Precision Castparts Corp.

January 18, 2012

Mr. Mark E. Detterman, PG, CEG
Environmental Protection
Alameda County Health Care Services
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Subject: **RI Workplan, Fuel Leak Case No. R0000320, Former Paco Pumps, Inc., 9201 San Leandro Street, Oakland, CA**

Dear Mr. Detterman:

Please find enclosed the *Remedial Investigation Workplan* (RI Workplan) for the Former Paco Pumps facility located at 9201 San Leandro in Oakland, California, Case No. R0000320, prepared by The Source Group, Inc (SGI). This was prepared in response to your November 1, 2011 letter.

The RI Workplan also includes the results of the utility survey and the Geotracker data upload has been completed, as requested in your November 2011 letter.

The RI Workplan includes a proposed sub-slab survey, installation of an additional downgradient well and monitored natural attenuation sampling. The groundwater monitoring and sampling conducted in December 2011 will be reported separately prior to February 10, 2012.

If you have any questions, please contact SGI's Paul Parmentier at 562/597-1055, or myself at 503/777-7494.

I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who

[illegible] • Portland, Oregon 97233-1262 • Phone (503) 946-4698 • Fax 503-[illegible]

managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,

Dave Murray
PCC Flow Technologies, Inc.

Cc: Mr. Scott Kaplan, Stoel Rives LLP
Mr. Mark Zeppetello, Barg Coffin Lewis & Trapp, LLP
Mr. Paul Parmentier, The Source Group

SUB-SLAB VAPOR SURVEY AND REMEDIAL INVESTIGATION WORK PLAN

Former PACO Pumps Site
9201 San Leandro Street, Oakland, California

04-PFT-003

Prepared For:

PCC Flow Technologies Holdings, Inc
4600 SE Harney Dr.
Portland, OR 97206-0898

Prepared By:

SGI environmental THE SOURCE GROUP, INC.

1962 Freeman Avenue
Signal Hill, CA 90755

January 13, 2012

Prepared By:

ivy inouye

Ivy Inouye
Senior Toxicologist

Reviewed By:

REGISTERED GEOLOGIST
Paul Parmentier
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STATE OF CALIFORNIA

Paul Parmentier, P.G., C.HG.
Principal Hydrogeologist

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1.0 INTRODUCTION

PCC Flow Technologies (PCC) retained The Source Group (SGI) to conduct groundwater monitoring and implement remedial action at the Area 4 of the former PACO Pumps facility located at 9201 San Leandro Street in Oakland, California (the Site, Figure 1) based on SGI's *Remediation Work Plan*, dated October 30, 2009. SGI implemented the additional investigation/remediation at Area 4 (the former underground storage tank location) during April and June 2010. The *Post Remediation Sampling and First Semi-Annual Monitoring* Report, dated October 8, 2010 was prepared to describe the results of the investigation/remediation at Area 4, post-remediation sampling, and first semi-annual groundwater monitoring. In response to the *Post Remediation Sampling and First Semi-Annual Monitoring Report* (SGI, 2010) and subsequent site-wide *Semi-Annual Monitoring Reports* (SGI, 2010 and 2011), Alameda County Environmental Health (ACEH) issued on November 1st 2011a letter of technical requests and comments including the following:

- GeoTracker compliance;
- Preferential pathway study;
- Sub-slab vapor survey work plan;
- Remedial investigation work plan;
- Groundwater monitoring; and
- Groundwater goals.

Geotracker data have been uploaded. Any subsequent data collected or reports prepared for the Site will be uploaded in compliance with the state GeoTracker requirements.

In support of the sub-slab vapor survey, a preferential pathway survey was completed. The results of this survey are presented as part of this *Sub-Slab Vapor and Remedial Investigation Work Plan* (Work Plan) and were used to further define the scope of work for the sub-slab vapor survey. The remainder of this report is presented as follows:

- Site Background (Section 2.0);
- Preferential Pathway Survey (Section 3.0);
- Sub-Slab Soil Vapor Survey (Section 4.0)
- Proposed Remedial Investigation (Section 5.0);
- Reporting (Section 6.0); and
- Schedule (Section 7.0).

A list of references is included in Section 8.0.

2.0 SITE BACKGROUND

2.1 Site Location and History

The former PACO Pumps facility is located at 9201 San Leandro Street in Oakland, California (the Site, Figures 1 and 2). The Site is an approximately 4.6-acre parcel that is generally bounded by: an access road and heavy industrial/manufacturing business to the north; San Leandro Street, Union Pacific Railroad tracks, and elevated Bay Area Rapid Transit (BART) tracks to the east; Union Pacific Railroad tracks and easements for petroleum pipelines to the west; and industrial/warehousing businesses to the south. The surrounding area is a mix of industrial and heavy industrial (manufacturing) use. The western portion of the Site is occupied by a parking lot and a warehouse previously used for furniture storage and more recently for plant growing. Several smaller buildings used as offices and furniture storage occupy the eastern portion of the Site.

The Site was historically used as a manufacturing facility since 1945 for industrial pumps, tents, and as a foundry (Jonas & Associates, Inc. [Jonas], 1991) and has been used for warehousing and recently for medicinal plant growing. Currently, the site is vacant. The Site is currently owned by 9201 San Leandro LLC. Four areas (Areas 1, 2, 3, and 5) at the Site were addressed in early 2009, and closure of these areas has been requested from the ACEH. Therefore, 2010 remedial action activities have focused on Area 4 only and the semi-annual groundwater monitoring information addresses groundwater conditions site-wide.

2.2 Previous Site Investigations - Area 4

Subsurface soil and groundwater conditions have been investigated since the 1980's by various consultants including Jonas, ERAS Environmental Inc. (ERAS), Levine Fricke Recon Inc. (LFR), and most recently SGI. According to the ERAS *Subsurface Investigation and Groundwater Monitoring Report* (ERAS, 2008), the Jonas *Site Characterization Report* (Jonas, 1992) identified the location of a former 550-gallon underground storage tank (UST) located on the southeast side of the Operations Building. According to LFR, the former UST was used for gasoline storage. The UST was reportedly removed prior to a 1992 investigation of the assumed former tank pit area, where gasoline impacted soil was discovered. This former UST location was over excavated in the 1992 investigation and soil was removed from the Site. These activities removed major sources of subsurface contamination, but impacted soil remained near the foundation of the building to the west of the former UST location. Several investigations were completed in the area, including drilling of soil borings inside the building located west of the former UST.

LFR conducted additional investigations and a remediation pilot test in 2009 and recommended site remediation by air sparging, soil vapor extraction and ozone injection. LFR completed five soil borings using membrane interface probe (MIP) technology to evaluate the distribution of contaminants in this part of the Site. LFR also collected two shallow groundwater samples (17 to 20 feet below ground surface [ft bgs]) and two deep groundwater samples (27 to 30 ft bgs),

installed two new groundwater monitoring wells, one shallow and one deep air sparge wells, and three soil vapor extraction (SVE) test wells. The results of the investigation, as summarized by LFR (2009), indicated that the deeper groundwater did not contain detectable concentrations of petroleum contaminants, and this finding has been confirmed during subsequent groundwater monitoring events.

Based on the previous site investigations, the site conditions in Area 4 can be summarized in a simplified conceptual site model as follows:

- A gasoline UST reported to have been removed in 1992 was the likely source of hydrocarbon concentrations in soil and groundwater in Area 4 of the Site. Following UST removal, soil was over excavated and removed under and in the vicinity of the former UST, but residual hydrocarbons remained due to limited access in the area.
- The site lithology appears to consist essentially of clay to a depth of approximately 12 ft bgs, where possibly more gravelly clay contains the first encountered groundwater. More clay extends to approximately 23 ft bgs, where a deeper groundwater zone is found. The clay is locally reported to contain organics, and pebbles were noted in some boring logs as rich in calcium carbonate.
- Hydrocarbon contamination in soil is limited to the edges of the former UST excavation, and downgradient from the former UST, consisting of hydrocarbons adsorbed to the clayey soil. Removal of these hydrocarbons by SVE has been shown to be of very limited effectiveness. Due to the presence of the buildings, additional soil excavation is not possible. The presence of clay also limits the lateral transport of hydrocarbons from the source area.
- Hydrocarbon contamination in groundwater appears to be associated with a gravelly clay layer, noted by geophysical methods during the MIP investigation, although lithologic observations during drilling did not clearly indicate a more permeable zone at a depth of 9 to 10 ft bgs. The lateral extent of dissolved hydrocarbon contamination at the site is limited.
- The upgradient edge of the dissolved hydrocarbon contamination is defined. The deeper groundwater is not impacted by hydrocarbons, as demonstrated by deep grab groundwater samples and samples from the LFR wells AS-1D and ASMW-2D. There have been no reported measurements of phase-separated hydrocarbons in wells at the site.
- Shallow groundwater at the site is not used as a source of drinking water. Based on the San Francisco Bay Basin Plan, shallow groundwater in the Bay Area is to be protected for current and future beneficial uses. While shallow groundwater at the Site is not currently being used for municipal, industrial, or agricultural purposes, groundwater must be protected for potential future beneficial uses. However, based on past and current uses of the Site and surrounding area (industrial and heavy industrial), multiple contaminated properties in the area, and secure and high quality municipal water provided by East Bay

Municipal Utility District, it is unlikely that shallow groundwater at the Site will be used for future beneficial uses.

- As described in Section 3.2, nearby industrial water wells are more than 500 feet deep, and no vertical preferential pathways from the Site were identified.

2.3 Site Remediation

After review of the previous site investigation data and LFR vapor extraction test data, SGI made alternative recommendations for remediation with the following approach (SGI, 2009):

- Focused, high vacuum extraction of vadose zone hydrocarbons in the edges of the former UST excavation, including inside the building; and
- Extraction of hydrocarbons from the shallow groundwater zone, followed by natural attenuation.

In October 2009, SGI submitted a Remediation Work Plan that proposed episodes of high-vapor dual phase extraction (HVDPE) rather than construction and operation of a fixed remediation system. In April 2010, a 24-hr remedial action pilot test was conducted, and the results indicated that a longer-term remedial action was recommended. In June, after installation of 12 extraction wells and an additional groundwater monitoring well (MW-8), SGI conducted a 10-day dual phase extraction episode that resulted in the removal of significant hydrocarbon mass and the collection of reliable site contaminant distribution data.

Based on the limited air flow and groundwater extraction rates, low hydrocarbon concentrations present in soil, and a laterally and vertically delineated, limited benzene plume, any effort focused on in-situ remediation of hydrocarbons would be both lengthy and costly, and not substantially more effective than the apparent on-going natural attenuation of hydrocarbons. The primary source of hydrocarbons (the former UST) has been removed, and significant additional hydrocarbon mass has been removed from the site during the soil removal after UST excavation, and through the 2010 dual phase extraction.

3.0 PREFERENTIAL PATHWAY STUDY

A preferential pathway study was conducted to satisfy a request by ACEH. Included in the preferential pathway study was a utility trench survey which evaluated underground utility trenches located at the Site and in the Site vicinity and an off-site well survey which evaluated active, abandoned, and destroyed wells within a one-quarter mile radius of the Site. Both components of the preferential pathway study were intended to evaluate the potential for chemicals of concern (COCs; volatile organic compounds [VOCs] and TPH) to migrate from the Site. Based on this study, potential migration pathways and potential conduits (wells, utilities, utility laterals, pipelines, and etc.) for vertical and lateral migration were identified.

3.1 Utility Survey

Onsite utility laterals (i.e., sewer, water supply, electrical, and other utilities located directly beneath the warehouse building north of the former UST location) were located. Figure 3 presents the locations of all utilities identified in Area 4. The utility survey did not identify any subsurface utility trenches within Area 4 that would serve at a preferential pathway for the lateral migration of contaminants off the Site.

3.2 Well Survey

A detailed well survey of all wells (i.e., monitoring and production wells: active, inactive, standby, decommissioned [sealed with concrete], abandoned [improperly decommissioned or lost] and dewatering, drainage, and cathodic protection wells) within a one-quarter (0.25) mile radius of the Site. As requested by ACEH, both Department of Water Resources (DWR) and Alameda County Public Works Agency databases were reviewed.

A review of the Alameda County Public Works Agency database identified a total of 94 wells within one-quarter mile of the Site; 77 monitoring wells, six industrial wells, three irrigation wells, five geotechnical borings, two cathodic wells, and one unidentified well. None of the 94 wells are located in the downgradient direction.

- Thirty-three monitoring wells are located cross-gradient of the Site. Six monitoring wells are located at 9131 San Leandro Street, the adjacent property to the north. The six monitoring wells range in depth from 15 to 20 ft bgs. Three monitoring wells are located at 9235 San Leandro Street, the adjacent property to the south. The three monitoring wells are 20 feet deep.
- The six industrial wells all are located upgradient of the Site, and range in depth from 551 to 957 ft bgs.
- The three irrigation wells all are located crossgradient of the Site, and range in depth from unknown to 282 ft bgs.

A review of the California Department of Water Resources database identified the wells listed above. The DWR database search identified many more wells outside than the one-quarter mile search radius; mainly monitoring wells used to assess water quality at contaminated sites.

The well survey did not identify any wells (supply or monitoring) that are located downgradient of the Site and are potential preferential pathways for contaminated groundwater to move vertically through the soil column.

4.0 SUB-SLAB SOIL VAPOR SURVEY

4.1 Prefield Activities

Subsequent to Work Plan approval, SGI will perform prefield activities that will include updating the Site-specific Health and Safety Plan (HASP), obtaining necessary permits, obtaining site access, clearing the proposed drilling and sampling locations of underground utilities, and notifying ACEH.

4.1.1 Health and Safety Plan

All field activities will be completed with safety as a foremost concern. In accordance with federal Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120, the Site-specific HASP will be reviewed and updated, if necessary. SGI personnel and subcontractors associated with the project will be required to be familiar and comply with all provisions of the HASP.

4.1.2 Drilling Permits

Due to the shallow nature of the sub-slab vapor point installation, permits are not required.

4.1.3 Site Access

Access to the Site will be coordinated by SGI prior to performing any work at the Site. Currently, the warehouse building is vacant. Therefore, it is anticipated work will be conducted during normal working hours.

4.1.4 Borehole Clearance

A Site visit will be performed to mark the location of the proposed drilling and sampling locations at the Site. Following the Site visit, Underground Services Alert (USA) will be notified of drilling at the marked locations. It is anticipated that USA and their affiliated companies will mark the offsite locations of underground utilities in the vicinity of the proposed borings. Based on the utility survey conducted at the site, the proposed drilling locations are assumed to be clear of subsurface utilities.

4.1.5 Regulatory Notification

The ACEH will be notified of proposed field activities at least 10 days prior to initiating any field work.

4.2 Sub-Slab Soil Vapor Survey

Six temporary sub-slab soil vapor monitoring probes will be installed to characterize the nature and extent of VOC and TPH compounds in soil vapor beneath the warehouse building in the vicinity of the former UST. The results from recent soil and groundwater data were used to select soil vapor monitoring probe locations. Two locations (SS-1 and SS-2) are proposed near the walls of the warehouse building closest to the former UST. One of these two locations (SS-1) is proposed adjacent to the former UST

and a second location (SS-2) is northwest of groundwater monitoring wells AS-1S and MW-3. The highest concentrations of TPH and BTEX have historically been detected in groundwater monitoring wells AS-1S and MW-3, immediately downgradient from the former UST. A third location (SS-3) is proposed southwest of the former UST, near groundwater extraction well E-8. Three additional locations are proposed near the center of the warehouse building (SS4 and SS-6), and near well MW-6(SS-5). Location of SS-4 was selected to evaluate the potential preferential vapor transport along the identified electrical conduit. During the sampling event in December 2010, the third highest TPHg and benzene concentrations were detected in MW-6. The proposed locations for the temporary sub-slab soil vapor monitoring probes are shown on Figure 2. Exact locations may vary slightly based on accessibility and feasibility. At all locations, soil vapor probes will be installed sub-slab, directly beneath the building floor. Methodologies for the installation of sub-slab soil vapor probes and the collection of sub-slab soil vapor samples will be consistent with Department of Toxic Substances Control (DTSC) Vapor Intrusion Guidance (CalEPA, 2011) and Advisory-Active Soil Gas Investigation (CalEPA, 2010).

A summary of the proposed scope of work for the sub-slab soil vapor survey is defined below.

4.2.1 Sub-Slab Soil Vapor Probe Installation

A small diameter hole (approximately 1 to 1.25 inches) will be drilled through the concrete foundation slab. The holes will be drilled 3 to 4 inches into the sub-slab material. Sampling probes will then be installed by inserting a ¼-inch diameter Nylaflow® or Teflon® tubing with a permeable probe tip into the foundation hole. The probe tip will be covered with sand. Dry bentonite chips will be placed in the annular space between the probe and the base of the concrete foundation. Hydrated bentonite will then be placed above the dry bentonite to the foundation surface. Upon completion, probes will be properly secured, capped, and completed to prevent infiltration of water or ambient air into the subsurface and to prevent accidental damage. During probe installation, subsurface conditions are unavoidably disturbed. Therefore, prior to sampling, the subsurface soil vapor profile will be allowed to equilibrate and the construction materials will cure for at least 2 hours following probe installation.

4.2.2 Sub-Slab Soil Vapor Sampling and Analysis

Approximately 2 hours after the soil vapor probes have been installed, a soil vapor sample will be collected from each temporary soil vapor monitoring probe. A leak test will be conducted each time a soil vapor sample is collected to determine whether leakage has occurred. A leak check compound, or tracer, such as 1,1-difluoroethane (1,1-DFA) will be used. Immediately before sampling, a leak check compound will be introduced under a shroud into ambient air surrounding the sampling probe. The leak check compound will be analyzed as part of the laboratory analysis of each sample.

Prior to sampling, soil vapor sampling probes will be purged to ensure that stagnant or ambient air is removed from the sampling system and to assure that samples collected are representative of subsurface conditions. Soil vapor samples will be collected through the Nylaflow® or Teflon® tubing using a calibrated glass syringe connected to a sampling port. Appropriate volumes of soil vapor will be

purged through the calibrated syringe prior to sampling. The purge volume will be determined in the field based on the results of the purge volume test. The purge volume test will consist of collecting soil vapor samples from an area where soil vapor concentrations are expected to be elevated and analyzing a sample for COCs after removing one, three, and ten purge volumes. The purge sample with the highest concentrations of COCs will be selected as the purge volume to be applied at all the sampling locations. If the soil lithology results in limited air flow into the probe, the sample will be collected after a default one-purge volume. One duplicate soil vapor sample will be collected.

The sample containers will be labeled with sample-point identification, date, and time of collection. Soil vapor samples will be immediately transferred to an onsite mobile laboratory for analysis, where they will be logged onto the chain-of-custody form and assigned a laboratory identification number.

The soil vapor samples will be analyzed by EPA method 8260 and field instruments. Consistent with previously reported contaminants, soil vapor samples will be analyzed for TPHg, BTEX, and MTBE. These analytes have been selected based on contaminants detected in previous soil and groundwater samples. In addition, all sub-slab probes will also be sampled for methane, and analyzed by field instruments or laboratory analysis for carbon dioxide, and atmospheric gases (oxygen and nitrogen) to evaluate the subsurface conditions under the building.

4.2.3 Boring Completion

After the sub-slab soil vapor survey is complete, the sample rods will be removed from the ground and the sampling holes will be sealed with cement slurry. The boring will be completed with concrete or asphalt to be consistent with site surface conditions.

4.2.4 Equipment Decontamination

After each use, drive rods and other reusable components will be properly decontaminated to prevent cross-contamination. These methods include: 3-stage wash and rinse (e.g., wash equipment with a non-phosphate detergent, rinse with tap water, and finally rinse with distilled water); and/or a steam cleaning process. The probe point, ¼-inch tubing, and sampling syringes are all disposable, and new ones are used for each sample.

4.3 Sub-Slab Data Interpretation and Reporting

The results of the sub-slab soil gas sampling will be evaluated following DTSC guidelines for estimation of potential human health risks from vapor intrusion. The sampling, data interpretation and recommendations following the sub-slab soil gas sampling will be reported in a remedial investigation report that will combine the additional tasks described in the following sections.

5.0 PROPOSED REMEDIAL INVESTIGATION

ACEH requested a Remedial Investigation Workplan in addition to the sub-slab sampling described in previous sections. ACEH's correspondence of November 1st 2011 cited concerns that the 10-day aggressive remediation conducted in 2010 did not provide sufficient data to support the evaluation of remedial methods. Appendix A presents a response to ACEH's concerns.

The clayey lithology at the site and the presence of hydrocarbons under an existing building limit the use of any in-situ treatment method. If the sub-slab soil gas survey results confirm that the health risks under current site usage are not significant, groundwater monitoring of natural attenuation is the proposed remedial approach. Application of this approach will require the following steps:

- Confirmation of the absence of preferential pathways: this evaluation was completed, as described in the previous section
- Vertical dissolved contamination delineation: previous repeated sampling of groundwater from deeper-screened wells have confirmed that the dissolved hydrocarbons have not reached deeper groundwater
- Lateral delineation of contaminants: although sampling and testing of soil from a soil boring (GP-8) located in the border alley southwest of the USTs, and sampling of groundwater wells interpreted to be generally downgradient from the former USTs indicate that the hydrocarbon contaminants are not migrating off-site, further delineation sampling is proposed by installation and subsequent sampling of an additional groundwater monitoring well, as described in the following sections
- Technical Demonstration of Natural Attenuation: although periodic sampling of groundwater since 1992 indicate that natural attenuation of dissolved hydrocarbons is occurring at the Site, procedures for specific sampling of groundwater wells to demonstrate that natural biodegradation is occurring are described in the following sections as one of the remedial investigation techniques.

5.1 Additional Groundwater Monitoring Well Installation

One groundwater monitoring well (MW-9) will be installed to additionally characterize groundwater downgradient of the Site. Figure 2 shows the location of the proposed well at the former GP-8 location. Concurrent with the sub-slab soil vapor survey, SGI will perform prefield activities that will include updating the Site-specific Health and Safety Plan (HASP), obtaining necessary permits and site access, clearing the proposed drilling and sampling location of underground utilities, and notifying ACEH (Section 4.1). Appropriate drilling applications for the new groundwater monitoring well will be prepared and submitted along with appropriate fees to the Alameda County Public Works Agency, Water Resources Section. Permit copies will be kept onsite during all field activities.

5.1.1 Groundwater Monitoring Well Installation

Prior to advancing the soil boring to install the monitoring well, the well location will be hand augured at the diameter of the down-hole equipment to a depth of 5 ft bgs. The boring will be advanced to a total of 18 ft bgs, using a hollow-stem auger operated by a limited-access rig. The proposed well MW-9 will be constructed using a 2-inch diameter schedule 40 PVC casing. The well will be tentatively screened from 8 to 18 ft bgs with a filter pack of #2/12 Monterey sand filled in the annular space from 6 to 18 ft bgs. Two feet of hydrated bentonite will be placed above the filter pack. Neat cement-grout will be placed above the bentonite to the surface. The well will be completed with a traffic-rated vault box set in concrete. The soil will be logged by visual observations of the soil cuttings. Soil matrix samples will be collected during well installation as described in the following section.

5.1.2 Soil Sampling and Analysis

After the 5-foot hand-augering effort, the soil will be continuously cored using acetate sleeves. The soil samples will be field screened for total volatile organics using a PID. Soil samples will be collected at a depth where hydrocarbon impacts are first noted during drilling, assumed to be between 9 to 10 ft bgs, which corresponds to the depth of groundwater equilibration in completed wells, and at a depth of approximately 14 to 15 ft bgs. The two or three soil samples will be collected consistently with procedures required for EPA Method 5035. The soil samples will be analyzed for BTEX and oxygenates using EPA Method 8260B, total petroleum hydrocarbons as gasoline (TPHg) and total petroleum hydrocarbons as diesel and Motor Oil (TPHd and TPHmo) using EPA Method 8015 modified.

5.1.3 Well Development

Prior to development, the well will be monitored for dissolved oxygen (DO) and oxidation-reduction potential (ORP) using a YSI 556 meter equipped with a down-hole cable. The well will be developed by surging, swabbing, and purging approximately 10 well casing volumes. During well development, groundwater parameters including specific conductivity, temperature, and pH will be monitored. These parameters will be allowed to stabilize prior to terminating development. Once development is completed, DO and ORP will be monitored a second time.

5.1.4 Groundwater Monitoring and Sampling

After a minimum of 48 hours after well development, the monitoring well will be gauged and sampled. The well will be gauged using a water level meter accurate to the nearest 0.01 foot bgs. The depth to groundwater measurement will be recorded in field notes. Gauging and sampling of the well will be incorporated in the Site-wide groundwater monitoring program, and will follow the purging and sampling procedures accepted for this Site. At the end of purging, groundwater samples will be collected using a disposable bailer equipped with a bottom-emptying device. Samples will be decanted into appropriate containers provided by the laboratory. The containers will be capped, labeled, placed on ice, and transported to a state-certified laboratory for analysis of TPH-g, TPHd, TPHmo, BTEX, oxygenates, 1,2-

dichloroethane (1,2-DCA), ethylene dibromide (EDB) by EPA Method 8260, and TPH-d by EPA Method 8015. A laboratory-supplied trip blank will be included with the well samples.

5.1.5 Waste Handling

Soil cuttings, decontamination water and well development water will be stored onsite temporarily in 55-gallon steel drums pending offsite disposal.

5.1.6 Surveying

Subsequent to groundwater monitoring well installation, a licensed surveyor will survey the elevation and location of the well casing relative to a known datum to the nearest 0.01 feet above mean sea level (msl). The latitude, longitude, and coordinates for top of casing will be based on the California State Coordinate System Zone III (NAD83). The surveying data and other well information will be uploaded to GeoTracker.

5.2 Natural Attenuation Monitoring

The current set of historical groundwater monitoring data indicates that dissolved hydrocarbons are naturally attenuating at the site. To provide further confirmation of these observations, a specific episode of sampling for natural attenuation parameters is proposed.

During the first Site-wide groundwater monitoring event following installation of the proposed well MW-9, groundwater monitoring and sampling for natural attenuation parameters nitrate, sulfate, and ferrous iron will be performed on the groundwater samples from wells MW-4, MW-8, MW-3, MW-6, E-7, MW-5 and MW-9. Field monitoring of DO and ORP in these wells will be conducted. The DO/ORP data and dissolved concentration trends will be used to assess the effect of adding additional electron donor compounds (dissolved oxygen, sulfate, and potentially nitrate) on natural attenuation/passive bioremediation/reduction of organic chemicals within the plume.

Based on the results of the proposed subslab investigation, additional well installation and testing, and natural attenuation demonstration, the option for remediation will be presented in a feasibility study and remedial action plan.

6.0 REPORTING

Following investigation activities, a report will be prepared and will document the methodologies and results from the sub-slab soil vapor survey and additional remedial investigation. The report will present the findings of the sub-slab soil gas and groundwater investigations and interpretations. Analytical data will be presented in tabular format and annotated on the appropriate figures. Figures will include a site location map, site map showing the sub-slab soil vapor sampling locations, and a site map showing annotated VOC and TPH concentrations. The report will contain all pertinent documentation such as boring logs, laboratory reports and chain-of-custody forms, and will include recommendations.

7.0 PROJECT SCHEDULE

Implementation of this Work Plan will commence immediately upon approval from the ACEH. Based on the scope of work presented in this Work Plan, SGI has prepared a schedule for project implementation. The preliminary project schedule is presented as follows:

Completion Date	Activities
January 13, 2012	Submittal of Work Plan
	ACEH approval of Work Plan
60 days after ACEH Approval	Report preparation and submittal (60 days after Work Plan approval)
First Quarter 2012	Natural attenuation analyses associated with first quarter 2012 groundwater sampling

8.0 REFERENCES

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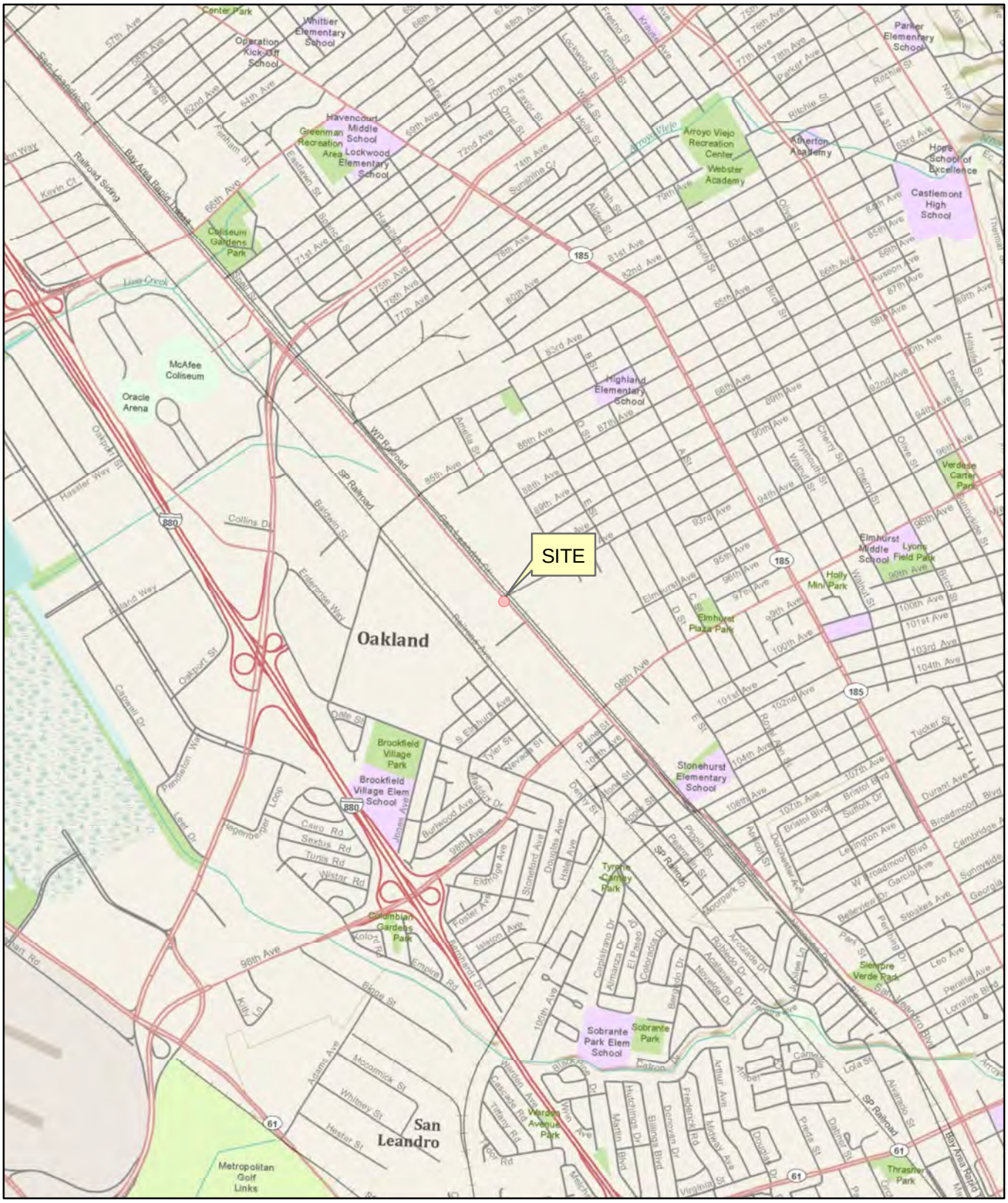
The Source Group, Inc. (SGI). 2011. Second Semi-annual 2011 Groundwater Monitoring and Sampling Report, Former PACO Pumps Site, 9201 San Leandro Street, Oakland, California. January.

FIGURES

APPENDIX A

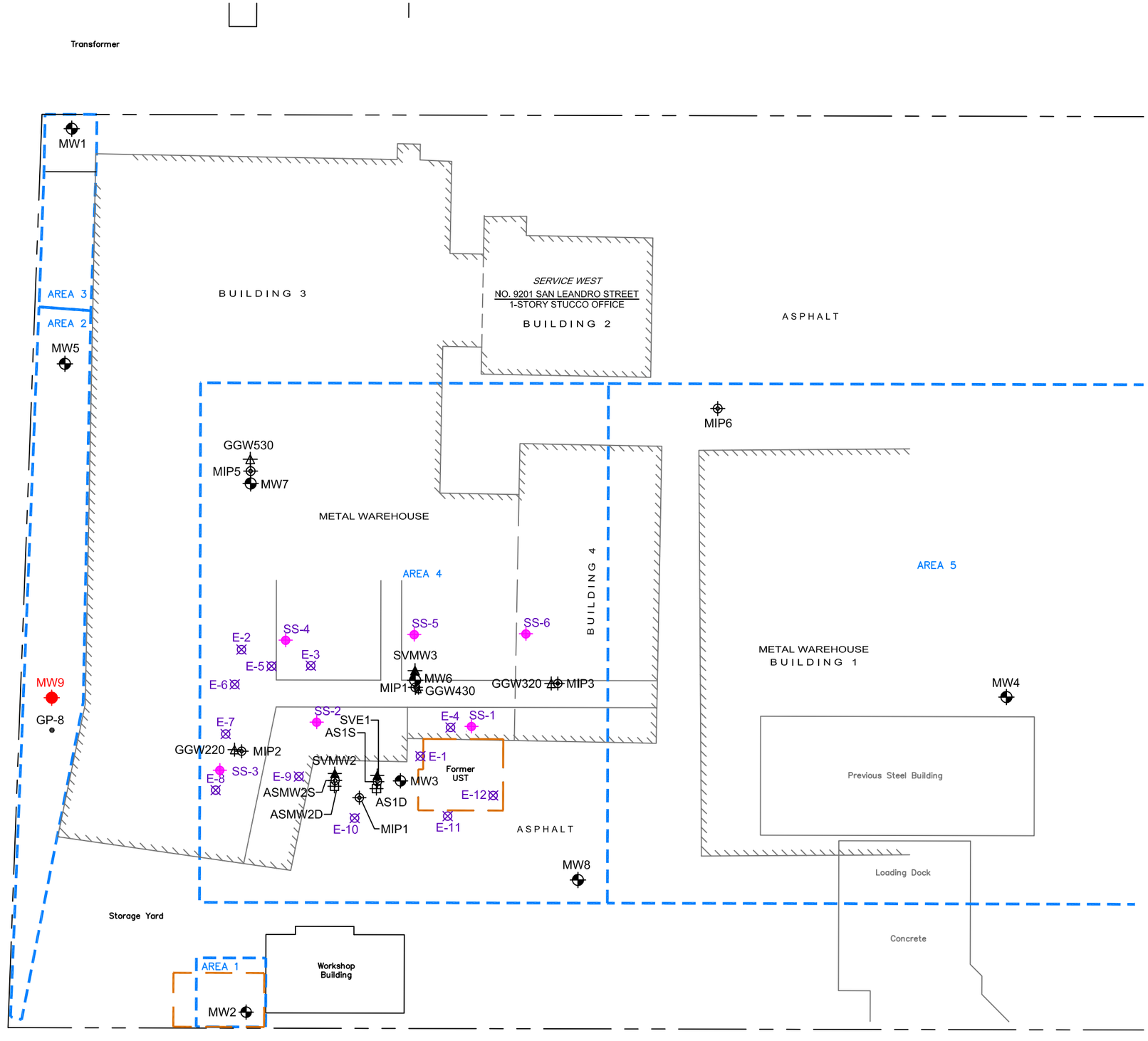
TECHNICAL RESPONSE TO ACEH COMMENTS TO 2010 REMEDIAL ACTION

FIGURES



SOURCE: 7.5 MINUTE USGS TOPOGRAPHIC MAP FROM ARCGIS MAP SERVICE

SGI environmental THE SOURCE GROUP, INC. 1962 FREEMAN AVE. SIGNAL HILL, CA 90755	PROJECT NO.: 04-PFT-001	DATE: 10/14/2009	DR.BY: AC	APP.BY: SS	SCALE 1:24,000 0 875 1,750 3,500 Feet N
	FORMER PACO PUMPS FACILITY 9201 SAN LEANDRO STREET OAKLAND, CALIFORNIA				**SITE LOCATION MAP**
					FIGURE **1**



LEGEND

- Site Boundary
- Project areas of concern
- AS1D — Deep groundwater air injection or air injection monitoring well by LFR January 2009
- AS1S — Shallow groundwater air injection or air injection monitoring well LFR January 2009
- SVMW3 — Vadose well by LFR January 2009
- MW6 — Groundwater monitoring well
- MIP3 — Membrane interface probe by LFR January 2009
- GGW320 — Grab groundwater sample location by LFR January 2009
- Area of excavation
- SS-6 — Proposed Sub-Slab Soil Vapor Point Location
- MW9 — Proposed Monitoring Well Location

0 40 80

APPROXIMATE SCALE IN FEET

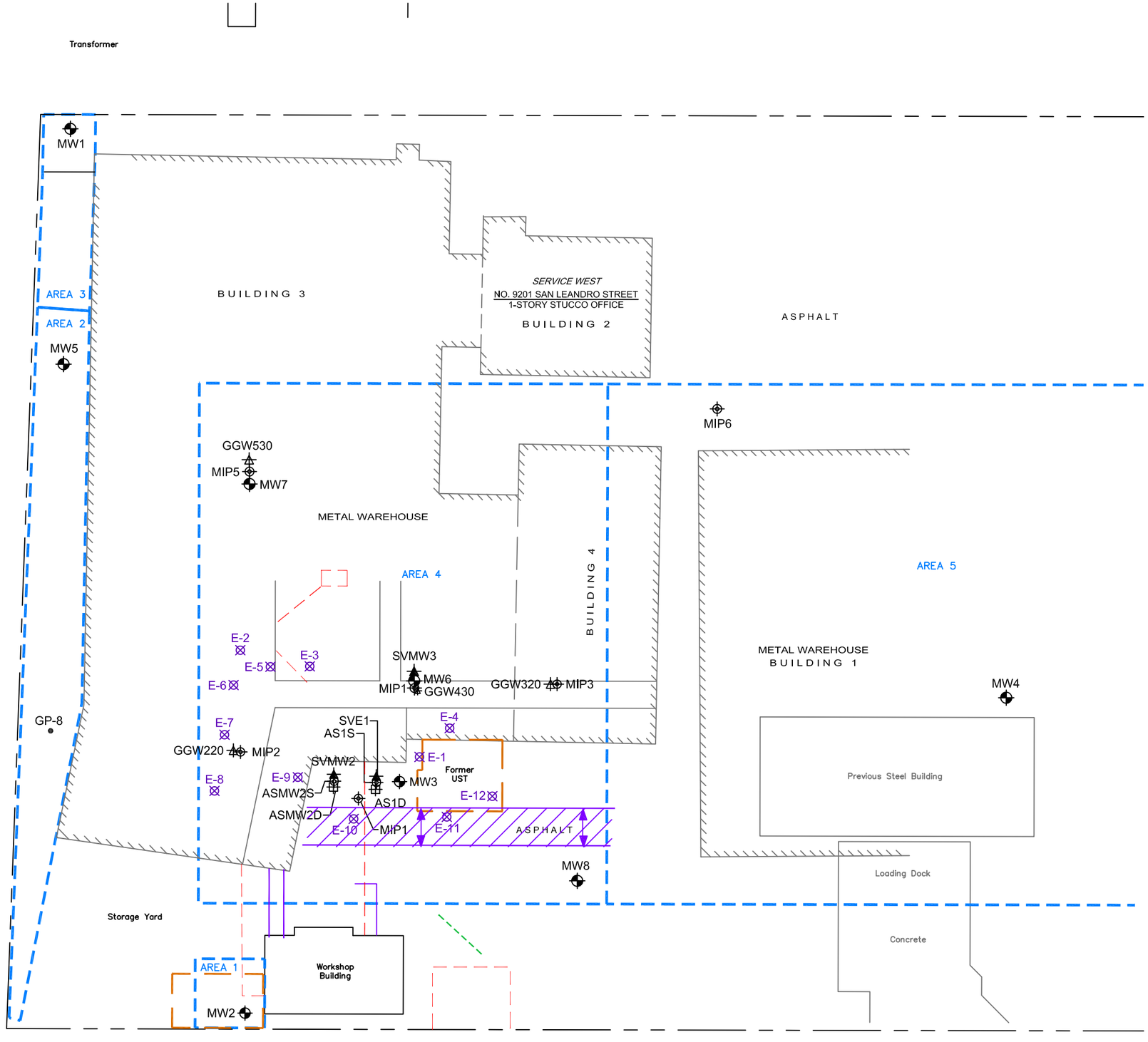
DATE:	FILE NAME:	SOURCE:
06/2011	PCC-Q2-11.DWG	LFR, MAY 2009

PROPOSED MONITORING WELL AND SUB-SLAB SOIL VAPOR POINT LOCATIONS

9201 SAN LEANDRO STREET
OAKLAND, CALIFORNIA

SGI environmental — THE SOURCE GROUP, INC.

FIGURE 2



LEGEND

- Site Boundary
- Project areas of concern
- AS1D — Deep groundwater air injection or air injection monitoring well by LFR January 2009
- AS1S — Shallow groundwater air injection or air injection monitoring well LFR January 2009
- SVMW3 — Vadose well by LFR January 2009
- MW6 — Groundwater monitoring well
- MIP3 — Membrane interface probe by LFR January 2009
- GGW320 — Grab groundwater sample location by LFR January 2009
- Area of excavation
- Electrical Conduit
- Storm Drain
- Unknown Conduit

0 40 80

APPROXIMATE SCALE IN FEET

DATE:	FILE NAME:	SOURCE:
06/2011	PCC-Q2-11.DWG	LFR, MAY 2009

UTILITY MAP
AREA 4

9201 SAN LEANDRO STREET
OAKLAND, CALIFORNIA

SGI environmental — THE SOURCE GROUP, INC.

FIGURE 3

APPENDIX A

TECHNICAL RESPONSE TO ACEH COMMENTS TO 2010 REMEDIAL ACTION

Appendix A
Paco Pumps Site
Responses to ACEH Comments

ACEH Issue/Comment	Response
General Comments	
Pilot Test: not enough data reported for evaluation	
No sufficient post-test analysis	The on-going groundwater monitoring is providing post-remediation data
No radius of influence reported	The radius of influence in the vadose zone was demonstrated to be very small (<10 feet), due to the clay nature of the soil. Section 3.2 of the October 2010 report indicates that "The data indicate a very small (0.00 to 0.03 inches of water) vacuum response in wells SVE-1 and SVMW-2, located at 10 and 27 feet respectively, from the extraction well. These very low values confirm that the vadose zone has limited air flow permeability"
	The radius of influence of groundwater extraction was demonstrated: Section 3.1 of the October report describes the groundwater drawdown at 10 and 27 ft at 0.3 to 0.5 ft, and Table 1a lists drawdown over time in 5 wells. The observed drawdown demonstrate the radius of influence of the groundwater extraction, and also demonstrate that despite high rates of groundwater extraction, the observed drawdown were not large enough to result in dewatering of the shallow groundwater zone
No graph of inlet concentrations	The vapor inlet concentrations are listed for each measurement time period in tables 1a and 1b
The extraction was not a pilot test but a remedial test, and sufficient data were not collected to evaluate the effectiveness of the remediation method.	The remedial objectives of the removal effort were to remove contaminant mass from the vadose zone by extraction, and to enhance the contaminant removal by dewatering the shallow groundwater zone, thereby opening zones for enhanced vapor extraction. This extraction followed a pilot test that had also already been done by LFR that included pilot test measurements. The 2010 installation of wells and extraction confirmed that all shallow soil is clay, a key element in remediation evaluation. The extraction and monitoring of vacuum response confirmed the very small (<10 feet) radius of influence from vadose vapor extraction. The 2010 extraction demonstrated the limited practicability of dewatering of the shallow groundwater zone
Groundwater concentrations higher in some wells after extraction: contaminants appear to have been mobilized by the extraction	Mobilization of contaminants is common during aggressive extraction. The extraction occurred from wells within the contaminated area, and therefore any mobilization occurred within areas already contaminated, and mobilization occurred towards extraction wells. The observed mobilization is expected to be transient and will be monitored
Remediation and recent groundwater results indicate that source may be larger than thought.	The drilling of borings for extraction wells provided additional documentation of contaminants in the vicinity of previous MIPs investigation location MIP-2. The additional information collected in 2010 was evaluated during the preparation of the RI Workplan, and will be incorporated in the future evaluation of remedial options.
Borings E-1, GP4 and E-12 reported lithology does not match expected UST excavation footprint	The size and location of previous UST excavation had not been previously well documented. The 2010 boring locations were professionally surveyed, and the former UST location is now therefore better known
Human Health risk assessment incomplete: oxygen data to verify aerobic degradation recommended, report uses 2010 groundwater concentrations, not more recent, also soil gas data should be used	As the impact to indoor air under the building at this site would be from volatilization from groundwater, the groundwater data was used in the health risk evaluation. The RI Workplan includes a proposed subslab sampling program.

Appendix A
Paco Pumps Site
Responses to ACEH Comments

ACEH Requests	
Subslab soil gas survey workplan-January 13 2012	Completed
Preferential Pathway Study- to be incorporated in Jan 2012 Soil Gas workplan	
Request for RI Workplan- January 13 2012	
Comment: lateral extent not defined	The benzene concentrations in one soil sample and three groundwater samples from boring location GP-8 southwest of the former UST were non detectable (SGI's Q4 2010 groundwater monitoring report). A downgradient sentinel well is proposed in the alley near former location GP-8.
Comment: previous remedial well drilling not documented adequately	The extraction wells were drilled within an area previously documented by sampling and MIPs soundings. The logging was limited by the field geologist to observing soil conditions and identify inconsistencies with known site conditions.
Comment: remedial boring logs indicate a single clay, contrary to wealth of previous investigation	Previous soil boring logs and MIPs logs by LFR indicate a site-wide shallow clay, and drilling by SGI confirmed this lithology. SGI may request from County potential information regarding non-clay lithology evidence at the site.
Only limited sampling was conducted on the new wells	SGI believes that sampling all 12 wells drilled for extraction in 2010 within a narrow area would be excessive. Soil sampling is proposed for the MW-9 installation.
Geotracker compliance December 16, 2011	Data upload completed
Groundwater monitoring of all wells with more analytes quarterly initially- starting Q4 2011	The technical analysis protocol for Q4 2011 monitorign event was discussed with ACEH and implemented as requested. Report pending.
Comment: demonstrate natural attenuation by sampling	This was proposed in RI Workplan
Q1 2012 sampling required	Noted