ENVIRONMENTAL RISK SPECIALTIES CORPORATION

August 11, 2009

Mr. Jerry Wickham, Hazardous Materials Specialist
Alameda County Environmental Health Services
Environmental Protection Division
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

RE: Work Plan Addendum for DPE Interim Remedial Action
Eagle Gas Station
4301 San Leandro Street
Oakland, California 94601

LOP StID# 2118
ACEH Case No. RO0000096
USTCF Claim No. 014551

Dear Mr. Wickham:

Thank you very much for the July 9, 2009 letter with your review comments for the Environmental Risk Specialties Corporation's (ERS') *Interim Remedial Action Work Plan* for the Eagle Gas Station. Following your review and request, ERS has prepared a work plan addendum entitled *"Work Plan Addendum for DPE Interim Remedial Action."*

ERS would like to perform the interim remedial action and pilot test in November or December 2009, after the proposed DPE wells are installed. Your assistance on this site closure project is much appreciated. Please do not hesitate to contact the undersigned should you have questions regarding the Addendum.

Sincerely,
ERS

Jim Ho, Ph.D., P.E.
Principal Engineer
cc: Ms. Farah Naz and Mr. Muhammad Jamil

Mr. Jerry Wickham
Hazardous Materials Specialist
Alameda County Health Care Services Agency
Environmental Health Services
Environmental Protection
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

RE: Eagle Gas Station
4301 San Leandro Street
Oakland, California 94601

LOP SID# 2118
Fuel Leak Case No. RO0000096
USTCF Claim No. 014551

Dear Mr. Wickham,

As the legally authorized representative of the above-referenced project location, I have reviewed the *Work Plan Addendum for DPE Interim Remedial Action* prepared by my consultant of record, Environmental Risk Specialties Corporation. 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,

Muhammad Jamil 7-29-09

Mr. Muhammad Jamil

Work Plan Addendum for DPE Interim Remedial Action

Eagle Gas
4301 San Leandro Street
Oakland, California 94601

LOP StID# 2118
Fuel Leak Case No. RO0000096
USTCF Claim No. 014551

Prepared for:

Ms. Farah Naz
Mr. Muhammad Jamil

Prepared by:

Environmental Risk Specialties Corporation
Walnut Creek, California

August 2009

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

On behalf of Ms. Farah Naz and Mr. Muhammad Jamil, Environmental Risk Specialties Corporation (ERS) submitted a work plan entitled, "*Interim Remedial Action Work Plan*", dated May 11, 2009, for the Eagle Gas Station located at 4301 San Leandro Street, Oakland, California. This work plan is used to replace the approach and scope of work previously proposed by the former consultant, Clearwater Group (Clearwater). The Alameda County Environmental Health (ACEH) staff issued a review of this work plan in the letter dated July 9, 2009, in which ACEH accepted:

- The use of High Vacuum Dual Phase Extraction (HVDPE) technology;
- The installation of 12 dual-phase extraction wells; and
- The implementation of a 30-day interim remedial action/pilot test, instead of the 5-day pilot test previously proposed by Clearwater.

ACEH's July 9, 2009 letter also indicates that minimal descriptions are included in the work plan for field operation and monitoring procedures during the DPE interim remedial action. Therefore, ACEH asked Ms. Naz and Mr. Jamil to submit a Work Plan Addendum to expand the discussion of the work proposed for the 30-day interim remedial action/pilot test. ACEH requested that, at a minimum, the following information or items should be addressed in the Addendum:

- Permitting and treatment of extracted vapor and water
- Whether the stinger will be used to apply vacuum and the expected vacuum ranges
- Whether step tests will be performed including the number and duration of the step tests
- Number of wells to be tested at one time and the criteria for continuing or discontinuing treatment in individual wells
- Description of the data to be collected during the DPE activity including vacuum, vapor flow rates, water levels, groundwater flow rates, and vapor concentrations
- Description of the method for sealing wells during DPE
- Discussion of the frequency of soil vapor sample collection

- Discussion of groundwater sampling

To meet the above requests, on behalf of Ms. Farah Naz and Mr. Muhammad Jamil, ERS has prepared a *Work Plan Addendum for DPE Interim Remedial Action*, for the Eagle Gas Station. Since topics such as site description, objectives of interim remedial action, design of the interim remedial system, and background information related to the proposition of this interim remediation/pilot test approach have been presented in the *Interim Remedial Action Work Plan* (ERS, 2009), they are not repeated in this document. The vicinity map and the site plan of the subject site are shown again in Figures 1 and 2 of this document.

2. FIELD OPERATIONS AND MONITORING PROCEDURES

2.1 Equipment of the HVDPE System

The proposed HVDPE remediation system includes the following sub-systems:

- Water-vapor separator
- Water holding tank (200-gallon Poly tank)
- High vacuum pump (25-horse power, oil-sealed liquid ring pump with a designed maximum vacuum of 29-inch mercury (Hg) and a maximum inflow rate of 450 standard cubic feet per minute, with a noise level of less than 80 dB at 3 feet distance away from the truck)
- Thermal-catalytic oxidizer (rated for a heating capacity of 400,000 BTU per hour and a maximum operation temperature of 1,450 °F and 800 °F for the thermal and catalytic mode, respectively, and a 9-foot stack)
- Manifold for DPE wells (including 6 legs, a pressure gauge, and sampling ports)
- Air dilution valve
- Water treatment system (including two 200-pound granular activated carbon vessels with a designed maximum flow rate of 20 gallons per minute)

All the above components are installed on a 34 feet (length) by 10 feet (width) box truck including a soundproof enclosure. The truck-mounted HVDPE system is mobile and flexible, and is most appropriate for a short-term remedial action or pilot test. Use of a mobile HVDPE system is critical for the subject site because only limited space is available at the site. The designed maximum flow rates of the mobile HVDPE system for vapor and water are 450 standard cubic feet per minute (scfm) and 50 gallons per minute (gpm), respectively. The propane-heated thermal-catalytic oxidizer destroys the extracted hydrocarbon vapor under thermal or catalytic mode depending on the influent vapor concentrations. The HVDPE technology is effective for both permeable and low permeability soils. The induced effective range of vacuum influence by the HVDPE system depends on the soil permeability and subsurface stratigraphy. The estimated range of influence of this HVDPE system is approximately 20 to 30 feet in the sand/gravel media and 10 ft in the clayey soil.

The water treatment system is a separate unit mounted on a 16 feet long and 8 feet wide trailer. The water treatment unit contains two 200-pound granular activated carbon vessels, three 20/50-micron sediment bag filters, one 2-horse power transfer pump, and one flow totalizer.

2.2 Operation of the HVDPE System

The vacuum pump extracts both hydrocarbon vapor and groundwater from the vadose zone and/or the saturated zone. The vacuum generated by the pump is introduced into each DPE well using vacuum-rated, flexible 1¼-inch diameter PVC tubing (stinger). One end of the tubing will be trimmed at an angle of approximately 45° and inserted into the DPE well, while the other end of the tubing will be connected to the manifold of the DPE system. Depending on the permeability of the subsurface or the resistance of air/water in the soil, as well as the magnitude of vapor/water flow into the DPE system, the system vacuum expected under the conditions of the subject site may vary from 20 to 25 inches Hg. This is also dependant on the number of DPE wells extracted simultaneously. The vacuum introduced in each DPE well will be less than the combined system vacuum. The sum of the vacuums introduced to all DPE wells will be approximately equal to the system vacuum.

Each DPE wellhead will be sealed with a rubber vacuum boot installed on top of the well casing. The size of the boot fits the diameter of the well casing. A vacuum tubing/stinger will pass through the center of the boot. No spacing is allowed between the boot and the stinger to prevent leakage. There are two types of boots available for the DPE operation. They are FERNCO Incorporated 1056-215 and SIMMONS 3502 boots. The FERNCO boot is easier to install than the SIMMONS boot and has been used in many sites without leakage identified.

Based on the change of vapor concentration in combined influent, concentration of vapor extracted from each DPE well, water elevation in the observation wells, and groundwater extraction rate, the depth of the stinger in each DPE well can be adjusted to improve the contaminant mass removal from the subsurface. The number of DPE wells to be simultaneously extracted may also be determined by examining the change of the vapor concentration in combined influent and the vapor concentration extracted from each individual DPE well.

2.3 Measurement of DPE System Parameters

In order to evaluate the system performance, the following system parameters will be measured: system vacuum, combined inflow rate, influent and effluent vapor

concentrations, and system operation temperature. System vacuum is measured using a pressure gauge installed on the manifold. Combined inflow rate is determined from a tabulated chart given the measured system vacuum. Influent and effluent vapor concentrations are measured using a Horiba VOC analyzer. The system operating temperature is shown on the control panel. Vacuum of each DPE well can also be measured individually from the wellhead using a pressure gauge.

The system vacuum, influent vapor concentration, and combined inflow rate will be measured hourly during the first day of system operation. After the first day of system operation, the above data will be measured once every 4 hours. The above data will be used to calculate the incremental and total hydrocarbon mass removal from the subsurface in the vapor phase. In addition to the vapor concentrations measured by the Horiba VOC analyzer, influent vapor will be sampled at the beginning and the end of the test period using Tedlar bags; this will accurately calculate the mass removed during each test period. It should be noted that due to the presence of high system vacuum, the dissolved contaminants such as MTBE, TBA, TPH-g, and benzene will be greatly stripped from the dissolved phase into the vapor phase within the water-vapor separator. The residual dissolved constituents not stripped in the water-vapor separator will stay in the liquid phase and treated by the water treatment system.

Since no sounding tube will be installed at each DPE well, the water level within each DPE well will not be measured. The pilot test will measure the depth to groundwater and the level of vacuum within the selected observation wells, including groundwater monitoring wells and vapor wells in the vicinity of DPE wells. The water depth, vacuum, and groundwater/vapor sampling periods during the pilot test are described in Section 2.5.

2.4 Expanded Discussion of the Pilot Test

The combined application of an interim remedial action and a pilot test is cost-effective. Since the subsurface of the subject site is heterogeneous, data collected from a 30-day, site-wise pilot test will be more reliable than data obtained from a 5-day pilot test for a particular location.

During the 30-day interim remediation/pilot test, the truck-mounted DPE system will be operated continuously 24 hours each day. The total flow rate of the combined influent, system vacuum, and vacuum/groundwater depth in the observation wells will be measured every 4 hours both day and night. Vacuum, flow rate, and vapor concentration of each individual extraction well will be measured every 12 hours. The vapor concentrations will be directly measured from the sampling port on the manifold

using a Horiba vapor analyzer. Vacuum and groundwater depth in each observation well will be measured using a pressure gauge or a water level indicator. The induced vacuum data will be measured accurate to 0.01 inch Hg. The measurement of vacuum influence from the observation wells will be used to evaluate the Range of Influence (ROI) using a criterion of an induced vacuum of 0.1-inch water.

In addition to the instrument measurements, vapor samples also will be collected by Tedlar bags and delivered to a certified laboratory for TPH-g, MTBE, TBA, and BTEX analyses using EPA Methods 8015M and 8021B. Groundwater from the monitoring wells assigned to each test group will also be sampled and analyzed for VOCs including oxygenates and TPH-g using EPA Methods 8260B and 8015B. Wells selected for vapor and groundwater sampling are listed in Table 1. The volume of groundwater extracted from all DPE wells of each test group will be determined from the totalizer reading.

A total of 13 extraction wells including 12 proposed 4-inch DPE wells (D1 through D12) and one existing 4-inch groundwater extraction well (EW-1) will be extracted. The proposed location of these DPE wells is included in Figure 7 of the *Interim Remedial Action Work Plan* (ERS, 2009). The same well location map is again presented in Figure 3 of the Addendum. Since groundwater in shallow zone under the subject site has been widely contaminated, the proposed DPE wells will be placed within or near the boundary of the shallow zone plume. For the convenience of the pilot test and the objective of improving the effectiveness of interim remediation, the DPE wells are gathered in three test groups according to their relative locations and the sub-areas selected according to the lateral range of the shallow zone plume. All the wells in the same group will be extracted simultaneously. DPE wells assigned to each test group, observation wells associated with each group, the extraction duration, and the order of DPE operation are presented in Table 1.

2.5 Collection of Soil Vapor and Groundwater Data

Combined influent will be sampled from the DPE system at the beginning and the end of the test using Tedlar bags (described in Section 2.3). Vapor concentrations in the extraction wells will be measured every 12-hour during the test (described in Section 2.4). In addition, soil vapor samples also will be collected from the selected DPE wells at the beginning and the end of the test period using Tedlar bags. During the DPE test, groundwater in selected observation wells also will be sampled. The selected sampling wells and the sampling time are included in Table 1. The collected vapor and groundwater samples will be analyzed using the analytical methods described in Section 2.4.

Since the top of screen of monitoring wells (MW-4, MW-7, and MW-8) and oxygen diffuser wells (IS-2, IS-3, IS-4, and IS-5) is located at 10 feet bgs, these wells can still be used to measure the level of induced vacuum if the groundwater level is drawn down and the well screen is exposed after the dual phase extraction.

2.6 Performance Evaluation of the Interim Remedial Action

The data to be collected from the interim remediation/pilot test can be grouped in two categories. In addition to the test groups, test wells, observation wells, and sampling frequency presented in Table 1, the types of data and their sampling/measurement periods are summarized below:

DPE System Parameters

- Depth of stingers (between 2 to 4 feet above bottom of wells)
- System vacuum (hourly on the first day and 4-hour after the first day)
- Combined influent flow rate and influent concentration (hourly on the first day and 4-hour after the first day)
- Vacuum and influent flow rate and influent concentration of each DPE well (12-hour)
- Combined influent concentrations sampled using Tedlar bags at the beginning and the end of each test period.

Soil Vapor and Groundwater Data

- Vacuum of observation wells (4 hour)
- Depth to groundwater of observation wells (4 hour)
- Soil vapor from selected DPE wells will be collected using Tedlar bags at the beginning and the end of each test period
- Groundwater from selected observation wells will be collected at the beginning and the end of each test period

The above data will be manipulated and plotted in order to:

- Estimate the contaminant mass removal rate and the effectiveness of the DPE system;
- Estimate the Range of Influence of DPE wells (using the vacuum data obtained from the observation wells); and
- Collect system operational parameters to assist in future upgrade of the interim remedial system.

The collected data will demonstrate:

- The change of mass removal rate over time
- The effect of DPE on groundwater drawdown
- The expected groundwater yield

This data can be used to predict the expected duration for site remediation and to decide whether a full-scale, fixed-based HVDPE system is required. In addition, the pilot test data may be used to demonstrate the feasibility of groundwater-extraction using a pneumatic pump and to estimate the volume of carbon vessels and the cost needed for the on-site groundwater treatment, as well as the expected cost, if extracted water is to be disposed/treated off site.

2.7 Permitting and Treatment of Extracted Vapor and Water

A required well permit will be obtained from the Alameda County Public Works Agency prior to the installation of the DPE wells. Both aqueous and gaseous phases of hydrocarbons extracted from subsurface by vacuum pump will be separated in the water-vapor separator and treated by the thermal-catalytic oxidizer and activated carbon prior to being discharged into the environment. Release of treated hydrocarbon vapor/air to the atmosphere requires an air permit available from the Bay Area Air Quality Management District. Treated groundwater will be discharged into the sewer. A permit for the discharge of treated water is available from the East Bay Municipal Utility District. Since all the DPE wells will be installed within the property boundary, no encroachment permit is required. The selected contractor, CalClean, will apply the air and water discharge permits. ERS will apply the well permit.

2.8 Step Tests

The measurement of system operational data described in Section 2.3 is primarily to evaluate the effectiveness and performance of the HVDPE system for the subject site. The site-wise pilot test will focus on the collection of soil vapor and groundwater data to characterize the response of each sub-area to the vacuum extraction. It is not the intention of this site-wise pilot test to assess the air permeability of the clayey soil at a selected location. Thus, step tests normally designed for the estimation of intrinsic air permeability/conductivity of soil at selected locations are not adopted, and will not be performed during this pilot test.

3. SCOPE OF WORK

The scope of work for the 30-day interim remediation/pilot test includes the following tasks:

Task 1 – Application for a permit for well installation (Note: Permits for air emission and discharge of treated groundwater are to be provided by the equipment/service provider. An off-site encroachment permit is not needed.)

Task 2 – Cost estimate and budget pre-approval, if requested by ERS management (Cost pre-approval by the UST Cleanup Fund should not be necessary.)

Task 3 – Installation and development of the DPE wells D1 through D12 (Wells should be developed at least 72 hours prior to the DPE operation.)

Task 4 – Field operation of the interim remediation and pilot test (A truck-mounted DPE unit will be operated continuously 24 hours each day for 30 days.)

Task 5 – Evaluation and reporting of the interim remediation/pilot test data and the results including recommendations in the report (The pilot test data will be used to evaluate the performance of the proposed interim remedial system and to evaluate the need to upgrade the interim remedial system to a full-scale system.)

Task 6 – Prepare a Corrective Action Plan, if needed, and design/upgrade the interim remedial system.

4. SCHEDULE

Following the concurrence included in ACEH's July 9, 2009 letter, the proposed DPE wells will be installed in October. The application for the water discharge and air emission permits will not be submitted until the Addendum is approved by ACEH. A tentative schedule for the scope of work is as follows:

Tasks	Scope of Work	Duration
	Approval of the Addendum	Not known
1	Well permits application	15 days
2	• Cost estimate • Budget pre-approval (if requested)	• 1 day • 30 - 50 days
3	Installation and development of DPE wells	7 days
4	• Equipment mobilization • Interim remediation and pilot test	• 1 day • 30 days
5	Reporting	60 days
6	CAP preparation and system upgrade	To be determined

REFERENCE

Environmental Risk Specialties (ERS), *Interim Remedial Action Work Plan*, May 2009.

REPORT DISTRIBUTION LIST

Mr. Jerry Wickham, Senior Hazardous Materials Specialist (via electronic transmittal)
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Environmental Health Services
Environmental Protection
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

Ms. Farah Naz (via U.S. Mail)
C/o Mr. Muhammad Jamil
40092 Davis Street
Fremont, CA 94538

CERTIFICATION

This document was prepared under the supervision of a State of California Professional Engineer at Environmental Risk Specialties Corporation (ERS). All statements, conclusions, and recommendations are based solely upon published results from previous consultants, field observations by ERS, and laboratory analysis performed by a California DHS-certified laboratory related to the work performed by ERS.

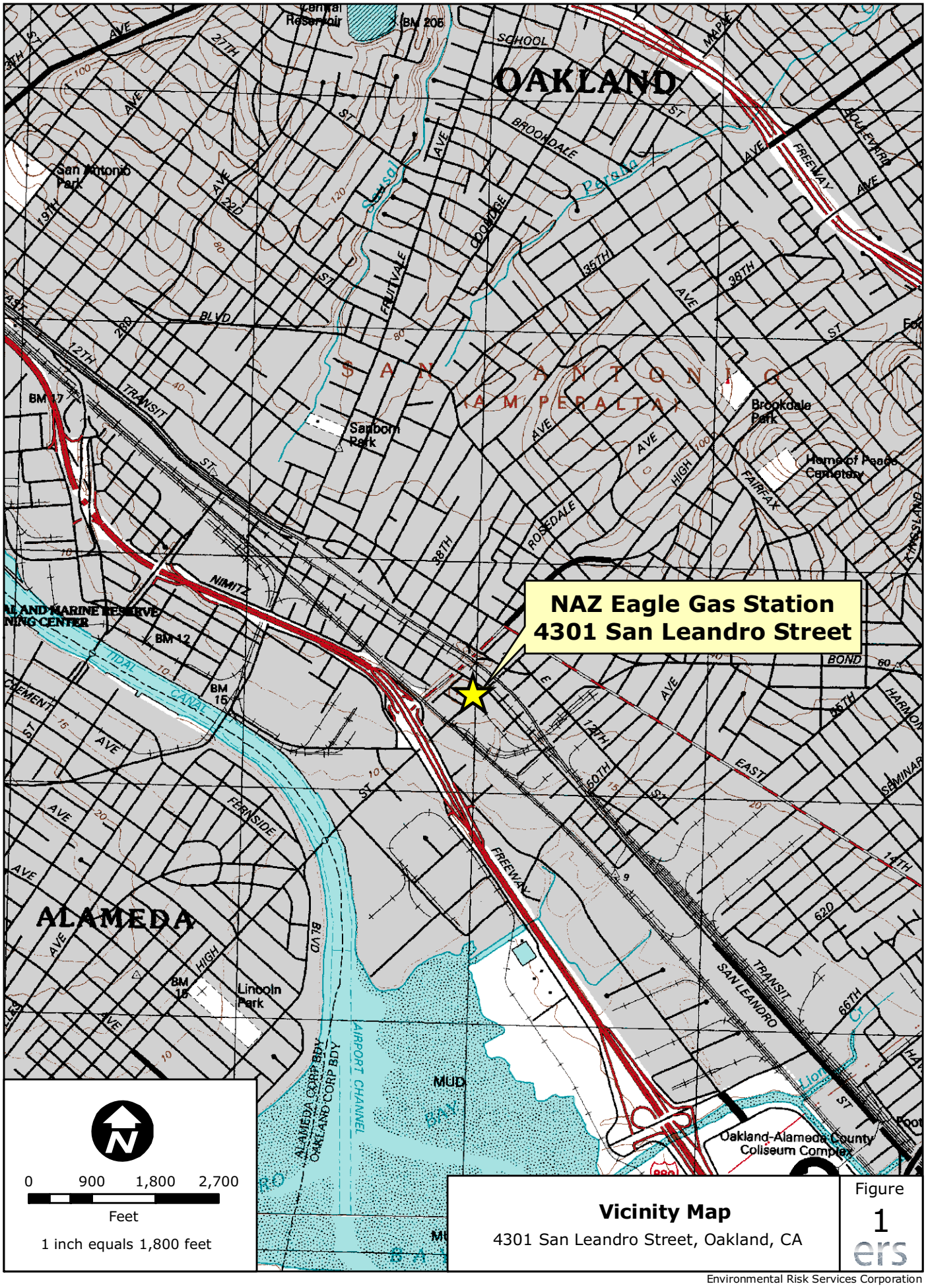
Information and interpretation presented herein are for the sole use of the client and regulating agency. The service performed by ERS has been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions in the area of the property. No other warranty, expressed or implied, is made.

Sincerely,

ENVIRONMENTAL RISK SPECIALTIES CORPORATION

Jim Ho, PE #C68639

FIGURES

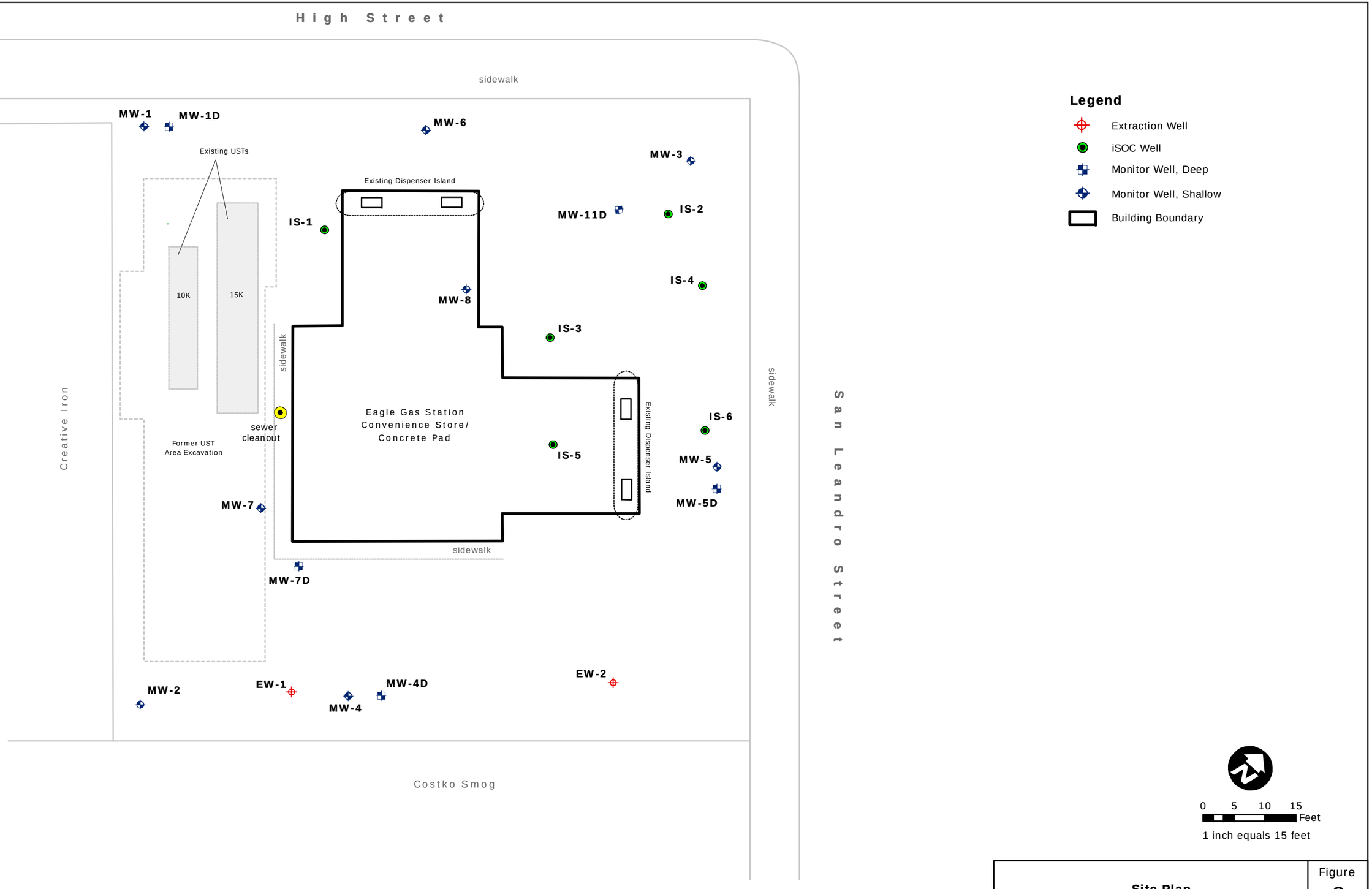


Vicinity Map

4301 San Leandro Street, Oakland, CA

Figure 1

Environmental Risk Services Corporation



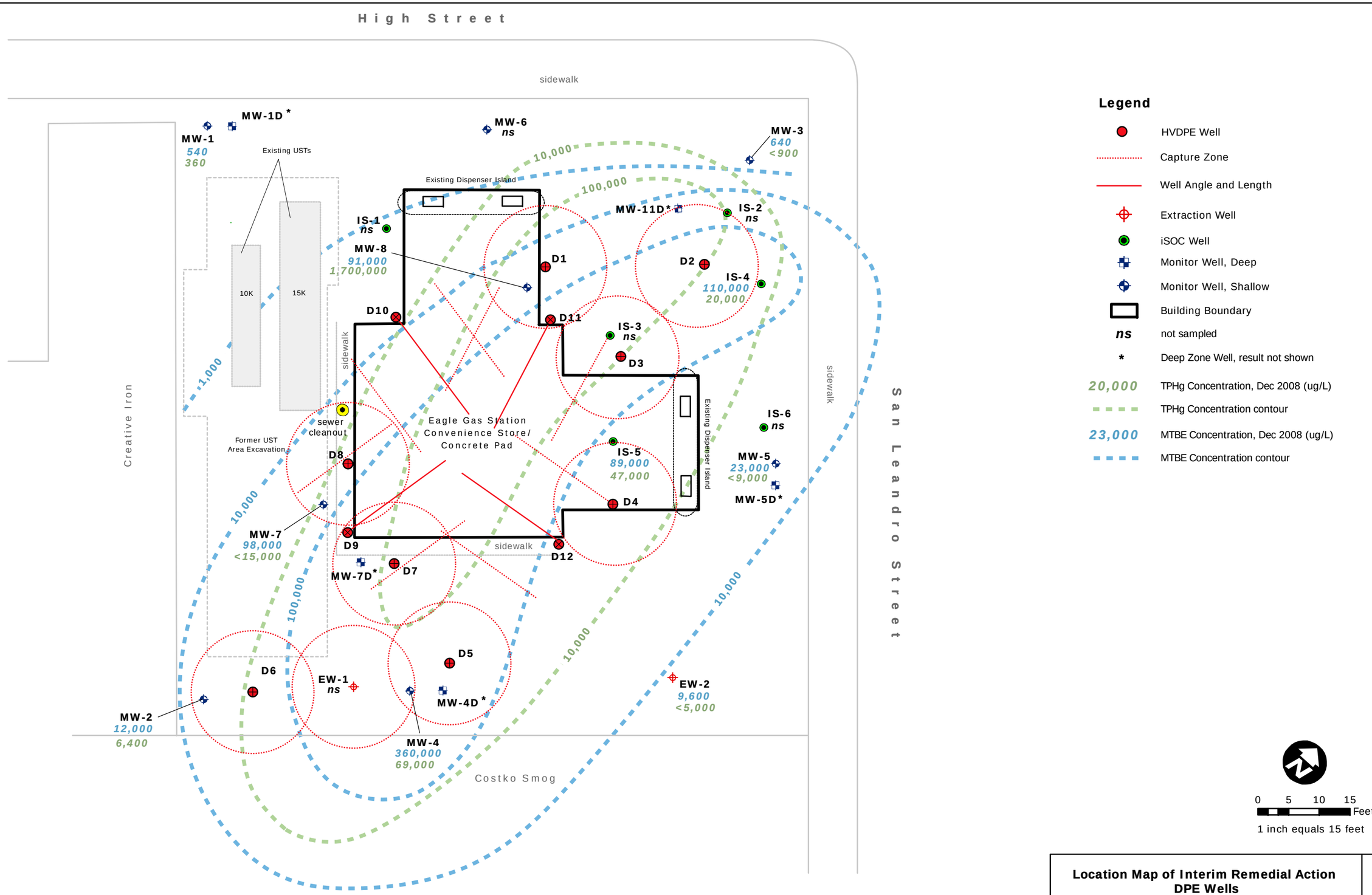
Site Plan

Eagle Gas Station, 4301 San Leandro Street, Oakland, CA

Figure 2

ers

Environmental Risk Services Corporation



Legend

- HVDPE Well
- Capture Zone
- Well Angle and Length
- Extraction Well
- iSOC Well
- Monitor Well, Deep
- Monitor Well, Shallow
- Building Boundary
- *ns* — not sampled
- * — Deep Zone Well, result not shown
- 20,000 — TPHg Concentration, Dec 2008 (ug/L)
- TPHg Concentration contour
- 23,000 — MTBE Concentration, Dec 2008 (ug/L)
- MTBE Concentration contour

0 5 10 15 Feet

1 inch equals 15 feet

Location Map of Interim Remedial Action
DPE Wells
Eagle Gas Station, 4301 San Leandro Street, Oakland, CA

Figure 3

Environmental Risk Services Corporation

TABLES

Table 1. Operation of the DPE Wells for Interim Remediation and Pilot Test

Test Groups	Extraction Wells	Order of DPE Operation	Extraction Period/ Duration (days)	Observation Wells	Sampling Wells and Sampling Frequency
A	D5, D6, D7, D8, EW-1	1st	14	VP-2, VP-3, VP-4, VP-5, VP-6, MW-4, MW-7, MW-4D	• Vacuum and groundwater depth of observation wells measured every 4 hours • Vapors from D5, D6, and D8 sampled on 1st and 14th day • Wells MW-4 and MW-7 sampled on 1st and 14th day
B	D1, D2, D3, D4	2nd	8	VP-6, MW-3, MW-5, MW-6, MW-8, IS-1 through IS-6	• Vacuum and groundwater depth of observation wells measured every 4 hours • Vapors from D2 and D4 sampled on 15th and 22nd day • Wells MW-3, MW-5, and MW-8 sampled on 15th and 22nd day
C	D9, D10, D11, D12 (All angle wells under the building)	3rd	8	VP-2, VP-6, MW-7, MW-8, IS-1, IS-3, IS-4, IS-5	• Vacuum and groundwater depth of observation wells measured every 4 hours • Vapors from D9, D10, and D11 sampled on 23rd and 30th day • Wells MW-8, IS-1, IS-3, IS-4, and IS-5 sampled on 23rd and 30th day