



KAMUR INDUSTRIES, INC.
2351 Shoreline Dr., Alameda, CA 94501-6228
(510) 523-7866 · Fax (510) 523-3172

RECEIVED

2:24 pm, Nov 06, 2007

Alameda County
Environmental Health

November 2, 2007

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

Subject: Corrective Action Plan Report
400 San Pablo Avenue
Albany, CA

Dear Jerry:

Enclosed is a Report the Corrective Action Plan prepared by Enviro Soil Tech Consultants.

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,

Murray T Stevens, CEO
Kamur Industries Inc.

**CORRECTIVE ACTION PLAN
FOR THE PROPERTY
LOCATED AT 400 SAN PABLO AVENUE
ALBANY, CALIFORNIA
OCTOBER 30, 2007**

**PREPARED FOR:
MR. MURRAY STEVENS
KAMUR INDUSTRIES, INC.
2351 SHORELINE DRIVE
ALAMEDA, CALIFORNIA 94501**

**BY:
ENVIRO SOIL TECH CONSULTANTS
131 TULLY ROAD
SAN JOSE, CALIFORNIA 95111**

ENVIRO SOIL TECH CONSULTANTS

LIST OF FIGURES

FIGURE 1 ... Site Vicinity Map Showing 400 San Pablo Avenue, Albany, California

FIGURE 2 ... Site Map

FIGURE 3 ... Isocontours of TPHg in Groundwater Map

FIGURE 4 ... Residual TPHg Contamination in Soil Map

FIGURE 5 ... Area of Potential Soil Excavation Map

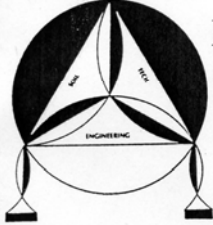
TABLE OF CONTENTS	<u>PAGE NO.</u>
Letter of Transmittal	1-2
1.0 Introduction	
<i>1.1 Site Location and Ownership</i>	3
<i>1.2 Background</i>	3-4
<i>1.3 Purpose of Corrective Action Plan</i>	5
2.0 Remediation Target Levels and Objectives	5-6
3.0 Evaluation of Soil Remediation Methods	
<i>3.1 Excavation and Disposal</i>	7-8
<i>3.2 Soil Vapor Extraction</i>	8
<i>3.3 Bioventing</i>	9
4.0 Evaluation of Groundwater Remediation methods	
<i>4.1 Groundwater Extraction</i>	10
4.1.1 Extraction System Design and Testing	10-11
4.1.2 Treatment System Options	11-14
<i>4.2 Oxygen Releasing Compound (ORC)</i>	14-15
4.2.1 System Configuration	15
4.2.2 Maintenance and Monitoring	16
<i>4.3 Microsparging (Gas Infusion)</i>	16-17
4.3.1 System Configuration	17-18
4.3.2 Maintenance and Monitoring	18
<i>4.4 In-Well Air Stripping</i>	18-19
4.4.1 System Configuration	19
4.4.2 Maintenance and Monitoring	20
5.0 Cost Comparisons	20
6.0 Recommendations	20-21

TABLE OF CONTENTS CONT'D

PAGE NO.

APPENDIX "A"

Figure 1 - Vicinity Map	M1
Figure 2 - Site Map	M2
Figure 3 - Isocontours of TPHg in Groundwater Map	M3
Figure 4 - Residual TPHg Contamination in Soil Map	M4
Figure 5 - Area if Potential Soil Excavation Map	M5



ENVIRO SOIL TECH CONSULTANTS

Environmental & Geotechnical Consultants
131 TULLY ROAD, SAN JOSE, CALIFORNIA 95111
Tel: (408) 297-1500 Fax: (408) 292-2116

October 30, 2007

File No. 8-90-421-SI

Mr. Murray Stevens
Kamur Industries, Inc.
2351 Shoreline Drive
Alameda, California 94501

SUBJECT: CORRECTIVE ACTION PLAN FOR THE PROPERTY

Located at 400 San Pablo Avenue, in
Albany, California

Dear Mr. Stevens:

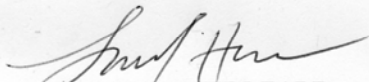
Alameda County Health Care Services Agency has requested a Corrective Action Plan to remediate subsurface contamination at Plaza Car Wash, which is located at 400 San Pablo Avenue in Albany, California. The site has been under investigation since 1989 and was partially remediated in 1989, 1990, and 2000. The Agency has concluded that further cleanup is necessary, and we have prepared this Plan to address the Agency's concerns.

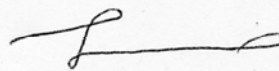
File No. 8-90-421-SI

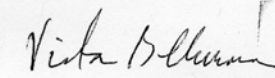
If you have any questions or require additional information, please feel free to contact our office at (408) 297-1500 or via email at info@envirosoiltech.com.

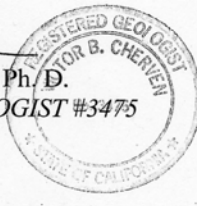
Sincerely,

ENVIRO SOIL TECH CONSULTANTS


FRANK HAMEDI-FARD
GENERAL MANAGER


LAWRENCE KOO, P. E.
C. E. #34928


VICTOR B. CHERVEN, Ph.D.
PROFESSIONAL GEOLOGIST #3475



ENVIRO SOIL TECH CONSULTANTS

1.0 INTRODUCTION

1.1 SITE LOCATION AND OWNERSHIP

Plaza Car Wash is located at 400 San Pablo Avenue, in Albany, California, approximately one mile east of San Francisco Bay (Figure 1). Norge Dry Cleaners is adjacent to the car wash at 398 San Pablo, and is bordered by El Cerrito Creek to the north. Both properties are bordered by San Pablo Avenue to the east and Adams Street to the west. Mr. Murray Stevens leased the car wash site from Mr. George Ososke in 1970 and is the identified Responsible Party for 400 San Pablo Avenue. Mr. and Mrs. George Ososke are the identified Responsible Party for the property at 398 San Pablo.

1.2 BACKGROUND

Background information about the site history, investigation history, investigation results, and extent of the problem has been detailed in numerous previous reports, including a Site Conceptual Model report that was submitted in early 2005. Therefore, this information will be summarized only briefly here.

The investigation began in July 1989 and has been ongoing more or less continuously since that time. Several phases of drilling have taken place to delineate the lateral and vertical extent of petroleum and other hydrocarbons in the subsurface, and currently there are eight monitoring wells at the site to monitor groundwater contaminant concentrations. Surface water quality in El Cerrito Creek is also monitored on a quarterly basis. Figure 2 shows the locations where borings and vapor probes have been installed and soil has been excavated to remove hydrocarbons.

Hydrocarbons leaked from two primary sources and mixed in the subsurface to create an intermingled hydrocarbon plume. The source at 400 San Pablo was the underground gasoline storage tanks and related product lines and dispensers, which leaked unleaded gasoline. The Contaminants of Concern from this source are Total Petroleum Hydrocarbons in the gasoline range (TPHg), Benzene, Toluene, Ethylbenzene, and Xylenes. The tanks were located near the center of the site area but were removed in 1990 (Figure 2). An unidentified source at the dry cleaners leaked dry cleaning solvents, and the main Contaminants of Concern from that source are Vinyl Chloride, Tetrachloroethene and Trichloroethene. The exact location of that leak point is uncertain, but is somewhere in the vicinity of the dry cleaners building.

Figure 3 shows the present extent of the groundwater impact and the most common direction of groundwater flow in the recent past. Over time, concentrations of both petroleum and solvent hydrocarbons have declined, but have not reached permissible cleanup levels. Recently, gasoline concentrations in the central portion of the site have ranged between about 40,000 and 100,000 µg/L (micrograms per Liter) and Benzene concentrations have varied between 5,000 and 15,000 µg/L. Concentrations are below the detection limit in the northern portion of the area near El Cerrito Creek, and are in the 400-2,000 µg/L range for TPHg and 40-3,000 µg/L range for Total Chlorinated (solvent) compounds in the northwestern portion of the site. A new well was installed in the southwestern part of the site area in mid-2007, and a TPHg concentration of 1,300 µg/L was reported there. Very low concentrations of adsorbed gasoline hydrocarbons were detected in soil samples from the capillary fringe in that boring, suggesting that they had been transported away from the source by groundwater flowing down the hydraulic gradient.

1.3 PURPOSE OF A CORRECTIVE ACTION PLAN

The purpose of a Remedial or Corrective Action plan are to establish cleanup goals and objectives for the specific site, to compare the suitability of various remedial technologies for remediation of the site, and to identify the most suitable technologies, if possible. If the evaluation is based on field tests or other reliable data, the evaluation commonly includes cost comparisons and a work schedule showing the time frame necessary to restore the site. The plan may also contain recommendations for feasibility tests of technologies or methods if tests are necessary to confidently evaluate the alternatives.

2.0 REMEDIATION TARGET LEVELS AND OBJECTIVES

Remediation Target Levels or Objectives for this type of site are typically based on contaminant concentration limits necessary to protect human health and groundwater quality (e.g., Maximum Concentration Level or MCL). The following concentration targets and objectives have been taken from the Underground Storage Tank Cleanup Fund Pay for Performance Condition of Payment, dated March 2002.

The site cleanup objectives for the vadose zone include the following:

1. The remaining vadose zone BTEX/TPHg concentrations no longer cause concentrations in the leachate discharging to groundwater to exceed groundwater cleanup levels, based on interpretation of soil data using an appropriate vadose zone model; and
2. BTEX and TPHg have been removed to the extent technically and economically feasible.

The Remediation Target Levels for the groundwater are the concentrations to be achieved for specified chemicals (“Chemicals of Concern,” or “COCs”). These COCs and their respective concentrations are listed in the following table. The chemical concentrations shown are identified as “Preliminary Active Remediation Goals” (“PARGs”).

<i>Chemicals of Concern (“COCs”)</i>	<i>Preliminary Active Remediation Goals (“PARGs”)</i>
TPHg	1,000 ppb
Benzene	100 ppb
Toluene	200 ppb
Ethylbenzene	500 ppb
Xylenes	300 ppb
MTBE	200 ppb

These Preliminary Active Remediation Goals have been met in the monitoring wells in the northern part of the site (STMW-3, STMW-4, STMW-5, MW-2, and MW-3). Although hydrocarbons in the gasoline range have occasionally exceeded 1,000 ppb in MW-3, laboratory data have shown that non-petroleum hydrocarbons make up the bulk of that concentration, and therefore the concentration of petroleum hydrocarbons in the area around MW-3 does not exceed the PARG’s. Remediation of non-petroleum chlorinated hydrocarbons falls under different guidelines and goals, and the PARG’s do not apply to the northwestern portion of the site where MW-3 is located.

The only wells in which the goals have not been met are STMW-1, STMW-2, and STMW-6. This is a reflection of the fact that the gasoline plume is located in the central and southern portions of the site area.

3.0 EVALUATION OF SOIL REMEDIATION METHODS

Interim soil remediation was performed in November 1990, and 1100 cubic yards of contaminated soil were removed from a large excavation that encompassed the UST cavity and the product dispensers (Figure 2). The excavation ranged from 10 to 13 feet in depth, making it possible to remove the highly impacted soil that had been sampled from 4 to 10 feet. However, sidewall samples and later samples from surrounding borings indicate that impacted soil was left in place around the perimeter of the excavation (Figure 4). Concentrations exceeded 1,000 mg/Kg (milligrams per kilogram) in five samples at a depth of approximately 10 feet, and impacted soil extends laterally at least 30 feet from the limit of the excavation in some areas (Figure 4). This soil has the potential to continue to release hydrocarbons to groundwater, which is commonly in the depth range of 8-10 feet. Here, we consider three possible methods of addressing soil contamination.

3.1 EXCAVATION AND DISPOSAL

Excavation was shown to be effective at this site in 1990 and 2000, when more than 50% of it was removed. Additional soil could be removed beyond the limits of the original excavation, as illustrated in Figure 5. This would entail removing approximately 450 square yards of asphalt and two monitoring wells. Excavating to a depth of 10 feet would remove 1,440 cubic yards of soil, but would leave behind any impacted soil below this depth (as noted above, TPHg concentrations exceeded 1,000 mg/Kg at this depth in some sidewall samples from the original excavation).

An excavation of that size and shape would probably require several days of work, especially since space to stockpile and sample the soil is very limited at the site. A reasonable estimate for the time during which the site would be shut down is two weeks. This would be a major interruption for site operations and would have a significant business impact, and would likely not result in complete removal of the hydrocarbon mass. Therefore, this method is not favored by the Responsible Parties.

3.2 SOIL VAPOR EXTRACTION

A less invasive method of soil remediation is in-situ vapor extraction, where liquid hydrocarbons are induced to vaporize and then a vacuum is applied to a network of vapor wells to withdraw the vapors from the soil. The vapor is then treated by either carbon absorption or thermal destruction to prevent it from escaping into the environment. This method has been proven effective at numerous sites where soil conditions are suitable.

For effective vapor extraction, the soil must have good permeability to air so that satisfactory air flow rates can be obtained, and the contaminants must be volatile and within the unsaturated zone where the air flow is occurring. Unfortunately, the conditions at this site are not very conducive to effective vapor extraction. Numerous soil borings, as well as observations of the original excavation walls, indicate that the soil is primarily clay and silty clay, with limited permeability. This is particularly true in the upper 10 feet above the water table. Moreover, as noted above, hydrocarbon concentrations may be significant below 10 feet, where the high water table would prevent vapor flow. Even if additional measures were taken to lower the water table, the problem of low soil permeability would remain. Many closely spaced extraction wells would be required because the radius of influence of each well would probably be in the range of 5-10 feet. Prior to installing such a system it would be necessary to conduct a pilot test of the method to determine whether it would be cost effective.

3.3 BIOVENTING

Another method that could be considered for this site is similar to vapor extraction, but utilizes hydrocarbon-degrading bacteria to metabolize the hydrocarbons rather than carbon absorption or thermal destruction. In this method, a network of wells is installed in the unsaturated zone to increase the oxygen supply to soil bacteria, thereby fostering bacterial growth and respiration. The hydrocarbon contaminants become a food source that the bacteria convert into bacterial mass and byproducts such as carbon dioxide. The principal difference between bioventing and soil vapor extraction is in the rate of air flow. Bioventing does not attempt to create a large vacuum to withdraw hydrocarbon vapors; rather, the lower vacuum and air flow rate induce the bacterial activity. The wells can be used either as injection wells or as extraction wells, but injection appears to work better at sites that have relatively impermeable asphalt surfaces.

Probably the main advantage of this method over vapor extraction is that the introduction of oxygenated air would also help to oxygenate the groundwater, possibly making the method effective for remediating groundwater as well as soil. However, it would have the same limitations regarding soil permeability and radius of influence.

There are other disadvantages to this method. It would be necessary to conduct soil tests to determine whether soil bacteria are present, and whether other nutrients are available for bacterial growth. Due to lower flow rates and the slow process of bioremediation, the method would most likely take longer than other methods to achieve the cleanup goals, and it would require frequent monitoring of bacterial populations to show that bacteria are present and active.

4.0 EVALUATION OF GROUNDWATER REMEDIATION METHODS

4.1 GROUNDWATER EXTRACTION

In groundwater remediation, the most common practice is to pump the groundwater to an above-ground separation and treatment system. “Pump and Treat” systems control the movement of a groundwater contaminant plume by inducing an artificial hydraulic gradient around the plume, causing groundwater to flow toward the site instead of away from it. Pumping groundwater from one or more suitably located wells lowers the water table near the pumping well(s) and allows groundwater farther away to flow in to replace the extracted water. The extracted water is then piped to some type of treatment unit that removes the contaminants from the water stream. The effectiveness of the method is dependent on several variables, including the characteristics of the aquifer; the solubility of the contaminants of concern; their concentration; the pumping rate and well configuration; and others. A primary advantage of groundwater extraction is that it can be finely adjusted to meet the objectives by changing the pumping rate or the number of pumping wells. Major disadvantages are the time required (normally each pore must be flushed multiple times before the hydrocarbons can be leached and dissolved into the groundwater) and the large volumes of water that must be extracted and treated or disposed of.

4.1.1 EXTRACTION SYSTEM DESIGN AND TESTING

It is usually necessary to conduct a groundwater pumping test to measure the potential pumping rate and radius of influence of an extraction well before an effective

groundwater extraction system can be designed. However, experience at this site has shown that the subsurface soil has low permeability and yields water slowly. No true aquifers have been identified, and it appears that the groundwater is normally perched above a hard, impermeable layer at a depth of 23 feet that inhibits communication with deeper groundwater. Monitoring wells can be pumped dry at pumping rates of 1 gallon per minute, implying that a pumping test is neither feasible nor likely to yield encouraging results. Hence, the low hydraulic conductivity of the subsurface soil would be a strongly limiting factor on the cost effectiveness of groundwater extraction at this site. Several wells would be required to achieve an extraction rate of 10 gpm or higher, and many wells would be required to affect the entire groundwater plume.

4.1.2 TREATMENT SYSTEM OPTIONS

Treatment options for BTEX constituents and chlorinated hydrocarbons are relatively well known. The most commonly used systems are granular activated carbon and air stripping, but other, more exotic, methods are available.

There are a number of stripper configurations. Large, packed-tower strippers are generally the most effective when high flow rates are required and are therefore less expensive for high-volume, high-concentration situations. At lower flow rates, such as would be the case at this site, low-profile strippers become competitive with packed towers, and are mechanically more reliable and flexible in changing flow and concentration conditions.

Contaminant removal efficiencies of greater than 95% can be achieved with packed towers, even in high-concentration situations, but may not be achievable with other types of strippers. At high flow rates, air stripping is less costly than other methods such as filtration by granular activated carbon, but carbon is the least expensive option for off-gas treatment when influent concentrations are less than 200 µg/L. Carbon usage rises as concentrations rise, and catalytic or thermal oxidation is usually preferred when influent concentrations exceed 2,000 µg/L. Oxidation is most effective if the waste heat from the oxidation unit is used to pre-heat the influent water before it enters the air stripper. With pre-heating, lower towers can be used, which reduces both the capital cost and the operating cost (power requirements). However, the waste heat from the oxidation unit might not be sufficient to raise the water temperature enough, depending on the ambient water temperature and the requirements of the stripper. Therefore, an additional heat source such as an electric heater or solar panels might be necessary. Post-treatment cooling might also be required, depending on the method of water disposal.

An alternative off-gas treatment method is the gas-phase biofilter, which may be more cost-effective than oxidation units in high-influent situations. However, biofilters have a large footprint, and depending on the space requirements of the air stripper and other equipment, sufficient space for a biofilter may not be available at the site.

Another method of removing hydrocarbons from groundwater involves filtering the contaminated water through an absorbent material that has a high affinity for hydrocarbons. The most important property of an absorbent/absorbate pair is their affinity, usually measured in terms of mass of organic absorbed per unit mass of absorbent. Sorption capacity and the load of contaminants in the influent water stream determine the service life of an absorption system. Some absorbents can be regenerated and reused when they reach their absorption limit.

Granular activated carbon, made from coconut shells, coal, peat or wood is a well-known and accepted method of filtering hydrocarbons from contaminated gas or water streams. It is effective in removing organic compounds from contaminated water because it has a high adsorption capacity for organic compounds. Intermolecular attraction between the carbon and the contaminant causes the contaminant to be adsorbed onto the surface of the carbonaceous material. Pulverizing and heating the material greatly increases both its surface area and its affinity for hydrocarbon contaminants.

Two principal advantages of activated carbon are that it can be regenerated using steam and capital costs for ancillary equipment are low. The frequency of regeneration is dictated by the sorption capacity of the material for the contaminant(s) of concern. For benzene, the efficiency of activated carbon is approximately 10%, meaning that 100 pounds of carbon can absorb 10 pounds of benzene.

An important parameter in the design of an absorption system is the Empty Bed Contact Time (EBCT). For systems treating contaminated water, EBCT should be on the order of several minutes to allow sufficient contact time between the adsorbate (BTEX) and the adsorbent. This contact time must be accounted for in the design, and is a constraint on the allowable flow rate.

There are several technologies that are designed to destroy the organic contaminants directly, without transferring them to a solid or vapor phase. In these systems, the contaminants are reacted with hydroxyl radicals (OH) and destroyed. Several types of systems have been employed to remediate chlorinated and other hydrocarbons, but they are rarely used to remediate petroleum hydrocarbons at UST sites because of their cost and other factors.

One type of system utilizes one or more ozone generators to convert oxygen (O_2) to ozone (O_3), which then enters the water stream through a vacuum created by the venturi effect. Contaminants react with the ozone bubbles in a mixing tank, and the oxygenated water then is pumped to large retention tanks where most of the contaminant oxidation takes place. After ozone treatment, the water is then piped to a UV radiation unit for further oxidation. One of the benefits of UV treatment is the reduction of hydroxyl radicals. Treatment units can be constructed to suit site requirements, and units ranging from 1 gpm to 1,000 gpm are available. Another advantage of this technology is that no off-gas treatment is required. This is a relatively new technology, and site-specific testing would be required to determine whether this technology would be cost effective.

Regardless of the treatment method, disposal of the extracted groundwater is a major issue in groundwater extraction systems. The two main options are disposal to the city sanitary sewer and disposal to the storm drain, which ultimately drains to surface waters belonging to the State of California. Therefore, storm drain disposal requires a National Pollution Discharge Elimination System (NPDES) permit from the Regional Water Quality Control Board. ESTC will be contacting the Board and the City of Albany to determine whether either option is viable at this site and to determine which would likely be the least costly.

4.2 OXYGEN RELEASING COMPOUND (ORC)

In-situ methods of groundwater remediation eliminate the costly step of water disposal that plagues groundwater extraction systems. They rely on efficient delivery mechanisms to get the treatment agents to the contaminated area, and this is usually the most

difficult part of in-situ systems. Delivery is usually by injection wells, but can be by direct application in excavations, trenches, etc. or in horizontal pipes buried within or above the contaminated zone. Most systems work by adding oxygen to the system, which acts as an electron receptor in the breakdown of hydrocarbons. One such method has been developed by a company called Regenesis, which markets a trade-label product known as Oxygen Releasing Compound (ORC).

ORC usually comes in powdered form and is dissolved in water before being applied. If delivery is through a network of wells screened in the contaminated zone, ORC is injected under pressure to force it outward from the well. The injection distance depends on the soil permeability and the volume of the solution. Regenesis personnel normally provide calculations of the volume and injection rate necessary to achieve adequate coverage for a specific set of site conditions. After mixing, ORC reportedly hardens into a solid that gradually dissolves, slowly releasing oxygen to the affected area. ESTC personnel have had limited experience with in-situ (downhole) ORC applications, and found that it did not effectively reduce hydrocarbon concentrations in most monitoring wells, even those located close to ORC injection borings. The main problem appeared to be attaining sufficient injection efficiency for the ORC slug to expand outward into the contaminated zone.

4.2.1 SYSTEM CONFIGURATION

Due to the difficulty of injecting fluids below the water table in low-permeability soil, it would probably be necessary to install injection borings at spacings of no more than 10 feet, and perhaps as little as 5 feet. Drilling this many borings would be one of the more costly aspects of this method, but the volume of ORC required would also be expensive. A pilot test to gauge the effectiveness of the method and the attainable radius of influence would be mandatory, and would require at least 6 months of monitoring to gather reliable data.

4.2 .2 MAINTENANCE AND MONITORING

Maintenance and monitoring requirements are likely to be somewhat different than those for vapor extraction or groundwater pumping. Neither field-based measurements of hydrocarbon vapors nor laboratory vapor samples would be required, but other monitoring activities would be needed in place of those. For example, it would be necessary to monitor dissolved oxygen levels in the groundwater to demonstrate that conditions for bacterial growth have been enhanced. This could be done with monthly field measurements, supplemented with quarterly laboratory samples during regular groundwater monitoring events. It would also be advantageous to track other parameters, such as carbon dioxide and bacterial abundance, both of which are proxies for bacterial degradation of the contaminants. Without such data, it would be difficult to demonstrate that any changes in contaminant concentrations are due to ORC bioremediation rather than other (perhaps natural) processes.

4.3 MICROSPARGING (GAS INFUSION)

A new technique that has been tested at a few sites in northern California. In some situations, in-situ degradation is an effective and relatively inexpensive alternative to extraction of the contaminants. Some workers term this method gas-infusion technology, while others use the term biosparging or microsparging. In this process, oxygen is injected at low pressure into the groundwater to oxygenate the subsurface and enhance the activity of naturally occurring bacteria, which utilize the hydrocarbon contaminants as a nutrient source for respiration. Like other in-situ methods, biosparging works best in permeable sediment, where liquids or gasses that are injected into the subsurface are able to disperse away from the injection well and reach the contaminated soil or groundwater.

However, InVentures Technology markets a gas infusion system that may also work in lower permeability environments such as at the Plaza Car Wash site. This system may therefore be a suitable remedial option. It consists of a down-hole gas diffuser, above-ground oxygen tank, and a control unit to regulate and monitor oxygen flow to the injection well. The system can be configured to allow one control unit to control up to three down-hole diffusers. The manufacturer reports that a single diffuser can create a radius of influence of at least 10 feet from the injection well, up to perhaps 20 feet, depending on site conditions. Diffusers can be placed in 2-inch or 4-inch wells, and can deliver up to 16 pounds of oxygen in three months.

4.3.1 SYSTEM CONFIGURATION

Assuming that this method might have half the radius of influence of a more powerful vapor extraction blower, several injectors would likely be needed to reduce the high concentrations between STMW-2 and STMW-6. Those two wells could continue to serve as monitoring points, while STMW-1 could be used for infusion. After concentrations in the core have been reduced, the injectors could be moved to the margins of the plume to create an oxygen curtain to prevent off-site migration of hydrocarbons. This would require installing additional injection wells near the western property boundary, the car wash building, the eastern boundary along San Pablo Avenue, and in a circular array around MW-3. All wells would require underground plumbing connections to the oxygen tanks and a central control panel, which could be located behind the dry cleaners building where the purge water storage tank is currently located. This method would therefore require rather extensive trenching through the pavement at the site.

Unlike vapor extraction, biosparging produces no hydrocarbon vapors and requires no above-ground vapor absorption or destruction equipment (carbon filters or oxidation chambers). The equipment therefore requires less space and this method should have fewer impacts on site operations, except during the time when additional wells and piping runs are being installed.

4.3.2 MAINTENANCE AND MONITORING

Like ORC, this method depends on biological activity to reduce contaminant concentrations and produces no hydrocarbon vapors or off-gasses that would require treatment. Therefore, maintenance and monitoring requirements would be similar to those for ORC.

4.4 IN-WELL AIR STRIPPING

A somewhat similar, but more aggressive form of in-situ remediation has been developed by Accelerated Remediation Technologies, Inc. (ART) and applied in a variety of settings in recent years. The ART system combines biosparging, vapor extraction, and air stripping methods in single or multiple well bores to speed up the oxidation of groundwater and remove volatile components. According to the company, this method has been successful in closing sites that had reached asymptotic concentrations by other methods and were above regulatory concentration limits. ART claims to have also developed the method for applications in low-permeability settings, which might therefore make it applicable at this site.

This method is designed to raise the water table locally in the vicinity of the well bore, decreasing the hydraulic head and allowing groundwater to flow radially toward the well. The sparging unit oxygenates the groundwater, which is then pumped upward and emitted through an in-well sprayer. The sprayer separates (strips) the volatile hydrocarbons from the water in a miniature version of above-ground air strippers, and the de-contaminated water then flows downward along the well casing and in the well annulus to recharge the aquifer. This eliminates the problems associated with discharge of treated water from an above-ground stripper.

4.4.1 SYSTEM CONFIGURATION

The configuration of the system could be slightly different than that for gas-infusion because the well locations would be different, but the control unit location could be the same. None of the existing wells at the site would be suitable as stripper wells, because the method requires 4-inch diameter wells to house the air sparging instrument, the submersible pump (for stripping), and the vacuum line (for vapor removal). The number of 4-inch wells that would be required is uncertain, and a feasibility test in a single well would be necessary before determining the total number of wells that would be needed and designing an integrated network. However, test results would be obtained more quickly than with either ORC or biosparging.

Underground hose and vapor piping would be run to the treatment wells, and these lines would be manifolded to the control unit compound. The compound would include vapor destruction equipment (probably granulated activated carbon), but no large water storage tank would be required.

4.4.2 MAINTENANCE AND MONITORING

Relative to the previously discussed methods, in-well air stripping would probably be more costly because of both equipment requirements and monitoring costs. Because this method involves multiple treatment methods, maintenance and monitoring requirements would be greater than for any of the previously discussed methods. Vapor and groundwater samples would be needed quarterly, but if the method works as quickly as claimed by the company, more frequent (monthly) monitoring would be preferable during the early stages of the operation. Although replacement of vapor-phase carbon units might be necessary, no fluid-phase units would be needed. This would result in some savings as compared to groundwater extraction.

5.0 COST COMPARISONS

Normally, Corrective Action Plans include a comparison of the estimated costs of the various methods to enable regulatory agencies to evaluate the cost-effectiveness of each method. As the previous discussion of these methods points out, however, many uncertainties exist that would greatly affect the overall cost of each method. Hence, it would be premature to provide even rough estimates before the methods have been tested.

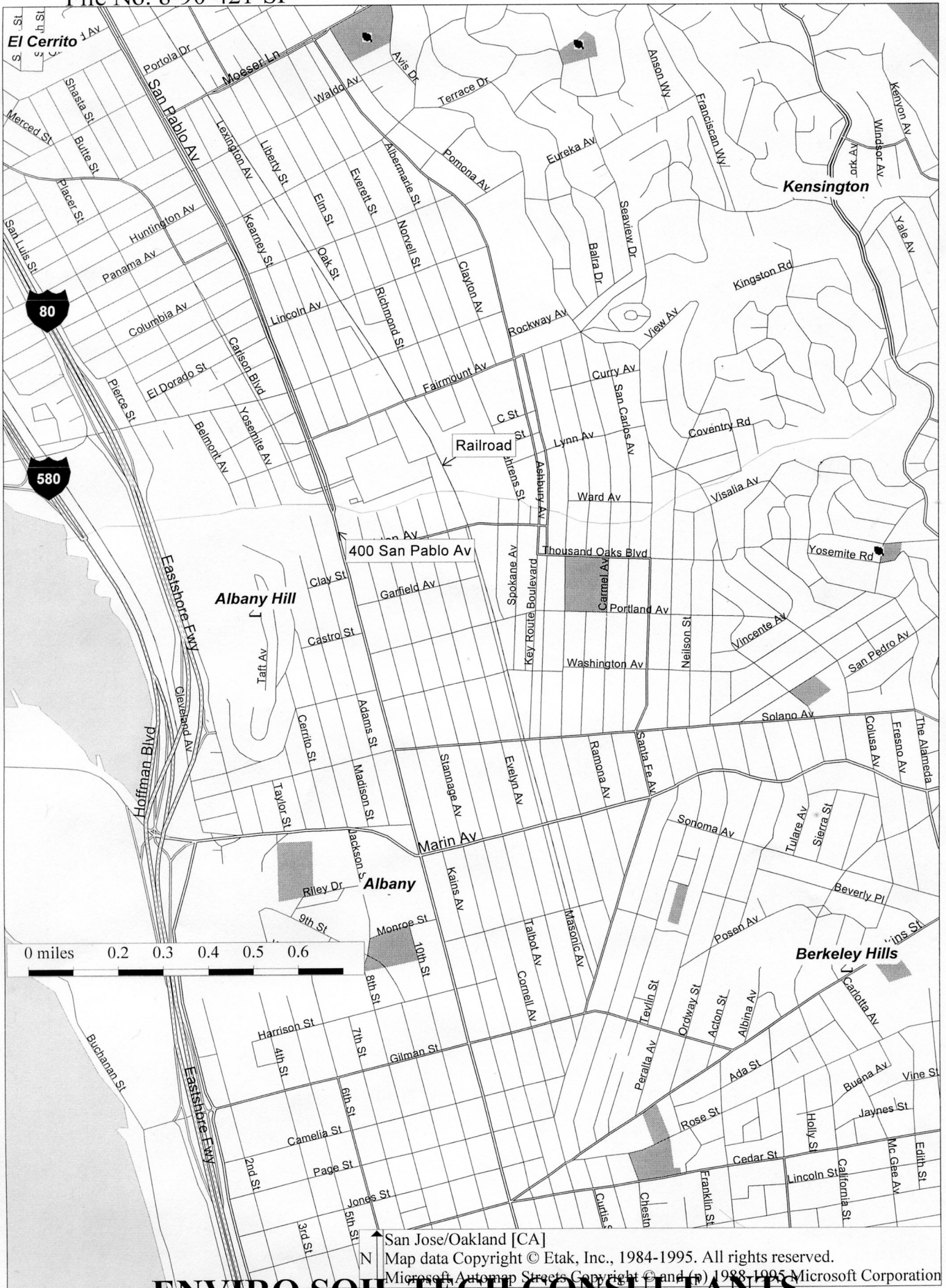
6.0 RECOMMENDATIONS

We recommend taking a stepped approach to evaluating the remediation options, beginning with those that have the greatest likelihood of achieving the goals at the lowest cost. Once a feasible method has been identified, testing could be terminated and a Final Remedial Plan could be prepared, or testing could continue if requested by the regulatory agency and/or UST Cleanup Fund.

If this approach is acceptable to Alameda County Health Care Services Agency, ESTC will prepare a work plan to conduct a bioventing pilot test. The advantages of testing this method first are that it has the potential of treating both soil and groundwater, and the monitoring data collected during the test (bacterial plate counts, oxygen concentrations, radius of influence, etc.) are also applicable to the other in-situ groundwater treatment methods.

A P P E N D I X "A"

FIGURES

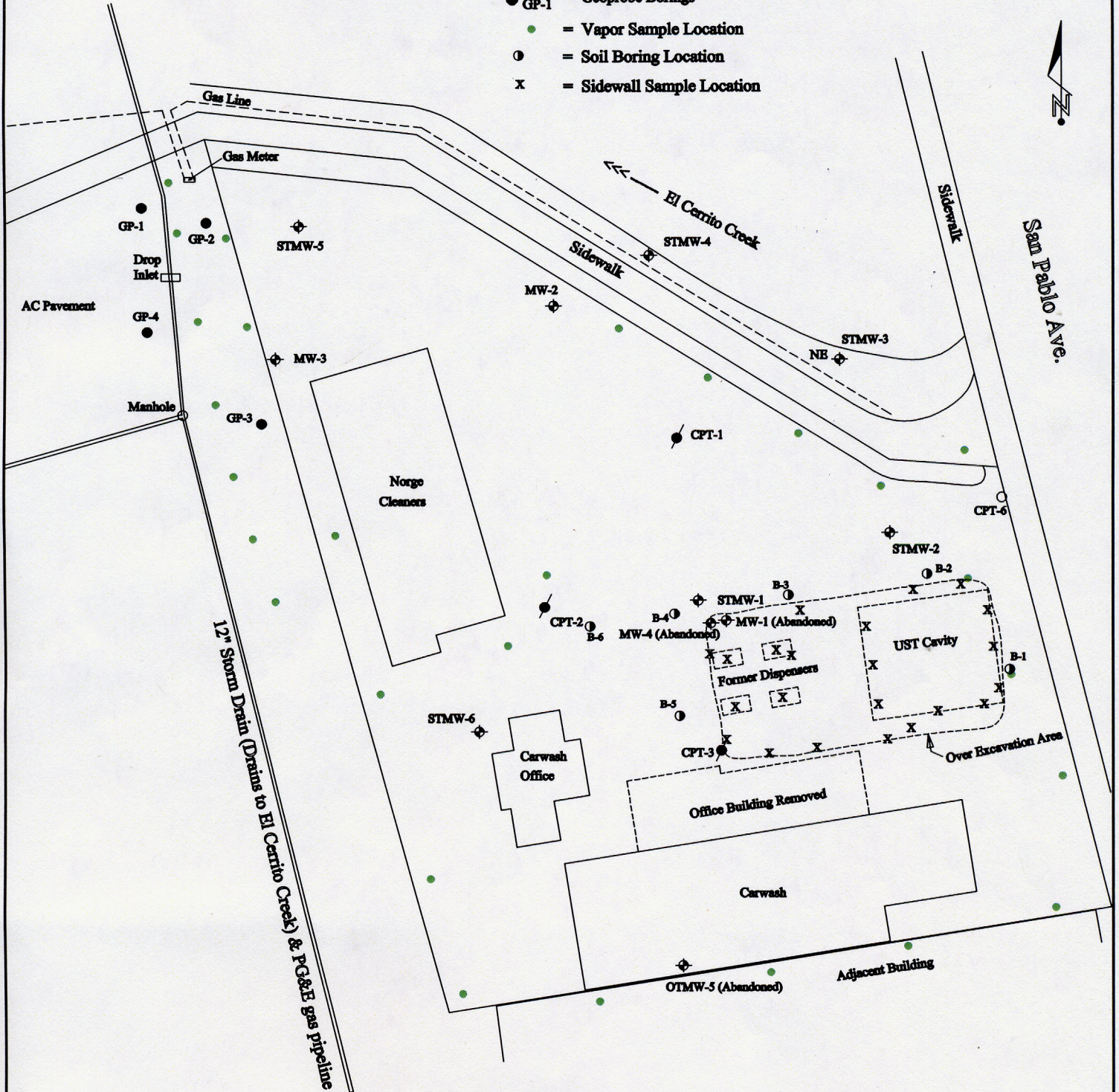


ENVIRO SOIL TECH CONSULTANTS

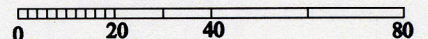
Figure 1

Legend

- ⊕ = Monitor Well
- = CPT-1 = Cone Penetrometer Boring
- = GP-1 = Geoprobe Borings
- = Vapor Sample Location
- = Soil Boring Location
- x = Sidewall Sample Location



Scale: Feet

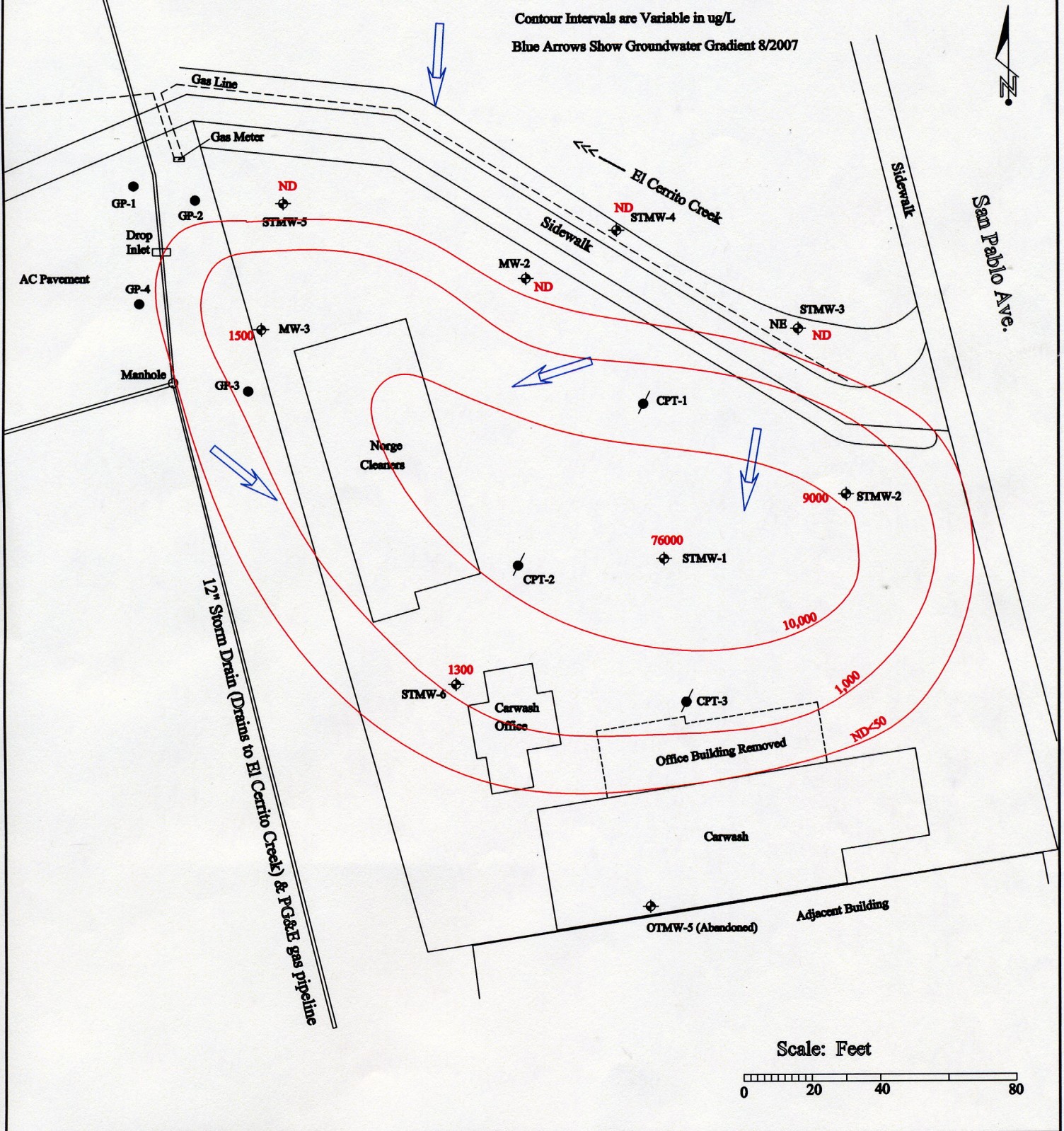


Legend

- ⊕ = Monitor Well
- = CPT-1 = Cone Penetrometer Boring
- = GP-1 = Geoprobe Borings

Contour Intervals are Variable in ug/L

Blue Arrows Show Groundwater Gradient 8/2007



Enviro Soil Tech
Consultants

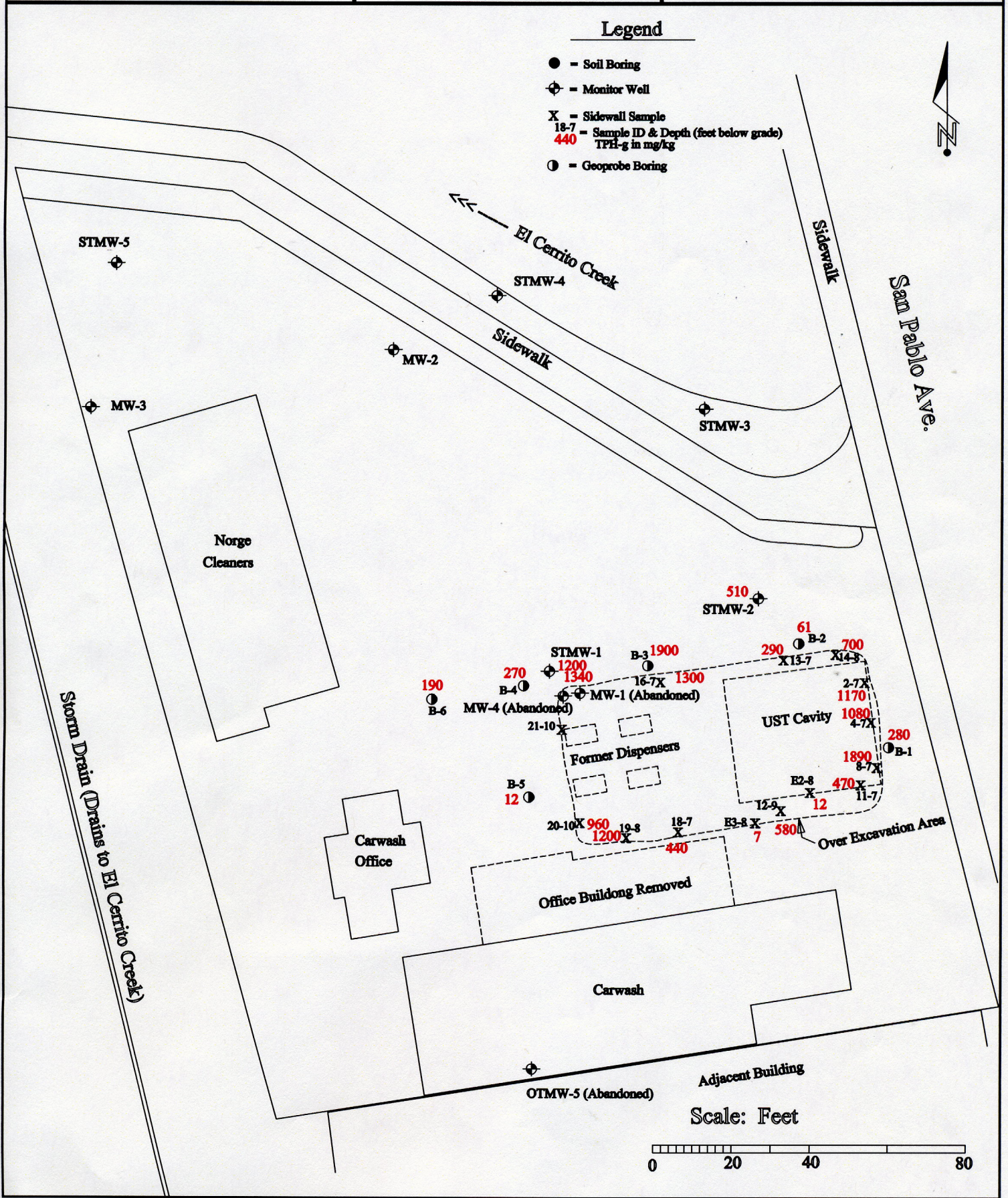
131 Tully Road
San Jose, CA 95112

PROJECT
Plaza Car Wash
400 San Pablo Ave
El Cerrito, California

PROJECT # 8-90-421-SI
DATE: 10/29/2007

Figure 4

Residual TPH-g
Contamination in Soil



Enviro Soil Tech
Consultants

131 Tully Road
San Jose, CA 95112

PROJECT
Plaza Car Wash
400 San Pablo Ave
El Cerrito, California

PROJECT # 8-90-421-SI
DATE: 10/29/2007

Figure 5

Area of Potential
Soil Excavation

