ARCADIS
Infrastructure · Water · Environment · Buildings

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Work Plan Addendum for Additional Soil Characterization
Former BP Service Station #4931
731 West MacArthur Boulevard
Oakland, California 94609
ACEH Case #RO000076

ENVIRONMENT

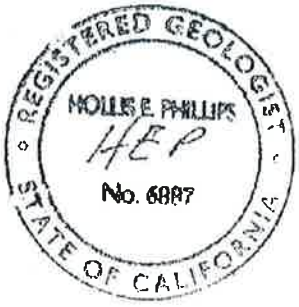
"I declare that to the best of my knowledge at the present time, that the information and/or recommendations contained in the attached document are true and correct."

Date:
March 7, 2011

Submitted by:

ARCADIS U.S., Inc

Hollis E. Phillips, PG
Project Manager



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Our ref:
GP09BPNA.C110

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Paresh Khatri
Hazardous Materials Specialist
Alameda County Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

ENVIRONMENT

Subject:
Work Plan for Soil Vapor Characterization
Former Atlantic Richfield Company Station No. 4931
731 West MacArthur Boulevard
Oakland, California 94609
ACEH Case # RO0000076

Date:
March 7, 2011

Contact:
Ben McKenna

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925.296.7857

Email:
Ben.McKenna@
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Our ref:
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Dear Mr. Khatri:

ARCADIS U.S., Inc. (ARCADIS) has prepared this Work Plan to describe soil vapor assessment activities associated with the former BP Service Station #4931 (Site) located at 731 West MacArthur Blvd in Oakland California (**Figure 1**).

The objective of this investigation is to evaluate the potential volatilization of chemicals of concern (COCs) and impacts to the indoor air exposure pathway. The investigation activities described in this Work Plan include:

- Installation of six temporary soil vapor probes (SV-1 through SV-6);
- Collection of soil samples for geophysical parameter evaluation;
- Collection of soil vapor samples from each of the vapor probes for COC analysis;
- Preparation of a report detailing the findings of the investigation activities.

Site Description

Currently the Site is an active Beacon-branded gasoline station. Improvements to the Site include four 10,000 gallon double-wall fiberglass gasoline underground storage tanks (USTs) installed on April 8, 1992. Product lines were excavated, removed, inspected, and replaced on October 2, 2002. The majority of the Site surface is paved with concrete and asphalt. A Site Location Map is provided as **Figure 1**.

The Site is bound by West MacArthur Boulevard to the north-northeast, West Street to the west-northwest and single-family residential dwellings to the south-southwest and east-southeast. Interstate 580 is located approximately 620 feet south-southwest of the Site.

A summary of previous site investigations can be found in ARCADIS' Site Investigation Report dated November 11, 2010.

Proposed Scope of Work

This Work Plan includes the following investigation activities:

- ARCADIS will install six temporary soil vapor probes in the locations shown on **Figure 2**.
- Collect soil samples for geophysical parameter analyses.
- Conduct soil vapor sampling from the temporary soil vapor probes.
- Prepare a report detailing the findings of the investigation activities.

The specific scope of work for project is discussed below.

Site-Specific Health, Safety & Environmental Protection Plan

As required by the Occupational Health and Safety Administration (OSHA) "Hazardous Waste Operations and Emergency Response" guidelines (29 CFR 1910.120), ARCADIS will prepare a site-specific environmental health and safety plan (E-HASP). The field staff and contractors will review the E-HASP prior to beginning field operations at the Site.

Permitting

All applicable permits will be obtained from ACEH and the City of Oakland, as necessary, prior to drilling.

Underground Utility Locating

Underground Service Alert (USA) will be notified a minimum of 48 hours prior to commencing field activities to identify any public utility alignments that may be in conflict with the proposed borings. In conjunction with USA, a private utility locating company will be utilized to further evaluate the potential presence of underground utilities in the vicinity of the proposed soil vapor point locations. Soil vapor point locations may require field modifications due to onsite utility locations and/or field conditions.

Soil Vapor Probe Installation Activities

Six temporary soil vapor probes (SV-1 to SV-6) will be installed to 5 feet below ground surface (bgs) at the approximate locations illustrated on **Figure 2**. These soil vapor probe locations have been chosen based on historical soil sampling data, the location of former USTs, their relation to the existing structures, and in accordance with the comments made in the ACEH letter dated January 6, 2011.

General Soil Vapor Probe Construction

Depth-to-water readings will be collected from the existing monitoring well network prior to soil vapor probe installation activities and properly documented by field staff.

Each soil vapor point boring will be advanced using either a 2-inch or 4-inch hand auger to a maximum depth of 5 feet bgs. A soil vapor probe approximately 6 inches long will be centered within a 1 foot standard sand pack at the bottom of each soil vapor point boring. One foot of dry granular bentonite will be placed above the sand pack and hydrated bentonite will fill the borehole from the top of the dry granular bentonite to surface level. The 1 foot layer of dry granular bentonite serves to ensure that the bentonite grout does not seep down into the soil vapor probe screen and interfere with sampling.

Vapor probe tubing will be small diameter (1/4 inch OD) and made of either Teflon® or nylon. All probes will have a Swagelok® connector fitted to the soil vapor sampling tube upper end cap.

Soil samples will be collected in order to log the soil stratigraphy at each soil vapor installation. A hand auger will be used for soil sample collection. Soil samples will be field screened for VOCs with a photoionization detector (PID). The PID results will be noted on the field boring logs. Up to two soil samples per boring will be analyzed for dry bulk density, porosity and water filled porosity in order to establish the physical parameters of the soil.

Sampling Train Assembly

Samples will be collected using 0.25-inch outer diameter (OD) Teflon®-lined polyethylene tubing. Each sampling train assembly (STA) will consist of a laboratory-provided soil gas sampling manifold (SGSM) with a two-way valve, vacuum gauge for reading the vacuum within the sample or purge canisters flow controller, and vacuum gauge for reading the vacuum within the sampling point. Components of the SGSM will be assembled using ¼-inch OD stainless steel tubing.

Vacuum Leak Testing

Prior to sampling, the STA will be checked for leaks by applying a vacuum to it. In the absence of a cap at the sub-slab probe, a two way valve will be affixed to the sample end of the SGSM, and the vacuum will be applied. The vacuum inside the STA will be monitored with vacuum gauges. This vacuum will be monitored for 30 minutes for a decrease greater than or equal to 0.5 inch mercury (in Hg).

If the vacuum reading does not decrease by 0.5 in Hg or more during the 30-minute period, the STA can be used for sampling. If the vacuum readings decrease by 0.5 in Hg or more during this monitoring period, the fittings and connection on the STA will be checked and tightened, and the vacuum leak check will be performed again until the STA maintains a vacuum throughout the monitoring period.

Soil Vapor Point Sampling

Soil vapor points will be sampled a minimum of 48 hours after installation to allow for vapor equilibration. Six liter (or an acceptable alternative) volume Summa® 100% lab certified clean canisters will be used for soil vapor probe sampling. Soil vapor sampling points will use a three-volume purging and sampling technique. Three dead-space tubing volumes will be removed from the soil vapor sampling point. The dead-space tubing volume will be calculated by multiplying the area bounded by the inner diameter of the soil vapor sampling tube and its length between the soil vapor probe and the upper end cap. The flow rate of purging will be equal to the flow rate used for sampling and will be less than 200 milliliters per minute (mL/min). Dead-space tubing calculations, field conditions, flow rate, pump specifics and any other applicable purging information will be recorded by field personnel.

A shroud will cover the entire sampling train (probe to Summa® canister) in order to detect possible leaks in all fittings and tubing associated with the sampling system. The containment unit will be filled with lab grade helium before purging the sampling point. A 20% helium atmosphere, plus or minus 5%, will be maintained inside the shroud and monitored using a portable Helium meter to estimate any potential leakage rate.

After purging, sampling will begin. Soil vapor samples will be collected in laboratory supplied 100% level certified Summa® canisters and transported to a California certified laboratory for analyses within 72 hours of collection. If possible, all soil vapor probes will be sampled the same day and collection will not exceed one week regardless. A vacuum of < 10 in Hg will be used and should be sufficient for sampling; a flow rate of > 10

mL/min will be maintained throughout sampling. Sampling will be stopped when the canister vacuum has dropped to approximately 5 in Hg.

Soil vapor samples collected from the soil vapor probes will be submitted to a State of California certified laboratory under chain-of-custody documentation and analyzed for the following constituents:

- TPH-G, BTEX, MTBE, naphthalene and helium (tracer gas) by USEPA Method TO-15; and
- Oxygen, carbon dioxide, nitrogen, helium and methane by American Society for Testing and Materials Method 1946.

Equipment Decontamination

All down-hole sampling equipment will be washed with Alconox® or similar solution between samples. All down-hole and sampling equipment will be steam-cleaned following the completion of drilling activities.

Waste Disposal

Soil cuttings, drilling fluids, purge water, decontamination water, and personal protective equipment generated during drilling operations will be stored in DOT-approved 55-gallon drums and temporarily stored on the subject property pending transport by Belshire Environmental Services Inc. (BESI) disposal contractor to an appropriate disposal or treatment facility.

Notification

ARCADIS will notify ACEH a minimum of 48 hours prior to starting work.

Reporting

A report will be prepared to document the results of site investigation activities. This report will include at a minimum the following:

- Summary of site conditions and background information,
- A scaled site plan illustrating the soil boring locations and other relevant site features,

- Documentation of field activities performed in connection with the site assessment,
- Results of the laboratory analyses performed on soil samples,
- Results of the laboratory analyses performed on soil vapor samples, and
- Conclusions and recommendations relevant to the assessment objectives.

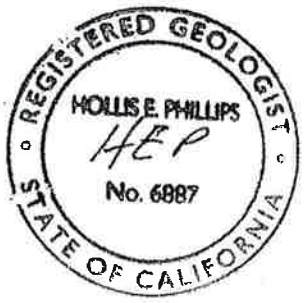
Schedule

ARCADIS is prepared to initiate field work upon approval of this Work Plan by ACEH, the execution of necessary access agreements and the issuance of required permits.

If you have any questions or comments regarding the contents of this Work Plan, please contact either Ben McKenna of ARCADIS at 925.296.7857 or by e-mail at Benino.McKenna@arcadis-us.com or Hollis Phillips of ARCADIS at 415.374.2745 or by e-mail at Hollis.Phillips@arcadis-us.com.

Sincerely,

ARCADIS



Ben McKenna
Project Geologist

Hollis Phillips P.G.
Senior Geologist

Enclosures:

Figure 1 – Site Location Map
Figure 2 – Site Map with Proposed Temporary Soil Vapor Sampling Points

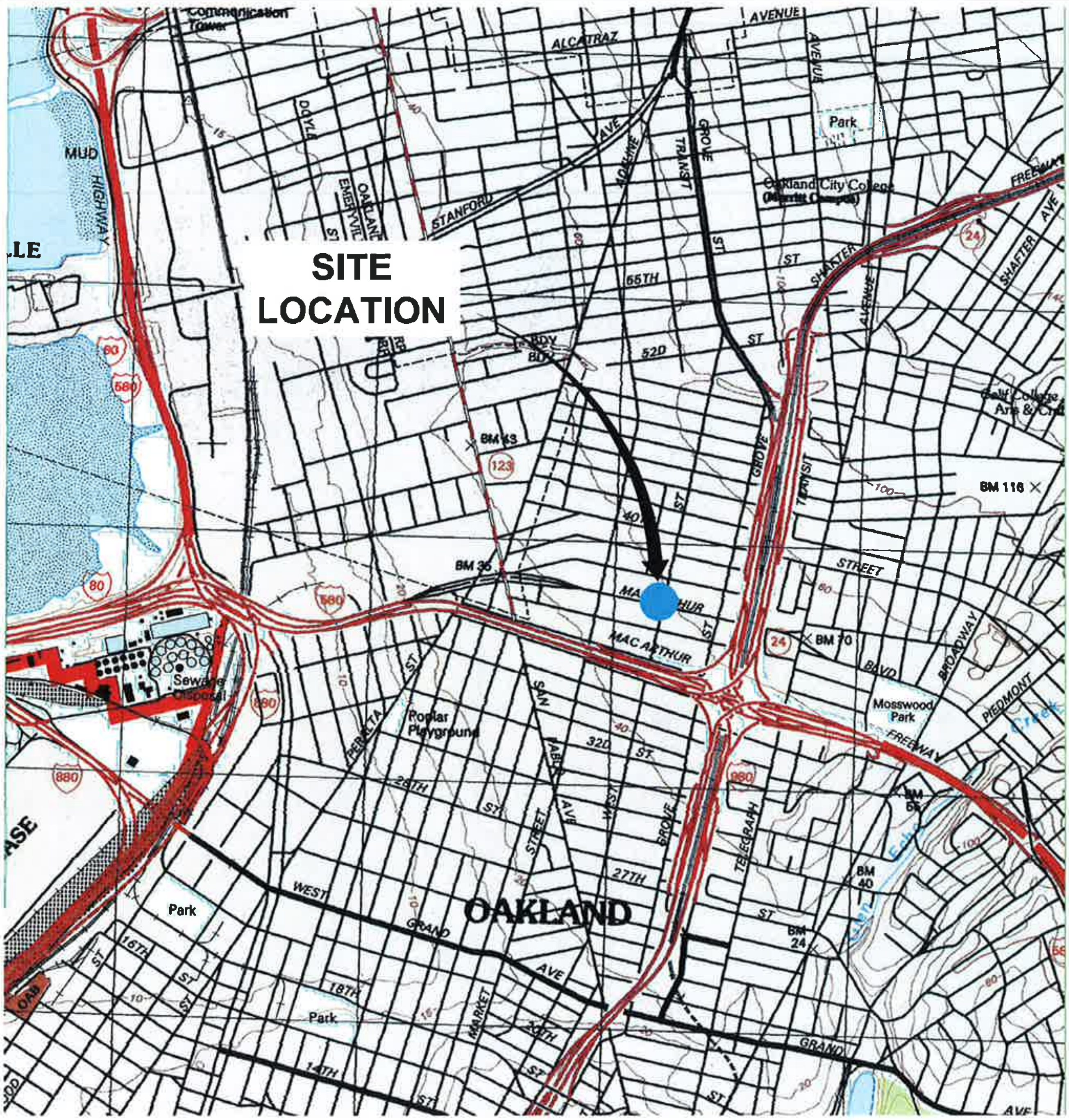
Copies:
File Copy

References Cited

- Alameda County Environmental Health; Incomplete Scope of Work for Fuel Leak Case No. RO0000318 and Geo Tracker Global ID T0600100207, BP #11266, 1541 Park Street, Alameda, CA 94501. Letter from Mr. Paresh Khatri (ACEH) to Mr. Paul Supple (Atlantic Richfield Company)

- Broadbent & Associates, Inc.; *Work Plan for Soil & Water Investigation, Former BP Service Station #11266, 1541 Park Street, Alameda, California,* December 15, 2008

- Broadbent & Associates, Inc.; *On-Site Soil Investigation and Second Quarter 2009 Ground-Water Monitoring Report, Former BP Service Station #11266, 1541 Park Street, Alameda, California,* August 14, 2009



NOTE:
1. BASE MAP USGS 7.5 MIN. TOPO. QUAD, OAKLAND WEST CALIFORNIA 1997.

0 2000' 4000'
Approximate Scale: 1 in. = 2000 ft.

FORMER ARCO SERVICE STATION No. 4391
731 WEST MACARTHUR BOULEVARD, OAKLAND, CALIFORNIA
WORK PLAN FOR SOIL VAPOR CHARACTERIZATION

SITE LOCATION MAP

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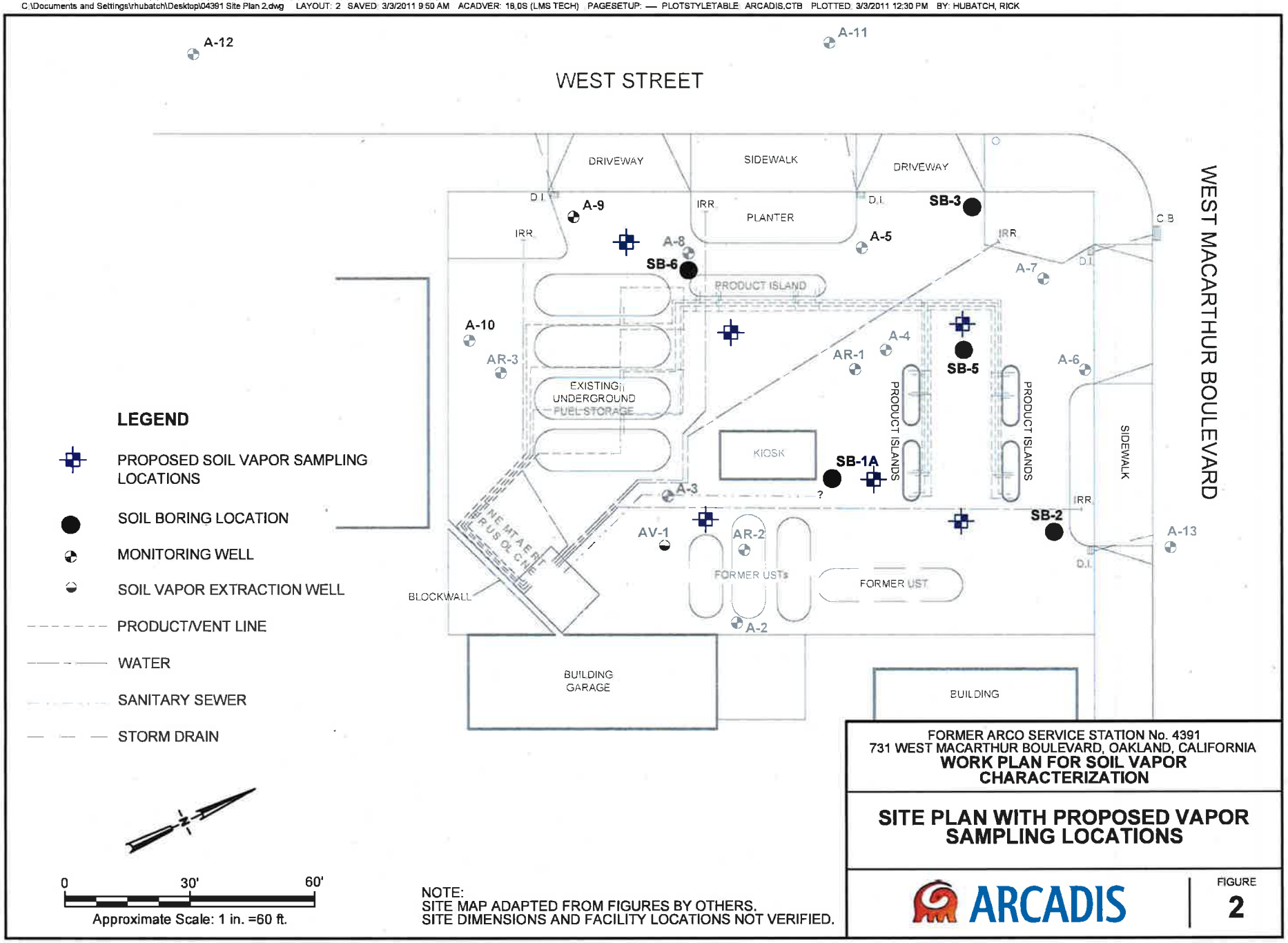
FIGURE
1

CITY:(Reqd) DIV/GROUP:(Reqd) DB:(Reqd) LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
C:\Documents and Settings\rhubatch\Desktop\04391 Site Plan 2.dwg LAYOUT: 2 SAVED: 3/3/2011 9:50 AM ACADVER: 18.0S (LMS TECH) PAGESETUP: — PLOTSTYLETABLE: ARCADIS.CTB PLOTTED: 3/3/2011 12:30 PM BY: HUBATCH, RICK



NOTE:
SITE MAP ADAPTED FROM FIGURES BY OTHERS.
SITE DIMENSIONS AND FACILITY LOCATIONS NOT VERIFIED.

FORMER ARCO SERVICE STATION No. 4391
731 WEST MACARTHUR BOULEVARD, OAKLAND, CALIFORNIA
WORK PLAN FOR SOIL VAPOR CHARACTERIZATION

SITE PLAN WITH PROPOSED VAPOR SAMPLING LOCATIONS

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FIGURE
2