	11/13/00	4.5	1.4	1.1	1.7	0.06	9.23
	12/22/00	6.7	6.7	1.0	<1.0	8.22	56

97-0317/F-3-Benzene



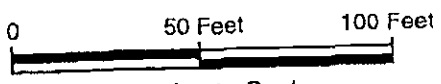
Fruitvale Avenue

Davis Street



MW-F6 (<0.0005)

MW-F5 (<0.0005)



Approximate Scale

- Legend**
- Approximate Location of Monitoring Wells
 - 0.035 Concentration of benzene in mg/L
 - Benzene ≥ 0.001 mg/L
 - Benzene ≥ 0.01 mg/L
 - Benzene ≥ 0.1 mg/L

FIGURE 3
LABORATORY RESULTS FOR
BENZENE FOR SAMPLES COLLECTED ON
DECEMBER 22, 2000

2662 Fruitvale Avenue
Oakland, California



CITY OF OAKLAND

INNOVATIVE TECHNICAL SOLUTIONS, INC.

Source: Modified from Figure 3, Groundwater Elevation Contour Map, 13 December 1996. BASELINE.

97-0377F & Graphs

Figure 4a: Graph of Historical Concentrations of TPHg in MW-F4 and MW-13

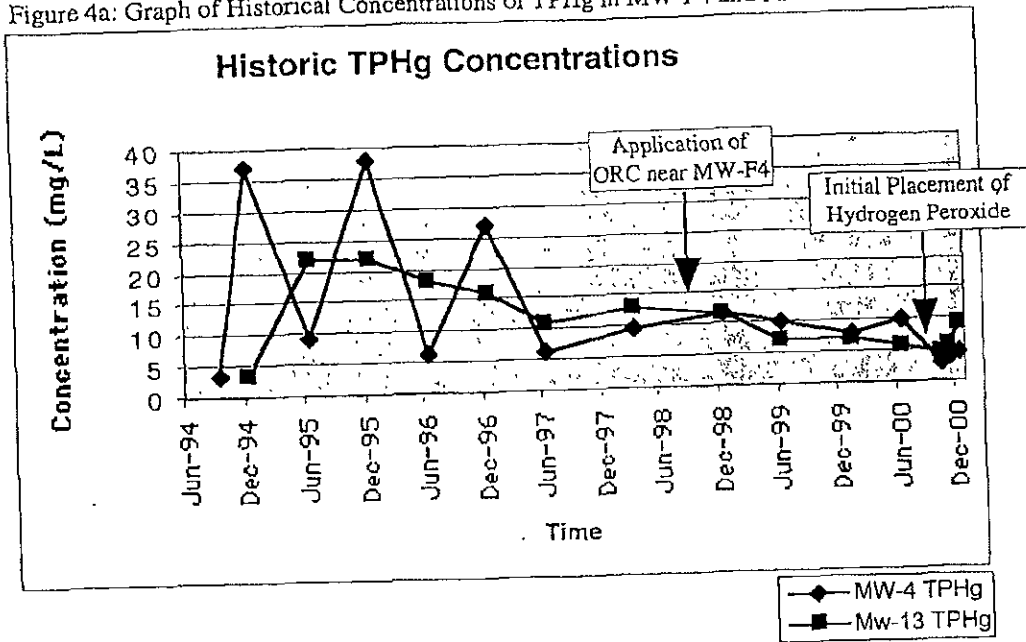


Figure 4b: Graph of Historical Concentrations of TPHg in MW-F4 and MW-13

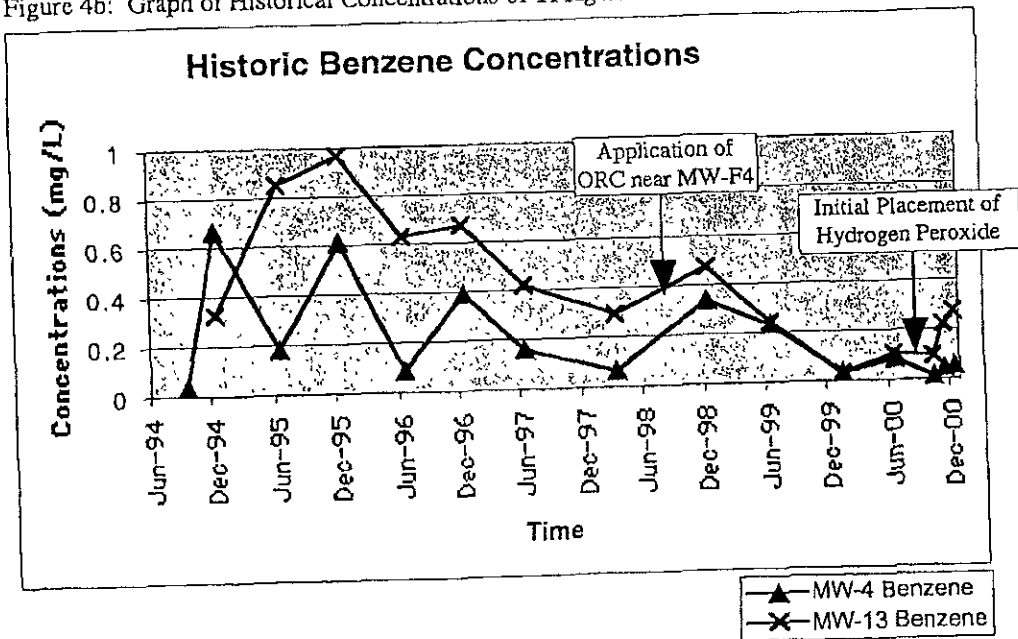


FIGURE 4

GRAPHS OF HISTORICAL CONCENTRATION TRENDS FOR TPHg AND BENZENE

2662 Fruitvale Avenue
Oakland, California



CITY OF OAKLAND

INNOVATIVE TECHNICAL SOLUTIONS, INC.

ATTACHMENT B

EXCAVATION SAMPLING PROCEDURES

Soil excavation is often performed to remove soil contamination that may pose a threat to human health or the environment. Soil samples are routinely collected to monitor the progress of the excavation and to confirm that soils containing contaminants above regulatory limits have been completely removed. Cambria has developed standard operating procedures for collecting soil samples during routine excavation operations to ensure that the samples are collected, handled and documented in compliance with State and local regulatory agency regulations.

Excavation Sampling

Prior to collecting soil samples during excavation operations, Cambria field staff screen the removed soils with a portable photoionization detector (PID) to qualitatively assess the presence or absence of volatile hydrocarbons. The removed soil is typically segregated based on hydrocarbon concentration and stockpiled on site on plastic sheeting. When the PID measurements indicate that the hydrocarbon bearing soil has been completely removed, Cambria collects soil samples from the excavation sidewalls and bottom for confirmatory analysis at a State-certified analytic laboratory. PID measurements are not required when metals excavation is conducted and volatile organic compounds are not a concern.

The soil samples are collected in steam cleaned brass or steel tubes from either a driven split-spoon type sampler or the bucket of a backhoe or excavator. When a backhoe or excavator is used, approximately three inches of soil are scraped from the surface and the tube is driven into the exposed soil.

Upon removal from the sampler or the backhoe, the samples are trimmed flush, capped with Teflon tape and plastic end caps, labeled, logged and refrigerated for delivery under chain of custody to a State-certified analytic laboratory.