Environmental Resources Management

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7 April 2011

Mr. Jerry Wickham
Alameda County Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

Subject: Corrective Action Plan
Lucasey Site- 2744 East 11th Street, Oakland

Dear Mr Wickham:

Environmental Resources Management (ERM) is pleased to present this Corrective Action Plan for the Lucasey site in Oakland, California.

This CAP has been prepared to (1) summarize the remedial alternative evaluation process; and (2) identify the selected approach for addressing areas of concern.

Based on the implementability, cost, and the effectiveness of the evaluated alternatives, ERM recommends monitored natural attenuation as the selected remedial alternative. This alternative addresses the site-specific cleanup goals of:

Removal of mobile free product to the extent practicable: Monitoring of product observation wells installed and designed to definitively determine whether mobile product was present at the site has indicated no mobile free product is present where it was reported during previous investigations.

Ensure that soil vapor does not pose a risk to indoor air for off-site residences: Soil vapor sampling has demonstrated that applicable screening levels are not exceeded adjacent to residences, therefore no risk is posed to offsite residences.

The monitored natural attenuation alternative will also continue to reduce the mass, toxicity, mobility, volume, or concentration of the chemicals of potential concern in site soil and ground water through biodegradation, dispersion, dilution, sorption, volatilization, and chemical or biological stabilization, transformation, or destruction. Furthermore, this alternative provides for the most sustainable option in that cleanup goals are achieved with the least amount of additional current or future resources.

The other evaluated alternatives would be no more effective at achieving site-specific cleanup goals than the selected alternative, would be expensive to implement and disruptive to both site operations and traffic along E.11th Street, and be much less sustainable, when compared to the selected alternative.

Please direct any comments or questions regarding this report to me at (925) 482-3240. Thank you for your consideration.

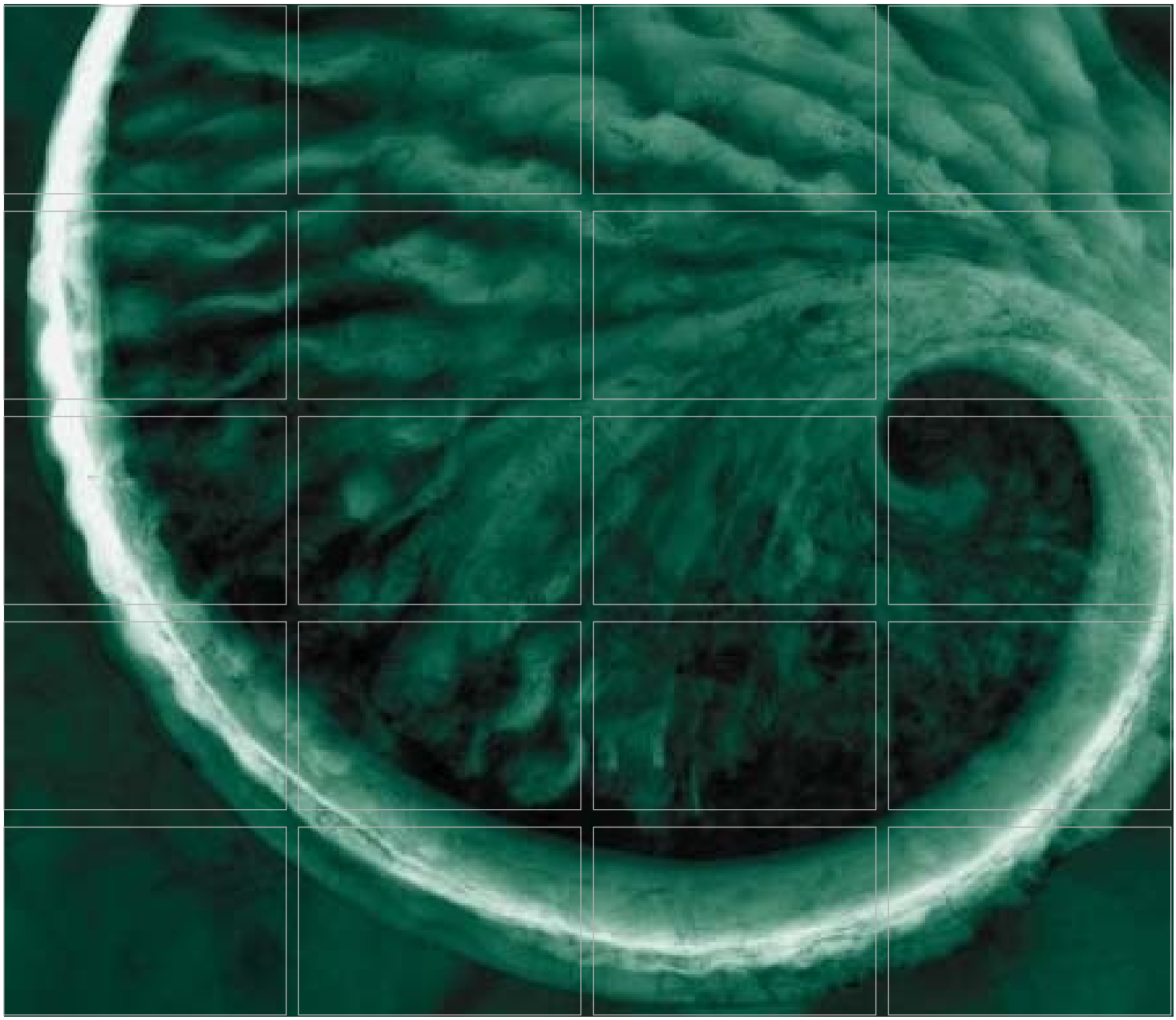
Sincerely,

John Moe
Project Manager

Paul Hausmann
Partner-in-Charge

JCM/Enclosures

Cc: Bruce Flushman
Scott Rickman
Chuck Lucasey



Corrective Action Plan

Lucasey Manufacturing Property
2744 E. 11th Street
Oakland, California

Prepared for:
Lucasey Manufacturing Corporation

April 2011

www.erm.com

ERM

Delivering sustainable solutions in a more competitive world

Lucasey Manufacturing Corporation

Corrective Action Plan

Lucasey Manufacturing Property
2744 E. 11th Street
Oakland, California

April 2011

Project No. 0097888

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23 March 2011

Mr. Jerry Wickham
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

Subject: Lucasey Manufacturing
2744 East 11th Street
Oakland, CA 94601
RO0002902

Dear Mr. Wickham:

As the legally authorized representative of the above-referenced project location, I have reviewed the Corrective Action Plan (March 2011) prepared by my consultant of record, ERM. I declare, under penalty of perjury, that the information and/or recommendations contained in this report are true and correct to the best of my knowledge.

Sincerely,

Mr. Charles Lucasey

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LIST OF ACRONYMS

ACHCSA	Alameda County Health Care Services Agency
bgs	Below ground surface
CAP	Corrective Action Plan
CHHSLs	California Human Health Screening Levels
ERM	ERM-West, Inc.
ESL	Environmental Screening Level
ISCO	In situ chemical oxidation
LNAPL	Light nonaqueous-phase liquid
µg/L	Microgram per liter
mg/kg	Milligram per kilogram
OEHHA	Office of Environmental Health Hazard Assessment
O&M	Operation and maintenance
POTW	Publicly owned treatment works
PVC	Polyvinyl chloride
RWQCB	California Regional Water Quality Control Board, San Francisco Bay Region
TPH	Total petroleum hydrocarbon
UST	Underground storage tank
VOC	Volatile organic compound

1.0 INTRODUCTION

This Corrective Action Plan (CAP) was prepared by ERM-West, Inc. (ERM) on behalf of Lucasey Manufacturing Corporation (Lucasey) to address remedial options for its property located at 2744 E. 11th Street in Oakland, Alameda County, California ("site"; Figure 1). The selected remedies are designed to minimize potential exposure by current and future site users to substances that could pose an unacceptable risk to human health and the environment. This CAP is being submitted to Alameda County Health Care Services Agency (ACHCSA) for review and approval in response to their request.

Based on the results of previous investigations at the site, portions of the site are known to have been impacted with total petroleum hydrocarbons (TPH). This CAP has been prepared to (1) summarize the remedial alternative analysis and evaluation process; and (2) identify the selected approach for addressing these areas of concern. This CAP is organized as follows:

- The remainder of Section 1 summarizes the findings of historical soil and ground water investigations for the site and immediate vicinity.
- Section 2 is a summary of current environmental conditions, including the hydrogeologic site conditions, and the nature and extent of chemical occurrence in soils, ground water, and soil gas.
- Section 3 summarizes chemicals of potential concern and assesses the associated risks posed to human health and the environment.
- Section 4 summarizes the development of target cleanup goals.
- Section 5 describes the process undertaken to develop and screen remedial alternatives for evaluation of their ability to meet the target cleanup goals, and identifies the preferred remedial alternative.
- Section 6 presents references cited or reviewed in preparation of the CAP.

The main text is followed by figures, tables, and appendices containing supporting information.

1.1 SITE LOCATION, HISTORY, AND DESCRIPTION

The site is located at 2744 E. 11th Street in Oakland, California (Figure 1). The site is in a mixed residential and light industrial area. The property is bounded by railroad tracks to the north, residences to the southwest, the Oakland Animal Shelter to the southeast and businesses to the northeast and northwest. E. 11th Street runs along the southern border of the site.

Lucasey fabricates television mounting systems. The property occupied by the site was formerly a cannery and canned food warehouse.

1.2 PROJECT HISTORY

Environmental investigations have been conducted at the site and are described below. Sampling locations are shown on Figure 2 and laboratory results are included in Tables 1, 2, and 3.

***Phase I Environmental Site Assessment (AEI Consultants, 24 August 2004)* ("AEI Phase I")**

A Phase I environmental assessment was conducted in 2004 and provided to Lucasey. The AEI Phase I noted that historical Sanborn maps showed an "oil house" and "oil tank in ground" on the property.

***Phase II Subsurface Investigation (AEI Consultants, September 2004)* ("AEI Phase II")**

Based on the findings of the AEI Phase I, a soil and grab ground water sampling investigation was conducted at the site to delineate vertical and horizontal extent of possible soil and groundwater impacts. In total, five soil borings (SB-1 through -4 and SB-6) were advanced to approximately 16 feet in depth in the areas presumed to be (based on historic maps) the former locations of the "oil house," "oil tank in ground," and machine shops. Four of the borings were reported to have staining from depths of approximately 12 to 16 feet below ground surface (bgs). Soil samples were not analyzed. Grab ground water samples were collected from temporary 0.75-inch-diameter, slotted polyvinyl chloride (PVC) casings inserted into the borings. As set forth in summary form in Table 2, TPH-gasoline, -diesel, and -motor oil were reported in four of the five ground water samples. TPH-gasoline ranged from non-detect to 3,800 micrograms per liter (µg/L); TPH-diesel ranged from non-detect to

560,000 µg/L; and TPH-motor oil ranged from non-detect to 520,000 µg/L. Benzene was non-detect in all samples.

Phase II Subsurface Investigation (Terra Firma, July 2005) **("TF Subsurface Investigation")**

An additional subsurface investigation to delineate vertical and horizontal extent of possible soil and groundwater impacts was performed on July 9, 2005. Based on the results from the AEI Phase I and Phase II, six soil borings (BH-1 through -4 and BH-6) were installed in areas of petroleum hydrocarbon ground water impacts. As set forth in summary in Table 1, soil samples were reported to contain TPH-gasoline ranging from non-detect to 700 milligrams per kilogram (mg/kg), TPH-diesel from 22 to 8,900 mg/kg, and TPH-motor oil from 46 to 7,500 mg/kg. As set forth in summary in Table 2, grab ground water samples were collected from three of the boreholes (BH-2, -4, and -6). TPH-gasoline ranged from non-detect to 310 µg/L, TPH-diesel ranged from 670 to 580,000 µg/L, and TPH-motor oil ranged from 2,800 to 510,000 µg/L. Benzene was non-detect in all samples.

Soil and Ground Water Investigation (Clearwater Group, January 2007) **("2007 CW Investigation")**

An investigation at the site in 2007 further delineated the vertical and horizontal extents of possible soil and ground water impacts. Thirteen soil borings were installed (SB-7 through SB-15 and SB-21 through SB-24) and soil and grab ground water samples were collected. As set forth in summary in Table 1, soil samples were reported to contain TPH-gasoline ranging from non-detect to 29 mg/kg, TPH-diesel from non-detect to 5,300 mg/kg, and TPH-motor oil from non-detect to 3,800 mg/kg. Grab groundwater samples were collected from all boreholes. TPH-gasoline ranged from non-detect to 310 µg/L, TPH-diesel ranged from 670 to 580,000 µg/L, and TPH-motor oil ranged from 2,800 to 510,000 µg/L. Benzene was non-detect in all samples.

Soil Vapor Survey and Recovery Well Installation (Clearwater Group, August 2008) **("2008 CW SV Survey")**

A soil gas survey was conducted using Gore-Sorber modules to further evaluate the distribution of volatile organic compounds (VOCs) in the shallow subsurface on the subject property and the surrounding downgradient properties. Twenty-four sampling modules were installed on the Lucasey property and along E. 11th Street and Lisbon Avenue. As

noted in the 2008 CW SV Survey, the results of the survey were presented in micrograms, and can not be directly correlated with the existing soil and ground water results. TPH was detected in all the modules ranging from 0.01 to 8.4 µg. Benzene was detected in one module at 0.06 µg. Hydrocarbons in the range of C11, C13, and C15 were detected in nine modules ranging from 0.01 to 0.10 µg.

During this field mobilization three product recovery wells were installed on the site. RW-1 was installed in the presumed former location of the underground storage tank (UST). RW-2 and RW-3 were installed adjacent to boring locations SB-14 and SB-13 where previous analytical results indicated "high levels of free product during the soil borings." The 4-inch wells were installed to 25 feet in depth and screened from 7 feet to 25 feet bgs. The wells were not then developed or sampled.

***Site Investigation Results (ERM, August 2009)* ("2009 ERM Investigation")**

In 2009, the following investigation tasks were conducted at the site to further delineate vertical and horizontal extent of possible soil and groundwater impacts:

- Development and sampling of the three on-site recovery wells (RW-1, RW-2 and RW-3);
- Collection of soil vapor samples at 11 on-site locations, and off site along E. 11th Street and Lisbon Street; and
- Gathering of available information on water supply wells in the site vicinity.

Well Sampling

Analytical results from the on-site wells indicated TPH-diesel was detected in all three wells ranging from 58 to 210 µg/L. Following silica gel cleanup, as set forth in summary in Table 2, two of the three wells had non-detect levels of TPH diesel and the third well had a detection of 88 µg/L. No evidence of product was observed in any of the wells during development, purging, or sampling.

Soil Vapor Sampling

A direct-push rig was utilized to facilitate the collection of soil vapor samples from a depth of 5 feet bgs. Soil vapor samples were collected with Summa canisters. Results of the soil vapor sample analyses were

compared to the residential and commercial/industrial California Environmental Protection Agency Office for Environmental and Health Hazard Assessment (OEHHA) California Human Health Screening Levels (CHHSLs) and San Francisco Bay Regional Water Quality Control Board (RWQCB) Environmental Screening Levels (ESLs). As set forth in summary in Table 3, the data indicated the following:

- Samples collected on the Lucasey site (ASV-6, -7, -8, -9, -10, -11) had no exceedances of residential or commercial/industrial CHHSLs or ESLs;
- Samples collected southwest of and off-site on the northeastern side of E. 11th Street exceeded the ESL and CHHSL for benzene:
  - ASV-1 exceeded the residential and commercial/industrial CHHSL and the residential ESL.
  - ASV-2 exceeded the residential CHHSL and ESL.
  - No other CHHSLs or ESLs were exceeded.
- Samples collected further to the southwest, across E. 11th Street and off-site exceeded benzene ESLs and CHHSLs and ethylbenzene ESLs (ethylbenzene does not have an established CHHSL):
  - ASV-3 exceeded ESLs and CHHSLs for benzene and the residential ESL for ethylbenzene;
  - ASV-4 exceeded ESLs and CHHSLs for benzene and the residential ESL for ethylbenzene; and
  - ASV-5 had no exceedances of any CHHSLs and ESLs.

Water Supply Wells

Based on a previous survey there were four deep supply wells in the vicinity of the Lucasey site. Additional research determined that one of the wells was located south of the current Lucasey site and was properly abandoned in 1977. Despite substantial investigation effort, no information was available for the remaining three wells.

***Site Investigation Report (ERM, July 2010)* ("2010 Site Investigation")**

ERM conducted additional field work in response to ACHCSA comments on the previously completed work. This work included:

- Evaluation of free product mobility by installing monitoring wells with screen intervals placed to allow product to freely enter the wells;
- Delineation of the northern and southern extent of any product; and

- Evaluation of potential vapor intrusion concerns at residences to the west of the Lucasey site.

On-Site Monitoring Wells

Two product monitoring well pairs were installed near existing monitoring well RW-1 and former boring location SB-15. At each well pair location, a pilot boring was completed to determine stratigraphy and intervals of product occurrence. The pilot boring was then converted to a product monitoring well constructed and screened only in the deeper hydrocarbon-impacted unit. An additional well was completed in a shallower hydrocarbon impacted lithologic unit approximately 5 feet laterally away from the deeper well.

Pilot boring PMW-1B was continuously cored using dual-tube direct-push methods to a total depth of 25 feet. At approximately 10 feet in depth, petroleum staining was encountered in the recovered cores. Difficulty in sample recovery from 11.5 to 20 feet bgs hampered complete characterization of the borehole. Petroleum staining was encountered as deep as 21 feet. The well was screened from 17 to 25 feet bgs in a clayey gravel and gravelly sand unit.

PMW-1A was installed approximately 5 feet southwest of PMW-1B. Similar to PMW-1B, petroleum staining was initially encountered at a depth of approximately 10 feet. Staining was observed to a depth of 14.5 feet. The well was constructed using 2-inch PVC casing and screened from 7 to 17 feet bgs in a clayey sand and gravelly sand unit.

Pilot boring PMW-2B was completed using a dual-tube, direct-push rig to a total depth of 25 feet. At approximately 12 feet bgs, petroleum staining was encountered in the recovered cores and was observed to continue to a depth of 17 feet bgs. Staining was also observed from 21 to 25 feet bgs. The well was constructed using 2-inch PVC casing and screened from 19 to 25 feet bgs in a gravelly sand and clayey sand unit.

PMW-2A was installed approximately 5 feet southwest of PMW-2B and was screened from 7 to 17 feet in a clayey sand, silty sand and gravelly sand unit.

Offsite Monitoring Well

A single product monitoring well was installed adjacent to SB-22, the location furthest away from the Lucasey site where previous reports

indicated that product was present. The well was completed using a direct-push rig, continuously cored to a total depth of 14 feet. At approximately 10 feet, evidence of product was observed and continued to be observed to 14 feet. The well was screened from 7 to 14 feet in a sand, sandy gravel, and clayey gravel unit.

Product Recharge Testing and Monitoring

Monitoring for the presence of product commenced following development of the product monitoring wells. Monitoring was conducted according to the following schedule:

- Immediately following well development (March 2010);
- Weekly for the following 4 weeks; and
- Monthly for the following 6 months (through October 2010).

Following development, no measurable product was observed in any wells. Some observations of staining on the product probe were recorded as indicated on Table 4. Monitoring of the three previously existing wells (RW-1, -2, and -3) was also conducted according to the same schedule, with no measurable product observed in any of the wells (Table 5).

Soil Vapor Sampling

To further evaluate the potential for indoor air impacts from soil and ground water at and in the vicinity of the Lucasey site, soil vapor sampling was conducted at the four locations shown on Figure 2. The objectives of this sampling were:

- To collect additional samples between the Lucasey site and ASV-3 and ASV-4 to further evaluate whether the soil vapor impacts detected in ASV-3 and ASV-4 during the June 2009 sampling event could be further delineated.
  - Samples were collected from locations ASV-12 and ASV-13, downgradient of the area where product had previously been observed on the Lucasey site, and where no previous soil vapor sampling had been conducted.
- To collect additional samples closer to the residences fronting E. 11th Street to determine whether soil vapor exceeded indoor air screening levels.
  - Samples were collected from locations ASV-14 and ASV-15 in the front yard of 2743 E. 11th Street, directly across E. 11th Street from

the Lucasey site, near the area where product had previously been observed at the Lucasey site, and near soil vapor sampling locations ASV-3 and ASV-4, where elevated levels of benzene and ethylbenzene were detected during the June 2009 investigation.

A direct-push rig was utilized to facilitate the collection of soil vapor samples from a depth of 5 feet bgs. The results of the soil vapor sampling from this investigation in addition to the results from the August 2009 investigation are presented in Table 3. Based on the 2010 vapor sampling:

- **Benzene** and **ethylbenzene** were not detected in any vapor samples.
- **Toluene** and **m,p-xylenes** were detected in ASV-12, with detections well below California Health Hazard Screening Levels (CHHSLs) and Environmental Screening Levels (ESLs).
- **Naphthalene** was not detected in any vapor samples.
- **TPH-gasoline** and **TPH-diesel** were not detected in any vapor samples.
- **Methylene chloride** was detected in ASV-15 below the residential ESL. No CHHSL is established for this compound.
- **Acetone** was detected in ASV-13 and ASV-14 below the residential ESL. No CHHSL is established.
- **2-Butanone** was detected in ASV-14 below the residential ESL. No CHHSL is established.
- **VOCs** detected with no CHHSL or ESL established were as follows:
  - **1,2,4-Trimethylbenzene** was detected in ASV-12 and ASV-14. It was also detected in the laboratory blank.
  - **Carbon disulfide** was detected in ASV-14.
  - **Ethanol** was detected in ASV-12, ASV-13, and ASV-15. It was also detected in the ambient air sample and the laboratory blank sample.
- Other VOCs:
  - No other VOCs were detected in any of the 2010 vapor samples.

2.0 SUMMARY OF CURRENT ENVIRONMENTAL CONDITIONS

This section summarizes the findings of the historical investigations discussed in Section 1.2 as they pertain to the current environmental conditions. These findings include subsurface stratigraphy, ground water depth and flow direction, and chemical occurrence patterns in site soils, ground water, and soil gas.

2.1 HYDROGEOLOGY

Site stratigraphy is comprised primarily of gravelly silt and sand, silty sand, sand, and clay interbedded with thin (0.5 to 4 feet) discontinuous layers of clay, silt, clayey sand and clayey gravel. Overall, a change from coarse sediment grain size in the east (PMW-1A and PMW-1B) to fine grain size in the west (PMW-3, B-1 and B-2) was observed. There are two distinct water bearing zones, an upper unconfined to semi-confined zone (0 to 21 feet below ground surface (bgs)) characterized by stratigraphic heterogeneity and a lower confined zone consisting of clayey sands beginning at 24 feet bgs and extending to an unknown depth.

Site fluid levels were monitored from March 2009 through October 2010 and are provided in Tables 4 and 5. During the monitoring period a slight upward vertical gradient was observed at well pair PMW-1A and PMW-1B (0.01 to 0.15 foot) and a downward vertical gradient was observed at well pair PMW-2A and PMW-2B (0.70 to 1.16 feet). The vertical gradients observed at these well pairs suggest that the absence of free product in site wells is caused by the lack of product mobility and not displacement due to upward vertical gradients. Fluid levels from the 28 October 2010 fluid level monitoring event are shown on Figure 3. As seen on Figure 3, locally groundwater flow is to the northwest.

2.2 CHEMICAL OCCURRENCE IN SITE SOILS

During the field investigations summarized in Section 1.2, 71 soil samples were collected and submitted for analysis for TPH and VOCs. The results of these analyses are summarized in Table 1.

For the soil sampling results associated with all reported analytes (including all non-detected), the reader is referred to the reports themselves, which contain the full laboratory documentation.

For comparison purposes, ESLs for soils are included on Table 1. The ESLs are screening levels that were developed by the RWQCB to accelerate the preparation of environmental risk assessments at sites with soil and ground water impacts. The specific ESLs presented in Table 1 were developed for assessment of deep soils (i.e., > 3 meters bgs) at locations where ground water is a potential source of drinking water, under a commercial/industrial use scenario. ESLs are not cleanup goals, do not establish policy or regulation, and are not intended to be used as a stand-alone tool for decision making. Detections lower than the ESLs are presumed not likely to pose a threat to human health or the environment. As stated in the ESL documentation, the presence of a chemical above an ESL does not necessarily indicate that adverse impacts to human health or the environment are occurring. An ESL for ethylene dibromide has not been established.

Chemical detections in soil are lower than the ESLs for all compounds except for TPH. ERM conducted a review of the chromatograms of samples collected during previous investigations. That review indicated that the TPH detected in the samples is a highly weathered heavy fuel oil, such as Bunker C or fuel oil #6. Therefore the ESL for TPH (residual fuels) of 5,000 mg/kg was compared to the sum of reported results for TPH-diesel and TPH-motor oil. Seven soil samples exceeded the residual fuel ESL. As set forth in summary in Table 1, the maximum TPH-diesel and -motor oil detections were 8,900 and 7,500 mg/kg, respectively, in BH -2 at 12 feet. The only exceedances of the TPH-gasoline ESL were in the samples at BH-2 at 12 feet and in BH-4 at 12 feet. In general, TPH exceedances were found in soil samples collected at or near the top of the site ground water table (12-16 feet bgs).

2.3 CHEMICAL OCCURRENCE IN GROUND WATER

During the field investigations summarized in Section 1.2, 28 grab ground water samples were collected from 23 boring locations at the site and its vicinity. In addition, samples were collected from the three product recovery wells installed by Clearwater in 2008 and analyzed for TPH-diesel. The ground water laboratory results are summarized in Table 2. Full laboratory reports for the various sampling events are contained in the investigation reports discussed in Section 1.2.

As described above for soils, ESLs are provided on Table 2 for comparison purposes.

As with soil, chemical detections in ground water were well below screening levels, with the exception of TPH. As discussed above, chromatograms of samples collected during previous investigations indicate that the TPH detected is a highly weathered heavy fuel oil, such as Bunker C or fuel oil #6. TPH detections in ground water samples were higher than the screening levels at several grab sampling locations. The highest TPH-diesel and -motor oil concentrations were associated with water samples collected from soil borings and may represent effects of incorporation of impacted soil particles rather than actual ground water conditions. Detections of TPH-diesel in samples collected from the product recovery wells, which were installed in locations reported to have substantial TPH impacts, were substantially lower than grab samples and were lower than the ESL following silica gel cleanup.

2.4 CHEMICAL OCCURRENCE IN SOIL GAS

Soil vapor samples were collected at 15 locations on the site and in the street and front yards of residences west of the site. Results of the soil vapor sample analyses were compared to the residential and commercial/industrial CHHSLs and ESLs.

Results from 2009 vapor sampling (2009 ERM Investigation) identified potential off-site sources (e.g., auto maintenance facilities) due to a pattern of higher concentrations in off-site locations ASV-3 and ASV-4 than in on-site locations ASV-1 and ASV-2. As set forth in summary in Table 3, samples collected in 2010 between the Lucasey site and near the residences downgradient of the site had no detectable levels of benzene, ethylbenzene, TPH-gasoline, TPH-diesel, or naphthalene. The 2010 data (2010 Site Investigation) support the conclusion that detections of benzene and ethylbenzene in the 2009 sampling are a result of activities conducted off the Lucasey site (e.g., releases from parking and maintenance of cars along E.11th Street). As set forth in summary in Table 3, the sampling conducted in the residential yard indicates that, regardless of the source, impacts do not appear to extend to the residences.

Analytical results for soil vapor are summarized on Table 3.

2.5 OCCURRENCE OF FREE PRODUCT

Previous investigation reports indicate the observance of "free product" at several boring locations both on site and southwest of the site. During the installation of product monitoring wells in 2010 both on and off site in the same areas where free product had been previously reported, ERM observed petroleum staining from depths of approximately 10 to 18 feet in the borings, but no flowing free product.

Data gathered from wells installed in 2010 indicate that any product present in the subsurface is not mobile. Minor amounts of product were observed in 2010 in some of the wells immediately after installation. During the subsequent 9 months of monitoring, no measurable product has been observed either on or off site. The only indication that any product is present is the 2010 observations of staining on the monitor probe in wells MW-1A, MW-1B, and MW-2A (Table 4).

The possible occurrence of product has been confined to the north and south of the Lucasey site by borings B-1 and B-2 as set forth in summary in Tables 1 and 2. Further delineation to the east and west is prevented by existing structures. The maximum extent of practical product delineation has occurred.

3.0 ASSESSMENT OF RISKS ASSOCIATED WITH SITE CONDITIONS

This section identifies the chemicals of potential concern at the site based on the information provided in Section 2 and assesses the associated risks posed to human health and the environment. The discussion includes a description of the physical and chemical characteristics of the chemicals of potential concern, their toxicity, and their potential for migration.

3.1 IDENTIFICATION OF CHEMICALS OF POTENTIAL CONCERN

The chemicals of potential concern at the site have been identified based on comparison of detections in soil, ground water, and soil gas samples to established risk-based screening levels (ESLs and/or CHHSLs). As discussed in Section 2, the only constituents ever reported in soil and ground water at concentrations in excess of these screening levels are TPH compounds, primarily as residual fuel oil. Soil gas results from 2010 indicate that levels of benzene and ethylbenzene that exceeded ESLs and/or CHHSLs are a result of offsite activities.

3.1.1 Migration Potential

The most likely source of the residual fuel oil is the UST identified during the AEI Phase I as discussed in Section 1.2. The fuel oil UST was likely not used after the early 1970s, because the cannery operating at the site switched over to natural gas at that time. Therefore, the oil source and driving head have not been present for more than 30 years, and subsurface migration of the fuel oil likely stopped decades ago.

From review of the boring logs and hydrogeologic conditions at the site, it appears that the vast majority of the fuel oil is trapped below the water table. Based on data from 1992 to 2007 from a nearby site (2301 E. 21st Street), the water levels fluctuated only about 3 feet during that 15-year period. This is consistent with an interpreted maximum range for water levels for the Lucasey site of about 11 to 15 feet bgs based on the smear zone at Boring SB-22. This results in the residual oil in soil deeper than 14 or 15 feet as being permanently trapped, because the soil pores are always filled with water.

For the residual oil in soil at depths between 11 and 15 feet, it appears that the balance of several factors has resulted in the oil being immobile under

current conditions: (1) low oil saturation versus high water saturation, (2) high oil viscosity, (3) generally low hydraulic conductivity soil type, and (4) lack of a driving head.

3.2 EVALUATION OF POTENTIAL THREAT TO HUMAN HEALTH AND THE ENVIRONMENT

Theoretically, if chemical constituents were present in the various site media at levels of concern, exposures to impacted soil or water could represent a potentially unacceptable health risk to human receptors (1) on the subject property or (2) the residences along E. 11th Street that are adjacent to the subject property. Evaluation of chemical occurrence patterns and the land uses suggests that this is not a concern.

3.2.1 Subject Property

As discussed in Section 1, the subject property currently is a commercial/industrial use. No residential properties are present within the site boundaries. Buildings and pavement cover the entire property. Therefore, no soils are exposed at the site or immediate vicinity, and, given current land use, there is no potential for direct contact with soils and the chemicals within them.

Chemical detections in ground water are also unlikely to pose a threat to the health of site users. No water supply wells are currently present on the subject property, and a site user is not likely to come into direct contact with ground water.

Soil gas data indicate that VOCs are not present at appreciable concentrations in soil gas, and none of the detections exceed the ESLs and CHHSLs. Therefore, emission of volatile constituents from soil and ground water into the overlying soil column exposure pathway does not appear to represent a threat to current or future site users.

3.2.2 Adjacent Property – Sidewalk and Street

TPH-impacted soils and product may be present in ground water beneath and immediately proximate to the site (i.e., beneath the sidewalk and E. 11th Street). Therefore, the potential for adverse health effects to street workers was also evaluated. Because the ground surface is covered with sidewalk and road, direct contact to underlying soils is not possible under current conditions.

If sidewalk or roadway repair were to be performed, there would be the potential for direct contact by those repair workers to impacted soils. Soil impacts have been observed at or below 10 feet bgs. Therefore, direct exposures to soils within the sidewalk/street areas should not pose an unacceptable risk to human health.

Ground water is encountered below the depths in which workers involved in road construction or utility maintenance would typically be working, and dewatering would typically not be required. Under those circumstances, direct exposures to ground water would not be anticipated. However, for certain types of utilities, in particular deeper sewers, ground water could be encountered. Given the short duration of such activities, direct exposures to ground water should not pose an unacceptable risk to human health.

As discussed above, based on the relatively low chemical detections in soil gas compared to applicable screening levels (Section 2.4, Table 3), emission of volatile constituents from soil or ground water does not appear to represent a threat to off-site maintenance workers.

3.2.3 Adjacent Property – Residences across E. 11th Street

TPH detections been reported in soil and ground water in this area. Therefore, the potential for adverse health effects to residents at these properties was also evaluated.

As discussed above, observed soil impacts are at or below 10 feet bgs. Therefore, direct exposures to soils in the residential area should not pose an unacceptable risk to human health.

There is no evidence that ground water is used for any purpose by residents, nor is it likely that any excavation or planting would be deep enough to encounter impacted ground water.

The lack of any exceedances of ESLs or CHHSLs in soil gas collected on the residents' property supports the conclusion that emission of volatile constituents from soil or ground water does not appear to represent a threat to off-site residents.

4.0 DEVELOPMENT OF CLEANUP GOALS

This section presents the target cleanup goals developed for the site, including a summary of the beneficial property uses.

4.1 BENEFICIAL USES SUMMARY

Site ground water is not currently in use. There are no known residential-use wells or irrigation wells in the area around the site and no planned future use for ground water at the site.

The nearest surface water bodies within proximity of the site are Sausal Creek approximately 800 feet northeast of the site and a tidal canal of San Francisco Bay (Brooklyn Basin) approximately one-half mile south of the site. Neither of these water bodies is impacted by on-site contamination.

4.2 TARGET CLEANUP GOALS

The following target cleanup goals have been developed based on review of the data and response to ACHCSA comments on work conducted to date on the site:

- Removal of mobile free product to the extent practicable; and
- Ensure that soil vapor does not pose a risk to in-door air for off-site residences.

5.0 SELECTION OF REMEDIAL ACTION ALTERNATIVE

ERM has developed remedial action alternatives potentially capable of meeting the target cleanup goals for the site. This section describes the development process for the remedial action alternatives and the methodology used to evaluate each alternative, and provides an evaluation of each alternative against standard screening criteria.

5.1 TECHNOLOGY SCREENING

Various remedial technologies and process options were screened to identify those that have the potential to meet the target cleanup goals for the chemical constituents identified at the site. The screenings of technology process options for various environmental media are summarized in Table 6. Based on the screening, those technology process options least suitable for addressing impacted media and achieving target cleanup goals were eliminated. Those technology process options considered technically effective, implementable given current knowledge of the site, and cost-effective relative to competing options were retained and evaluated to develop remedial alternatives.

5.2 REMEDIAL ALTERNATIVE DEVELOPMENT

The following three remedial action alternatives were retained for further analysis:

- **Alternative 1** – Monitored Natural Attenuation;
- **Alternative 2** – Ozone Sparging; and
- **Alternative 3** – Excavation/Soil Source Removal.

The following subsections present a conceptual description of each alternative in sufficient detail for evaluation and comparison of the alternatives later in this document.

5.3 REMEDIAL ALTERNATIVE EVALUATION

This section provides detailed descriptions and a comparative analysis of the remedial alternatives presented in Section 5.2. The comparative

analysis evaluates the relative advantages and disadvantages of each of the alternatives with respect to effectiveness, implementability, and cost (described below).

5.3.1 Evaluation Criteria

The three criteria that were used in evaluating the candidate alternatives are defined below.

- **Effectiveness.** This criterion measures how well the alternative meets the target cleanup goal, and the time required to achieve it. Effectiveness also measures the long-term reliability of the alternative, including any uncertainties that may be associated with the alternative, the magnitude of residual risk posed by the presence of untreated waste or treatment residuals, and the adequacy of institutional actions or containment measures needed to manage residual risk. Finally, this criterion assesses the potential impact on the environment during remediation and the effectiveness of the proposed remedial measures.
- **Implementability**. This criterion measures the ease or difficulty of conducting the proposed remedial action. Included in this criterion are the technical feasibility of the alternative, the ease of undertaking additional actions, and the ability to monitor the effectiveness of the action. Additionally, it assesses the availability of the required equipment, materials, and services, as well as site-specific constraints. This criterion also measures the administrative feasibility (i.e., permit availability and regulatory acceptance) of the action and the likelihood of public acceptance of the action. This criterion favors proven technologies that are widely available and simple to implement or construct and operate.
- **Cost**. The cost criterion assesses the financial burden associated with implementing the remedial action alternative. The factors that are addressed include direct and indirect capital costs, and operation, monitoring, and maintenance costs, if applicable. Direct capital costs include construction costs or expenditures for labor, materials, equipment, and subcontractors associated with the remedial action. Indirect capital costs include expenditures for engineering, permitting, construction management, and other services necessary to carry out the remedial action. Operation and maintenance (O&M) costs include operational labor and maintenance materials associated with the extended O&M and reporting for each alternative. Costs are evaluated in terms of present worth and are presented in Table 7.

The components of the remedial alternatives are summarized later in this section. A detailed analysis was performed for each alternative relative to the evaluation criteria, the results of which are comparatively presented in Section 5.4 and summarized in Table 8.

5.3.2 Alternative 1 – Monitored Natural Attenuation

The monitored natural attenuation alternative includes no active remediation and relies on the natural abilities of the subsurface to reduce the mass, toxicity, mobility, volume or concentration of the chemicals of potential concern to achieve site-specific cleanup goals. Several processes contribute to natural attenuation of chemicals, including:

- Biodegradation;
- Dispersion;
- Dilution;
- Sorption;
- Volatilization; and
- Chemical or biological stabilization, transformation, or destruction.

The capabilities of natural attenuation depend on geologic and hydrogeologic characteristics of the aquifer, the physical and chemical properties of the soil, and the metabolic capabilities of the native microbes. Natural attenuation can prove to be a viable remediation alternative under favorable conditions. Residual fuel oil TPH, the predominant chemical mixture present at and near the site, is amenable to natural attenuation, provided the indigenous microorganisms have an adequate supply of nutrients and electron acceptors, and biological activity is not inhibited by substances toxic to the organisms. Where site data shows contaminant plume stability and decreasing concentrations at rates acceptable for human health risk concerns, natural attenuation may be used to achieve cleanup goals without the assistance of active remediation. Based on product monitoring, the extent of mobile product in site ground water appears to have decreased and be stable. To date, no measurable product has been observed in any of the on- or off-site product monitoring wells. Natural attenuation has proven to be effective.

Monitoring conducted from March through October 2010 indicated that no mobile free product is present in either on- or off-site monitoring wells. No additional monitoring would be performed under this alternative.

5.3.3 Alternative 2 – Ozone Sparging

In situ chemical oxidation (ISCO) using ozone is one of the presumptive methods to remediate hydrocarbons. Ozone is a strong oxidizer that will, upon contact, oxidize, or destroy, any hydrocarbons. Unlike many other chemical oxidizers, ozone is a gas, which enables it to migrate more easily through fine-grained soils. To maximize mass transfer to ground water, ozone is commonly injected into sparge wells where small fine bubbles of ozone are generated and dispersed through the subsurface. Also, as an ancillary benefit, upon decomposition, ozone provides oxygen to the microbial community, which can aid in bioremediation of TPH and VOCs due to increased dissolved oxygen concentrations in ground water beneath the site.

Under this alternative, 2-inch sparge wells screened in the saturated zone would be installed in the area of interest. Using a plasma arc connected to an air compressor, ozone would be created from air and injected through underground piping into the sparge wells. Each wellhead would be fitted with an airtight seal. In addition, a vapor extraction system would be implemented to capture any residual ozone.

Long-term feasibility testing would be required to determine the remedial effectiveness of ISCO; therefore, the majority of the infrastructure (sparge wells, underground piping, and power drop, etc.) would need to be installed even for the multi-month feasibility test.

The effectiveness of ISCO may be limited due to low permeability subsurface conditions and may require extended periods of implementation.

5.3.4 Alternative 3 – Excavation/Soil Source Removal

Excavation can be used to remove saturated sediments containing petroleum hydrocarbons, if conditions are appropriate. With this method, impacted soil is excavated, hauled off site for disposal, and replaced with clean backfill material.

Excavation dewatering would be required to facilitate an excavation event. The dewatering would be performed using a trash pump placed in the excavation. The pump would be connected by hoses to a sedimentation tank to remove solids, followed by granulated activated carbon treatment to remove organics. The treated water would be

discharged to the sanitary sewer and conveyed to the publicly owned treatment works (POTW).

5.4 COMPARATIVE ANALYSIS OF ALTERNATIVES

The three remedial action options summarized above were evaluated with respect to the evaluation criteria. The findings of this analysis are listed in Table 8, and summarized below.

5.4.1 Effectiveness

Alternative 3 includes the removal of all impacted soil and associated product from the site, as well as impacted ground water. Under this alternative, excavated soil would be disposed of off site in a landfill and the product and impacted ground water would be removed by pumping and treated prior to disposal at the POTW. Because the soil source and product would be removed under this alternative, the residual risk would be minimal to human health, the environment, and the beneficial uses of ground water. In addition, natural attenuation of the dissolved-phase impacts remaining after source removal would permanently reduce risk to the beneficial uses of ground water. This option could pose a greater short-term risk to workers and the community due to truck traffic required to transport the soil off-site and potential direct contact with impacted soils, ground water, and product. Volatilization of chemicals during soil excavation activities could also pose a short-term risk.

Alternative 2 is an adequate and reliable method to treat soil and ground water in order to achieve the cleanup goal, although the heterogeneous lithology at the site may reduce its effectiveness. In addition, natural attenuation of the dissolved-phase impacts remaining after source removal would permanently reduce risk to the beneficial uses of ground water. The off-gas resulting from implementation of Alternative 2 would need to be monitored and possibly treated prior to discharge. Potential additional short-term risks for this option include those associated with exposure to ground water during sampling events.

Alternative 1 has already been implemented and continues to be implemented. LNAPL, sorbed constituents, and dissolved constituents will also degrade under Alternative 1. This option would not produce short-term risk to the community or workers because no remedial activities would be performed. The remedial goal of removing free product has already been achieved. Monitoring over a 9-month period

has indicated that free product is not mobile enough to be collected and removed from on- or off-site product monitoring wells.

5.4.2 Implementability

Alternative 1 is the easiest to implement, as limited additional actions are required.

Alternative 2 will require the installation of product recovery or sparge wells, as well as additional monitoring wells to monitor bioremediation rates and effectiveness. Alternative 2 involves minimal aboveground equipment and requires a low to moderate amount of equipment maintenance. Depending on concentrations and emission rates, one or more off-gas treatment units may be required on the surface. This alternative would require regular O&M visits to the site. If sparge wells and piping are required for installation in E. 11th Street, significant disruption of traffic would occur.

Alternative 3 – Excavation/Soil Source Removal is the least implementable option. The product plume lies directly beneath the parking lot of the active manufacturing facility as well as E. 11th Street. This would significantly disrupt operations at the manufacturing facility as well as traffic travelling along E.11th Street. Over ten feet of unimpacted overburden would need to be removed to access the impacted soils. In addition, several utilities pass through the footprint of the excavation area, which would make excavation more disruptive.

5.4.3 Cost

The estimated costs are as follows:

- Alternative 1 = $35,000 (abandoning the on- and off-site wells).
- Alternative 2 = $759,000
- Alternative 3 = $2,318,000. Note that the cost provided for Alternative 3 does not include the additional costs associated with excavation of soil from E. 11th Street.

A summary of the estimated costs is listed in Table 8, and a detailed breakdown of costs is included for Alternatives 1 through 3 in Tables 9 through 11, respectively.

5.5 SELECTED ALTERNATIVE

Based on the implementability, cost, and the effectiveness of the outcomes, ERM recommends Alternative 1 – Monitored Natural Attenuation as the selected remedial alternative. This alternative addresses the site-specific cleanup goals of:

- **Removal of mobile free product to the extent practicable**: Monitoring of product observation wells installed and designed to definitively determine whether mobile product was present at the site has indicated no mobile free product is present where it was reported during previous investigations.
- **Ensure that soil vapor does not pose a risk to indoor air for off-site residences**: Soil vapor sampling has demonstrated that applicable screening levels are not exceeded adjacent to residences, therefore no risk is posed to offsite residences.

The monitored natural attenuation alternative will also continue to reduce the mass, toxicity, mobility, volume, or concentration of the chemicals of potential concern in site soil and ground water through biodegradation, dispersion, dilution, sorption, volatilization, and chemical or biological stabilization, transformation, or destruction. Furthermore, this alternative provides for the most sustainable option in that cleanup goals are achieved with the least amount of additional current or future resources.

The ozone sparging and excavation alternatives would be no more effective at achieving site-specific cleanup goals than the selected alternative. Ozone sparging would be expensive and disruptive to both site operations and traffic along E.11th Street. The excavation alternative would cause major disruptions in the operations at the site (including use of utilities) as well as traffic along E.11th Street, would be cost-prohibitive.

6.0 REFERENCES

AEI Consultants, 2004. *Phase I Environmental Site Assessment- 2744 E. 11th Street, Oakland, California*. August.

AEI Consultants, 2004. *Phase II Subsurface Investigation- 2744 E. 11th Street, Oakland, California*. September.

California Environmental Protection Agency, 2005. *Human-Exposure-Based Screening Numbers Developed to Aid Estimation of Cleanup Costs for Contaminated Soil*. Revised January 2005.

California Regional Water Quality Control Board (RWQCB), San Francisco Bay Region, 2005. *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Interim Final*. Revised May 2008.

Clearwater Group, 2004. *Phase II Subsurface Investigation Report- 2744 E. 11th Street, Oakland, California*. September.

Clearwater Group, 2007. *Soil and Groundwater Investigation Report- 2744 E. 11th Street, Oakland, California*. March.

Clearwater Group, 2008. *Results of Gore-Sorber Soil Vapor Survey and Recovery Well Installation- 2744 E. 11th Street, Oakland, California*. August.

ERM, 2009. *Site Investigation Results – Lucasey Site- 2744 E. 11th Street, Oakland, California*. August.

ERM, 2010. *Site Investigation Report – Lucasey Site- 2744 E. 11th Street, Oakland, California*. July.

Terra Firma, 2005. *Phase II Subsurface Investigation- 2744 E. 11th Street, Oakland, California*. July.

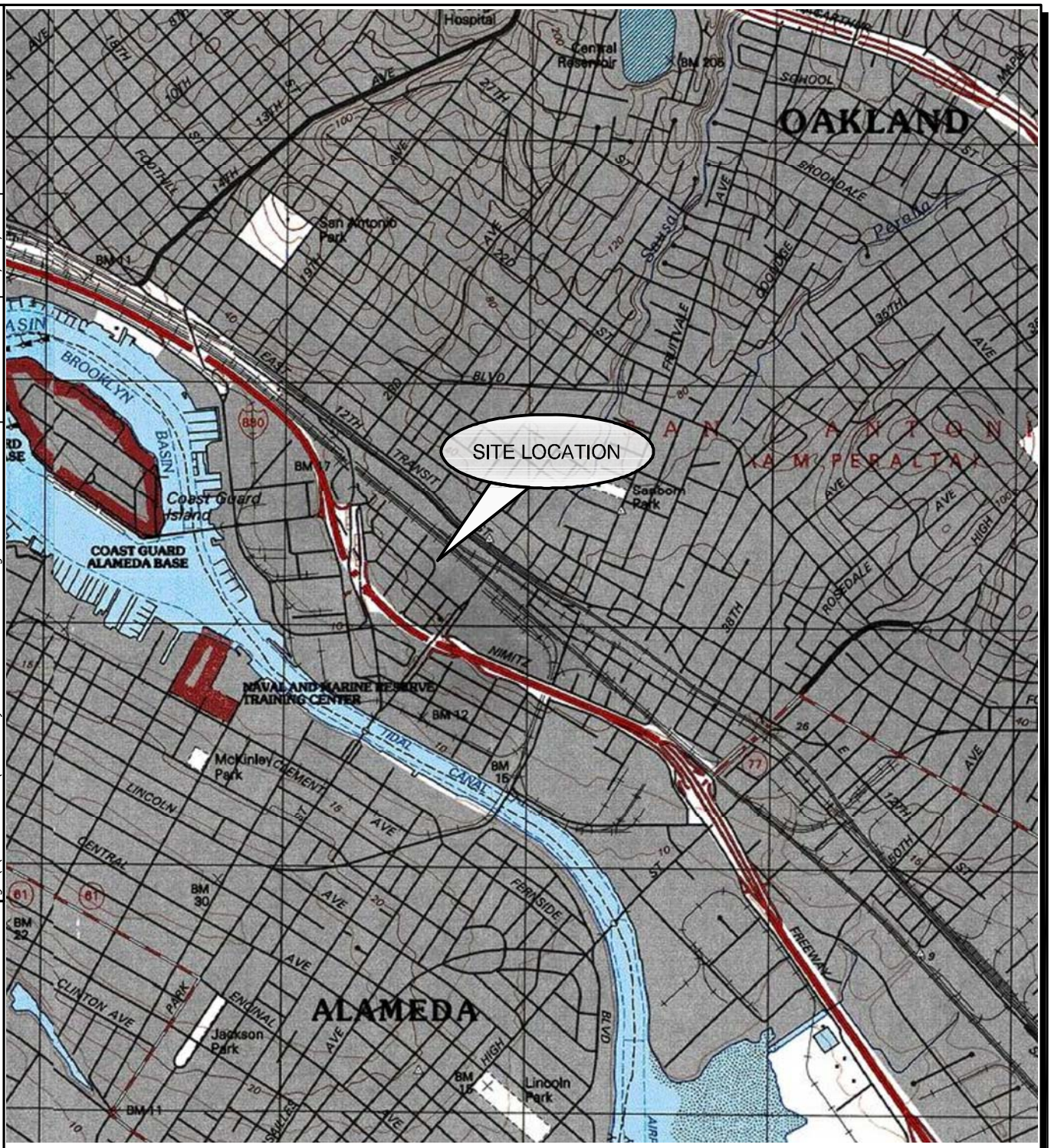
Figures

Project No. 0097888.00

Date: 03/21/11

Drawn By: J. Estrada

CAD File: g:\0097888\Lucasey site location.dwg



SCALE 1: 24,000

1 1/2 0 1 MILE

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1 .5 0 1 KILOMETER

N

References:
TOPO!®Software
U.S.G.S. 7.5 Minute Series (Topographic) Quadrangle,
Oakland East, California
Dated: 1997

Figure 1
Site Location Map
Lucasey Manufacturing
2744 East 11th Street
Oakland, California

ERM 03/11

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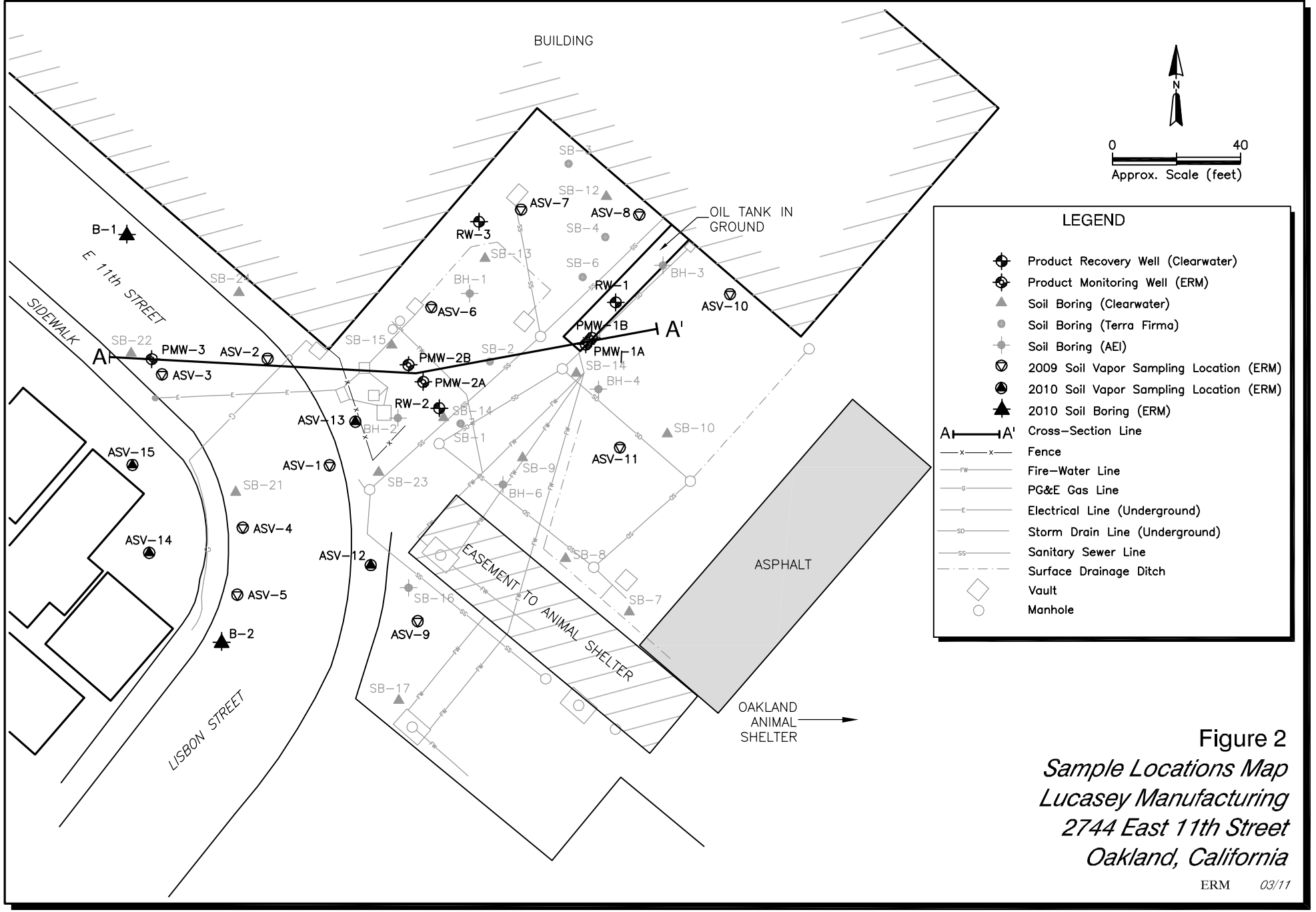

Figure 2

Sample Locations Map
Lucasey Manufacturing
2744 East 11th Street
Oakland, California

ERM 03/11

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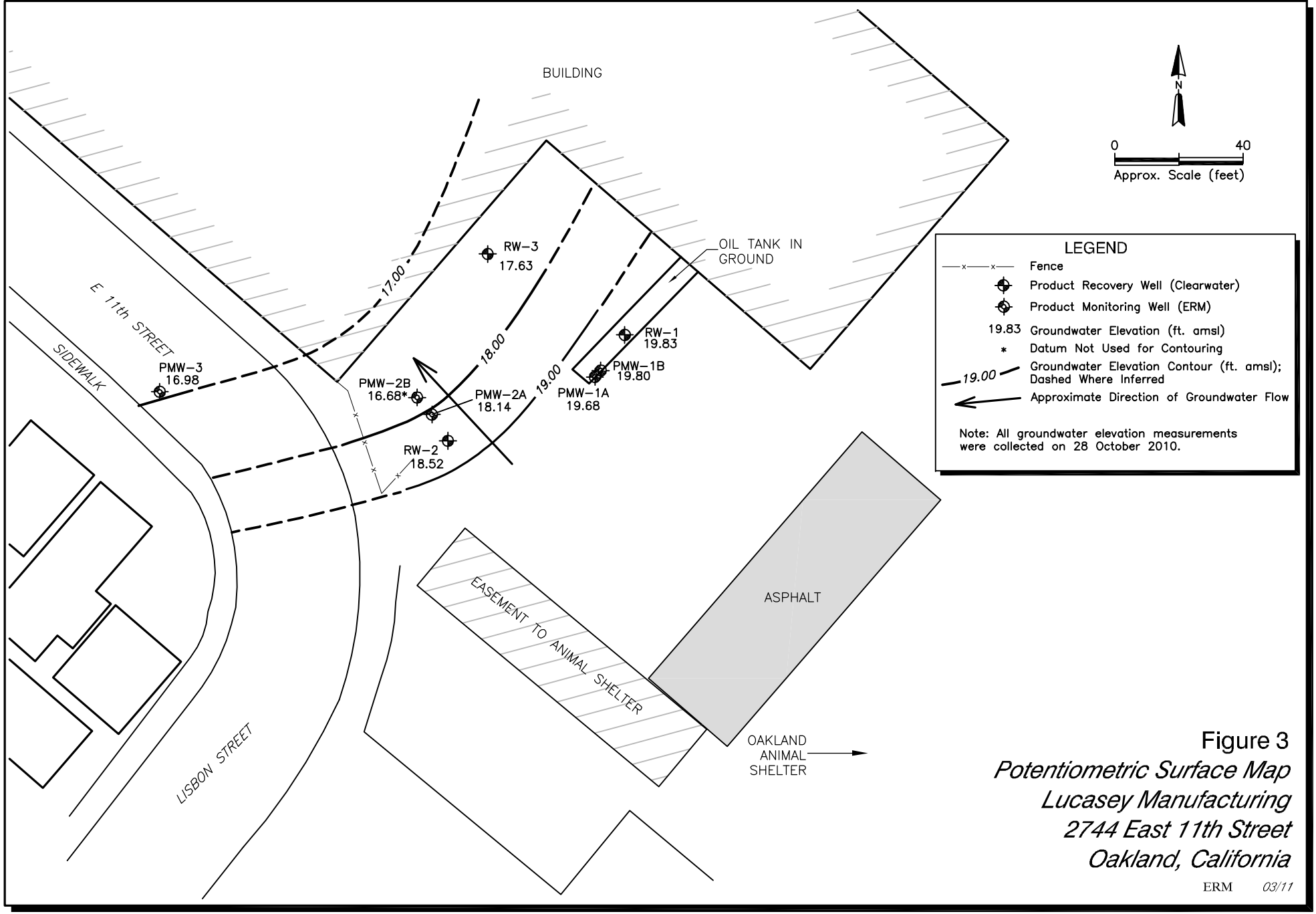

Figure 3

Potentiometric Surface Map
Lucasey Manufacturing
2744 East 11th Street
Oakland, California

ERM 03/11

Project No. 0097888.02
Date: 07/27/10
Drawn By: R. Olson
CAD File: G:\0097888\0097888800-06.dwg

A

A'

PMW-3

PMW-2B

PMW-2A

PMW-1A

PMW-1B

FEET BELOW GROUND SURFACE

0

5

10

15

20

25

30

SILTY SAND

SILT

GRAVELLY SILT

SILTY SAND

FINE SAND

SANDY GRAVEL

CLAY

CLAYEY GRAVEL

SILTY SAND

FILL

SILT

CLAY

SANDY GRAVEL

GRAVELLY CLAY

CLAYEY SAND

SILT

SANDY GRAVEL

CLAYEY GRAVEL

GRAVELLY SAND

CLAY

CLAYEY SAND

ASPHALT, CONCRETE, AND/OR ROADBASE

FILL AND BACKFILL

CLAY

GRAVELLY CLAY

SILT & GRAVELLY SILT

CLAYEY SAND

SILTY SAND

FINE SAND

GRAVELLY SAND

CLAYEY GRAVEL

SANDY GRAVEL

OCCURRENCE OF PRODUCT IN BORING SAMPLES

PMW-2B

WELL ID

WELL

WELL SCREEN

SILT TRAP

WATER LEVEL (AT TIME OF DRILLING)

(Vertical Exaggeration = 2X)

VERTICAL SCALE IN FEET
1" = 5'

HORIZONTAL SCALE IN FEET
1" = 10'

Figure 4
Cross Section A-A'
Lucasey Manufacturing
2744 East 11th Street
Oakland, California

ERM 03/11

Tables

Table 1
Soil Sampling Data
Lucasey Site - 2744 E. 11th Street
Oakland, California

Sample ID	Depth (ft)	Sample Date	Volatile Organic Compounds									Total Petroleum Hydrocarbons		
			Benzene	Toluene	Ethyl-benzene	Xylenes (Total)	MTBE	EDB	1,2-DCA	TCE	PCE	TPH (as Gasoline)	TPH (as Diesel)	TPH (as Motor Oil)
ESL*			**0.044**	**2.9**	**3.3**	**2.3**	**0.023**	**NA**	**0.0045**	**0.46**	**0.7**	**83**	**5000****	**5000****
BH-1	12	07/09/05	<0.005	<0.005	<0.005	<0.005	<0.05	-	-	-	-	<1	22	83
BH-1	16	07/09/05	<0.005	<0.005	<0.005	<0.005	<0.05	-	-	-	-	4.8	48	46
BH-2	12	07/09/05	<0.5	<0.5	<0.5	<0.5	<5	-	-	-	-	**700**	**8,900**	**7,500**
BH-3	7.5	07/09/05	<0.005	<0.005	<0.005	<0.005	<0.05	-	-	-	-	7.4	50	79
BH-4	12	07/09/05	<0.02	<0.02	<02	0.23	2	-	-	-	-	**89**	2,800	3,000
BH-6	12	07/09/05	<0.005	<0.005	<0.005	<0.005	<0.05	-	-	-	-	<1	41	53
BH-6	16	07/09/05	<0.05	<0.05	<0.05	<0.05	<05	-	-	-	<0.50	73	1,800	1,700
SB7-5	5	01/10/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<1	<10	<50
SB7-17.5	17.5	01/11/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<1	<10	<50
SB7-23	23	01/11/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<1	<10	<50
SB8-5	5	01/10/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB8-15	15	01/10/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB8-23.5	23.5	01/10/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB8-26.5	26.5	01/10/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB9-5	5	01/09/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB9-10	10	01/09/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB9-11.5	11.5	01/09/07	VP	-	-	-	-	-	-	-	-	-	-	-
SB9-16	16	01/22/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	140	93
SB9-18	18	01/09/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	18	<50
SB9-22	22	01/09/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB10-5	5	01/10/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB10-12	12	01/10/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB10-23	23	01/10/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB11-5	5	01/09/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB11-12	12	01/10/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	11	3,300	2,500
SB11-22	22	01/09/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
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SB12-11	11	01/08/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	370	85
SB12-14	14	01/19/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	470	270
SB12-26	26	01/08/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB12-34	34	01/08/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	1.4	170	<50
SB13-5	5	01/08/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB13-10	10	01/08/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50

Table 1
Soil Sampling Data
Lucasey Site - 2744 E. 11th Street
Oakland, California

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SB13-14	14	01/08/07	VP	-	-	-	-	-	-	-	-	-	-	-
SB13-18	18	01/08/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB13-26	26	01/22/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	170	110
SB13-30	30	01/08/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB14-10.5	10.5	01/12/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB14-11.5	11.5	01/12/07	VP	-	-	-	-	-	-	-	-	-	-	-
SB14-13.5	13.5	01/12/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB14-17	17	01/12/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	14	3,800	2,500
SB14-23	23	01/12/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB15-5	5	01/09/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB15-15	15	01/19/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	21	**5,300**	3,400
SB15-19.5	19.5	01/22/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	36	20
SB15-23	23	01/19/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	18	1,800	1,100
SB15-27	27	01/09/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB21-5	5	01/11/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB21-10	10	01/11/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB21-11	11	01/19/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	1.0	770	800
SB21-13.5	13.5	01/19/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	520	630
SB21-22	22	01/11/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB22-10	10	01/12/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB22-11.5	11.5	01/24/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	4.3	2,600	3,800
SB22-15	15	01/12/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB23-5	5	01/11/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<1	<10	<50
SB23-15	15	01/11/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<1	<10	<50
SB23-23	23	01/11/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<1	<10	<50
SB23-29	29	01/11/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
SB24-5	5	01/12/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	23	<50
SB24-11.5	11.5	01/19/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	29.0	2,300	3,600
SB24-18	18	01/12/07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<1	<10	<50
B-1 - 4.5- 5	4.5- 5	03/04/10	<0.005	<0.005	<0.005	<0.010	-	-	-	-	-	<0.1	<9.5	<19
B-1 - 9.5 - 10	9.5-10	03/04/10	<0.0049	<0.0049	<0.0049	<0.0098	-	-	-	-	-	<0.098	<9.9	<20
B-1 - 15.5 - 16	15.5-16	03/04/10	<0.005	<0.005	<0.005	<0.099	-	-	-	-	-	<0.099	<10	<20
B-1 - 19.5 - 20	19.5-20	03/04/10	<0.005	<0.005	<0.005	<0.010	-	-	-	-	-	<0.1	<19	<38
B-2 - 4.5- 5	4.5- 5	03/04/10	<0.005	<0.005	<0.005	<0.099	-	-	-	-	-	<0.099	<10	<20
B-2 - 9.5 - 10	9.5-10	03/04/10	<0.005	<0.005	<0.005	<0.099	-	-	-	-	-	<0.099	<9.9	<20
B-2 - 15.5 - 16	15.5-16	03/04/10	<0.0049	<0.0049	<0.0049	<0.0098	-	-	-	-	-	<0.098	<9.9	<20
B-2 -20 -20.5	20-20.5	03/04/10	<0.005	<0.005	<0.005	<0.099	-	-	-	-	-	<0.099	<10	<20

Key:

Concentrations reported in milligrams per kilogram (mg/kg)
Bold results exceed the ESL

- Not analyzed for this compound

< = less than; compound not detected at the laboratory reporting limit

VP = Consultant reported sample contained visible product, therefore not run for analysis at laboratory

* San Francisco Regional Water Quality Control Board Environmental Screening Levels for deep soils (>3 meters), ground water potentially used for drinking water, commercial/industrial land use

** review of chromatograms indicates the TPH quantified is highly weathered heavy fuel oil, therefore the ESL for TPH residual fuels is applied

Table 2
Ground Water Sampling Data
Lucasey Site - 2744 E. 11th Street
Oakland, California

Sample ID	Sample Date	Volatile Organic Compounds					Total Petroleum Hydrocarbons				
		Benzene	Toluene	Ethyl-benzene	Xylenes (Total)	MTBE	TPH (as Gasoline)	TPH (as Diesel)	TPH (as Motor Oil)	TPH (as mineral spirits)	TPH (as kerosene)
ESL*		**1**	**40**	**30**	**20**	**5**	**100**	**100**	**100**	**100**	**100**
Grab Ground Water Samples											
SB-1W	08/31/04	<0.5	<0.5	<0.5	<0.5	<0.5	**650**	**520,000**	**520,000**	-	-
SB-2W	08/31/04	<0.5	<0.5	<0.5	<0.5	<0.5	**2,200**	**110,000**	**89,000**	-	-
SB-3W	08/31/04	<0.5	<0.5	<0.5	<0.5	<0.5	<50	<50	<250	-	-
SB-4W	08/31/04	<0.5	<0.5	<0.5	<0.5	<0.5	**3,800**	**560,000**	**410,000**	-	-
SB-6W	08/31/04	<0.5	<0.5	<0.5	<0.5	<0.5	**130**	**8,700**	**6,900**	-	-
BH-2	07/09/06	<0.5	<0.5	<0.5	<0.5	<0.5	**310**	**580,000**	**510,000**	-	-
BH-4	07/09/06	<0.5	<0.5	<0.5	<0.5	<0.5	<50	**160,000**	**150,000**	-	-
BH-5	07/09/06	<0.5	<0.5	<0.5	<0.5	<0.5	<50	**670**	**2,800**	-	-
SB7-W	01/11/07	<0.5	<0.5	<0.5	<0.5	<0.5	<25	<50	<500	-	-
SB8-W	01/10/07	<0.5	<0.5	<0.5	<0.5	<0.5	<25	3	<500	-	-
SB9-W	01/09/07	VP	-	-	-	-	-	-	-	-	-
SB8-W23.5	01/10/07	<0.5	<0.5	<0.5	<0.5	<0.5	<25	**390**	<500	-	-
SB10-W16	01/10/07	<0.5	<0.5	<0.5	<0.5	<0.5	<25	<50	<500	-	-
SB10-W23	01/10/07	<0.5	<0.5	<0.5	<0.5	<0.5	<25	**340**	<500	-	-
SB11-W	01/09/07	VP	-	-	-	-	-	-	-	-	-
SB12-W	01/09/07	VP	-	-	-	-	-	-	-	-	-
SB13W (18')	01/22/07	<0.5	<0.5	<0.5	0.84	<0.5	**560**	**5,800,000**	**3,000,000**	-	-
SB13W2 (26")	01/22/07	<0.5	<0.5	<0.5	<0.5	0.56	**150**	**140,000**	**70,000**	-	-
SB14-W	01/12/07	<0.5	<0.5	<0.5	<0.5	<0.5	<25	**11,000**	**4,500**	-	-
SB15W	01/09/07	VP	-	-	-	-	-	**-**	-	-	-
SB21-W17	01/11/07	<0.5	<0.5	<0.5	<0.5	<0.5	<25	**730**	<500	-	-
SB21-W26	01/11/07	<0.5	0.54	<0.5	1.7	1.2	<25	**1,500**	**580**	-	-
SB22-W12	01/12/07	VP	-	-	-	-	-	-	**-**	-	-
SB23-W	01/11/07	<0.5	<0.5	<0.5	<0.5	<0.5	<25	**2,800**	**1,500**	-	-
SB23-W23	01/11/07	<0.5	<0.5	<0.5	<0.5	<0.5	<25	**630**	<500	-	-
SB24-W	01/23/07	<0.5	<0.5	<0.5	<0.5	<0.5	**1400**	**430,000**	**210,000**	-	-
B-1-15-25	03/04/10	<1	<1	<1	<2	-	<50	<97	<190	<97	<97
B-2-15-25	03/04/10	<1	<1	<1	<2	-	<50	<98	<200	<98	<98
Product Recovery Well Samples											
RW-1	06/08/09	-	-	-	-	-	-	58/<50[1]	-	-	-
RW-2	06/08/09	-	-	-	-	-	-	140/<50[1]	-	-	-
RW-3	06/08/09	-	-	-	-	-	-	210/88[1]	-	-	-

Key:

Concentrations reported in micrograms per liter (µg/L)

* San Francisco Regional Water Quality Control Board Environmental Screening Levels, ground water potentially used for drinking water

Bolded results exceed the ESL

VP - visible product reportedly observed in sample

- Not analyzed for this compound

< = Less than; compound not detected at the laboratory reporting limit

[1] 1st value without silica gel cleanup, 2nd value with silica gel cleanup

Table 3
Soil Vapor Sampling Results
Lucasey Site - 2744 E. 11th Street
Oakland, California

Sample ID	Sample Date	Benzene	Toluene	Ethyl-benzene	m,p-Xylene	o-Xylene	Naphthalene	TPHg	TPHd	Methylene Chloride	Acetone	1,2,4-Trimethyl benzene	Carbon Disulfide	2-Butanone	Ethanol
CHHSL-residential		36.2	135,000	-	319,000	315,000	31.9	-	-	-	-	-	-	-	-
CHHSL-commercial		122	378,000	-	887,000	879,000	106	-	-	-	-	-	-	-	-
ESL-residential		84	63,000	980	21,000	21,000	72	10,000	10,000	5,200	660,000	-	-	1,000,000	-
ESL-commercial		280	180,000	3,300	58,000	58,000	240	29,000	29,000	17,000	1,800,000	-	-	2,900,000	-
ASV-1	06/17/09	**150**	2,100	130	280	47	<48	NA	NA	NA	NA	NA	NA	NA	NA
ASV-1 duplicate	06/17/09	**170**	2,200	140	310	52	<97	NA	NA	NA	NA	NA	NA	NA	NA
ASV-2	06/17/09	**110**	2,900	250	810	180	<46	NA	NA	NA	NA	NA	NA	NA	NA
ASV-3	06/17/09	**740**	20,000	**1,900**	7,000	1,800	<460	NA	NA	NA	NA	NA	NA	NA	NA
ASV-4	06/17/09	**570**	22,000	**2,600**	10,000	2,900	<470	NA	NA	NA	NA	NA	NA	NA	NA
ASV-5	06/17/09	33	690	62	230	69	<31	NA	NA	NA	NA	NA	NA	NA	NA
ASV-6	06/18/09	14	470	44	180	55	<24	NA	NA	NA	NA	NA	NA	NA	NA
ASV-7	06/18/09	21	700	70	290	90	<25	NA	NA	NA	NA	NA	NA	NA	NA
ASV-7 duplicate	06/18/09	22	720	71	290	88	<25	NA	NA	NA	NA	NA	NA	NA	NA
ASV-8	06/18/09	18	690	54	220	72	<25	NA	NA	NA	NA	NA	NA	NA	NA
ASV-9	06/18/09	12	500	55	230	70	<24	NA	NA	NA	NA	NA	NA	NA	NA
ASV-10	06/18/09	12	370	40	160	54	<23	NA	NA	NA	NA	NA	NA	NA	NA
ASV-11	06/18/09	15	480	49	200	65	<23	NA	NA	NA	NA	NA	NA	NA	NA
Ambient air	06/18/09	4	7	<4.7	<4.7	<4.7	<23	NA	NA	NA	NA	NA	NA	NA	NA
Ambient air	05/10/10	<36	<43	<50	<50	<50	<25	<940	<5,000	<40	50J	<56	<36	<34	12J
ASV-12	05/10/10	<36	39J	<49	37J	<49	<25	<920	<5,000	<39	72J	27J	<35	<33	290
ASV-12 duplicate	05/10/10	<36	38J	<49	39J	<49	<25	<920	<5,000	<39	79J	27J	<35	<33	230
ASV-13	05/10/10	<36	<42	<49	<49	<49	<25	<920	<5,000	<40	<110	<56	<36	<34	100
ASV-14	05/24/10	<42	<50	<58	<58	<58	<25	<1,100	<5,000	<46	510	77	71	71	<100
ASV-14 duplicate	05/24/10	<42	<49	<57	<57	<57	<270	<1,100	<5,000	<46	340	74	83	70	<99
ASV-15	05/24/10	<42	<50	<58	<58	<58	<25	<1,100	<5,000	1,800	<130	<65	<41	<39	150
Lab Blank	05/19/10	<16	<19	<22	<22	<22	35J	<410	<5,000	<17	<48	23J	<16	<15	6J

Key:
CHHSL = OEHHA California Human Health Screening Levels for Soil Gas
ESL = SF Bay Regional Water Quality Control Board Environmental Screening Levels
NA = Not analyzed
- = No numerical value established
Concentrations reported in micrograms per cubic meter ($\mu g/m^3$)
Bold values exceed one or more of ESL or CHHSL criteria
< = Less than; compound not detected at the laboratory reporting limit
J = Estimated value

Table 4
Product Monitoring - Product Monitoring Wells
Lucasey Site - 2744 E. 11th Street
Oakland, California

Well	Date	Measuring Point Elevation (feet-msl)	Construction Depth (feet-bgs)	Screen Interval (feet-bgs)	Depth to Water (feet)	Depth to Product (feet)	Water Elevation (feet msl)	Product thickness (feet)	Notes
PMW-1A	03/03/10	30.18	17.5	7-17	7.12	NA	23.06	0.00	day of well installation
"	03/04/10	30.18	17.5	7-17	6.82	6.81	23.36	**0.01**	day after well installation
"	03/08/10	30.18	17.5	7-17	7.46	NA	22.72	0.00	prior to development
"	03/18/10	30.18	17.5	7-17	7.95	NA	22.23	0.00	product staining on probe
"	03/24/10	30.18	17.5	7-17	8.50	NA	21.68	0.00	no staining on probe
"	04/01/10	30.18	17.5	7-17	8.60	NA	21.58	0.00	no staining on probe
"	04/08/10	30.18	17.5	7-17	8.01	NA	22.17	0.00	no staining on probe
"	05/10/10	30.18	17.5	7-17	9.00	NA	21.18	0.00	no staining on probe
"	06/15/10	30.18	17.5	7-17	9.59	NA	20.59	0.00	no staining on probe
"	07/08/10	30.18	17.5	7-17	9.83	NA	20.35	0.00	no staining on probe
"	07/15/10	30.18	17.5	7-17	9.89	NA	20.29	0.00	product staining on probe
"	07/22/10	30.18	17.5	7-17	9.94	NA	20.24	0.00	product staining on probe
"	07/29/10	30.18	17.5	7-17	10.03	NA	20.15	0.00	product staining on probe
"	08/23/10	30.18	17.5	7-17	10.19	NA	19.99	0.00	product staining on probe
"	09/29/10	30.18	17.5	7-17	10.47	NA	19.71	0.00	product staining on probe
"	10/28/10	30.18	17.5	7-17	10.50	NA	19.68	0.00	product staining on probe
PMW-1B	03/03/10	30.20	25.5	17-25	6.99	6.98	23.21	**0.01**	day of well installation
"	03/04/10	30.20	25.5	17-25	6.71	6.70	23.49	**0.01**	day after well installation
"	03/08/10	30.20	25.5	17-25	7.42	7.40	22.78	**0.02**	prior to development
"	03/18/10	30.20	25.5	17-25	7.91	NA	22.29	0.00	no staining on probe
"	03/24/10	30.20	25.5	17-25	8.46	NA	21.74	0.00	product staining on probe
"	04/01/10	30.20	25.5	17-25	8.58	NA	21.62	0.00	no staining on probe
"	04/08/10	30.20	25.5	17-25	8.02	NA	22.18	0.00	no staining on probe
"	05/10/10	30.20	25.5	17-25	8.89	NA	21.31	0.00	no staining on probe
"	06/15/10	30.20	25.5	17-25	9.51	NA	20.69	0.00	no staining on probe
"	07/08/10	30.20	25.5	17-25	9.76	NA	20.44	0.00	no staining on probe
"	07/15/10	30.20	25.5	17-25	9.82	NA	20.38	0.00	product staining on probe
"	07/22/10	30.20	25.5	17-25	9.90	NA	20.30	0.00	product staining on probe
"	07/29/10	30.20	25.5	17-25	9.96	NA	20.24	0.00	product staining on probe
"	08/23/10	30.20	25.5	17-25	10.09	NA	20.11	0.00	product staining on probe
"	09/29/10	30.20	25.5	17-25	10.39	NA	19.81	0.00	product staining on probe
"	10/28/10	30.20	25.5	17-25	10.40	NA	19.80	0.00	product staining on probe
PMW-2A	03/04/10	30.12	17.5	7-17	8.44	NA	21.68	0.00	day of well installation
"	03/08/10	30.12	17.5	7-17	8.05	NA	22.07	0.00	prior to development
"	03/18/10	30.12	17.5	7-17	9.50	NA	20.62	0.00	no staining on probe
"	03/24/10	30.12	17.5	7-17	10.02	NA	20.10	0.00	no staining on probe
"	04/01/10	30.12	17.5	7-17	10.00	NA	20.12	0.00	no staining on probe
"	04/08/10	30.12	17.5	7-17	9.40	NA	20.72	0.00	no staining on probe
"	05/10/10	30.12	17.5	7-17	10.55	NA	19.57	0.00	no staining on probe
"	06/15/10	30.12	17.5	7-17	11.20	NA	18.92	0.00	no staining on probe
"	07/08/10	30.12	17.5	7-17	11.45	NA	18.67	0.00	no staining on probe
"	07/15/10	30.12	17.5	7-17	11.51	NA	18.61	0.00	product staining on probe
"	07/22/10	30.12	17.5	7-17	11.54	NA	18.58	0.00	product staining on probe
"	07/29/10	30.12	17.5	7-17	11.64	NA	18.48	0.00	product staining on probe
"	08/23/10	30.12	17.5	7-17	11.77	NA	18.35	0.00	product staining on probe
"	09/29/10	30.12	17.5	7-17	12.03	NA	18.09	0.00	product staining on probe
"	10/28/10	30.12	17.5	7-17	11.98	NA	18.14	0.00	product staining on probe

Table 4
Product Monitoring - Product Monitoring Wells
Lucasey Site - 2744 E. 11th Street
Oakland, California

Well	Date	Measuring Point Elevation (feet-msl)	Construction Depth (feet-bgs)	Screen Interval (feet-bgs)	Depth to Water (feet)	Depth to Product (feet)	Water Elevation (feet msl)	Product thickness (feet)	Notes
PMW-2B	03/04/10	30.42	25	21.5-25	9.44	NA	20.98	0.00	day of well installation
"	03/08/10	30.42	25	21.5-25	10.35	NA	20.07	0.00	prior to development
"	03/18/10	30.42	25	21.5-25	10.95	NA	19.47	0.00	no staining on probe
"	03/24/10	30.42	25	21.5-25	11.48	NA	18.94	0.00	product staining on probe
"	04/01/10	30.42	25	21.5-25	11.56	NA	18.86	0.00	no staining on probe
"	04/08/10	30.42	25	21.5-25	11.11	NA	19.31	0.00	no staining on probe
"	05/10/10	30.42	25	21.5-25	12.00	NA	18.42	0.00	no staining on probe
"	06/15/10	30.42	25	21.5-25	12.69	NA	17.73	0.00	no staining on probe
"	07/08/10	30.42	25	21.5-25	13.11	NA	17.31	0.00	no staining on probe
"	07/15/10	30.42	25	21.5-25	13.13	NA	17.29	0.00	no staining on probe
"	07/22/10	30.42	25	21.5-25	13.20	NA	17.22	0.00	no staining on probe
"	07/29/10	30.42	25	21.5-25	13.29	NA	17.13	0.00	no staining on probe
"	08/23/10	30.42	25	21.5-25	13.44	NA	16.98	0.00	no staining on probe
"	09/29/10	30.42	25	21.5-25	13.75	NA	16.67	0.00	no staining on probe
"	10/28/10	30.42	25	21.5-25	13.74	NA	16.68	0.00	no staining on probe
PMW-3	06/25/10	27.59	15	7-14	10.10	10.00	17.49	**0.10**	day of well installation
"	06/30/10	27.59	15	7-14	9.98	9.96	17.61	**0.02**	prior to development
"	07/08/10	27.59	15	7-14	10.06	NA	17.53	0.00	no staining on probe
"	7/15/2010	27.59	15	7-14	10.08	NA	17.51	0.00	no staining on probe
"	7/22/2010	27.59	15	7-14	10.13	NA	17.46	0.00	no staining on probe
"	07/29/10	27.59	15	7-14	10.22	NA	17.37	0.00	no staining on probe
"	08/23/10	27.59	15	7-14	10.35	NA	17.24	0.00	no staining on probe
"	09/29/10	27.59	15	7-14	10.62	NA	16.97	0.00	no staining on probe
"	10/28/10	27.59	15	7-14	10.61	NA	16.98	0.00	no staining on probe

Key:
msl = mean sea level
bgs = below ground surface

Table 5
Product Monitoring - Product Recovery Wells
Lucasey Site - 2744 E. 11th Street
Oakland, California

Well	Date	Measuring Point Elevation (feet-msl)	Construction Depth (feet-bgs)	Screen Interval (feet -bgs)	Depth to Water (feet)	Depth to Product (feet)	Water Elevation (feet msl)	Product thickness	Notes
RW-1	06/05/09	29.88	25	7-25	9.50	NA	20.38	0	no staining on probe
"	03/18/10	29.88	25	7-25	7.60	NA	22.28	0	no staining on probe
"	03/24/10	29.88	25	7-25	8.15	NA	21.73	0	no staining on probe
"	04/01/10	29.88	25	7-25	8.25	NA	21.63	0	no staining on probe
"	04/08/10	29.88	25	7-25	7.70	NA	22.18	0	no staining on probe
"	05/10/10	29.88	25	7-25	8.66	NA	21.22	0	no staining on probe
"	06/15/10	29.88	25	7-25	9.20	NA	20.68	0	no staining on probe
"	07/08/10	29.88	25	7-25	9.43	NA	20.45	0	no staining on probe
"	07/15/10	29.88	25	7-25	9.50	NA	20.38	0	staining on probe
"	07/22/10	29.88	25	7-25	9.54	NA	20.34	0	no staining on probe
"	08/23/10	29.88	25	7-25	9.77	NA	20.11	0	no staining on probe
"	09/29/10	29.88	25	7-25	10.03	NA	19.85	0	no staining on probe
"	10/28/10	29.88	25	7-25	10.05	NA	19.83	0	no staining on probe
RW-2	06/05/09	29.96	25	7-25	11.90	NA	18.06	0	no staining on probe
"	03/18/10	29.96	25	7-25	9.35	NA	20.61	0	no staining on probe
"	03/24/10	29.96	25	7-25	9.89	NA	20.07	0	no staining on probe
"	04/01/10	29.96	25	7-25	9.90	NA	20.06	0	no staining on probe
"	04/08/10	29.96	25	7-25	9.42	NA	20.54	0	no staining on probe
"	05/10/10	29.96	25	7-25	10.35	NA	19.61	0	no staining on probe
"	06/15/10	29.96	25	7-25	10.95	NA	19.01	0	no staining on probe
"	07/08/10	29.96	25	7-25	11.20	NA	18.76	0	no staining on probe
"	07/15/10	29.96	25	7-25	11.26	NA	18.70	0	no staining on probe
"	07/22/10	29.96	25	7-25	11.31	NA	18.65	0	no staining on probe
"	08/23/10	29.96	25	7-25	11.52	NA	18.44	0	no staining on probe
"	09/29/10	29.96	25	7-25	11.77	NA	18.19	0	no staining on probe
"	10/28/10	29.96	25	7-25	11.44	NA	18.52	0	no staining on probe
RW-3	06/05/09	30.19	25	7-25	11.40	NA	18.79	0	no staining on probe
"	04/01/10	30.19	25	7-25	10.62	NA	19.57	0	no staining on probe
"	04/08/10	30.19	25	7-25	10.08	NA	20.11	0	no staining on probe
"	05/10/10	30.19	25	7-25	11.06	NA	19.13	0	no staining on probe
"	06/15/10	30.19	25	7-25	11.75	NA	18.44	0	no staining on probe
"	07/08/10	30.19	25	7-25	11.97	NA	18.22	0	no staining on probe
"	07/15/10	30.19	25	7-25	12.04	NA	18.15	0	no staining on probe
"	07/22/10	30.19	25	7-25	12.15	NA	18.04	0	no staining on probe
"	08/23/10	30.19	25	7-25	12.31	NA	17.88	0	no staining on probe
"	09/29/10	30.19	25	7-25	12.55	NA	17.64	0	no staining on probe
"	10/28/10	30.19	25	7-25	12.56	NA	17.63	0	no staining on probe

Notes:
msl = mean sea level
bgs = below ground surface

Table 6
Remedial Technologies and Process Options
Lucasey Site - 2744 E. 11th Street
Oakland, California

General Response Action	Remedial Technology	Process Option	Applicable Media	Description	Effectiveness	Implementability	Cost	Summary of Screening
Institutional Controls / Limited Action	Institutional Control	Deed Notification /Restriction, Water Use Notification /Restriction	Soil/ground water	Implement deed notification to inform future owners of the presence of potentially hazardous substances at the property and /or implement deed restriction to restrict future use of the property. Implement deed restriction to restrict installation of new wells at the property.	Effectiveness for protection of human health would depend on enforcement of and compliance with deed restrictions.	Technically implementable. Specific legal requirements and authority would need to be met.	Low capital	Potentially applicable in combination with other technologies. Retained.
In Situ Treatment	Biological Treatment	Natural Attenuation	Soil/ground water/LNAPL	Reduction of concentrations through naturally occurring processes such as dilution, volatilization, biodegradation, or adsorption.	Effective for TPH. Will take longer to reach ESLs without source removal.	Technically implementable. Monitoring well network already established.	Low capital. Moderate O&M. Low overall cost relative to active remediation options.	Effective, low cost remedy for contaminants at this site. Retained.
In Situ Treatment	Biological Treatment	Bioventing	Soil	Induce air flow in the subsurface by extraction or injection of air to enhance aerobic biodegradation.	Limited effectiveness at enhancing biodegradation for residual fuels.	Technically implementable.	Low capital. Moderate O&M. Low overall cost relative to other in situ options.	Limited effectiveness for heavy hydrocarbons. Not retained.
In Situ Treatment	Biological Treatment	Soil Vapor Extraction	Soil/soil vapor	Vacuum is applied through extraction pipes to create a pressure/concentration gradient in impacted areas, which induces gas-phase volatiles to diffuse through soil to extraction wells. The process includes a system for treating off-gas. Air flow also induces aerobic bioremediation of some contaminants. Generally applied to highly volatile contaminants.	Limited effectiveness for heavier TPH. Effectiveness also limited in low permeability soils where SVE is diffusion limited.	Technically implementable. May require installation of vapor extraction wells and an above-ground treatment system.	High capital. Moderate O&M.	Not effective for residual fuels. Not retained.
In Situ Treatment	Biological Treatment	In-Well Air Stripping	ground water	In-well aerators perform air stripping of ground water within the well. Ground water is not removed from the well, but is circulated between an upper and lower screen in the well. Volatile compounds enter the vapor phase and are recovered and treated by a vapor extraction system.	Effective for VOCs, SVOCs and fuels. Less effective for residual fuels. Relies on adequate groundwater flow within an induced recirculation cell, which may be prohibited by layered nature of subsurface soils.	Layered nature of soils would significantly reduce radius of influence of this technology, increasing the number of recirculation wells required.	High capital. Moderate O&M.	Low effectiveness for addressing residual fuels. Not retained.
In Situ Treatment	Biological Treatment	Air Sparging	ground water	Air is injected into the saturated zone to induce mechanical stripping and volatilization of contaminants. Introduction of oxygen also enhances aerobic biodegradation. SVE is required to capture vapor phase contaminants.	Liimited effectiveness for residual fuels. Effective removal dependant on ability to sparge adequate air and to remove resultant vapor through SVE. Pilot testing would be required to determine effectiveness. Requires closely spaced SVE wells to effectively capture vapor phase contaminants.	Technically implementable. Heterogeneous soils may require numerous sparge wells and associated SVE wells for adequate effectiveness. Pilot testing will be necessary to determine spacing of sparge wells and operation parameters.	High capital. Low O&M. High cost relative to other in situ treatment options due to required number of wells, extent of equipment, and depth of impacts.	Not expected to be cost effective relative to other technologies. Not retained.
In Situ Treatment	Chemical Treatment	Chemical Oxidation	soil/ground water	Injection of a dilute solution of an oxidant such as potassium permanganate, sodium persulfate, or Fenton's Reagent, into the contaminated zone to directly oxidize VOCs.	Limited effectiveness for residual fuel.	Technically implementable but difficult to achieve sufficient distribution of oxidizing agents in heterogeneous soils.	High capital. Low O&M. High cost relative to other ex situ physical/chemical options.	Limited effectiveness for residual fuels. Not retained.
In Situ Treatment	Chemical Treatment	Ozone Sparging	Soil/ground water/LNAPL/soil vapor	Sparging of gas-phase ozone to oxidize VOCs in situ. Implemented similarly to air sparging with the addition of ozone to the sparged air. Typically combined with soil vapor extraction. Typically most applicable for high concentration and recalcitrant contaminants.	Ozone can be effective at oxidizing TPH in ground water. Short-lived ozone requires good distribution for adequate effectiveness. Presence of heterogeneous subsurface soils may limit effectiveness.	Technology is implemented in a similar manner as air sparging, and has similar implementation issues. Pilot testing will be necessary to determine spacing of sparge wells and operation parameters.	High capital. High O&M. High cost relative to other in situ treatment options due to required number of wells and extent of equipment.	More effective at treating residual fuels than chemical oxidation. Relatively high cost remedy. Retained.
Removal	Removal/Off-Site Disposal	Excavation	Soil	Excavation of impacted material with disposal at an off-site location. Would require dewatering and fluid treatment prior to discharge.	Effective for complete range of contaminant groups.	Implementable for impacted areas, but would be hindered by the presence of site parking area, public streets and underground utilities. Significant overburden would require removal in order to excavate impacted zones.	High capital, negligible O&M.	Effective, but high cost option.Evaluated in combination with groundwater extraction and treatment. Retained.
Removal	Chemical/Physical Treatment	Air Stripping	Ground water	Extracted water is passed downward against a stream of rising air. The countercurrent stream of air strips VOCs from the water. The resulting VOC-laden air is treated following removal from the vessel, if required.	Effective for removal of VOCs from extracted ground water. Ineffective in treatment of residual fuels.	Technically implementable. Treatment of off-gas may be required. Biological or iron fouling can severely limit system performance. Well established ex-situ technology readily provided by vendors.	Moderate capital. Moderate O&M. High cost relative to other ex situ treatment options.	Not effective in treating residual fuels. Not retained.
Removal	Chemical/Physical Treatment	Liquid or Gas-Phase Carbon Adsorption	Ground water/soil gas	Extracted water or vapor is passed through vessels containing granular activated carbon. Organic compounds with an affinity for carbon are transferred from the aqueous or vapor phase to the solid phase by sorption to the carbon.	Most effective for hydrocarbons and SVOCs.	Technically implementable. Streams with high suspended solids (> 50 milligrams per liter) cause fouling and require frequent carbon change-out. Streams with high organic concentrations or NAPL will also require frequent carbon change out. Well established ex-situ technology.	Low capital. High O&M. Moderate cost relative to other ex situ treatment options.	Effective for removing organics prior to disposal (ground water) or release (air). Evaluated in combination with excavation. Retained.

Notes:
Shading indicates Process Option not retained
O&M = Operation and maintenance
SVE = Soil Vapor Extraction
SVOC = Semivolatile organic compound
VOC = Volatile organic compound
LNAPL = Light non-aqueous phase liquid
TPH = Total petroleum hydrocarbon

Table 7
Comparative Analysis of Remedial Alternatives
Lucasey Site - 2744 E.11th Street
Oakland, California

Evaluation Criteria	**Remedial Alternatives**		
	1	**3**	**4**
	Monitored Natural Attenuation	**Ozone Sparging**	**Excavation /Soil Source Removal/Dewatering**
Effectiveness	Effective	Effective	Effective
Implementability	High	High	Low to Moderate
Cost (Present Worth)	$35,000	$759,000	$2,318,000

Table 8
Summary of Costs Associated with Evaluated Alternatives
Lucasey Site - 2744 E. 11th Street
Oakland, California

Alternative	Description	Direct and Indirect Capital Costs	NPW of Total O&M Costs	General Contingency (30%)	Estimated Total Cost
Alternative 1	Monitored Natural Attenuation	$26,400	$0	$7,900	**$35,000**
Alternative 3	Ozone Sparging	$365,000	$218,200	$175,000	**$759,000**
Alternative 4	Excavation/Dewatering Source Removal	$1,744,600	$38,100	$534,800	**$2,318,000**

Notes:

Alternatives 2 through 4 include Monitored Natural Attenuation

Alternative 4 does not include costs associated with demolition of buildings to provide access for soil removal

Table 9
Components and Costs of Alternative 1 - Monitored Natural Attenuation
Lucasey Site - 2744 E. 11th Street
Oakland, California

Description	Quantity		Cost	
	Number	Unit	Unit Cost	Total Cost
DIRECT CAPITAL COSTS				
Preparation Work				
Well Permits (1 permit/well)	8	ea.	$300	$2,400
SUBTOTAL				**$2,400**
Well Abandonment				
Driller	8	ea.	$2,000	$16,000
SUBTOTAL				**$16,000**
TOTAL DIRECT CAPITAL COSTS				***$18,400***
INDIRECT CAPITAL COSTS				
Contractor Overhead & Profit (15% Total Direct Costs)	1	LS	$2,800	$2,800
Engineering and Construction Oversight (15% Total Direct Costs)	1	LS	$2,800	$2,800
Health and Safety Costs (3% Total Direct Costs)	1	LS	$600	$600
Project Management & Administration (10% Total Direct Costs)	1	LS	$1,800	$1,800
TOTAL INDIRECT CAPITAL COSTS				**$8,000**
TOTAL CAPITAL COSTS (Direct and Indirect)				***$26,400***
TOTAL CAPITAL AND O & M COSTS				***$26,400***
General Contingency (30% of Total Capital and O&M Costs)				***$7,900***
TOTAL COST OF ALTERNATIVE (PRESENT WORTH)				***$35,000***

Table 10
Components and Costs of Alternative 3 - Ozone Sparging
Lucasey Site - 2744 E. 11th Street
Oakland, California

Description	Quantity		Cost	
	Number	Unit	Unit Cost	Total Cost
DIRECT CAPITAL COSTS				
Preparation Work				
Work Plan (incl. 35%, 90%, and Final Designs)	1	ea.	$30,000	$30,000
Installation of Additional Monitoring Wells	4	ea.	$3,000	$12,000
Well Permits (1 permit/well)	9	ea.	$300	$2,700
Air Permit	1	ea.	$2,000	$2,000
City Encroachment Permit	1	ea.	$1,000	$1,000
SUBTOTAL				**$47,700**
Ozone Sparging System				
Ozone Sparging & SVE Well Installation	10	ea.	$3,000	$30,000
Ozone Sparging System (incl. master panels, in-well units, below-well sparge units, misc. costs)	1	ea.	$80,000	$80,000
Freight	1	ea.	$500	$500
Injection and SVE Piping Installation (trench, install, fill)	500	lf	$50	$25,000
System Building	1	ea.	$7,000	$7,000
Electrical Installation	1	ea.	$10,000	$10,000
SVE System (incl. blower, ozone decomposer, piping, valves, gauges)	1	ea.	$25,000	$25,000
As-Built Drawings and O&M Manual Preparation	1	LS	$20,000	$20,000
System Startup and Optimization	1	LS	$10,000	$10,000
SUBTOTAL				**$207,500**
TOTAL DIRECT CAPITAL COSTS				***$255,200***
INDIRECT CAPITAL COSTS				
Contractor Overhead & Profit (15% Total Direct Costs)	1	LS	$38,300	$38,300
Engineering and Construction Oversight (15% Total Direct Costs)	1	LS	$38,300	$38,300
Health and Safety Costs (3% Total Direct Costs)	1	LS	$7,700	$7,700
Project Management & Administration (10% Total Direct Costs)	1	LS	$25,500	$25,500
TOTAL INDIRECT CAPITAL COSTS				**$109,800**
TOTAL CAPITAL COSTS (Direct and Indirect)				***$365,000***

Table 10
Components and Costs of Alternative 3 - Ozone Sparging
Lucasey Site - 2744 E. 11th Street
Oakland, California

Description	Quantity		Cost	
	Number	Unit	Unit Cost	Total Cost
O & M COSTS				
Yearly Treatment System O&M (1)				
Air Sampling and Analysis - VOCs	4	samples	$150	$600
Operation and Maintenance Labor	240	hours	$80	$19,200
Operation and Maintenance Equipment	12	day	$250	$3,000
Electrical Power	1	LS	$5,000	$5,000
Reporting	144	hours	$100	$14,400
Replacement Costs (3% Total Direct Costs)	1	LS	$7,700	$7,700
Contractor Overhead & Profit (15% Total Direct Costs)	1	LS	$6,300	$6,300
Engineering and Construction Oversight (15% Total Direct Costs)	1	LS	$6,300	$6,300
Health and Safety Costs (3% Total Direct Costs)	1	LS	$1,300	$1,300
Project Management & Administration (10% Total Direct Costs)	1	LS	$4,200	$4,200
SUBTOTAL				**$68,000**
Groundwater Monitoring Cost Per Event (2)				
Well Sampling Labor and Equipment	8	wells	$400	$3,200
Ground Water Analysis - VOCs, TPH (8 wells + 50% QA/QC)	12	samples	$200	$2,400
Ground Water Analysis - MNA Parameters (4 wells + 25% QA/QC)	5	samples	$250	$1,250
Contractor Overhead & Profit (15% Total Direct Costs)	1	LS	$1,000	$1,000
Health and Safety Costs (3% Total Direct Costs)	1	LS	$200	$200
Project Management & Administration (10% Total Direct Costs)	1	LS	$700	$700
SUBTOTAL				**$8,800**
FIRST THREE YEARS O&M COSTS (treatment O&M and quarterly sampling) (1)(3)				**$185,300**
REMAINING O&M COSTS (annual sampling for 5 years)(3)				**$32,900**
TOTAL O & M COSTS				***$218,200***
TOTAL CAPITAL AND O & M COSTS				***$583,200***
General Contingency (30% of Total Capital and O&M Costs)				***$175,000***
TOTAL COST OF ALTERNATIVE (PRESENT WORTH)				***$759,000***

Notes:
Assume 3 years of system operation
Quarterly Groundwater Monitoring
Present worth cost based on 5% discount factor

Table 11
Components and Costs of Alternative 4 - Excavation/Dewatering
Lucasey Site - 2744 E. 11th Street
Oakland, California

Description	Quantity		Cost	
	Number	Unit	Unit Cost	Total Cost
DIRECT CAPITAL COSTS				
Preparation Work				
Work Plan (incl. 35%, 90%, and Final Designs)	1	ea.	$30,000	$30,000
Abandonment of Existing Monitoring wells	6	ea.	$2,500	$15,000
Installation of Additional Monitoring Wells	4	ea.	$3,000	$12,000
Well Permits (1 permit/well)	4	ea.	$300	$1,200
POTW Sanitary Discharge Permit	1	ea.	$1,000	$1,000
City Encroachment Permit	1	ea.	$1,000	$1,000
SUBTOTAL				**$60,200**
Excavation & Backfill				
Equipment mobilization	1	ea.	$10,000	$10,000
Shoring	72000	sf	$10	$720,000
Excavate, stockpile, replace clean overburden	4000	ton	$10	$40,000
Excavation, transport, disposal of impacted material	2000	ton	$60	$120,000
Import, placement, compaction of clean backfill	2000	ton	$25	$50,000
Finish surface to match existing (i.e. asphalt, concrete, etc.)	7200	sf	$25	$180,000
Confirmation Sampling for VOCs & TPH	12	ea.	$200	$2,400
SUBTOTAL				**$1,122,400**
Dewatering System				
Dewatering pumps	6	mo	$1,400	$8,400
Sedimentation tank	6	mo	$1,500	$9,000
2 - 2,000 lb liquid carbon filters	6	mo	$1,665	$9,990
Disposal of treated water	50000	gal	$0.20	$10,000
SUBTOTAL				**$37,400**
TOTAL DIRECT CAPITAL COSTS				***$1,220,000***
INDIRECT CAPITAL COSTS				
Contractor Overhead & Profit (15% Total Direct Costs)	1	LS	$183,000	$183,000
Engineering and Construction Oversight (15% Total Direct Costs)	1	LS	$183,000	$183,000
Health and Safety Costs (3% Total Direct Costs)	1	LS	$36,600	$36,600
Project Management & Administration (10% Total Direct Costs)	1	LS	$122,000	$122,000
TOTAL INDIRECT CAPITAL COSTS				**$524,600**
TOTAL CAPITAL COSTS (Direct and Indirect)				***$1,744,600***

Table 11
Components and Costs of Alternative 4 - Excavation/Dewatering
Lucasey Site - 2744 E. 11th Street
Oakland, California

Description	Quantity		Cost	
	Number	Unit	Unit Cost	Total Cost
O & M COSTS				
Groundwater Monitoring Cost Per Event				
Well Sampling Labor and Equipment	8	wells	$400	$3,200
Ground Water Analysis - VOCs, TPH (8 wells + 50% QA/QC)	12	samples	$200	$2,400
Ground Water Analysis - MNA Parameters (4 wells + 25% QA/QC)	5	samples	$250	$1,250
Contractor Overhead & Profit (15% Total Direct Costs)	1	LS	$1,000	$1,000
Health and Safety Costs (3% Total Direct Costs)	1	LS	$200	$200
Project Management & Administration (10% Total Direct Costs)	1	LS	$700	$700
SUBTOTAL				**$8,800**
REMAINING O&M COSTS (annual sampling for 5 years)(1)				**$38,100**
TOTAL O & M COSTS				***$38,100***
TOTAL CAPITAL AND O & M COSTS				***$1,782,700***
General Contingency (30% of Total Capital and O&M Costs)				***$534,800***
TOTAL COST OF ALTERNATIVE (PRESENT WORTH)				***$2,318,000***

Notes:
Present worth cost based on 5% discount factor
Assumes 1.5 tons per cubic yard for site soils
Does not include costs associated with soil removal/dewatering outside property boundaries

Appendix A
Product Monitoring Field Notes

Product Monitoring
Lucasy Manufacturing
2744 East 11th Street
Oakland, California

Personnel Conor McDonough

Date 3/18/10
Time 1533

Safety Checklist Review the HASP

- [x] Do you have a copy of the HASP
- [x] Did you notify anyone onsite/offsite
- [x] Do you know the potential Hazards
- [x] Do you have proper PPE

Well	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Notes
PMW-1A	7.95	—		Some Product staining on probe PMW-1A
PMW-1B	7.91	—		no staining
PMW-2A	9.50	—		
PMW-2B	10.95	—		
RW-1	7.66	—		
RW-2	9.35	—		

Observations

Sent Railer down PMW-1B to confirm there was no free product. Water was clear and had no product or staining.

toni grover

Product Monitoring
Lucasy Manufacturing
2744 East 11th Street
Oakland, California

Personnel Conor McDonough

Date 3/24/10
Time 1445

Safety Checklist Review the HASP

- [x] Do you have a copy of the HASP
- [x] Did you notify anyone onsite/offsite
- [x] Do you know the potential Hazards
- [x] Do you have proper PPE

Well	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Notes
PMW-1A	8.50	—	—	—
PMW-1B	8.46	—	—	Some staining on probe after tagging
PMW-2A	10.02	—	—	—
PMW-2B	11.48	—	—	Some staining on probe after tagging
RW-1	8.15	—	—	—
RW-2	9.89	—	—	—

Observations

Marked locations on Maria's property with white flags / marked street
Went to Assessors office and confirmed Maria is home owner
Went to County Recorders office and obtained made copy of the 2744 11th st deed

Product Monitoring
Lucasy Manufacturing
2744 East 11th Street
Oakland, California

Personnel Conor McDonough

Date 4/1/10
Time 0900

Safety Checklist Review the HASP

- [x] Do you have a copy of the HASP
- [x] Did you notify anyone onsite/offsite
- [x] Do you know the potential Hazards
- [x] Do you have proper PPE

Well	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Notes
PMW-1A	8.60	—	—	no Staining
PMW-1B	8.58	—	—	
PMW-2A	10.00	—	—	
PMW-2B	11.56	—	—	
RW-1	8.25	—	—	
RW-2	9.90	—	—	
RW-3	10.60	—	—	

Observations

Met with foresite to do utility clearence on two boring locations in front of Maria's house. Location / Cleared

Product Monitoring
Lucasy Manufacturing
2744 East 11th Street
Oakland, California

Personnel Conor McDonough

Date 4/1/10
Time 0900

Safety Checklist Review the HASP

- [x] Do you have a copy of the HASP
- [x] Did you notify anyone onsite/offsite
- [x] Do you know the potential Hazards
- [x] Do you have proper PPE

Well	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Notes
PMW-1A	8.60	—	—	no Staining
PMW-1B	8.58	—	—	
PMW-2A	10.00	—	—	
PMW-2B	11.56	—	—	
RW-1	8.25	—	—	
RW-2	9.90	—	—	
RW-3	10.60	—	—	

Observations

Met with foresite to do utility clearence on two boring locations in front of Maria's house. Location / Cleared

Product Monitoring
Lucasy Manufacturing
2744 East 11th Street
Oakland, California

Personnel A. Wong

Date 4/8/10
Time 1430

Safety Checklist Review the HASP

- [x] Do you have a copy of the HASP
- [x] Did you notify anyone onsite/offsite
- [x] Do you know the potential Hazards
- [x] Do you have proper PPE

Well	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Notes
PMW-1A	8.01	—		No Staining
PMW-1B	8.02	—		
PMW-2A	9.40'	—		
PMW-2B	11.11'	—		
RW-1	7.70'	—		
RW-2	9.42'	—		
RW-3	10.08'	—		

Observations

Product Monitoring
Lucasy Manufacturing
2744 East 11th Street
Oakland, California

Personnel Conor McDonough

Date 5/10/10
Time 1500

Safety Checklist Review the HASP

- [x] Do you have a copy of the HASP
- [x] Did you notify anyone onsite/offsite
- [x] Do you know the potential Hazards
- [x] Do you have proper PPE

Well	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Notes
PMW-1A	9.00	—	—	No Staining on probe
PMW-1B	8.89	—	—	
PMW-2A	10.55	—	—	
PMW-2B	12.00	—	—	
RW-1	8.66	—	—	
RW-2	10.35	—	—	
RW-3	11.06	—	—	

Observations

Went over location PMW-3 with private utility locater, location Clear

Product Monitoring
Lucasy Manufacturing
2744 East 11th Street
Oakland, California

Personnel Conor McDonough

Date 6/15/10
Time 1600

Safety Checklist Review the HASP

- [x] Do you have a copy of the HASP
- [x] Did you notify anyone onsite/offsite
- [x] Do you know the potential Hazards
- [x] Do you have proper PPE

Well	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Notes
PMW-1A	9.59	—	—	No product or staining observed on probe
PMW-1B	9.51	—	—	
PMW-2A	11.20	—	—	
PMW-2B	12.69	—	—	
PMW-3	—	—	—	
RW-1	9.20	—	—	
RW-2	10.95	—	—	
RW-3	11.75	—	—	

Observations

Product Monitoring
Lucasy Manufacturing
2744 East 11th Street
Oakland, California

Personnel Rachel Sultan

Date 7-8-10
Time 8:00 AM

Safety Checklist Review the HASP

- [x] Do you have a copy of the HASP
- [x] Did you notify anyone onsite/offsite
- [x] Do you know the potential Hazards
- [x] Do you have proper PPE

Time	Well	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Notes
8:07	PMW-1A	9.83	Ø	Ø	some black droplets on probe
8:13	PMW-1B	9.76	Ø	Ø	no product measurable
8:44	PMW-2A	11:45	Ø	Ø	black & brown droplets on probe
8:54	PMW-2B	13:11	Ø	Ø	no product measurable
9:01	PMW-3	10.06	Ø	Ø	" "
8:19	RW-1	9:43	Ø	Ø	" "
8:37	RW-2	11:20	Ø	Ø	" "
8:25	RW-3	11.97	Ø	Ø	" "

Observations

- No wells had measurable product.

Product Monitoring
Lucasy Manufacturing
2744 East 11th Street
Oakland, California

Personnel Rachel Sultan

Date 7-22-10
Time 11:13 AM

Safety Checklist Review the HASP

- [x] Do you have a copy of the HASP
- [x] Did you notify anyone onsite/offsite
- [x] Do you know the potential Hazards
- [x] Do you have proper PPE

	Well	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Notes
11:15	PMW-1A	9.94	Ø	Ø	Some product staining on probe
11:24	PMW-1B	9.90	Ø	Ø	Some product staining on probe
12:13	PMW-2A	11.54	Ø	Ø	Some product staining on probe
12:22	PMW-2B	13.20	Ø	Ø	no product visible
12:04	PMW-3	10.13	Ø	Ø	no product visible
11:32	RW-1	9.54	Ø	Ø	no product visible.
11:49	RW-2	11.31	Ø	Ø	" " "
11:41	RW-3	12.15	Ø	Ø	no product visible.

Observations

PMW-1A - bailer casing brown smears on outside - clear w/no product on inside & on water surface - brown dots floating in H_2O column. PMW-1B - brown smears on outside of bailer, clean water on inside. Bailer added. RW-3 - bailer & water in bailer clean. RW-1 - Bailer & water clean. RW-2 - bailer & water clean PMW-3: no product on bailer or in H_2O. PMW-2A - brown smears on bailer outside. Water inside cloudy grey & smells like VOCs - no brown inside. Bailer removed. PMW-2B - clean bailer & clean H_2O.

Product Monitoring
Lucasy Manufacturing
2744 East 11th Street
Oakland, California

Personnel R. Sultan

Date 7-29-10
Time 9 AM

Safety Checklist Review the HASP

- [x] Do you have a copy of the HASP
- [x] Did you notify anyone onsite/offsite
- [x] Do you know the potential Hazards
- [x] Do you have proper PPE

Well	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Notes
PMW-1A	10.03	Ø	Ø	Some product staining on probe.
PMW-1B	9.96	Ø	Ø	" " " "
PMW-2A	11.64	Ø	Ø	" " " "
PMW-2B	13.29	Ø	Ø	no product on probe
PMW-3	10.22	Ø	Ø	" " " "
RW-1	9.60	Ø	Ø	no product on probe
RW-2	11.38	Ø	Ø	" " " "
RW-3	12.17	Ø	Ø	no product on probe

Observations

PMW-1A - Some staining on inside ~~of~~ of bailer - minimal. Bailer removed. PMW-1B - no product in bailer. Product staining outside bailer ~~well~~ casing. RW-1: bailer clean - no product. RW-3: bailer clean - no product. PMW-2A - product visible in bailer. PMW-2A - product in bailer. PMW-2B - no product - bailer clean. RW-2 - no product - bailer clean. PMW-3: bailer clean - no product.

Product Monitoring
Lucasy Manufacturing
2744 East 11th Street
Oakland, California

Personnel Rachel Sultan

Date 8-23-10
Time 15:30

Safety Checklist Review the HASP

- [x] Do you have a copy of the HASP
- [x] Did you notify anyone onsite/offsite
- [x] Do you know the potential Hazards
- [x] Do you have proper PPE

Well	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Notes
PMW-1A	10.19	Ø	Ø	dark brown staining visible on probe
PMW-1B	10.09	Ø	Ø	some dark brown staining visible on probe
PMW-2A	11.77	Ø	Ø	dark brown staining visible on probe.
PMW-2B	13.44	Ø	Ø	no product on probe/visible
PMW-3	10.35	Ø	Ø	no " " " "
RW-1	9.77	Ø	Ø	" " " "
RW-2	11.52	Ø	Ø	No product on probe/visible.
RW-3	12.31	Ø	Ø	" " " "

Observations

PMW-2A: Brown staining on outside of bailer - product on surface water in bailer. PMW-2B: ~~Steam~~ bailer, ~~Steam~~ H_2O - no product visible. PMW-3: No product visible on or in bailer. RW-2: Same as PMW-3. PMW-1B: Brown staining visible on outside of bailer. PMW-1A: Staining (brown) on inside & outside of bailer. product in bailer water column. RW-1: Staining slight (dark brown) on outside of bailer. Bailer removed. RW-3: no staining/product on bailer.
PMW-1A - Bailer removed. PMW-2A - bailer removed & replaced.

Product Monitoring
Lucasy Manufacturing
2744 East 11th Street
Oakland, California

Personnel Rachel Sultan

Date 9-29-10
Time 1353

Safety Checklist Review the HASP

- [x] Do you have a copy of the HASP
- [x] Did you notify anyone onsite/offsite
- [x] Do you know the potential Hazards
- [x] Do you have proper PPE

Well	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Notes
PMW-1A	10.47	—	—	Staining visible on probe
PMW-1B	10.39	—	—	" " " "
PMW-2A	12.03	—	—	Black staining visible on probe
PMW-2B	13.75	—	—	no product staining visible on probe.
PMW-3	10.62	—	—	no product staining visible on probe
RW-1	10.03	—	—	" " " "
RW-2	11.77	—	—	" " " "
RW-3	12.55	—	—	no product staining visible on probe

Observations

PMW-3 - no product* in or on bailer.
PMW-1A - product floating in and on outside of bailer. Bailer removed
PMW-1B - product on outside of bailer. Bailer removed
RW-1 - no product in or on bailer - bailer hung in well.
RW-3 - no product in or on bailer.
PMW-2A - staining visible on outside & on surface of water column in bailer.
RW-2 - no product in or on bailer.
PMW-2B - " " " " "

* "product" = product staining visible.

Product Monitoring
Lucasy Manufacturing
2744 East 11th Street
Oakland, California

Personnel Rachel Sultan

Date Oct 28, 2010
Time 8:10

Safety Checklist Review the HASP

- [x] Do you have a copy of the HASP
- [x] Did you notify anyone onsite/offsite
- [x] Do you know the potential Hazards
- [x] Do you have proper PPE

Well	Depth to Water (feet)	Depth to Product (feet)	Product Thickness (feet)	Notes
PMW-1A	10.50	—	—	Some brown staining on probe.
PMW-1B	10.46	—	—	Some brown staining on probe
PMW-2A	11.98	—	—	Some black staining on probe
PMW-2B	13.74	—	—	no staining on probe
PMW-3	10.61	—	—	no staining on probe
RW-1	10.05	—	—	no staining on probe
RW-2	11.44	—	—	" " " "
RW-3	12.56	—	—	no staining on probe

Observations

PWW-1B - no product observed in ~~bailer~~ bailer, product visible (staining) on very bottom of bailer.
PWW-1A - no product visible in bailer, product visible on top of bailer.
RW-1 - no product staining visible on or in ~~bailer~~ bailer.
PMW-3 - no product staining visible on or in bailer.
RW-3 - " " " " " " " " " "
RW-2 - " " " " " " " " " "
PMW-2A - brown product staining visible on outside of bailer. - no visible product inside bailer.
PMW-2B - no staining in or on bailer visible.