RO396

Ceres Associates
Sustaining Environments Worldwide

424 First Street, Benicia, CA 94510
(707) 748-3170 / fax (707) 748-3171

Alameda County
SEP 22 2005
Environmental Health

Ahmir Gholami
Alameda County Environmental Health Department
1131 Harbor Bay Parkway
Alameda, CA
94502

RE: **2547 East 27th Street, Oakland, California**

Mr. Gholami:

Enclosed is the workplan you requested for the above listed site. We seek approval of this workplan as soon as possible so that we may move onto implementation of the scope of work.

Please contact me with comments and/or a timeline for anticipated approval. We are working with the City of Oakland and Tomorrow Development (RP) for this project and they are seeking to expedite this process.

Thank you for your time. If you should have questions please call me at (707) 748-3170 or via email at ryanmeyer@ceresassociates.com.

Sincerely,

Ryan Meyer
Project Manager

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Sustaining Environments Worldwide

424 First Street
Benicia, California 94510
(707) 748-3170 / Fax (707) 748-3171

August 5, 2005

Amir Gholami
Alameda County Environmental Health Department
1131 Harbor Bay Parkway
Alameda, California
94502

Workplan
Former Gasoline Station
2547 East 27th Street
Oakland, California

Project: CA1264-2

Dear Mr. Gholami:

Ceres Associates is pleased to forward to you this workplan to conduct further soil and groundwater sampling along with the installation of groundwater monitoring wells at the former gasoline station at 2547 East 27th Street, Oakland, Alameda County, California (Property). The workplan and accompanying site conceptual model have been requested by the Alameda County Environmental Health Department (EHD) in response to the sampling report issued for the Property by Ceres Associates in January 2005.

BACKGROUND

The Property has been subject to prior environmental assessments including a Phase I ESA and two Phase II ESAs.

Phase I ESA

A Phase I ESA report, dated May 10, 2001, was conducted for the Property by ML River Group (ML). ML described the Property as a vacant lot which formerly supported a gasoline station and/or garage from 1927 - 1994. The report indicated that four 500-gallon and one 100-gallon underground storage tanks (USTs) were removed from the Property in 1994. It was reported that soil samples obtained during the UST removal indicated contamination in the soil. It was noted that the case had been forwarded to the Alameda County District Attorney's Office because no additional site work had occurred since 1994. The consultant made the following conclusion: "Soil remediation and subsurface investigation of the Subject Site must be performed before redeveloping the Property."

Phase II ESA - 2002

A Phase II ESA report, dated August 2, 2002, was conducted for the Property by Kleinfelder. According to report, the Property was formerly developed with a gasoline station and automotive repair facility from at least 1927 until 1994. In 1994, one 100-gallon waste oil UST and four

500-gallon gasoline USTs were removed from the Property. After the tanks were removed, the excavation pits were lined with visqueen plastic and backfilled with the excavated material. It was reported that eight soil samples were collected from below the tanks and two were collected from the stockpiled soil (from the excavation). The soil samples were analyzed for petroleum hydrocarbons including gasoline (TPH-g) and diesel (TPH-d), and benzene, toluene, ethylbenzene, and xylenes (BTEX). Concentrations of TPH-g were reported as high as 930 parts per million (ppm) from the excavation pit samples. Concentrations of benzene, toluene, ethylbenzene, and xylenes were reported as high as 2.2 ppm, 2.2 ppm, 2.7 ppm, and 3.3 ppm, respectively.

Kleinfelder advanced three soil borings on the Property. Monitoring wells were installed in each of the three borings (and remain on-site today). According to the report, reported concentrations TPH-g, TPH-d, and xylenes exceeded regulatory action limits. Kleinfelder recommended conducting further soil and groundwater sampling to determine the extent of soil contamination and to confirm the groundwater results from their initial study.

Phase II ESA - 2005

Ceres Associates advanced 10 soil borings on the Property in January 2005 in order to collect soil and groundwater samples for analysis. Based upon laboratory analysis, the consultant noted that it would appear that concentrations of target analytes in soil samples collected from five and 10 feet bgs fall below the regulatory criteria established by the Sate of California Regional Water Quality Control Board (RWQCB) and the United States Environmental Protection Agency (US EPA) for residential sites.

Groundwater sampling data indicate high concentrations of TPH-g and TPH-d, along with elevated levels of BTEX compounds. The concentrations reported by the laboratory for the groundwater samples collected by Ceres Associates far exceed the concentrations reported during a previous sampling event by Kleinfelder. Further, concentrations of TPH-g and TPH-d were found at 21,000 ppb and 250,000 ppb, respectively, along the eastern border of the Property adjacent to 26th Avenue; it is likely that contamination has migrated off-site. However, an accurate groundwater flow model has not yet been prepared for the Property. Further off-site work will require extensive sampling to ascertain the predominant groundwater flow direction. It may be necessary to define potential sensitive sites which may be impacted by the contamination flowing from the Property. The groundwater elevations observed and recorded in groundwater monitoring wells already installed on the Property varied by as much as 2.5 feet between wells located within 25 feet of one another. The influences on the disparity of groundwater elevations is unknown at this time.

The consultant made the following conclusions and recommendations:

> "Additional groundwater monitoring wells are warranted both on-site and off-site to not only help define the limits of contamination but also to assess an accurate groundwater flow direction. Such off-site well installations should be determined at the time of recommended off-site soil and groundwater sampling."

PURPOSE

The purpose of this investigation is to assess whether on-site soil and groundwater contamination has migrated off-site; and if so, to establish some concept of the extent of contamination. Further this workplan addresses the need for continued monitoring of the contamination plume as it relates to the Property location and other nearby sites.

The intent of Tomorrow Development, the current Property owner, is to redevelop the Property with a residential-use building as soon as practical.

SCOPE OF WORK

Ceres Associates proposes the following scope of work:

- Prepare a site-specific Health and Safety Plan
- Notify Underground Services Alert (USA)
- Obtain appropriate permits
- Advance fourteen (14) borings
- Collect soil and groundwater samples
- Analyze soil and groundwater samples
- Install five groundwater monitoring wells
- Install one groundwater extraction well
- Prepare a report detailing the findings

Site Conceptual Model

The following site conceptual model has been created based upon the work conducted for the Property by Kleinfelder and Ceres Associates. As new information and data is collected this model will change accordingly.

Developments

The Property was formerly developed with a fuel and service station between 1927 and 1994. In 1994, one 100-gallon waste oil UST and four 500-gallon gasoline USTs were removed from the Property. After the tanks were removed, the excavation pits were lined with visqueen plastic and backfilled with the excavated material. It was reported that eight soil samples were collected from below the tanks and two were collected from the stockpiled soil (from the excavation).

The Property is currently undeveloped with a chain-link fence along the perimeter. Some concrete pieces, remnants of the former foundation, were observed on the Property.

The Property is located amongst single and multiple family residences. Nearby sites of potential concern have not yet been identified.

Soil

The soils on the Property consist of generally sandy gravel fill from zero (0) to four (4) feet bgs. From four (4) to twelve (12) feet bgs the soil appears to be fat and lean silty clays. Below twelve (12) feet the soil is generally gravel and sand some clay.

Off-site soils are not yet known. As part of the proposed scope of work outlined in this document, further assessment of the soils on and off the Property will be made. Such information will provide insight as to potential contamination migration pathways.

Groundwater

Groundwater has been encountered on the Property between approximately eight and fourteen (14) feet bgs. Once encountered, groundwater appears to rise to within approximately three to five feet of the ground surface. The variable groundwater elevations across the Property suggest the possibility of a perched groundwater lense.

Groundwater flow directions have not yet been clearly identified. Potential groundwater flow directions appear to be to the southeast or east. The groundwater flow gradient or flow rate have not yet been calculated due to a lack of data points.

Future sampling should include the collection of data points for the calculation of the groundwater flow gradient, flow rate, and flow directions.

Contamination

Soil and groundwater contamination at the Property appears to have originated from historic uses of underground storage tanks for the purposes of storing motor vehicle fuel and waste oil. Underground storage tanks were present on the Property between at least 1927 and 2002. Resulting contamination appears to have migrated from the soil to the groundwater on the Property. An accurate assessment of the off-site impacts of this contamination has not yet been made to date.

Soil and groundwater sampling at the Property has yielded markedly different results with respect to the predominant location of target analytes:

2002 Soil and Groundwater Sampling

Kleinfelder conducted soil and groundwater sampling activities at the Property on June 19 and July 10, 2002. Kleinfelder supervised the advance of three soil borings ranging in depth from 11 to 19 feet below ground surface (bgs). Kleinfelder reportedly advanced each boring until approximately two feet below groundwater.

According to the report issued by Kleinfelder, dated August 2, 2002:

> "TPH-g was detected in the soil samples extracted from borings EB-1 and EB-2 at concentrations of 1,200 mg/kg and 1,800 mg/kg, respectively. TPH-d was detected in these samples, from borings EB-1 and EB-2, at concentrations of 650 mg/kg and 1,500 mg/kg, respectively. TPH-mo was detected in concentrations above laboratory reporting limits only in the sample from boring EB-1 at 14 mg/kg. Further, the laboratory described the detected TPH-g as strongly aged gasoline, and the TPH-d was described as Stoddard solvent."

Total lead was reported as high as 24 ppm in the soil samples collected from the Property.

Groundwater samples were reported to contain concentrations of TPH-g as high as 82 micrograms per liter (µg/l) or parts per billion (ppb); TPH-d as high as 360 ppb; motor oil as high as 540 ppb; benzene as high as 0.97 ppb; and toluene and xylenes as high as 1.3 ppb. Ethylbenzene and MTBE were not reported above their laboratory reporting limits.

2005 Soil and Groundwater Sampling

Ceres Associates collected soil and groundwater samples from the Property on January 7, 2005. Generally, soil samples collected from five feet bgs were not reported by the laboratory to contain concentrations of target analytes above their respective method reporting limits. The exceptions were SB-6 and SB-9. Concentrations of target analytes above method reporting limits in the five foot sample from SB-6 included: benzene at 0.024 ppm and ethylbenzene at 0.031 ppm. Concentrations of target analytes above method reporting limits in the five foot sample from SB-9 included: TPH-g at 32 ppm, TPH-d at 52 ppm, ethylbenzene at 0.017 ppm, and xylenes at 0.013 ppm.

The deeper soil samples, collected at 10 feet bgs, tended to contain higher concentrations of target analytes. Soil samples collected at this depth from SB-1, SB-2, and SB-8 were not reported by the laboratory to contain concentrations of target analytes above their respective method reporting limits. For those samples where concentrations of target analytes were reported above

the method reporting limits, they were reported to contain as much as 61 ppm of TPH-g, 46 ppm of TPH-d, 0.0070 ppm of benzene, 0.045 ppm of ethylbenzene, and 0.027 ppm of xylenes.

These reported concentrations of soil samples do not exceed regulatory criteria for further action based on Environmental Screening Levels (ESLs) established by the State of California Regional Water Quality Control Board (RWQCB) or Residential Preliminary Remediation Goals (Res PRGs) established by the United States Environmental Protection Agency, Region IX (US EPA).

Target analytes were reported above method reporting limits in all but one groundwater sample collected from the Property. Generally, samples collected after retrieving soil samples (using the continuous sampling macro-core device) were reported as containing higher concentrations of target analytes than from those samples collected using the hydro-punch device.

Concentrations of target analytes were reported by the laboratory as high as 90,000 micrograms per liter (µg/l) or parts per billion (ppb) for TPH-g; 750,000 ppb for TPH-d; 140 ppb for benzene; 1.5 ppb for toluene; 77 ppb for ethylbenzene; and 20 ppb for xylenes. Methyl tert butyl ether (MTBE) was not reported above the method reporting limits for any sample.

Concentrations of benzene far exceed the regulatory limit of 1.0 ppb as defined by the State of California Department of Health Services (CDHS) Maximum Contaminant Level (MCL). MCLs are not defined for petroleum hydrocarbons including gasoline and diesel. However, the RWQCB has established an ESL for TPH-g and TPH-d of 100 ppb. The ESL is designed to protect groundwater resources in the area.

Generally

Contamination on the Property was historically attributable to soil contamination by petroleum hydrocarbons and associated BTEX compounds. Groundwater contamination was limited. However, during the more recent January 2005 sampling of the Property, petroleum hydrocarbon and BTEX compounds were identified above regulatory action limits in the groundwater, but not in the soil.

The Property surface lacks an impermeable surface and given the rate of precipitation for Oakland (approximately 24.30 inches per year according to the National Oceanic and Atmospheric Administration) the rate of infiltration of contaminants from the soil to the groundwater has likely increased since the removal of an impervious surface.

Target analytes in the groundwater appeared to be elevated above regulatory action limits even near to the border of the Property. The groundwater flow direction has been estimated to be potentially southeast or east. Such flow directions would suggest that on-site contaminants have migrated off-site. The extent of such off-site migration is not yet known, as samples from off-site locations have not yet been collected. There is a significant potential that groundwater contaminants have migrated to off-site locations in the near surface groundwater.

The migration of target analyte contaminants to deeper aquifer layers is not yet known; however, based upon the general soil profiles of sites in the City of Oakland, it is anticipated that clay layers of varying thickness, located throughout the soil horizon, will retard the vertical flow of contaminants.

Further off-site contamination assessment is necessary. Data collected during the proposed sampling will aid in further delineating contamination migration as well as provide essential information necessary for any potential pre-remediation activities.

General Assessment Activities

Health and Safety Plan

A site-specific Health and Safety Plan (HASP) will be prepared by Ceres Associates prior to commencing field operations. The HASP will address known or potential health and safety hazards that may be present at the Property, and possible precautions to avoid personal injury from the hazards. The HASP will include a map of the Property area with a direct route to the nearest emergency medical facility. Ceres Associates will conduct worker's Health and Safety meetings prior to the commencement of each day's scheduled field activities.

Underground Services Alert (USA)

At least 48 hours prior to initiating field activities, Ceres Associates will mark the anticipated sampling locations on the surface of the Property and notify Underground Services Alert (USA). USA will notify its database of utility companies to visit the Property to find if the proposed sample locations will potentially impact subsurface utility lines. In addition, each boring location will be cleared with a private utility locator.

Permits

Ceres Associates will obtain necessary permits from the Alameda County Public Works Agency prior to field activities.

Reports

Reports will be issued regarding the activities which are conducted on the Property. Reports will contain an explanation of the assessment activities and the results of each activity. In addition, the reports will contain a section that summarizes the appropriate data and makes recommendations for conducting or not conducting further work. The appendices of the reports will contain applicable data including photographs of the field work, maps, tables of the results of analyses, and laboratory analytical reports.

Soil & Groundwater Sampling

Based upon high concentrations of target analytes in boring advanced on the Property near to adjacent sites, further off-site sampling is necessary to further assess the extent of contamination migration.

Proposed Borings

Ceres Associates proposes to advance a total of fourteen (14) soil borings on the Property according to the attached *Workplan Map*. The borings will be advanced to an anticipated total depth of approximately 15 feet below ground surface (bgs).

Three borings will be advanced on-site: two borings (SB23 & SB24) along the southwest edge of the Property to assess whether contamination has migrated to nearby residences southwest of the Property; and, one boring (SB21) along the southeast edge of the Property to confirm on-site contamination. Soil boring SB23 will be converted into a monitoring well. Soil boring SB21 will be converted into an extraction well.

A total of eleven (11) soil borings will be advanced off-site. One of these borings (SB11) will be advanced in East 27th Street, north of the Property. This boring will be used to assess the cross and up-gradient groundwater quality relative to the Property. The remaining ten (10) soil borings will be advanced in potential down-gradient groundwater flow directions from the Property. These borings will be used to further assess the extent of groundwater contamination resulting from historic petroleum releases at the Property. Soil borings SB12, SB13, SB17, and SB19 will be converted into monitoring wells after sampling.

Sample Collection

The borings will be continuously cored to aid in the logging process. At two-foot intervals soil will be placed in a Ziplock® bag and allowed to volatize. Photoionization Detector (PID) readings will be taken from the Ziplock® bag using a headspace method. Two samples of undisturbed soil nearest the highest PID readings will be submitted for analysis and the others will be held at the laboratory for further analysis if necessary. One groundwater sample (consisting of three VOAs and one 1-liter amber bottle) will be collected from each boring.

Soil Sampling

Soil samples will be collected in 1½-inch diameter polypropylene tubes. The sample tubes will be driven into undisturbed soil, the ends of the tubes will be sealed with plastic caps. The tubes will be labeled with unique identification information and stored in a chest cooled with ice, for delivery to the state certified analytical laboratory. Ceres Associates will follow chain-of-custody protocol.

Groundwater Sampling

Groundwater samples from each soil boring will be collected by placing a temporary PVC well screen into each boring and allowing groundwater to penetrate the well screen. Disposable polyethylene bailers will be used to collect groundwater. Groundwater samples will be placed

into laboratory-cleaned glass containers, labeled with unique identification numbers and placed into an ice-cooled chest for delivery to a State of California-certified analytical laboratory.

The borings will be backfilled using Portland® cement, and a reasonable attempt will be made to match the surface material.

Laboratory Analyses

Soil and groundwater samples collected from sampling activities at the Property will be sent to a State of California certified laboratory for analysis. Ceres Associates will request that the laboratory analyze the soil and groundwater samples for:

- Total Petroleum Hydrocarbons (TPH) as gasoline (g), diesel (d), motor oil (mo), hydraulic oil (ho), benzene, toluene, ethylbenzene, and xylenes (BTEX) using US EPA methods 8015/8020; and
- Lead using ICP analysis.

Groundwater Monitoring Well Installation

Based upon the data collected from various assessments, Ceres Associates proposes to install five groundwater monitoring wells and one groundwater extraction well onto and near to the Property.

The presence of high concentrations of petroleum hydrocarbons on-site along the edge of the Property suggest that off-site contamination is likely. The proposed monitoring wells will aid in further delineating the extent of groundwater contamination attributable to former petroleum releases on the Property.

Well Location

Ceres Associates proposes to install two wells on-site including one groundwater monitoring well and one groundwater extraction well. SB23 is anticipated to be converted into a groundwater monitoring well, to be used to monitoring groundwater flowing along the edge of the Property and near to adjacent residences. SB21 is anticipated to be converted into an extraction well. The likelihood of future remediation activities is significant given the presence of high concentrations of petroleum hydrocarbons in groundwater along the edge of the Property. In the event that future development of the Property occurs prior to final clean-up, these wells will be placed near to the edge of the Property in an effort to maintain their existence throughout potential developments.

Ceres Associates further proposes to install four groundwater monitoring wells off-site in potential down-gradient groundwater flow directions. SB12, SB13, SB17, and SB19 are anticipated to be converted into groundwater monitoring wells to be used to further assess the migration of contamination originating from the Property *(refer to Figure 2 - Workplan Map)*.

Well Design

The groundwater monitoring wells will be constructed of two-inch diameter flush-threaded PVC well casing and screen. The extraction well will be constructed of similar materials and design except that it will be a four-inch diameter well. The casing joints will be sealed with "o" rings. The upper five feet of the well will be blank casing. Ten feet of 0.020 slot PVC screen will complete the well, yielding a total well depth of approximately 15 feet.

The filter pack will extend from total depth to one-foot above the top of the screen, and to approximately four (4) feet below grade surface (bgs). The silica sand will be #3 or equivalent. As the well is drilled the geologist will evaluate the sediments encountered in the screen design interval (5 to 15 feet bgs) with respect to grain size, and select the appropriately sized filter pack. After the filter pack is placed, surge block will be used to gently surge the well screen to settle the filter pack and remove possible bridges or other gaps.

A one-foot thick bentonite pellet seal will be placed above the filter pack and hydrated with deionized water. Since the surface seal is so close to the surface, the surface seal will consist of concrete with 5% bentonite powder for both strength and flexibility. The mix will be 1:2:5%.,

Portland cement, coarse sand, bentonite powder.

A 12-inch diameter Morrison ® wellhead box, or similar-style wellhead box, will be installed approximately one inch above the height of the surrounding surface. A concrete apron approximately two-feet in diameter will be constructed of concrete with aggregate, and slopes away from the wellhead box to reduce flooding and infiltration of the well from surface water runoff and ponding. A locking wellhead plug with a padlock will be installed to reduce the possibility of tampering.

Well Construction

After the final sample has been obtained, the monitoring well will be constructed by inserting the well screen and casing inside the hollow stem auger. The casing will be suspended in the auger by a lifting plug and cable during the placement of the filter pack. After the filter pack has been completed the auger will be withdrawn, and the bentonite pellet seal with be set and hydrated. The concrete surface seal and wellhead box will be installed at the completion of the project, after allowing sufficient time for the bentonite seal to congeal and solidify sufficiently to withstand the weight of the surface seal.

Monitoring Well Development

After allowing sufficient time for the surface seal to set and cure, the monitoring well will be developed with a surge block and bailer. A small well development rig (Schmeal or equivalent) will perform the development. A two (2)-inch (nominal) stainless steel or PVC vented surge block will be reciprocated over two to three foot intervals of the well screen to cause two-way movement of water and sediment. The surging will begin at the bottom of the well screen and move successively upward through each interval. Each interval will be surged for two to three minutes. After the entire screen interval has been completed, the surge block will be withdrawn and a 1.5-inch diameter stainless steel sand pump bailer will be used to remove the developed sediment from the well. When sediment can no longer be effectively removed from the well, the surge block will be reintroduced, and the process repeated. Development will proceed until sediment can no longer be effectively removed from the well.

After the completion of mechanical development, an electric submersible development pump will be placed in the bottom of the well. The well will be pumped at a low discharge rate until relatively clear water is discharged. The well will be deemed sufficiently developed at this time. The well will be pumped at a rate which places low stress on the well relatively the recharge rate of the adjoining aquifer.

In order to obtain a rough estimate of the specific capacity and conductivity of the aquifer, groundwater level measurements with respect to time will be recorded prior to and during the pumping of the well. Recovery data will be recorded after pumping has ceased. The approximate discharge rate will also be recorded.

Soil and groundwater generated during this process will be collected into 55-gallon drums and stored on-site pending laboratory analysis to determine proper disposal.

If you have questions regarding this workplan please feel free to contact me or Ryan Meyer of my staff at (916) 485-2110, (707) 748-3170 or ryanmeyer@ceresassociates.com.

Sincerely,
Ceres Associates

FOR

Ken Durand, RG 5630
Project Manager

FIGURES

Figures 1 - 6 Target Analyte Maps from previous sampling
Figure - Workplan Map

APPENDICES

Appendix A - Other Documents