ALAMEDA COUNTY
**HEALTH CARE SERVICES**
AGENCY
ALEX BRISCOE, Director

ENVIRONMENTAL HEALTH SERVICES
ENVIRONMENTAL PROTECTION
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577
(510) 567-6700
FAX (510) 337-9335

January 26, 2012

Kevin Graves (*Sent via E-mail to: kgraves@waterboards.ca.gov*)
State Water Resources Control Board
1001 I Street
Sacramento, CA 95814

Subject: Response to Petition for Fuel Leak Case No. RO0000458 and GeoTracker Global ID T0600100262, Glovatorium, 3820 Manila Avenue, Oakland, CA 94611

Dear Mr. Graves:

This correspondence presents the Alameda County Environmental Health (ACEH) response to the November 18, 2011, *"Petition for UST Case Closure for the Former Underground Storage Tank Area (i.e. the Glovatorium) Located at 3820 Manila Ave., Oakland, CA 94611," (*Petition*).* The Petition, which was submitted to the State Water Resources Control Board (SWRCB) by Franklin J. Goldman, is dated November 18, 2011. The Petition requests that the SWRCB review the case and facilitate regulatory closure of the case. The Responses to Petition below describe the major reasons that this case should not be closed at this time.

ACEH has reviewed the Petition and finds that the justifications presented lack technical merit and in several cases are misleading, incomplete, or erroneous. The Petition demonstrates an inordinate degree of bias in its technical evaluations that is not commensurate with accepted industry practice. The Responses to Petition below discuss the reasons that many of the claims made in the Petition are not valid and the reasons for continuing work at the site.

The next immediate steps for this site are delineation of free product in the northeastern portion of the site to evaluate whether free product extends beneath the Red Cross building adjacent to the site and the resumption and expansion of source area remediation. The Petition has effectively stopped this work. We request that the Petition be denied in order to resume the needed work at this site.

## RESPONSES TO PETITION

1. **Free Product Delineation and Potential for Vapor Intrusion to Off-Site Building.** Free product has been observed historically in several wells and was observed in wells MPE-2 and MPE-3 during groundwater sampling events in February and August 2010. The thickness of free product in well MPE-3 increased from 0.34 feet in February 2010 to 0.84 feet in August 2010. The thickness of free product in well MPE-2 increased from 0.24 feet in February 2010 to 2.44 feet in August 2010. Well MPE-3 is located near the northeastern site boundary immediately adjacent to the Red Cross building. The extent of free product to the north and east is unknown. In order to assess whether the free product observed in the northeastern portion of the site could pose a potential risk for vapor intrusion to indoor air, ACEH also requested plans to collect and analyze one or more soil vapor samples in the northeastern portion of the site. Of particular concern is the potential for chlorinated solvents to volatilize from the free product to soil vapor beneath off-site buildings. Based on information regarding the construction of the Red Cross building foundation, ACEH has deferred decisions on the scope of work needed to evaluate the potential for vapor intrusion until free product

delineation has been completed. To date, the extent of free product in the area of the adjacent Red Cross Building has not been evaluated.

2. **Free Product Removal.** The Petition contends that free product has been removed to the extent practicable and that the layer of mobile free floating Stoddard solvent is overlain by thick clayey soils with low permeability. Further efforts to remove free product are deemed futile in the Petition. As of March 2008, approximately 1,895 gallons of free product has been removed at this site. As shown on the attached Figure 12 (Attachment 1), free product continues to appear in wells at the site. During the two sampling events in 2011, TPH as Stoddard Solvent was found in well LFR-2, which is the well nearest the residences, at concentrations of 380,000 to 470,000 micrograms per liter. TPH concentrations in this range generally indicate a free product source nearby. Free product appears to still be mobile at the site. A multi-phase extraction (MPE) system has been operating at the site in order to remove source mass including free product. Between December 2008 and October 2011, approximately 5,174 pounds of TPH as Stoddard Solvent was removed by the MPE system. We request that the Petition be denied in order to continue cleanup efforts.

3. **Presumption Regarding Clay Cap.** The Petition concludes that residual PCE contamination is, "generally located beneath a clay cap, which for all practical purposes, is laterally continuous from a depth of approximately 4 1/2 to 14 feet thick (Table 1) in the vicinity of the site." Based on the presumption of a continuous clay cap, the Petition concludes that PCE in soil does not pose a significant threat to human health via vapor intrusion. The presumption that a clay cap is continuous across the site does not accurately reflect the site data nor is it consistent with the expected conditions based on the alluvial depositional environment and the likelihood that portions of the site include fill material. We have attached several boring logs which indicate that a clay cap is not continuous across the site (Attachment 2). We have also attached the Site Geology sections prepared by other consultants who have worked on the site (Attachment 3). Please also see technical comment 4 regarding Table 1 of the Petition. Boring log B7 indicates that a solvent odor was observed in soils less than 2 feet below ground surface. Given that the potential sources of solvent releases include shallow piping, the conclusion that all soil contamination is beneath a continuous clay cap is flawed. No soil vapor samples have been collected at the site to evaluate the potential for vapor intrusion. A faulty presumption that all contamination is beneath a clay cap is not a sufficient basis to conclude that there is no potential for vapor intrusion.

4. **Table 1 of Petition.** Table 1 in the Petition is intended to show that clayey soils are present above soil samples where PCE was detected. For the last five borings on Table 1 (SB-8, SB-9, SB-10, MPE-2, and MPE-3), the Petition indicates that the 0 to 5 foot interval is a silty clay. A review of these boring logs indicates that the 0 to 5 foot interval was hand augered and no entry is made for soil type on the boring logs. Table 1 references the boring logs but misrepresents the actual content of the boring logs (Attachment 4).

5. **Soil Vapor Sampling.** The Petition concludes that a soil vapor survey performed at residential properties downgradient of the site demonstrated that the chlorinated solvents beneath these properties are not likely to be a threat due to a cap of clayey soils which lies below the slab of the houses. The collection of soil vapor samples was attempted in 2004 in the area surrounding the residences but soil vapor samples could not be collected due to low permeability soils at the depth at which the sampling was attempted. The presence of fine-grained soils in this area does indicate a

lower potential for vapor intrusion to indoor air. However, the inability to collect soil vapor samples from a designated depth is not a sufficient basis to assume that a potential for vapor intrusion does not exist. Alternative methods including sub-slab vapor sampling are available to evaluate the potential for vapor intrusion. In addition, the residences overly potential preferential pathways such as a sanitary sewer and storm drain. A human health risk assessment was conducted for the residences in 2004 (SOMA September 30, 2004). Using data for VOCs in groundwater, the risk assessment concluded that total excess cancer risk due to vapor intrusion was 1E-05 for the nearest residence. Although a health risk of 1E-05 does not necessarily indicate that remediation is required, a risk within the range of 1E-06 to 1E-04 generally indicates that further evaluation is required. Since August 2007, vinyl chloride has begun to appear in groundwater from well LFR-2, which is the well adjacent to the nearest residence. This case cannot be closed without further remediation and an evaluation of the potential for vapor intrusion.

6. **Groundwater Concentration Graphs.** The Petition presents concentration graphs for PCE in groundwater using data from four monitoring wells. In each case, the graph shows a declining trend line with a projection that water quality objectives will be achieved within less than two to six years. The starting points for each of the trend lines appear to have been arbitrarily chosen with higher concentrations in order to show a declining trend (Attachment 5). In addition, some of the graphs plot elevated reporting limits as higher concentrations on the graph. The trend lines are then drawn downward from the high reporting limits to artificially show a declining trend line. These highly questionable trend lines are then extended to "predict" when water quality objectives will be achieved. For two of the wells, water quality objectives appear to have already been achieved but the graph forces a trend line to "predict" when water quality objectives will be achieved. It is obvious that the trend lines shown on the concentration graphs are not valid and the "predictions" based on these trend lines are also not valid. Moreover, the depiction of declining PCE groundwater concentrations in the four wells selected in the Petition leaves out significant considerations regarding trends in groundwater quality for the site. Since February 2007, the concentration of TPH as Stoddard solvent in groundwater from well LFR-2, which is the monitoring well nearest to the residences, has increased from 1,200 to 470,000 micrograms per liter. Any assessment of water quality for the site must also consider the potential for rebound following the cessation of MPE and the generation of PCE daughter products such as vinyl chloride.

7. **Storm Drain.** The Petition states that past technical reporting has demonstrated that contaminants are likely migrating to the site from upflow properties through a 54-inch storm drain. A review of previous reports indicates that a videotape survey was conducted in the storm drain in 1993. The videotape survey confirmed the location and dimensions of the storm drain. Water was observed seeping into the storm drain in the vicinity of vertical joints. In a report dated March 11, 1998 and prepared by Mr. Franklin Goldman, it was reported that review of the videotape indicated that the drain is, "riddled with holes, cracks, and gaps." A forensic report dated April 10, 2000 prepared by Hurt & Associates, Inc. found that based upon isotope analyses, surface water was not a major contributor to groundwater in the area of the site. Regardless of whether there is or is not leakage from the storm drain, the contribution of possible off-site contamination does not appear to be a significant issue for this Petition. The responsible party has not been requested to address possible off-site contributions. The Stoddard solvent and chlorinated solvent which the responsible party has been requested to investigate and cleanup are the result of releases from the Glovatorium site. However, the discussion of the poor integrity of the storm drain in the Petition brings up the potential

for the storm drain to be a receptor for the site. The storm drain discharges to an open channel south of the site and eventually flows into Lake Merritt. An evaluation of preferential pathways (SOMA November 3, 2005) concluded that the storm drain was below groundwater and was a potential receptor for discharges from the site. We request that remediation be continued at the site to reduce further discharges from the source area and reduce the potential for migration to the storm drain.

8. **Off-Site Contributions.** The Petition speculates there is a likelihood that some portion of the PCE identified at the site came from off-site sources through preferential pathways. The basis for this conclusion is not presented and we are not aware of data to support this contention. We concur that consideration of the role of preferential pathways in contaminant transport is necessary for characterization of this site. However, the evaluation must use a more valid approach that considers potential migration through potential pathways both to and from the site.

9. **Use of Property.** The Petition indicates that the property should have provided leases for small businesses and jobs for citizens for the past 14 years. There have been no prohibitions or restrictions placed on the site by ACEH that would prevent commercial leasing of the site.

If you have any questions, please call me at (510) 567-6791 or send me an electronic mail message at jerry.wickham@acgov.org. Online case files are available for review at the following website: http://www.acgov.org/aceh/index.htm.

Sincerely,

Digitally signed by Jerry Wickham
DN: cn=Jerry Wickham, o=Environmental Health, ou=Alameda County, email=jerry.wickham@acgov.org, c=US
Date: 2012.01.26 16:08:22 -08'00'

Jerry Wickham, California PG 3766, CEG 1177, and CHG 297
Senior Hazardous Materials Specialist

Digitally signed by Donna L. Drogos
DN: cn=Donna L. Drogos, o=Alameda County Environmental Health, ou, email=donna.drogos@acgov.org, c=US
Date: 2012.01.26 16:18:41 -08'00'

Donna L. Drogos, PE
Division Chief

Attachments: 1 through 5 (18 pages)

cc: George Lockwood, State Water Resources Control Board, 1001 I Street, Sacramento, CA 95814 (*Sent via E-mail to: glockwood@waterboards.ca.gov*)

Leroy Griffin, Oakland Fire Department, 250 Frank H. Ogawa Plaza, Ste. 3341, Oakland, CA 94612-2032 (*Sent via E-mail to:* lgriffin@oaklandnet.com)

Stuart Depper, P.O. Box 337, Junction City, CA 96048-0337

Albert Cohen, Loeb & Loeb LLP, 10100 Santa Monica Boulevard, Suite 2200, Los Angeles, CA 90067-4164

Bruce Page, Bruce Page Consulting, Inc., 439 Kearney Street, El Cerrito, CA 94530

Eric Depper, 3820 Manila Avenue, Oakland, CA 94611

Mansour Sepehr, SOMA Environmental Engineering, 6620Owens Drive, Suite A, Pleasanton, CA 94588 (*Sent via E-mail to: msepehr@somaenv.com*)

Franklin J. Goldman, P.O. Box 224, Roseville, CA 95661 (*Sent via E-mail to: fjgoldmanchg@yahoo.com*)

Chuck Headlee, San Francisco Bay RWQCB, 1515 Clay Street, Suite 1400, Oakland, CA 94512 (*Sent via E-mail to: CHeadlee@waterboards.ca.gov*)

Cherie McCaulou, San Francisco Bay RWQCB, 1515 Clay Street, Suite 1400, Oakland, CA 94512 (*Sent via E-mail to: CMccaulou@waterboards.ca.gov*)

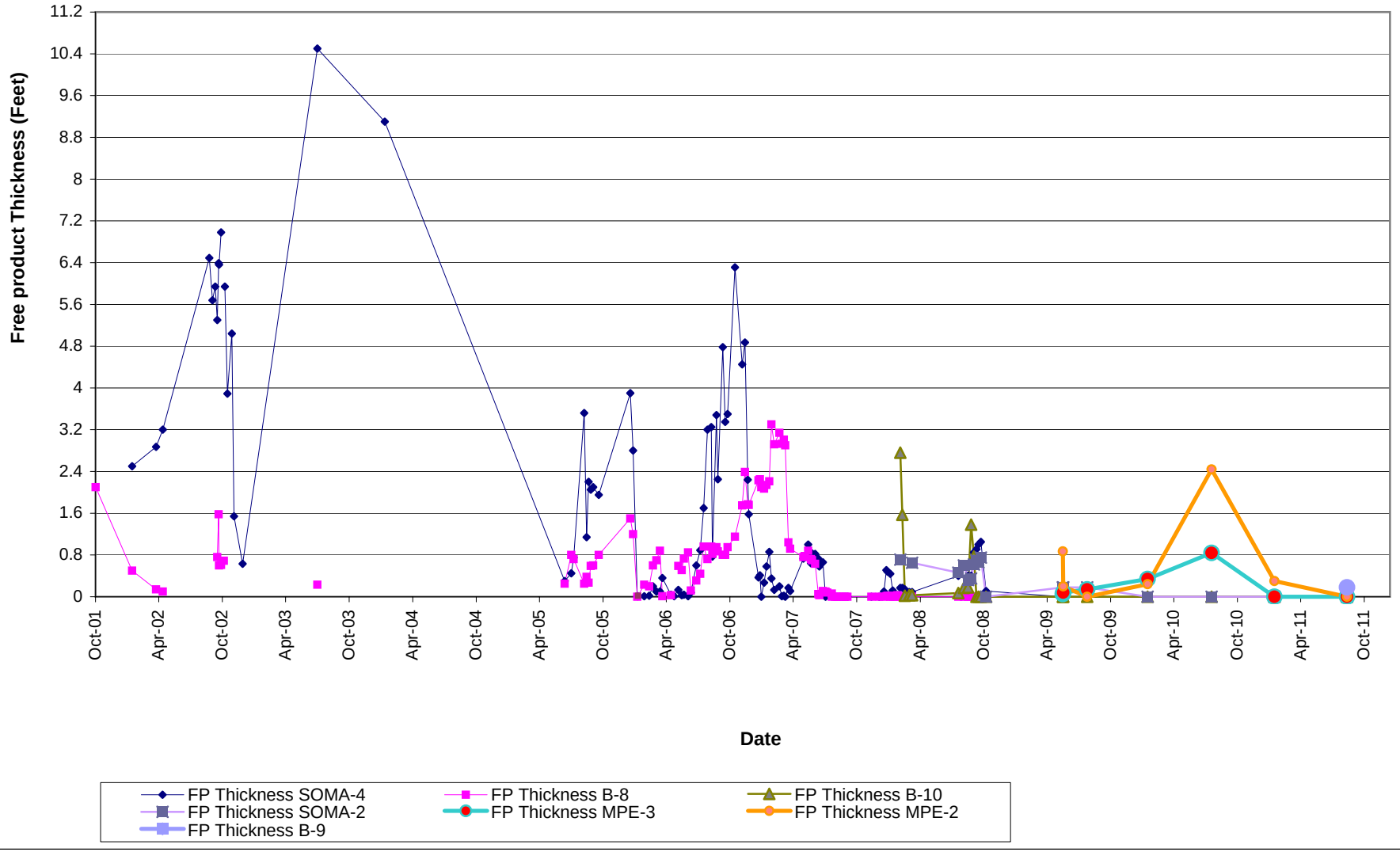
Earl Thompson, Jr., Estate of Earl Thompson, Sr., 75 Court Street, Quincy, CA 95971

Donna Drogos, ACEH (*Sent via E-mail to: donna.drogos@acgov.org*)
Jerry Wickham, ACEH (*Sent via E-mail to: jerry.wickham@acgov.org*)

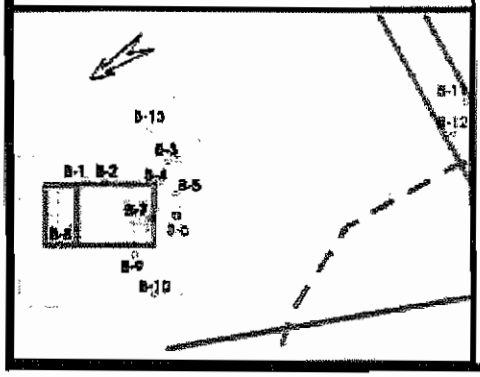
GeoTracker, eFile

ATTACHMENT 1

**Figure 12**
**Free Product Thickness**
**Former Glovatorium Site**
**3820 Manila Avenue, Oakland, California**



ATTACHMENT 2

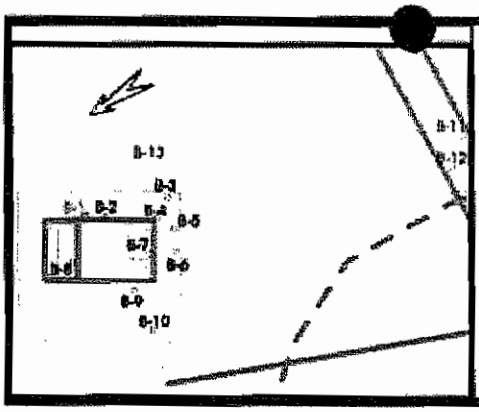



# DRILLING LOG

BORING NO. B7

| | | | |
|---|---|---|---|
| PROJECT NAME: | Depper | PROJECT NO. | |
| ADDRESS: | 3815 Broadway, Oakland, California | | ? |
| FIELD GEOLOGIST: | Frank Goldman | DATE: | |
| DRILLING COMPANY: | Precision | SAMPLER: | |
| DRILLING METHOD: | | TOTAL DEPTH: | 17.5' |
| BORING DIAMETER: | 2.5" | | |

| DEPTH | SAMPLE RECOVERY | BLOW COUNT | PID [ppm] | BORING CONSTR. | LITHOLOGIC LOG | USCS SYMBOLS | LITHOLOGIC DESCRIPTION<br>Description, Grain Size, Sorting, Color, Moisture, Mechanical Properties |
|---|---|---|---|---|---|---|---|
| | | | | | | CL | Silty clay, brown, soft, moist; solvent odor. |
| | | | | | | CL | Silty clay, black, firm, moist; high organics. |
| | | | | | | CL | Sandy clay, brown, stiff, moist. |
| | | | | | | | Mild solvent odor. |
| | | | | | | | Solvent odor. |
| | | | | | | | Sandier with depth. |
| 10 | | | | | | | End continuous core at 11 feet. vehicle<br>Resume with 1" split barrel. |
| 15 | | | | | | SW | Sand, brown, dense, coarse, wet; perched zone. |
| | | | | | | CL | Clay, brown, stiff, moist; no odor. |
| 20 | | | | | | | End of boring at 17.5 feet.<br>Groundwater encountered at 15'.<br>Boring converted into a well. |
| 25 | | | | | | | |
| 30 | | | | | | | |
| 35 | | | | | | | |



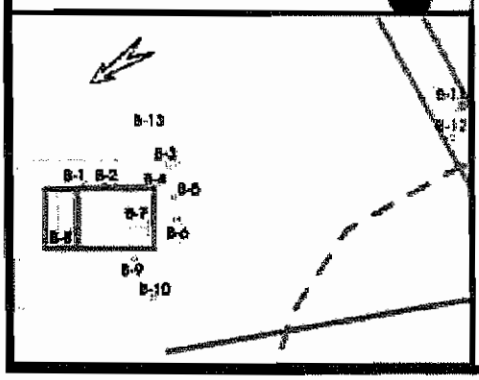

# DRILLING LOG

BORING NO. **B1**

| | | | |
|---|---|---|---|
| PROJECT NAME: | Depper | PROJECT NO. | |
| ADDRESS: | 3815 Broadway, Oakland, California | | |
| FIELD GEOLOGIST: | Frank Goldman | DATE: | 08/19/97 |
| DRILLING COMPANY: | Precision | SAMPLER: | |
| DRILLING METHOD: | | TOTAL DEPTH: | 21.5' |
| BORING DIAMETER: | 2.5" | | |

| DEPTH | SAMPLE RECOVERY | BLOW COUNT | PID [ppm] | BORING CONSTR. | LITHOLOGIC LOG | USCS SYMBOLS | LITHOLOGIC DESCRIPTION<br>Description, Grain Size, Sorting, Color, Moisture, Mechanical Properties |
|---|---|---|---|---|---|---|---|
| | | | | | | SW | Sand fine to medium grained with some gravel, gray, slightly moist, very loose. Mild odor.. |
| | | | | | | | Mild to medium strong diesel odor in loose sand. |
| 10 | | | | | | CL | Sandy clay, medium to coarse,gray,moist. Mild to moderate strong diesel odor. |
| | | | | | | | Increasing gravel with depth. |
| | | | | | | | Mild diesel odor at 12.5'. |
| | | | | | | SW | Refusal at 14' due to cobble. (Continueded with 1" split spoon) |
| 15 | | | | | | SW | |
| 20 | | | | | | SW | End of boring at 21.5 feet. No groundwater encountered during drilling. Boring converted into a well. |
| 25 | | | | | | | |
| 30 | | | | | | | |
| 35 | | | | | | | |
| 40 | | | | | | | |

# DRILLING LOG




BORING NO. **B11**

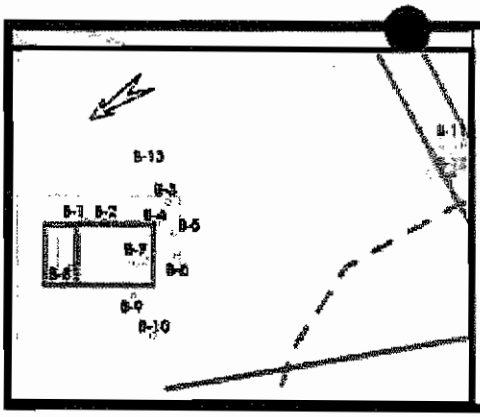
| | | | |
|---|---|---|---|
| PROJECT NAME: | Depper | PROJECT NO. | |
| ADDRESS: | 3815 Broadway, Oakland, California | | |
| FIELD GEOLOGIST: | Frank Goldman | DATE: | 08/22/97 |
| DRILLING COMPANY: | Precision | SAMPLER: | |
| DRILLING METHOD: | | TOTAL DEPTH: | 22' |
| BORING DIAMETER: | 2.5" | | |

double - cased the whole way?

| DEPTH | SAMPLE RECOVERY | BLOW COUNT | PID (ppm) | BORING CONSTR. | LITHOLOGIC LOG | USCS SYMBOLS | LITHOLOGIC DESCRIPTION<br>Description, Grain Size, Sorting, Color, Moisture, Mechanical Properties |
|---|---|---|---|---|---|---|---|
| | | | | | | SW | Sand, reddish brown, medium to coarse, very dense, dry to slightly moist; no odor. |
| | | | | | | SP | Sand, medium grained, orange, dense, slightly moist; no odor. |
| 10 | | | | | | CL | Gravelly clay, brown, stiff, moist; mottled; no odor. |
| 15 | | | | | | CL | Silty clay, grayish green, firm to stiff, moist; no odor. |
| | | | | | | ML | Sandy silt, green, firm, moist; no odor. |
| 20 | | | | | | SP | Silty sand, green, moderate dense, fine to medium, wet; no odor. |
| | | | | | | ML | Sandy silt, light brown, stiff, slightly moist to moist. |
| 25 | | | | | | | End of boring at 22 feet.<br>Groundwater encountered at 21'.<br>Boring converted into a well. |
| 30 | | | | | | | |
| 35 | | | | | | | |
| 40 | | | | | | | |

60-x analyzed

18.5' sample analyzed




# DRILLING LOG

**BORING NO. B12**

| | | | |
|---|---|---|---|
| PROJECT NAME: | Depper | PROJECT NO. | |
| ADDRESS: | 3815 Broadway, Oakland, California | | |
| FIELD GEOLOGIST: | Frank Goldman | DATE: | 08/22/97 |
| DRILLING COMPANY: | Precision | SAMPLER: | |
| DRILLING METHOD: | | TOTAL DEPTH: | 20' |
| BORING DIAMETER: | 2.5" | | |

| DEPTH | SAMPLE RECOVERY | BLOW COUNT | PID (ppm) | BORING CONSTR. | LITHOLOGIC LOG | USCS SYMBOLS | LITHOLOGIC DESCRIPTION<br>Description, Grain Size, Sorting, Color, Moisture, Mechanical Properties |
|---|---|---|---|---|---|---|---|
| | | | | | | SW | Gravel, coarse, medium dense, gray, slightly moist; no odor.<br>No core recovery to 4 feet.<br>Used 1" macrocore sampler. |
| | | | | | | CL | Silty clay, reddish brown, firm to stiff, moist; no odor. |
| 10 | | | | | | CL | No odor. |
| | | | | | | | No odor. |
| 15 | | | | | | SW | Sand, medium to coarse grained, dark gray, dense, wet; strong diesel odor. |
| | | | | | | | No odor. |
| 20 | | | | | | | End of boring at 20 feet.<br>Groundwater encountered at 15'.<br>Boring converted into a well. |
| 25 | | | | | | | |
| 30 | | | | | | | |
| 35 | | | | | | | |

indicated the presence of elevated levels of petroleum hydrocarbons next to the leaky UST.

## 1.2 Site Geology and Hydrogeology

The property is located on the alluvial plain between the San Francisco Bay shoreline and the Oakland hills. Surface sediments in the site vicinity consist of Holocene alluvial deposits representative of an alluvial fan depositional environment. These deposits consist of brown, medium-dense sand that fines upward to sandy or silty clay. The pattern of stream-channel deposition environment results in a three-dimensional network of coarse-grained sediments interspersed with finer-grained silts and clays. The individual units tend to be discontinuous lenses aligned parallel to the axis of the former stream flow direction.

The sediments encountered in soil borings are predominantly fine grained, consisting of clay, silty clay, sandy clay, gravelly clay and clayey silt. Discontinuous layers of coarse-grained sediments (clayey sand, silty sand, and clayey gravel) generally also contain relatively high percentages of silt and clay, which tends to reduce their permeability. Based on previous investigations conducted by Geosolv and LFR, a relatively coarse-grained layer of silty sand, clayey sand, and clayey gravel was encountered in soil borings E-23, E-25, E-26, GW-2, GW-3, GW-7, and GW-8 at depths of approximately 4.5 to 14 feet bgs. A discontinuous layer of silty to clayey sand was encountered in borings B-11, E-23, E-25, GW-7 and GW-8 at depths of 17 to 21 feet bgs.

Based on SOMA's October 2001 field investigation, no deeper major water-bearing zones were encountered at the site. Updated cross-sections were created from lithologic logs of groundwater monitoring wells installed by SOMA and boring logs from the current investigation (Figure 4) revealing the upper 25 to 30 feet of the subsurface beneath the site. These cross-sections (Figures 5 and 6) indicate that the water-bearing zone is composed of fine-grained, clayey sand to sandy clay sediments underlain by a very low-permeability clay layer, which is unsaturated in some locations. For instance, SOMA-5, which was screened within a significantly thick clay layer beneath the first water-bearing zone, from 21 to 26 feet bgs using the dual tubing method, was a dry well until the First Quarter 2002 sampling event. Due to the presence of unsaturated and low-permeability intervening clay layers between shallow and deep layers, there is a significant vertical downward gradient between shallow and deep wells.

Lenses of sandy clay are seen within the silty clay both above and below the main water-bearing zone. Discontinuous lenses of coarser grain sands and gravels are also seen along the base of the water bearing sandy clays; the parallel nature of these discontinuous lenses can be seen clearly in Figure 6. Static groundwater occurs around 10 to 12 feet bgs, although an obvious groundwater-bearing zone was not encountered in all borings.

In addition 1,1-dichloroethane (1,1-DCA; 0.0030 mg/l), 1,2-dichloroethane (1,2-DCA; 0.0041 mg/l), trans-1,2-DCE (0.013 mg/l), chlorobenzene (0.0027 mg/l), and 1,2-dichloropropane (1,2-DCP; 0.031 mg/l) were detected in groundwater.

# 4.0 LOCAL AND SITE GEOLOGY AND HYDROGEOLOGY

The following sections describe the local geology, sediments encountered in soil borings at the Site, and Site hydrogeology, including groundwater elevation measurements.

## 4.1 Local Geology

The Site is located on the alluvial plain between the San Francisco Bay shoreline and the Oakland hills. Surface sediments in the Site vicinity consist of Holocene alluvial deposits that are representative of an alluvial fan depositional environment. These deposits consist of brown, medium dense sand that fines upward to sandy or silty clay (Helley and Graymer 1997).

The pattern of stream channel deposition results in a three-dimensional network of coarse-grained sediments interspersed with finer-grained silts and clays. The individual units tend to be discontinuous lenses aligned parallel to the axis of the former stream flow direction.

## 4.2 Site Geology and Hydrogeology

Boring logs for this investigation are presented in Appendix A. Figure 3 shows the locations of geologic cross-sections, which are presented in Figures 4 through 7. Table 1 summarizes construction data for the borings and temporary groundwater sampling points.

Sediments encountered in soil borings at the Site are typical of those encountered in an alluvial fan depositional environment. The sediments are predominantly fine-grained, consisting of clay, silty clay, sandy clay, gravelly clay, and clayey silt. Discontinuous layers of coarse-grained sediments (clayey sand, silty sand, and clayey gravel) generally also contain relatively high percentages of silt and clay, which tend to reduce their permeability.

As indicated on the boring logs (Appendix A), groundwater was generally encountered during drilling at depths of approximately 7 to 13 feet bgs (68 to 70 feet bgs). These observations are consistent with previous investigations at the Site by GeoSolv.

As shown on cross-section A-A' (Figure 4), a relatively coarse-grained layer of silty sand, clayey sand, and clayey gravel was encountered in borings GW-2, GW-3 and GW-8 at depths between approximately 4.5 to 13 feet bgs (at elevations ranging from approximately 66 to 74 feet above mean sea level [msl]). The thickness of this unit

ATTACHMENT 4

# TABLE – 1

## Thickness of Clayey Soils Which Overlay Shallowest PCE Contamination in Soil

| Well/Boring Designation | Depth in feet below ground surface of PCE identified in Soil | Concentration of PCE Identified in Soil (ppm) | Thickness of clayey soils in feet between the ground surface and PCE identified in soil | Reference source for thickness of clayey soils | Date that field data was collected |
|---|---|---|---|---|---|
| GW-1 | 7 | 0.71 | (1 to 5'bgs) Silty Clay (5' to 7' bgs) Sandy clay 6' thick | Soil Boring Log | 7-16-99 |
| GW-8 | 9 | 0.05 | (1 to 7 ½ 'bgs) Silty clay (7 ½ to 9' bgs) Sandy clay 8' thick | Soil Boring Log | 7-16-99 |
| E-15 | 4 ½ | 0.62 | (0 to 4 ½' bgs) 4 ½' thick | Soil Boring Log | 9-9-98 |
| E-17 | 2 ½ | 0.026 | (0 to 2 ½' bgs) 2 ½' thick | Soil Boring Log | 9-9-98 |
| B-10 | 15 | 1.3 | (0 to 3 ½' bgs) Silty clay (3½' to 14½' bgs) Sandy clay 14½' thick | Soil Boring Log | 8-22-97 |
| SOMA 3 | 10 | 1.4 | ( ½ to 10' bgs) 9 ½' thick | Soil Boring Log | 10-11-01 |
| E-19 | 4 ½ | 2.1 | (0 to 4 ½' bgs) 4 ½' thick | Soil Boring Log | 9-9-98 |
| SB-8 | 8 | 4.5 | 0 to 5' clay Silty clay (6 ½' to 8'bgs) Sandy clay 6 ½' thick | Interpretation by SOMA 8-17-09 Fig 5 X sec A-A' & soil boring log | 5-5-09 |
| SB-9 | 5 | 1.9 | 0 to 5' clay Silty clay 5' thick | Interpretation by SOMA 8-17-09 Fig 5 X sec A-A' | 5-5-09 |
| SB-10 | 12 ½ | 0.69 | 0 to 5' clay Silty clay 5' thick | Interpretation by SOMA 8-17-09 Fig 5 X sec A-A' | 5-5-09 |

# TABLE – 2

## Thickness of Clayey Soils Which Overlay Free Floating Product

| Well/Boring Designation | Depth in feet below ground surface to the top of the free product | Thickness of free product in feet as measured in well | Thickness of clayey soils in feet between the ground surface and PCE identified in soil | Reference source for thickness of clayey soils | Date that field data was collected |
|---|---|---|---|---|---|
| **MPE-2** | **12.13** | **0.84** | **0 to 5' clay<br>Silty clay<br>(5' to 9'bgs)<br>Sandy clay<br>9' thick** | **Interpretation by SOMA 8-17-09 Fig 5 X sections A-A' and B-B' & soil boring log** | **8-1-10** |
| **MPE-3** | **11.67** | **2.44** | **0 to 5' clay<br>Silty clay<br>(5' to 11'bgs)<br>Sandy clay<br>11' thick** | **Interpretation by SOMA 8-17-09 Fig 5 X sec B-B' & soil boring log** | **8-1-10** |

ENVIRONMENTAL ENGINEERING, INC

# GEOLOGIC LOG OF BOREHOLE: SB-8



PROJECT: 2512

SITE LOCATION: 3820 Manila Ave., Oakland

DRILLER: Gregg Drilling & Testing

DRILLING METHOD: Direct Push

BORING DIAMETER: 3-inch

LOGGED BY: E. Hightower

DATE DRILLED: May 5, 2009

CASING ELEVATION: NA

DEPTH TO GW: 12

T.O.C. TO SCREEN: NA

SCREEN LENGTH: NA

APPROVED BY: M. Sepehr

| PID ppm | DEPTH | GRAPHIC LOG | SOIL CLASS | GEOLOGIC DESCRIPTION | SAMPLED: SPLIT SPOON | SAMPLED: CORE | GW LEVEL | BLOWCOUNTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Hand Auger to 5 Ft. | | | | | |
| 369.1 | 5 | | SC | CLAYEY SAND w/Gravel: Orange-brown, stiff, moist, fine- to coarse sand, fine gravel, no Petroleum Hydrocarbon (PHC) odor | | | | | |
| 372.9 | | | CL | SANDY LEAN CLAY: Brown, moist, soft, slight PHC odor, fine- to medium-grained sand | | X | | | |
| 1651 | 10 | | | As Above: turns green with strong PHC odor at 10 Ft. | | | | | |
| 1179 | | | SC | CLAYEY SAND: Brownish-green, moist, stiff, PHC odor, fine- to coarse-grained sand, gravel at 10.5 Ft. | | X | ▽ | | |
| | | | | Becomes very moist to wet at 12 Ft. | | X | | | |
| 628.2 | 15 | | CL | SILTY CLAY: Light brown, very stiff, moist, no PHC odor | | | | | |
| 221.8 | 20 | | | | | | | | |
| | 25 | | | | | | | | |

COMMENTS: TD @ 20 Ft.

SOMA ENVIRONMENTAL ENGINEERING, INC

# GEOLOGIC LOG OF BOREHOLE: SB-9



PROJECT: 2512

SITE LOCATION: 3820 Manila Ave., Oakland

DRILLER: Gregg Drilling & Testing

DRILLING METHOD: Direct Push

BORING DIAMETER: 3-inch

LOGGED BY: E. Hightower

DATE DRILLED: May 4, 2009

CASING ELEVATION: NA

DEPTH TO GW: 12

T.O.C. TO SCREEN: NA

SCREEN LENGTH: NA

APPROVED BY: M. Sepehr

| PID ppm | DEPTH | GRAPHIC LOG | SOIL CLASS | GEOLOGIC DESCRIPTION | SAMPLED: SPLIT SPOON | SAMPLED: CORE | GW LEVEL | BLOWCOUNTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Hand Auger to 5 Ft. | | | | | |
| | 5 | | CL | SANDY LEAN CLAY: Brown, moist, soft, fine- to coarse-grained sand, orange mottling, no Petroleum Hydrocarbon (PHC) odor | | X | | | |
| | | | SC | CLAYEY SAND w/Gravel: Orange-brown, stiff, moist, gravel up to 0.5 inch, fine- to coarse-grained sand, no PHC odor | | X | | | |
| | 10 | | SC | CLAYEY SAND: Greenish-brown, stiff, moist, PHC odor, fine- to medium-grained sand | | X | ▽ | | |
| | | | SP | POORLY GRADED SAND w/GRAVEL: Greenish-gray, very moist to wet, stiff, gravel up to 1-inch | | X | | | |
| | | | CL | SILTY CLAY: Light brown, stiff, moist, some orange mottling, very slight PHC odor | | | | | |
| | 15 | | CL | SANDY LEAN CLAY: Light brown, very stiff, moist, some orange mottling, no PHC odor, fine- to medium-grained sand | | | | | |
| | 20 | | | | | | | | |
| | 25 | | | | | | | | |

COMMENTS: TD @ 20 Ft., PID not functioning

SOMA ENVIRONMENTAL ENGINEERING, INC

# GEOLOGIC LOG OF BOREHOLE: SB-10



PROJECT: 2512

SITE LOCATION: 3820 Manila Ave., Oakland

DRILLER: Gregg Drilling & Testing

DRILLING METHOD: Direct Push

BORING DIAMETER: 3-inch

LOGGED BY: E. Hightower

DATE DRILLED: May 4, 2009

CASING ELEVATION: NA

DEPTH TO GW: 13.5

T.O.C. TO SCREEN: NA

SCREEN LENGTH: NA

APPROVED BY: M. Sepehr

| PID ppm | DEPTH | GRAPHIC LOG | SOIL CLASS | GEOLOGIC DESCRIPTION | SAMPLED: SPLIT SPOON | SAMPLED: CORE | GW LEVEL | BLOWCOUNTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Hand Auger to 5 Ft. | | | | | |
| | 5 | | SC | CLAYEY SAND: Orange-brown, moist, stiff, fine- to coarse-grained sand, no Petroleum Hydrocarbon (PHC) odor | | X | | | |
| | | | SC | CLAYEY SAND: Greenish-brown, stiff, moist, PHC odor, fine- to coarse-grained sand. Gravel starts at 9.5 Ft. | | X | | | |
| | 10 | | | | | X | | | |
| | | | SC | As Above: no gravel, no PHC odor | | X | | | |
| | | | SW | WELL GRADED SAND w/Gravel: Greenish-gray, wet, PHC odor, fine- to medium-grained sand, soft | | | ▽ | | |
| | 15 | | CL | SILTY CLAY: Light brown, stiff, moist, no PHC odor | | | | | |
| | 20 | | | | | | | | |
| | 25 | | | | | | | | |

COMMENTS: TD @ 20 Ft., PID not functioning

ENVIRONMENTAL ENGINEERING, INC.

# GEOLOGIC LOG OF BOREHOLE: MPE-2



PROJECT: 2512

SITE LOCATION: 3820 Manila Ave., Oakland

DRILLER: Gregg Drilling & Testing

DRILLING METHOD: Direct Push

BORING DIAMETER: 6-inch

LOGGED BY: E. Hightower

DATE DRILLED: May 21, 2009

CASING ELEVATION:

DEPTH TO GW: 15 ft.

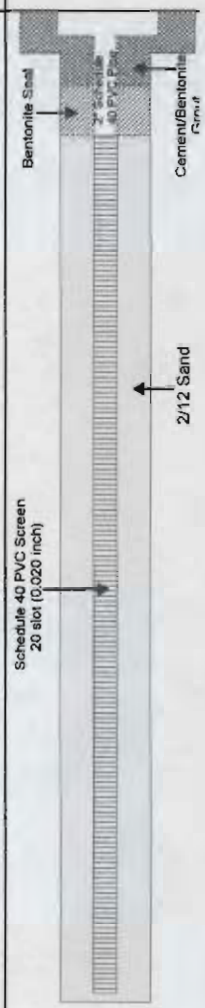
T.O.C. TO SCREEN: 2.5 ft.

SCREEN LENGTH: 17.5 ft.

APPROVED BY: M. Sepehr

| PID ppm | DEPTH | GRAPHIC LOG | SOIL CLASS | GEOLOGIC DESCRIPTION | SAMPLED: SPLIT SPOON | SAMPLED: CORE | GW LEVEL | BLOWCOUNTS |
|---|---|---|---|---|---|---|---|---|
| | | | | Hand Auger to 5 Ft. | | | | |
| | 5 | | CL | SANDY LEAN CLAY: Greenish-brown, stiff, moist, fine- to coarse-grained sand, strong Petroleum Hydrocarbon (PHC) odor | | | | |
| | 10 | | SC | CLAYEY SAND w/Gravel: Green-brown, moist, medium stiff, strong PHC odor, fine- to coarse-grained sand, fine gravel | | | | |
| | | | SC | As Above: green, gravel up to 1-inch | | | | |
| | 15 | | CL | SILTY CLAY w/SAND: Green, very moist to wet, PHC odor, fine- to coarse-grained sand | | | ▽ | |
| | | | CL | As Above: Saturated | | | | |
| | | | CL | SILTY CLAY: Light brown, very moist, very slight PHC odor | | | | |
| | 20 | | | | | | | |
| | 25 | | | | | | | |

WELL DIAGRAM




COMMENTS: TD @ 20 Ft.

SOMA ENVIRONMENTAL ENGINEERING, INC.

# GEOLOGIC LOG OF BOREHOLE: MPE-3



PROJECT: 2512

SITE LOCATION: 3820 Manila Ave., Oakland

DRILLER: Gregg Drilling & Testing

DRILLING METHOD: Hollow Stem Auger

BORING DIAMETER: 6-inch

LOGGED BY: E. Hightower

DATE DRILLED: May 22, 2009

CASING ELEVATION:

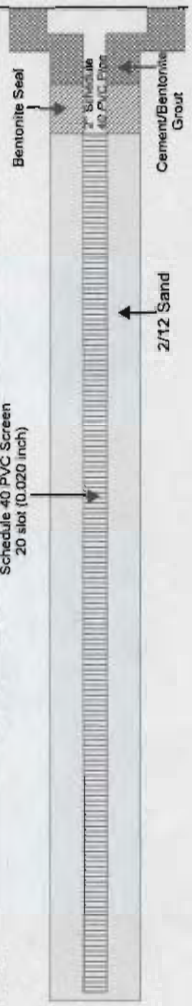
DEPTH TO GW: 11 Ft.

T.O.C. TO SCREEN: 2.5 ft

SCREEN LENGTH: 17.5 ft.

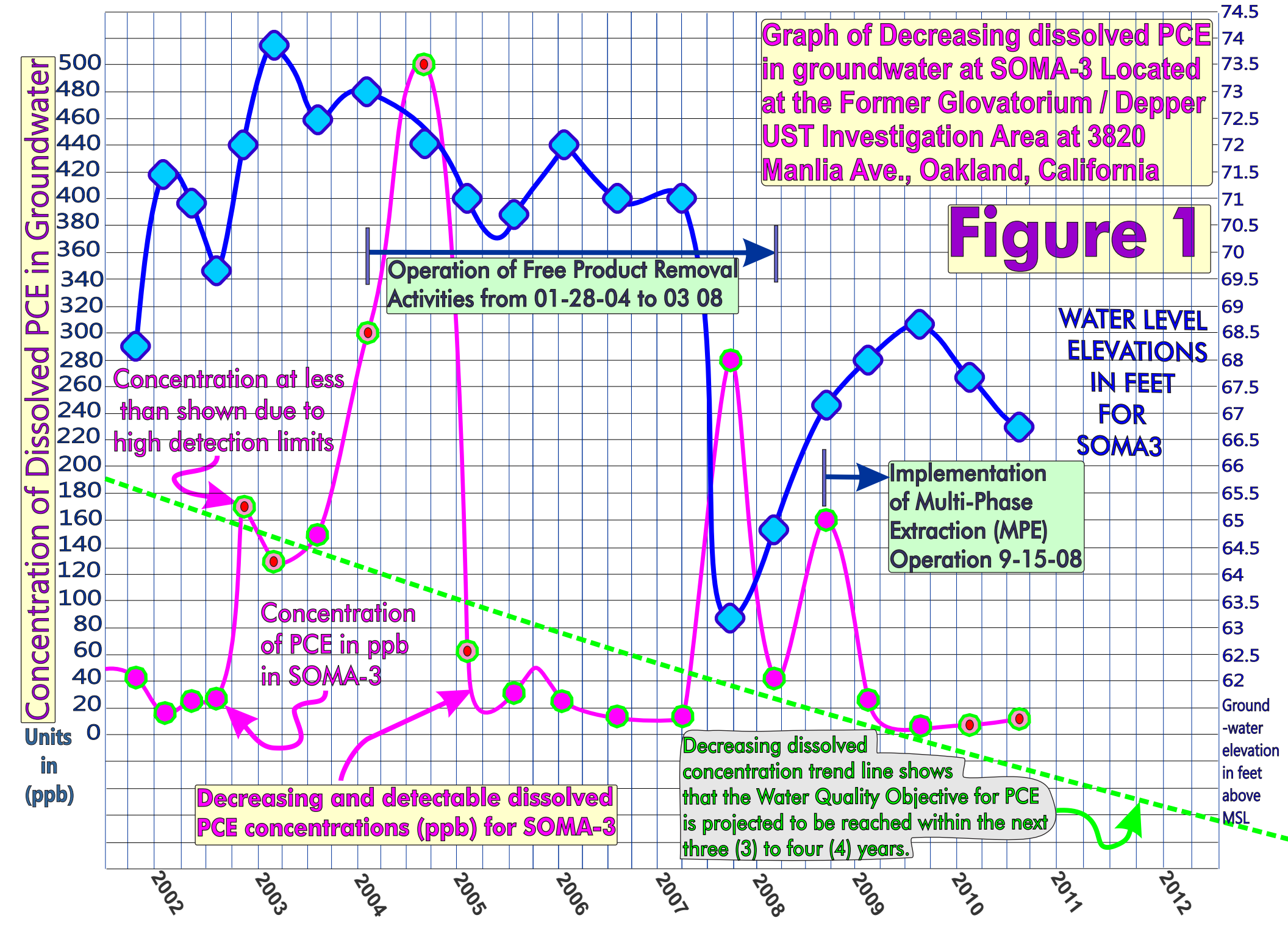
APPROVED BY: M. Sepehr

| PID ppm | DEPTH | GRAPHIC LOG | SOIL CLASS | GEOLOGIC DESCRIPTION | SAMPLED: SPLIT SPOON | SAMPLED: CORE | GW LEVEL | BLOWCOUNTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Hand Auger to 5 Ft. | | | | | |
| | 5 | | CL | SANDY LEAN CLAY: Greenish brown, stiff, moist, fine- to coarse-grained sand, strong Petroleum Hydrocarbon (PHC) odor | | | | | |
| | | | CL | As Above: very moist | | | | | |
| | 10 | | SC | CLAYEY SAND: Green, wet to saturated, loose, fine- to coarse-grained sand, PHC odor | | | ▽ | | |
| | | | CL | SILTY CLAY: Light brown, stiff, moist, slight PHC odor | | | | | |
| | 15 | | CL | As Above: no PHC odor | | | | | |
| | 20 | | | | | | | | |
| | 25 | | | | | | | | |




COMMENTS: TD @ 20 Ft.

ATTACHMENT 5



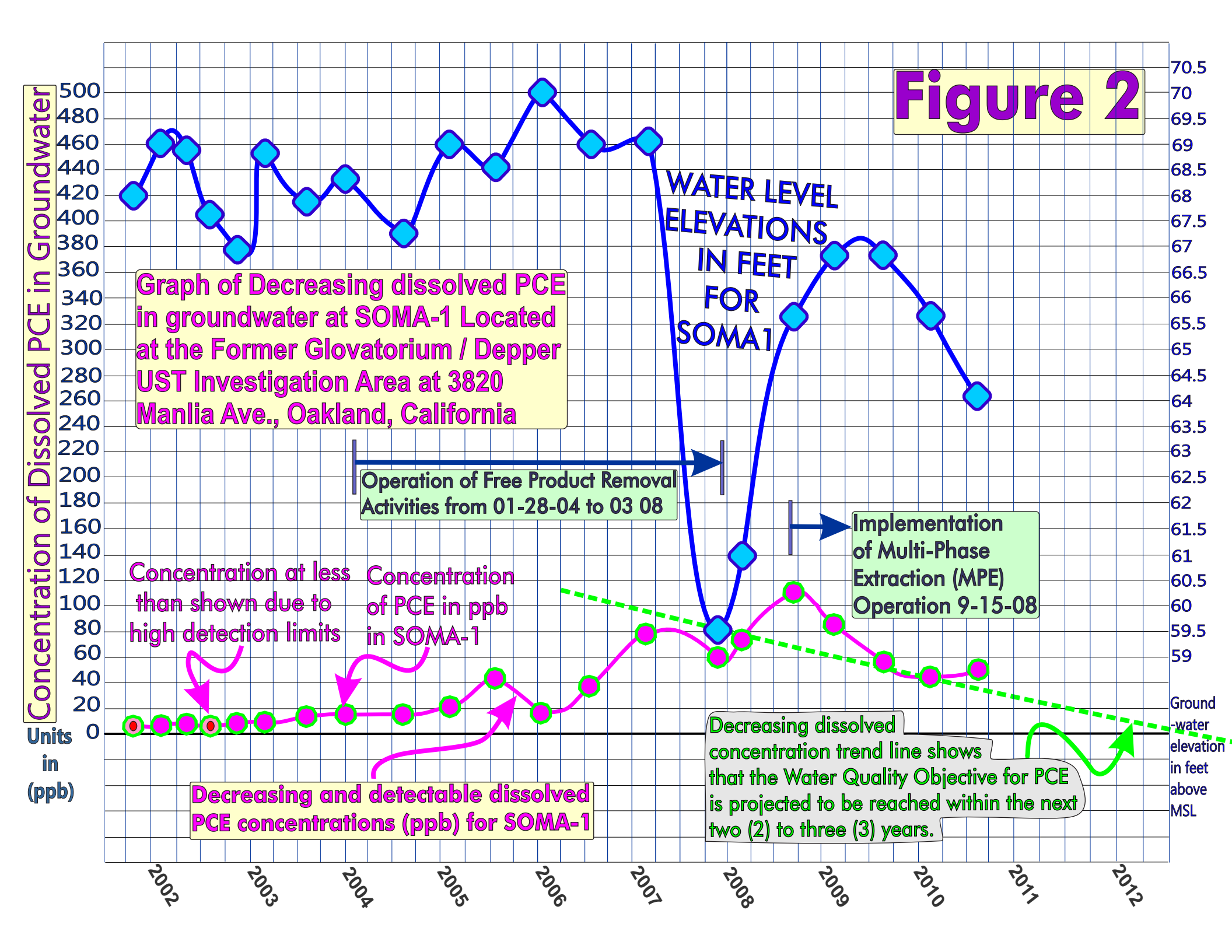


Figure 2
Concentration of Dissolved PCE in Groundwater
Units in (ppb)
500
480
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
70.5
70
69.5
69
68.5
68
67.5
67
66.5
66
65.5
65
64.5
64
63.5
63
62.5
62
61.5
61
60.5
60
59.5
59
Ground -water elevation in feet above MSL
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Graph of Decreasing dissolved PCE in groundwater at SOMA-1 Located at the Former Glovatorium / Depper UST Investigation Area at 3820 Manlia Ave., Oakland, California
WATER LEVEL ELEVATIONS IN FEET FOR SOMA1
Operation of Free Product Removal Activities from 01-28-04 to 03 08
Implementation of Multi-Phase Extraction (MPE) Operation 9-15-08
Concentration at less than shown due to high detection limits
Concentration of PCE in ppb in SOMA-1
Decreasing and detectable dissolved PCE concentrations (ppb) for SOMA-1
Decreasing dissolved concentration trend line shows that the Water Quality Objective for PCE is projected to be reached within the next two (2) to three (3) years.

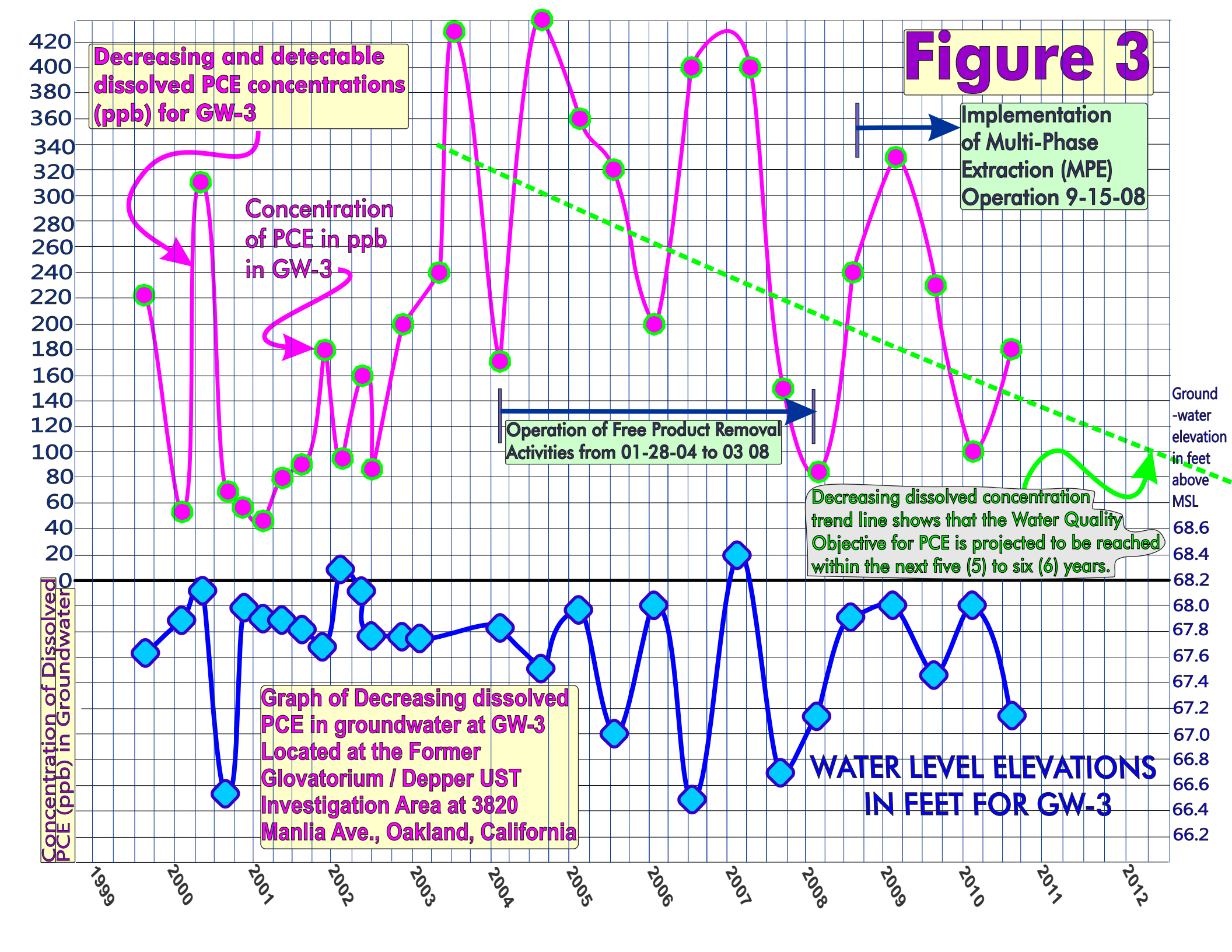
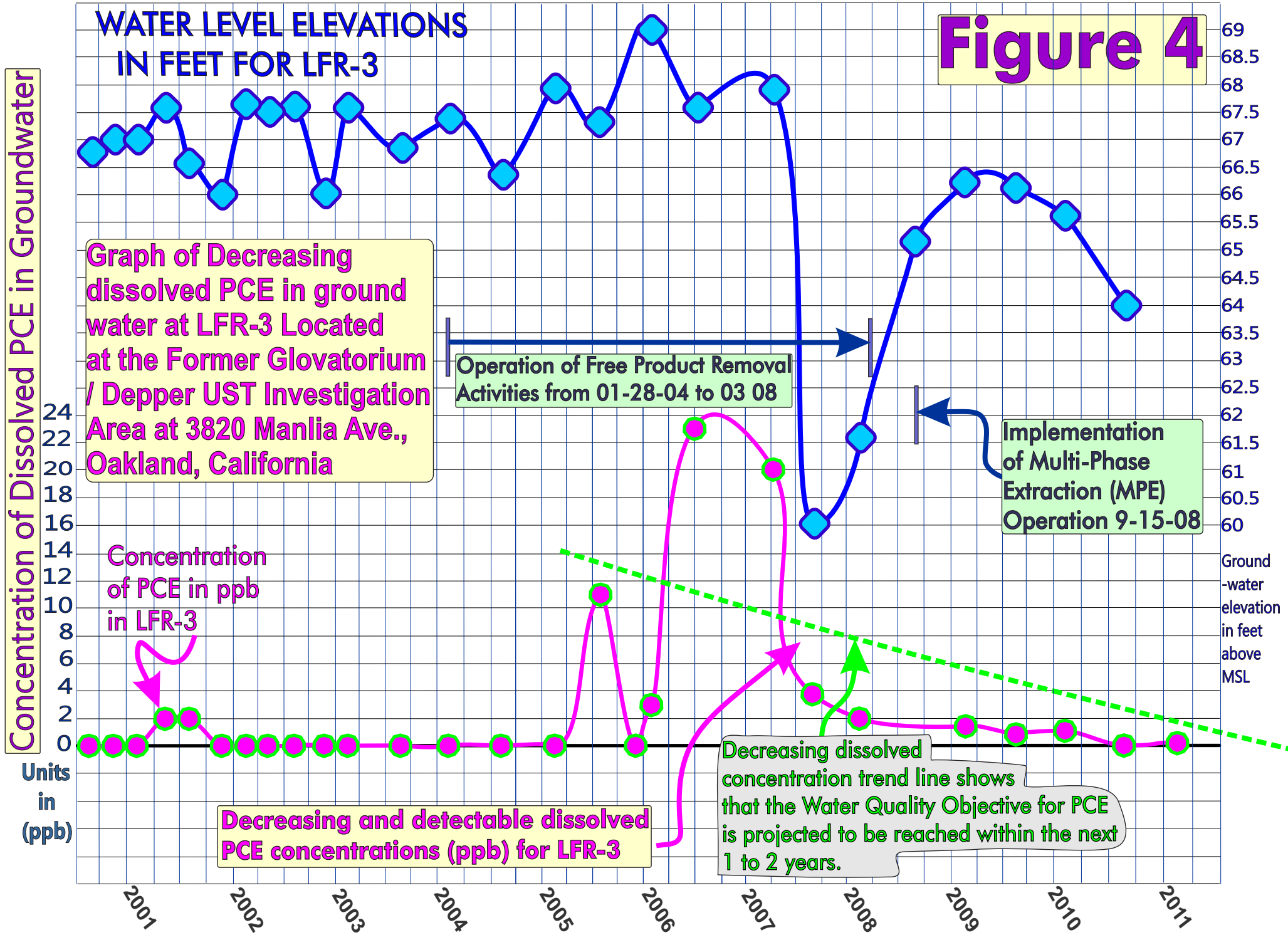


Figure 3
Decreasing and detectable dissolved PCE concentrations (ppb) for GW-3
Concentration of PCE in ppb in GW-3
Implementation of Multi-Phase Extraction (MPE) Operation 9-15-08
Operation of Free Product Removal Activities from 01-28-04 to 03 08
Decreasing dissolved concentration trend line shows that the Water Quality Objective for PCE is projected to be reached within the next five (5) to six (6) years.
Concentration of Dissolved PCE (ppb) in Groundwater
Graph of Decreasing dissolved PCE in groundwater at GW-3 Located at the Former Glovatorium / Depper UST Investigation Area at 3820 Manlia Ave., Oakland, California
WATER LEVEL ELEVATIONS IN FEET FOR GW-3
Ground -water elevation in feet above MSL
420
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
68.6
68.4
68.2
68.0
67.8
67.6
67.4
67.2
67.0
66.8
66.6
66.4
66.2
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012


WATER LEVEL ELEVATIONS IN FEET FOR LFR-3
Figure 4
Graph of Decreasing dissolved PCE in ground water at LFR-3 Located at the Former Glovatorium / Depper UST Investigation Area at 3820 Manlia Ave., Oakland, California
Operation of Free Product Removal Activities from 01-28-04 to 03 08
Implementation of Multi-Phase Extraction (MPE) Operation 9-15-08
Concentration of PCE in ppb in LFR-3
Decreasing and detectable dissolved PCE concentrations (ppb) for LFR-3
Decreasing dissolved concentration trend line shows that the Water Quality Objective for PCE is projected to be reached within the next 1 to 2 years.
Concentration of Dissolved PCE in Groundwater
Units in (ppb)
0
2
4
6
8
10
12
14
16
18
20
22
24
Ground -water elevation in feet above MSL
60
60.5
61
61.5
62
62.5
63
63.5
64
64.5
65
65.5
66
66.5
67
67.5
68
68.5
69
2001
2002
2003
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