REMEDIAL ACTION PLAN

Prepared for:
CORE Resource Inc.
Property No. 4826
Broadway Volkswagen

Submitted to:

Alameda County Health Care Services Agency
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Alameda, California 94502

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This report has been prepared by Environmental Science & Engineering, Inc. for the exclusive use of CORE Resource, Inc., as it pertains to their site located at 2740 Broadway Avenue in Oakland, California. Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by other geologists and engineers practicing in this field. No other warranty, express or implied, is made as to professional advice in this report.

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1.0 Introduction

This Remedial Action Plan (RAP) presents the objectives, technical approach, proposed cleanup goals, and proposed schedule for the implementation of remedial measures for ground water and soil cleanup at CORE Resource, Inc. (CORE) Property No. 4826 (Broadway Volkswagen) located at 2740 Broadway Avenue in Oakland, California (Figure 1). Environmental Science & Engineering, Inc. (ESE) has prepared this RAP on behalf of CORE for submittal to the Alameda County Health Care Services Agency (ACHCSA) and the Regional Water Quality Control Board (RWQCB), San Francisco Bay Region for review and approval. The ACHCSA is the lead agency for this site and is responsible for approving site closure with RWQCB concurrence.

Based upon a review of all available site assessment data, the results of a soil vapor extraction test, and an evaluation of remedial alternatives, ESE has concluded that a combination treatment system of soil vapor extraction and water entrainment appears to be the most technically correct method to effectively remediate the petroleum hydrocarbon affected soil and ground water beneath this site.

1.1 Objectives

The proposed corrective action is intended to achieve the following objectives:

- Prevent off-site migration of dissolved hydrocarbons in ground water; and,
- Reduce hydrocarbon concentrations in the onsite soils and ground water to acceptable levels.

1.2 Site Description

The site is located on the southeast corner of the intersection of Broadway Avenue and 28th Street in Oakland, California (Figure 1) in a predominantly commercial area. The Broadway Volkswagen automobile dealership currently occupies the site and consists of a three-story steel-reinforced concrete building, multiple service bays and a showroom (Figure 2). Numerous automobile dealerships and maintenance shops are in operation in the immediate area. Numerous underground service utilities are present within the right-of-way of 28th Street immediately adjacent to the site.

The site is at an approximate elevation of approximately 30 feet above mean sea level (amsl) in an area of moderately sloping topography (U.S.G.S., 1980).

1.3 Geology/Hydrogeology

The site is situated on an alluviated highland portion of Oakland and is topographically characterized by a gentle southeasterly slope toward Lake Merritt which lies approximately 2,000 feet south of the site. Soil borings drilled to depths of approximately 30 feet below ground surface indicated that the subsurface consists of clay, silty clay, sandy clay, silt, sandy silt and sand (Figures 3 and 4). A predominant sand layer, approximately two feet thick is present beneath the site at approximately 11 to 17 feet below ground surface and is sloping in a general northwesterly direction.

Regional ground water appears to flow in a predominantly southeasterly direction. Local ground water flow under the site appears to deviate from the regional ground water flow in a west-northwest direction. Confined ground water beneath the site has been observed at depths of 11 to 17 feet below ground surface, with observed elevations between 16 to 23 feet amsl. Recent measurements of ground water elevations are shown in Table 1 and on Figure 5.

2.0 Background Information

2.1 Environmental History

During August 1988, two underground storage tanks (USTs), one 500-gallon waste oil UST and one 3,000-gallon gasoline UST were removed from an area at the northeast side of the site along 28th Street (Figure 2). Soil samples collected during the removal of these USTs were reported to contain detectable concentrations of total petroleum hydrocarbons as gasoline (TPH-G) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) (SEMCO, 1989). Soil samples collected from soil borings, SB-3 and SB-4, drilled subsequent to the tank removal also contained detectable concentrations of TPH-G and BTEX (ESE, 1991a).

Boring logs for five additional ground water monitoring wells (MW-1, MW-3, MW-4, MW-5, and MW-6) installed by ESE at the site indicate the presence of clay sediments with perched, moist to wet sand beds at depths ranging between 11 to 17 feet below grade (ESE, 1991a; ESE, 1991b). ESE installed wells MW-1 and MW-3 to a depth of approximately 20 feet below grade and screened both over the interval containing the perched sand beds. ESE identified one two-foot thick perched sand bed in wells MW-5 and MW-6 at depths of 17 and 11 feet, respectively (ESE, 1991b). The sand bed was observed to have an apparent dip toward the west. Clay sediments above and immediately below the sand beds were observed to be dry.

Soil samples collected from the sand beds in borings MW-5 and MW-6 were noted to have a fuel odor and detectable volatile organic compound (VOC) concentrations as determined using a photoionization detector (PID). However, ESE did not observe a fuel odor or detect VOCs with a PID in samples of clay collected above and below the sand bed in these borings. No detectable concentrations of halogenated VOCs (HVOCs) have been reported to occur in soil samples collected from the sand and clay sediments at the site.

The analytical results of soil samples collected at this site indicate the petroleum hydrocarbon affected soil beneath the site is limited to the immediate area surrounding the former UST locations. A summary of the analytical results of soil samples collected at the site is shown in Table 2.

A sandy clay aquifer was intersected beneath the clay unit containing the perched sand beds at a depth of approximately 22 to 23 feet below grade in wells MW-4, MW-5, and MW-6. Monitoring well MW-4 was installed to a depth of 25 feet below grade and wells MW-5 and MW-6 were installed to a depth of 30 feet below grade. Water levels in these wells were observed to rise approximately 12 to 14 feet when the sandy clay aquifer was penetrated suggesting some confining pressures. These three wells were screened over the interval containing the sandy clay aquifer as well as the perched sand beds.

Detectable concentrations of TPH-G, BTEX, and HVOCs including trichloroethylene (TCE), tetrachloroethylene (PCE), and 1,2-Dichloroethane (DCA) have been reported to occur in some ground water samples collected from various site wells since May 13, 1991 (ESE, 1991a; ESE, 1991b; ESE, 1992; ESE, 1993). Historically, the highest concentrations of TPH-G and BTEX have been reported to occur in ground water samples collected from well MW-3 located west and hydraulically downgradient of the former UST area. Well MW-3 is selectively screened to recharge with water from the perched sand beds. The highest concentrations of HVOCs have been reported to occur in ground water samples collected from wells screened into the deeper, semi-confined aquifer (MW-4, MW-5, and MW-6). Contours of TCE concentration in ground water indicate an offsite source of TCE located to the north of the UST area. ESE concluded that ground water in the semi-confined aquifer containing TCE was cross-contaminating the upper perched sand beds at the site by upwardly migrating through the monitoring wells completed in the shallower sand beds (ESE, 1993).

Background research by ESE (ESE, 1991a) indicates that several sites surrounding the CORE property handled petroleum hydrocarbons and solvents containing HVOCs. In addition, numerous unauthorized releases at other properties have been documented by the ACHCSA and the RWQCB - San Francisco Bay Region (ESE, 1991a).

ESE recommended (ESE, 1991a) that:

- No ground water extraction from the deeper semi-confined aquifer be performed at the site;
- Monitoring wells MW-4, MW-5, and MW-6 be properly abandoned to prevent further HVOC cross-contamination of the shallow sediments; and,
- Three selectively screened vadose wells be installed for the purpose of conducting vapor extraction performance testing to determine whether it is feasible for recovery of gasoline constituents from the UST excavation backfill and the perched sand beds at the site (ESE, 1993).

The ACHCSA recommended that one additional well be installed further west of MW-3 to try and define the TPH-G plume in the downgradient direction (ACHCSA, 1993). Well MW-7 was installed for this purpose (ESE 1994). A summary of the analytical results of water samples collected at the site are shown in Table 3.

2.2 Extent of TPH Affected Soil and Ground Water

Results of the various site assessment and characterization activities conducted have defined the extent of TPH present in the soil and ground water at this site. A summary of the extent of TPH concentrations estimated at this site is presented in the following paragraphs.

Soil samples collected from soil borings drilled to depths of approximately 15 feet bgs in the former UST locations were determined to contain detectable concentrations of TPH and BTEX. Two additional borings were drilled to approximate depths of 17 feet bgs outside of the former UST locations. These borings revealed a two-feet thick sloping sand layer exists at the site at depths ranging from 11 feet to 17 feet bgs. Soil samples collected from this layer contained detectable concentrations of TPH and BTEX. Samples from the clay layers above and below the sand layer did not detect TPH and BTEX.

An evaluation of the analytical results of soil samples taken along 28th Street revealed the extent of soil affected by petroleum hydrocarbons at this site to be approximately 200 square feet (10 feet by 20 feet) in area and to extend vertically from approximately 5 feet to 15 feet bgs. Calculations based on this volume and reported analytical results reveal an estimated 50 to 150 pounds of TPH may be present in the soil beneath this site. A site map showing the estimated extent of TPH present in the soil beneath this site is shown on Figure 6.

A sandy-clay aquifer is present beneath this site at a depth of approximately 22 feet to 23 feet bgs. A rise in the static ground water levels was observed when exploratory borings were drilled into a lower aquifer, which indicate the presence of confining pressures at this site. Ground water samples collected from the various ground water monitoring wells in the upper sandy-clay aquifer at the site have been reported to contain detectable concentrations of dissolved-phase TPH and BTEX.

An evaluation of the analytical results of ground water samples taken from ground water wells at this revealed the area of the upper sandy-clay aquifer which has been affected by petroleum hydrocarbons at this site to be approximately 50 feet by 75 feet in size laterally and is limited to the thickness of the aquifer itself (approximately 2 feet). Calculations based on these dimensions and reported analytical results reveal approximately 2 pounds of dissolved-phase TPH may be present in the upper sandy-clay aquifer beneath this site. A site map showing the estimated extent of dissolved-phase TPH present in the ground water beneath this site is shown on Figure 7.

2.3 Soil Vapor Extraction Test Results

On December 6, 1994, ESE conducted a Soil Vapor Extraction Test (SVET) using vapor extraction wells VW-1 and VW-3 as test wells (ESE 1995). The test was performed to determine the effectiveness of in-situ vapor extraction in reducing petroleum hydrocarbon concentrations in the soil beneath the site and to collect data for the design of the full scale remediation system.

Results of the SVET indicated that conventional vapor extraction could be conducted using VW-3, which is located within the former underground storage tank excavation area. Results of the SVET conducted using VW-1 indicated that vapor extraction could be conducted using VW-1 if ground water levels present in this area could be depressed.

A maximum air flow rate of 90 standard cubic feet per minute (scfm) was obtained from well VW-3 at a vacuum of 13 inches of water. Air samples collected from Well VW-3 were analyzed for TPH using Environmental Protection Agency (EPA) Method 8015 Modified, and for BTEX using EPA Method 8020. The results indicated maximum concentrations of 2,400 milligrams per cubic meter (mg/m^3) TPH and 21 mg/m^3 benzene, 270 mg/m^3 toluene, 53 mg/m^3 ethylbenzene and 330 mg/m^3 total xylenes, respectively. No air samples could be collected from Well VW-1 because of a rapid rise of water in the well due to the applied vacuum.

Complete results of the SVET were presented in the ESE report dated January 27, 1995 (ESE 1995). A summary of the analytical results of collected air samples are shown in Table 4.

2.4 Aquifer Recharge Testing Results

On March 17, 1995, ESE conducted a test to determine the recharge rate of the upper aquifer beneath the subject site. A total of six on site and off site ground water monitoring and vapor extraction wells were used during testing. Initially static ground water levels were measured in all wells to use as a baseline for measurement of ground water recharge. Vapor extraction well VW-3 was used as the pumping well. This well was chosen because of its location within the former underground storage tank pit. Ground water was removed from VW-3 using a vacuum truck equipped with a fluids extraction vacuum hose.

Water was extracted from well VW-3 at a rate of approximately 23 gallons per minute. A total of 1,050 gallons of ground water were removed during 46 minutes of fluid vacuum extraction.

As a result of extracting ground water at well VW-3, the ground water level decreased by 5.31 feet. Monitoring of all wells was initiated immediately subsequent to the completion of ground water extraction from well VW-3. Ground water levels were initially monitored in VW-3 at approximately 2 minute intervals for the first 10 minutes of the test, and then at approximately 10 minute intervals for the duration of the test which lasted approximately 9 hours. Ground water levels in wells VW-1, VW-2, MW-1, MW-3 and MW-7 showed no change from their initial static ground water levels as a result of ground water extraction from well VW-3.

The ground water level in well VW-3 at the completion of the ground water extraction was measured to be at 13.38 feet below ground surface. After recovery, the ground water level in well VW-3 was measured to be at 12.34 feet below ground surface, yielding a total rise in the well of 1.04 feet over a 9-hour period. Recovery rate calculations based on this data indicate the ground water aquifer recharged at a rate of approximately 0.002 feet/minute during the test.

3.0 Evaluation of Remedial Alternatives

Based on the nature and extent of the constituents of concern and available site data, ESE has identified several alternatives for the treatment of soil and ground water at this site. Issues to consider when selecting an approach to remediate the soil and ground water at the subject site include the following:

- Potential public health effects;
- Potential environmental effects;
- Technical feasibility;
- Regulatory requirements; and,
- Intended use of the property.

Based on the aforementioned issues, ESE has identified the following potential technical approaches as options for the remediation of soil and ground water at this site:

Soil

- In-situ soil vapor extraction/treatment;
- Ex-situ soil vapor extraction/treatment (bio-farming and thermal treatment); and,
- Excavation and disposal (to an appropriate landfill facility).

Ground Water

- Water entrainment (liquid-phase carbon adsorption);
- In-situ treatment (biodegradation or air sparging); and,
- Ground water extraction (pump and treat) and onsite treatment (liquid-phase carbon adsorption, air stripping, or biological treatment).

The above mentioned soil and ground water remediation options were evaluated based on 1) technical feasibility, 2) performance and/or applicability to the site, 3) regulatory acceptance, 4) projected cleanup period, and 5) cost-effectiveness. Descriptions of these technologies and their evaluation for use at this site for soil and ground water remediation are presented in the following sections.

3.1 Soil Treatment

The remediation options for soil treatment at the subject site are discussed in the following sections.

3.1.1 In-situ Soil Vapor Extraction/Treatment

In-Situ Vapor Extraction is a method of extracting VOCs from undisturbed soil using a vacuum pump or air blower connected to a series of extraction wells or trenches via PVC piping. The vacuum creates air flow in the subsurface that volatilizes VOCs adsorbed onto soil grains or present in the pore space of the soil. Extracted vapors are then routed to a treatment device for destruction of the VOCs. With ongoing vapor extraction, VOC concentrations decrease in the soil and in the vapor stream entering the treatment device.

Vapors can be removed from the extracted soil by numerous treatment methods including carbon adsorption, catalytic or thermal oxidation, or by combustion within an internal combustion engine. The decision to employ any one of these particular methods depends on the TPH vapor concentrations, vacuum and flowrates obtained from the vapor extraction wells.

Vapor extraction has been proven to be a very effective, cost-efficient remediation method that has been successfully performed at many sites. Compared to other treatment systems, the capital and installation costs for vapor extraction can be relatively low. To determine the feasibility and overall effectiveness of this treatment method, and to gather data necessary for the proper engineering and design of the extraction/treatment system, a vapor extraction test was performed at the site. Results of the vapor extraction test indicated that in-situ soil vapor extraction is technically feasible for use at this site.

3.1.2 Ex-situ Soil Vapor Extraction/Treatment

Soil containing TPH may be excavated and treated on site using aboveground vapor extraction. The treatment methods used for aboveground vapor extraction are identical to those mentioned in Section 3.1.1. Aboveground vapor extraction and treatment, requires the establishment of a treatment area, usually on-site. Slotted vertical and/or horizontal PVC pipes are inserted into a constructed soil stockpile. Since excavated soil containing VOCs must be covered, air intake pipes may have to be installed to facilitate passive air intake for the vapor extraction system. Extraction pipes are then manifolded to a vacuum pump to extract the vapors for treatment. Design parameters for aboveground treatment of VOCs depends on the vapor concentrations, vacuum and flowrates which can be extracted from the stockpiled soil.

Soil excavation, treatment and disposal or soil excavation and recycling should only be applied to sites where excavation is technically and economically feasible and/or at sites where in-situ remediation methods are not feasible due to soil conditions. At this site, soil excavation with on site treatment is not considered technically or economically feasible because of (1) the commercial costs associated with disruption of business at the site during excavation activities, (2) the overall expense of excavating, shoring the excavation walls, transporting soil to an appropriate facility (or treating the soil on site) and backfilling, (3) the safety considerations of an open excavation(s), and (4) the results of a soil vapor extraction test showing that in-situ vapor extraction is a feasible soil remediation method. Thus, ex-situ soil vapor extraction/treatment as a soil remediation method for this site will not be considered further.

3.1.3 Excavation and Disposal

This remediation alternative involves excavating soil potentially impacted by petroleum hydrocarbons for on-site segregation into clean and hydrocarbon affected soil stockpiles. Soil found to contain petroleum hydrocarbons must then be transported to and managed at an appropriate off-site storage, treatment and/or disposal facility in accordance with all applicable local, state and federal regulations. Soil affected with less than 1,000 mg/kg of TPH and without volatile organic compound (VOC) emissions may be accepted for disposal at a local Class III landfill. Soil impacted with more than 1,000 mg/kg of TPH or having excessive VOC emissions (concentrations greater than 50 parts per million as measured with a portable organic vapor analyzer six inches from the soil surface) must be disposed of at a landfill approved for accepting petroleum wastes which is more expensive than disposal at a Class III landfill.

Regardless of the TPH concentrations present in the soil however, soil analyses and written authorization from the landfill operator and the Regional Water Quality Control Board will most likely be required. In addition, the transport of the soils also requires that a properly completed manifest be prepared and signed by the generator. In addition, generator liability continues after soil disposal at a landfill. Continued liability and potentially high excavation costs make this option unacceptable.

This method of treatment for the soil at this site is subject to the same considerations for technical and economical feasibility as stated in Section 3.1.2 and therefore excavation and disposal is not being considered for the treatment of soil at this site.

3.2 Water Treatment

The remediation options for the treatment of ground water at the subject site are discussed in the following sections.

3.2.1 Water Entrainment

Ground water containing dissolved-phase petroleum hydrocarbons can be extracted from the subsurface through water entrainment. This method of remediation removes both water and vapor and provides for the treatment of the vadose and capillary zones and ground water table simultaneously. Contaminants known to be present in the subsurface are recovered in all three phases; liquid, vapor and dissolved phase.

Water entrainment is accomplished through the application of a vacuum and sufficient air flow velocity to a vapor extraction well fitted with a drop tube to convey water entrained in the extracted air stream. The drop tube is placed inside a vapor extraction well and has an appropriately designed opening at the bottom which extends into the ground water. Water entrained in the vapor stream can be transported up through the drop tube in various phases, either as a column or slug of water or as a froth, a mist or a film.

Because ground water monitoring well observations have shown ground water contamination to be present, and the aquifer recharge rate is slow, extraction of ground water using water entrainment appears to be technically and economically appropriate extraction method for this site. Although ground water extraction rates will be relatively slow, it is anticipated that this method will be effective for treatment of the ground water capillary and unsaturated zones.

3.2.2 In-situ Water Treatment

Biological agents that would be most suitable to destructing hydrocarbons at the site would most likely be strains of the native soil microorganisms. Key elements to provide these micro-organisms to enhance the natural biodegradation are a stable environment, oxygen, water and nutrients. Oxygen could be provided via injection points into the ground water or by diffusion from the vadose zone (if vented). Nutrients could be injected in an aqueous solution through infiltration galleries. The injection water would have to be free of chlorine that would be toxic to microorganisms. However, achieving a constant extraction flow rate and good flow distribution through the affected area is a major limitation in implementing this option due to the extremely slow recharge rate of the aquifer. Therefore, this option is not being recommended for further evaluation as a treatment method for ground water at this site.

3.2.3 Ground Water Extraction

Ground water extraction is commonly applied to remove hydrocarbons dissolved in ground water and separate-phase hydrocarbons (free product). Liquids may be extracted by a number of techniques but are most commonly accomplished through the use of pneumatic and/or electrical submersible pumps connected to a series of hoses and piping. Physical space constraints at this site dictate the placement of treatment equipment on the third floor of the building occupying the site. Due to the extremely slow recharge rate of the affected aquifer, a steady ground water extraction rate is not likely to be sustainable. In addition, extended ground water extraction could cause offsite plumes of HVOCs to migrate onsite. Therefore, conventional ground water extraction is not being recommended for further evaluation as a method for ground water remediation at this site.

4.0 Remedial Alternatives Recommendations

Based on the results of the SVET conducted on December 6, 1994, In-Situ Vapor Extraction is expected to be successful and is recommended for the treatment of soil at this site. Calculations based on data collected during this test indicate an approximate initial removal rate of 19 pounds per day of TPH. As VOC concentrations are expected to decrease rapidly during the initial stages of operation and the estimated mass of TPH present in the soil is relatively small (150 pounds) treatment of the extracted vapors can easily be accomplished using carbon adsorption. Following treatment the air will be exhausted to the atmosphere in accordance with all conditions as specified in a Bay Area Air Quality Management District (BAAQMD) permit.

Results of aquifer recharge testing indicated that ground water could be extracted at a rate of approximately 1 gpm using well VW-3. Results of vapor extraction testing indicated that air could be extracted at 90 cfm from well VW-3. However, vapor extraction at locations other than the former tank backfill will likely produce lower air flow. Therefore, a vapor extraction/water entrainment system of approximately 1 gpm and 200 cfm total air flow is envisioned for this site.

Treatment of the affected ground water will also be accomplished using a granular activated carbon (GAC) system, whereby water is pumped through a series of two vessels containing activated carbon, resulting in adsorption of the hydrocarbons onto the surface of the carbon. Saturated or spent carbon must be replaced with fresh carbon during the treatment period. Following treatment, the ground water will be discharged to a sanitary sewer in accordance with an East Bay Municipal Utilities District (EBMUD) permit.

5.0 Proposed Remedial Action

This section presents the proposed remedial action plan for the treatment of TPH affected soil and ground water present beneath this site. The proposed remedial actions described in this plan were selected based upon the feasibility of the treatment systems to effectively reduce the concentrations of petroleum hydrocarbons in the soil and ground water for this site. Regulatory consent, including all required permits, will be obtained prior to implementation of the proposed remedial actions.

5.1 Treatment System Description

5.1.1 Soil Treatment System

Remediation of the petroleum hydrocarbon affected soil at the site is proposed using In-Situ Vapor Extraction as described in Sections 3.1.1 and 4.0.

A process flow diagram of the proposed soil remediation system is shown on Figure 8. A total of **three vertical vapor extraction wells (Figure 2) will initially be used for vapor extraction and to remove residual hydrocarbons from the soil.** Wells VW-1, VW-2 and VW-3 (Figure 2) are existing vertical wells previously installed to conduct the SVET and were screened appropriately to remove hydrocarbons from the affected sand layer. In addition, existing ground water monitoring wells (MW-1 and MW-3, see Figure 2) may be used for vapor extraction at a later time should conditions warrant. Based on vapor extraction test results, an air flow of up to 90 cfm can be expected at well VW-3. However, extracted air flow rates at wells VW-1 and VW-2 may be much lower. The radius of influence is also expected to be greater around the tank backfill (VW-3) than around VW-1 and VW-2.

A 5-horsepower positive-displacement blower will be used to apply negative pressure (vacuum) to the vapor extraction wells and to withdraw hydrocarbon vapors from the soil. Vapor treatment will be accomplished using a GAC system. The blower and carbon system will be designed for a 200 cfm air flow rate.

Vapor-phase carbon (used to treat vapor streams) can typically adsorb approximately 15 to 25 percent of its weight in gasoline hydrocarbons. For example, 1,000 pounds of carbon is capable of adsorbing approximately 150 to 250 pounds of TPH from the vapor stream before breakthrough (saturation) occurs. Removal efficiencies for carbon systems are typically in excess of 99 percent. Once the adsorptive capacity of the carbon is reached, breakthrough occurs and the carbon in the canister must be replaced.

The proposed vapor extraction/treatment system will likely consist of the following equipment:

- A 5 horsepower positive displacement blower (minimum rated 150 cfm);
- An entrainment separator to remove the entrained moisture from the influent air stream;
- An air filter to protect the blower from particulate matter present in the influent air stream;
- Two 1,000-pound GAC vessels for vapor treatment;
- An air dilution valve on the blower suction to provide dilution air during start up and to decrease hydrocarbon concentrations in the air stream (if necessary);
- Temperature, pressure and vacuum gauges, and sample ports; and,
- Three-inch diameter schedule 40 PVC piping, fittings and PVC ball valves for air flow control from each of the wells.

The location of the proposed treatment compound is shown on Figure 9. The treatment compound will be constructed to accommodate both the proposed soil and ground water remediation system equipment.

5.1.2 Ground Water Treatment System

Water Entrainment is considered the best option for remediating the ground water underlying this site, and off-site to the east. Because of the slow recharge rate of the aquifer, water entrainment will also dewater affected areas of the capillary fringe and saturated zone so that they can be exposed for vapor extraction. A process flow diagram of the proposed ground water remediation system is shown on Figure 8. The location of the treatment equipment is shown in Figure 9. The ground water remediation system consists of the following major components:

- Three vapor extraction wells (VW-1, VW-2 and VW-3) outfitted with 1" diameter drop tubes extending into the ground water,
- Surge tank (100 gallons) for flow equalization,
- Ground water transfer pump,
- Two 200-pound granular activated carbon drums for removal of hydrocarbons, and,
- Necessary 3" diameter schedule 40 PVC system piping, valves, and instruments (level controls, pressure gauges and flow meter).

Ground water will be extracted by becoming entrained in the air stream flowing from the vapor extraction wells. The entrained ground water will pass through the system piping into the surge tank where it will then be transferred by means of the transfer pump to the two 200-pound carbon adsorber drums (connected in series) for treatment and removal of dissolved petroleum hydrocarbons. After treatment, the treated ground water will be discharged to a nearby sanitary sewer. The remediation system will be designed to operate a single well or all three extraction wells simultaneously.

5.2 Site Cleanup Criteria for Soil and Ground Water

Both the soil and ground water will be treated simultaneously using the technologies described in the sections above. Because ground water has been affected, the protection of ground water from future vertical migration of residual hydrocarbons present in the soil has become irrelevant.

A review of guidelines presented in the State Water Resources Control Board Leaking Underground Fuel Tank (LUFT) Manual reveals recommended cleanup levels for the soil to be 10 mg/kg TPH-G and not applicable for BTEX constituents. The California Department of Toxic Substances Control (DTSC), office of drinking water, has promulgated maximum contaminant levels (MCLs) for benzene, ethylbenzene, and xylenes and an action level for toluene. These MCLs/action levels are: benzene (1 μg/L), toluene (100 μg/L), ethylbenzene (680 μg/L) and xylenes (1,750 μg/L). No MCLs or action levels have been set for TPH.

ESE proposes to operate the system until ground water concentrations have reached the above mentioned levels or extracted ground water concentrations become asymptotic. At that time, ESE will then reevaluate the site conditions and implement either a risk-based closure assessment or an ongoing comprehensive monitoring program.

5.3 Health and Safety Plan

A site-specific Health and Safety Plan has been prepared for use during remediation activities at this site. The plan is divided into two sections: (1) general health and safety guidelines; and, (2) specific guidelines for this site. The plan has been reviewed and approved by ESE's Health and Safety Officer. Prior to commencement of field activities, all personnel will sign statements indicating that they have reviewed, understood, and will comply with all aspects of the plan.

5.4 System Permitting

An Authority to Construct (ATC) and Permit to Operate PTO) the vapor extraction/treatment system for soil remediation will be obtained, under Regulation 8, Rule No. 40 from the BAAQMD. Since no schools (pre-school through high school) are located within 1,000 feet of the site, public notification according to BAAQMD Rule No. 40 will not be required. The vapor treatment system will be designed to meet BAAQMD air discharge levels listed in Table 5.

The ground water treatment system will be designed to meet EBMUD effluent limitations (Appendix A). Potentially, the ground water may have to be treated for metals removed to comply with EBMUD limitations. Ground water from selected monitoring wells (MW-1 and MW-3) will be analyzed for heavy metals as part of the permit application process. EBMUD will take "background" levels into account in setting effluent limitations. An EBMUD permit is required for discharge of treated ground water into the sanitary sewer.

In addition to the above-mentioned permits, construction plan-check and permit approvals may be required from the City of Oakland Building and Fire Departments to install the soil remediation system. The building and fire departments will be contacted to obtain necessary permit approvals. The RAP will be submitted to the ACHCSA for approval. It is anticipated that no special permitting is required by the Department of Toxic Substances Control for the proposed soil and ground water remediation systems.

5.5 System Operation and Monitoring

Once the system has been installed and the start-up period has been completed (approximately one week), the system will be considered to be in operational mode. A report summarizing all remedial activities since startup through the first 30 days of operation will be prepared and submitted to CORE.

All data as required by the BAAQMD, EBMUD, and the ACHCSA will be collected and reviewed on a regular basis (vapor and water discharge monitoring). These data will be compiled and maintained in accordance with the guidelines set forth by each agency for record keeping.

Weekly site visits to conduct air and water discharge monitoring as required by the BAAQMD and EBMUD will be conducted. All routine operation and maintenance tasks will be performed during these visits.

For the water treatment system, the operation technician's visit will likely consist of recording removal rates and depth-to-water measurements; checking surge tank levels and inspecting the operation of the transfer pump; checking filters for debris and replacing them if necessary; and performing a general overall inspection of the equipment to ensure no leaks or damage to the system has occurred.

For the vapor treatment system each visit will consist of checking water levels in the water knock-out (WKO); recording air flowrates, vacuums, and temperatures (influent and effluent); recording equipment effluent hydrocarbon concentrations with a flame ionization detector (FID); collecting air samples to monitor extraction progress and to calculate TPH removed from the subsurface; and, performing a general overall inspection of the equipment.

In accordance with the BAAQMD requirements, influent and effluent vapor samples will be collected once a week and analyzed using an FID or PID. Once a month, air samples will be collected and analyzed for the specified constituents by an independent laboratory. In accordance with EBMUD discharge permit requirements, effluent water samples will be collected once a week and analyzed for the specified constituents.

Once the collected data demonstrates that the system is in compliance with the regulatory conditions, ESE will focus on optimizing the remedial activities in order to reduce the duration of the remediation effort and the associated costs. Analyses taken from air and water samples from the influent and effluent streams and from individual vapor and ground water monitoring wells, will supply a spectrum of data to allow ESE to implement several procedures to optimize the remediation process. Variables in optimizing the operation are:

- Soil venting flow alternation (cross-ventilation) to promote an efficient removal of hydrocarbons from the vadose zone;
- Removal of hydrocarbons from selected zones of the formation by the application of packers;
- Induced bio-stimulation by indirect introduction of aerobic conditions in the formation due to soil venting; and,
- Monitoring water levels to determine the degree of exposure and removal, and adjust air flow rates in the wells accordingly.

The application of these procedures can reduce the time and money required for remediation.

5.6 Sampling/Analyses and Reporting

When a vapor extraction/treatment system is operated for soil remediation, effluent air monitoring must be performed in accordance with the BAAQMD permit requirements. It is anticipated that the BAAQMD will require initial, startup sampling and analyses and monthly influent and effluent vapor samples thereafter. The vapor samples will be analyzed for TPH-G and BTEX by EPA Methods 8015/8020. ESE will include this data along with a description of system performance in the quarterly ground water monitoring reports.

Ground water samples from the treatment system, including effluent water samples, will be collected and analyzed for TPH-G and BTEX using EPA Methods 8015 (modified) and 8020, respectively, to comply with the requirements of the EBMUD permit under which the treated ground water will be discharged. Additionally, ground water samples will be collected on a quarterly basis from the ground water monitoring wells (MW-1, MW-3 and MW-7) to comply with the RWQCB and ACHCSA requirements and to assist in determining the effectiveness of ground water remediation system. The ground water samples collected during quarterly monitoring will also be analyzed for TPH-G and BTEX using EPA Methods 8015 (modified) and 8020, respectively. Quarterly ground water monitoring reports will continue to be prepared until remediation is completed.

5.7 Site Closure

Once it has been determined that further cleanup actions would result in diminishing returns as it relates to the effort expended versus the amount of TPH laden soil vapors and ground water treated, ESE will prepare a confirmation boring drilling plan for review and approval by the ACHCSA. This plan will outline the locations and projected depths of the borings to be drilled to confirm achievement of cleanup goals. Upon the completion of confirming drilling activities, ESE will then prepare a closure report to be submitted to the ACHCSA. This report will contain data collected during the remediation program, including the estimated amount of hydrocarbons removed by the remediation system, a graphical presentation of soil vapor and dissolved-phase levels as functions of operation time, the response of soil vapor levels and dissolved-phase ground water concentrations to system optimization and all supporting laboratory analyses relative to remediation activities.

6.0 Schedule

Once this RAP has been approved by the appropriate regulatory oversight agencies, CORE Resource, Inc. will select a qualified contractor to install and operate the soil vapor extraction and water entrainment system at this site. The estimated schedule for project implementation is shown below.

TASK	COMPLETION DATE
System Design:	September 8, 1995
Permit Applications:	September 18, 1995
Regulatory Approval:	September 29, 1995
System Installation:	October 20, 1995
System Startup:	October 27, 1995

7.0 References

County of Alameda Health Care Services Agency (ACHCSA), 1993. Unpublished Letter Response to Recommendations in August 3, 1993 Environmental Science & Engineering, Inc. Report of Quarterly Activities at Vorelco Property No. 4826, Broadway Volkswagen, 2740 Broadway, Oakland, California; September 23, 1993.

Environmental Science & Engineering, Inc. (ESE), 1991a. Unpublished Report of Quarterly Activities at Vorelco Property No. 4826, Broadway Volkswagen, 2740 Broadway, Oakland, California; July 10, 1991.

__________, 1991b. Unpublished Report of Quarterly Activities at Vorelco Property No. 4826, Broadway Volkswagen, 2740 Broadway, Oakland, California; November 12, 1991.

__________, 1992. Unpublished Report of Quarterly Activities at Vorelco Property No. 4826, Broadway Volkswagen, 2740 Broadway, Oakland, California; December 3, 1992.

__________, 1993. Unpublished Report of Quarterly Activities at Vorelco Property No. 4826, Broadway Volkswagen, 2740 Broadway, Oakland, California; August 3, 1993.

__________, 1995. Report of Findings Soil Vapor Extraction Test, CORE Resource Property No. 4826, Broadway Volkswagen, 2740 Broadway, Oakland, California; January 27, 1995.

SEMCO, Inc., 1989. Unpublished Report of Underground Storage Tank Removal at Vorelco Property No. 4826, Broadway Volkswagen, 2740 Broadway, Oakland, California; February 3, 1989.

State of California Department of Water Resources (DWR), 1981. Water Well Standards: State of California. DWR Bull. 74-81; December, 1981.

TABLES

CORE RESOURCE, INC.
PROPERTY NO. 4826

TABLE 1 - SUMMARY OF RELATIVE GROUND WATER ELEVATIONS

WELL I.D.	WELL ELEV. (amsl)[1]	MEASURED GROUND WATER ELEVATIONS (bgs)[2]						
		1/29/89	2/6/89	3/13/89	5/13/91	10/18/91	10/27/91	7/13/93
MW-1	29.22	21.72	20.22	20.72	16.62	19.11	19.59	22.96
MW-3	30.00	18.30	19.00	19.30	19.44	19.79	19.19	20.36
MW-4	29.70	NA	NA	NA	18.50	20.15	20.49	21.38
MW-5	30.50	NA	NA	NA	NA	19.23	19.26	20.29
MW-6	29.19	NA	NA	NA	NA	18.98	19.41	20.69

NA = Not Available
[1] (amsl) = above mean sea level
[2] (bgs) = below ground surface. Ground surface approximately 30 feet amsl.

CORE RESOURCE, INC.
PROPERTY NO. 4826

TABLE 2 - SUMMARY OF ANALYTICAL RESULTS OF SOIL SAMPLES

BORING I.D.	SAMPLE DEPTH (ft. bgs)	EPA METHOD 8015M (mg/Kg)	EPA METHOD 8020 (μg/Kg)			
		TPH-G	B	T	E	X
SB-2A	10	NA	NA	NA	NA	NA
	15	NA	NA	NA	NA	NA
SB-2B	10	NA	NA	NA	NA	NA
	15	NA	NA	NA	NA	NA
SB-3	5	2.30	5.20	6.00	ND	21.00
	10	740	1,200	30,000	9,400	42,000
	15	5.90	810	480	99	380
SB-4	5	ND	ND	ND	ND	ND
	15	13	610	1,100	170	840
MW-4	5	ND	ND	ND	ND	ND
	10	21	220	700	260	1,300

NOTE: NA = Not Analyzed
TPH-G = Total Petroleum Hydrocarbons as gasoline
B = Benzene; T = Toluene; E = Ethylbenzenes; X = Xylenes
mg/Kg = milligrams per kilogram
μg/Kg = micrograms per kilogram
ft. bgs = Feet below ground surface

CORE RESOURCE, INC.
PROPERTY NO. 4826

TABLE 3 - SUMMARY OF ANALYTICAL RESULTS OF GROUND WATER SAMPLES

Well No.	Analyte	Concentrations (µg/L)				
		1/21/89	5/13/91	10/18/91	10/27/92	7/13/93
MW-1	B	53	ND	ND	ND	ND
	T	13	ND	ND	ND	ND
	E	1.4	ND	ND	ND	ND
	X	8.2	1.1	ND	ND	ND
	TPH-G	ND	130	ND	ND	ND
MW-3	B	9,600	7,800	9,400	7,100	8,100
	T	8,200	12,000	8,600	4,900	6,200
	E	1,800	1,200	750	970	1,400
	X	6,200	4,000	3,300	3,500	4,400
	TPH-G	32,000	81,000	73,000	37,000	41,000
MW-4	B	NA	160	11.0	6.4	36
	T	NA	690	11.0	2.8	4.4
	E	NA	250	ND	1.2	1.8
	X	NA	1,100	15.0	6.2	5.3
	TPH-G	NA	13,000	ND	180	320
MW-5	B	NA	NA	3,500	ND	ND
	T	NA	NA	530	ND	ND
	E	NA	NA	670	ND	ND
	X	NA	NA	1,100	ND	ND
	TPH-G	NA	NA	16,000	87	90

CORE RESOURCE, INC.
PROPERTY NO. 4826

TABLE 3 - SUMMARY OF ANALYTICAL RESULTS OF SOIL SAMPLES
(continued)

Well No.	Analyte	Concentrations (μg/L)				
		1/21/89	5/13/91	10/18/91	10/27/92	7/13/93
MW-6	B	NA	NA	640	48	5.1
	T	NA	NA	2,700	130	30
	E	NA	NA	1,100	55	30
	X	NA	NA	4,500	230	230
	TPH-G	NA	NA	28,000	1,300	1,100

NOTE: NA = Not Applicable (wells constructed after date indicated).
ND = Not Detected Using Analytical Methods EPA 8015 or 8020.
B = Benzene, T = Toluene, E = Ethylbenzene, X = Xylenes.
TPH-G = Total Petroleum Hydrocarbons as gasoline.
All results reported in micrograms per Liter (μg/L).

CORE RESOURCE, INC.
PROPERTY NO. 4826

TABLE 4 - SUMMARY OF ANALYTICAL RESULTS OF VAPOR SAMPLES

Sample I.D.	Time* (minutes)	TPH-G (mg/m^3)	Benzene (mg/m^3)	Toluene (mg/m^3)	Ethylbenzene (mg/m^3)	Xylenes (mg/m^3)
VW-3-1	10	2,300	21	190	47	330
VW-3-2	105	2,400	18	270	53	320

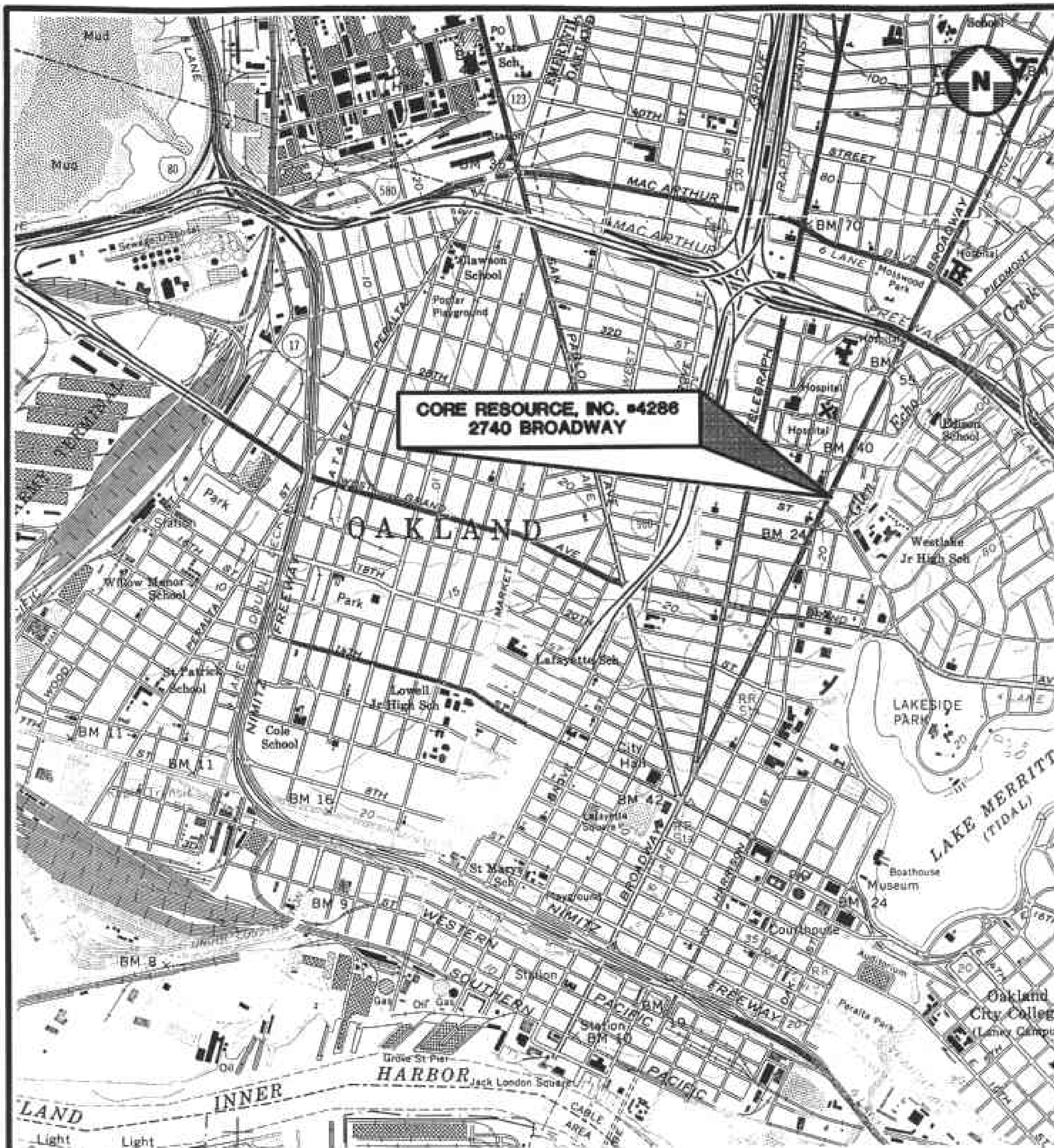
NOTE: * Refers to time after initiating vapor extraction.
TPH-G = Total Petroleum Hydrocarbons as gasoline
B = Benzene; T = Toluene; E = Ethylbenzene; X = total Xylenes
mg/m^3 = milligrams per cubic meter

CORE RESOURCE, INC.
PROPERTY NO. 4826

TABLE 5 - ESTIMATED AIR DISCHARGE LEVELS

VOC	AIR DISCHARGE REDUCTION FROM INFLUENT CONCENTRATIONS
TPH-g[1]	>98.5%
Benzene	>98.5%
Toluene	>98.5%
Ethylbenzene	>98.5%
Xylenes	>98.5%

NOTE: [1] = Projected BAAQMD requirements for influent TPH-g concentrations greater than 3,000 ppmv.
VOC - Volatile Organic Compound
TPH-g = Total Petroleum Hydrocarbons as gasoline



SCALE 1:24,000

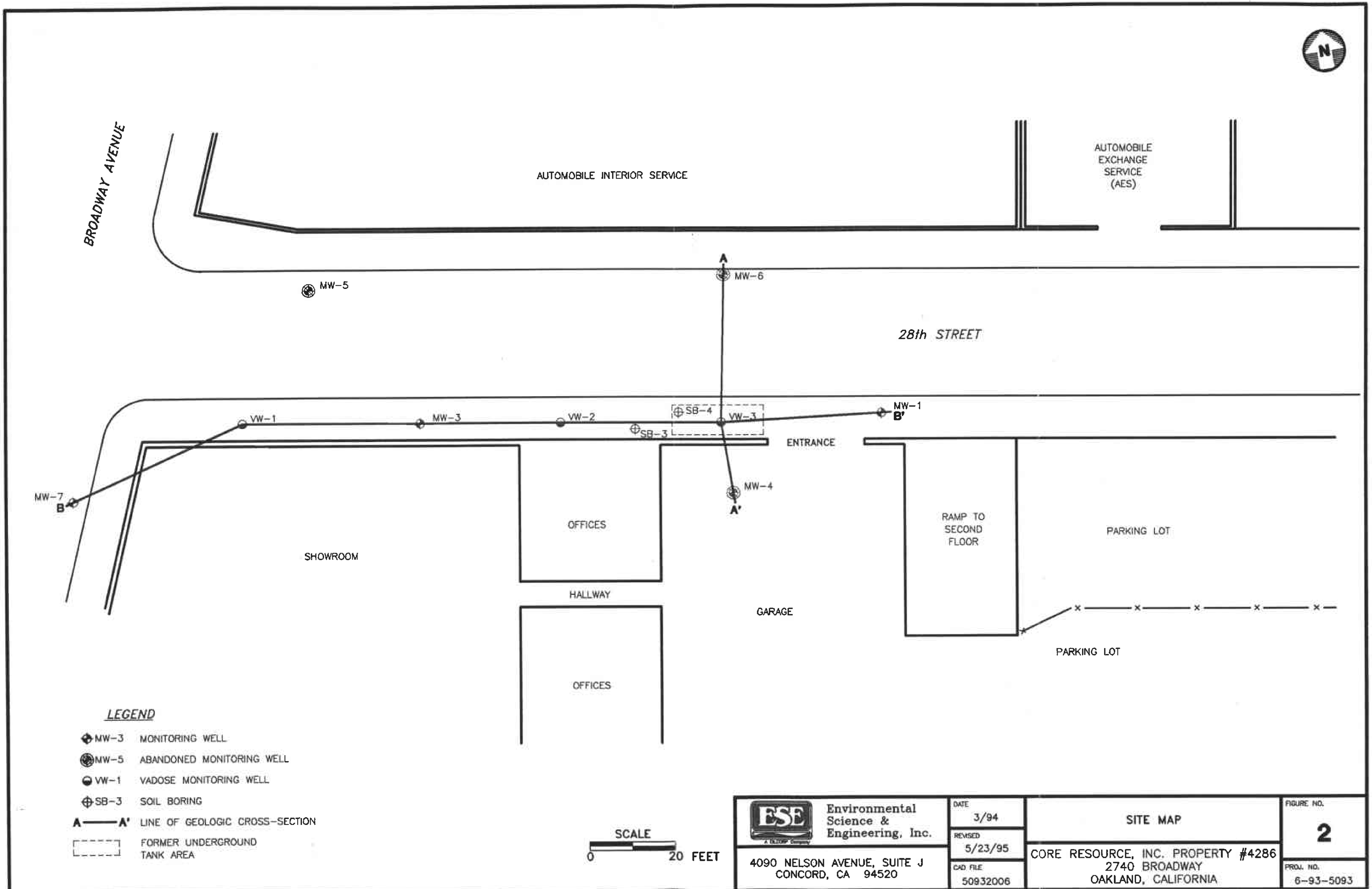
1 ½ 0 1 MILE

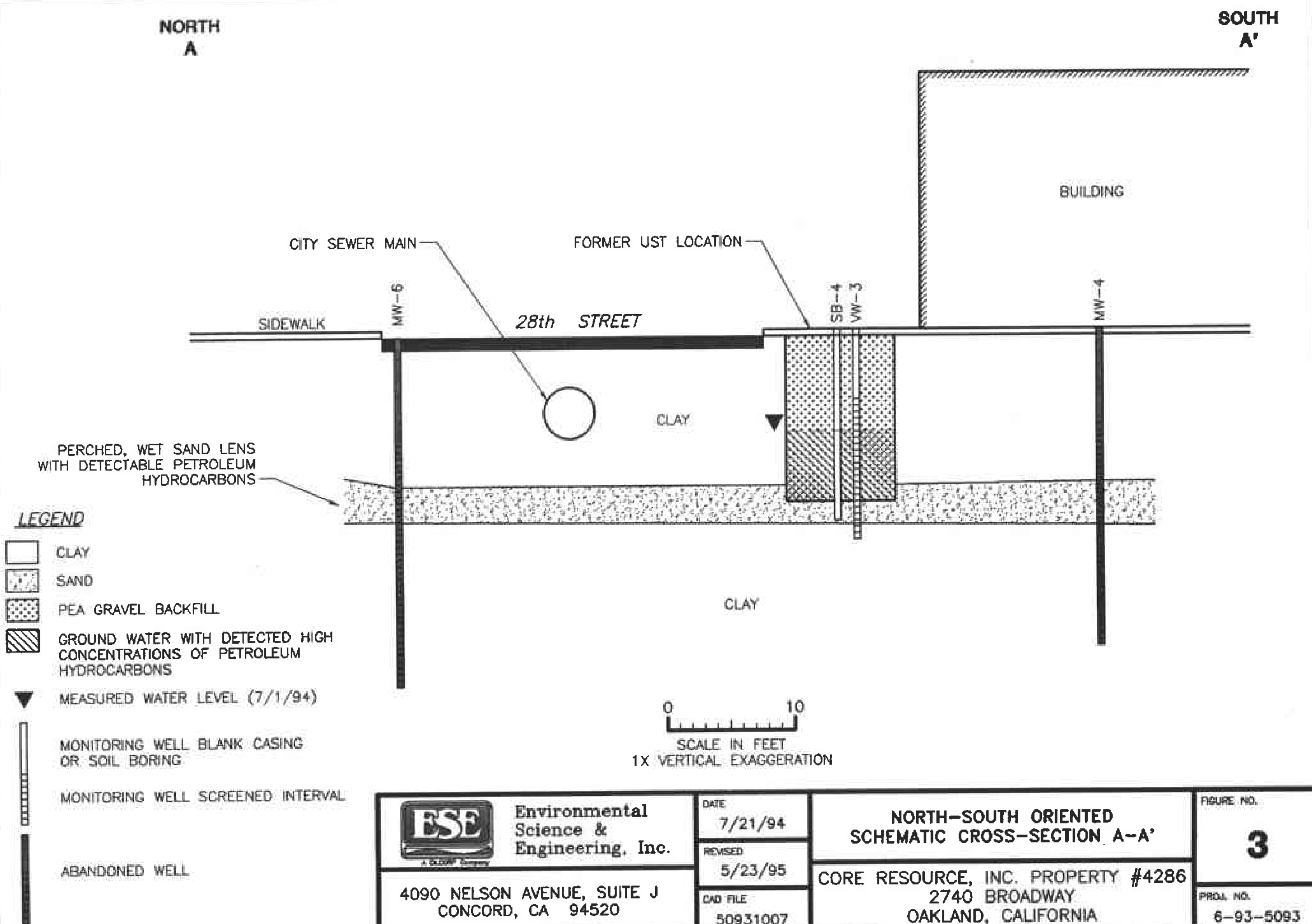
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

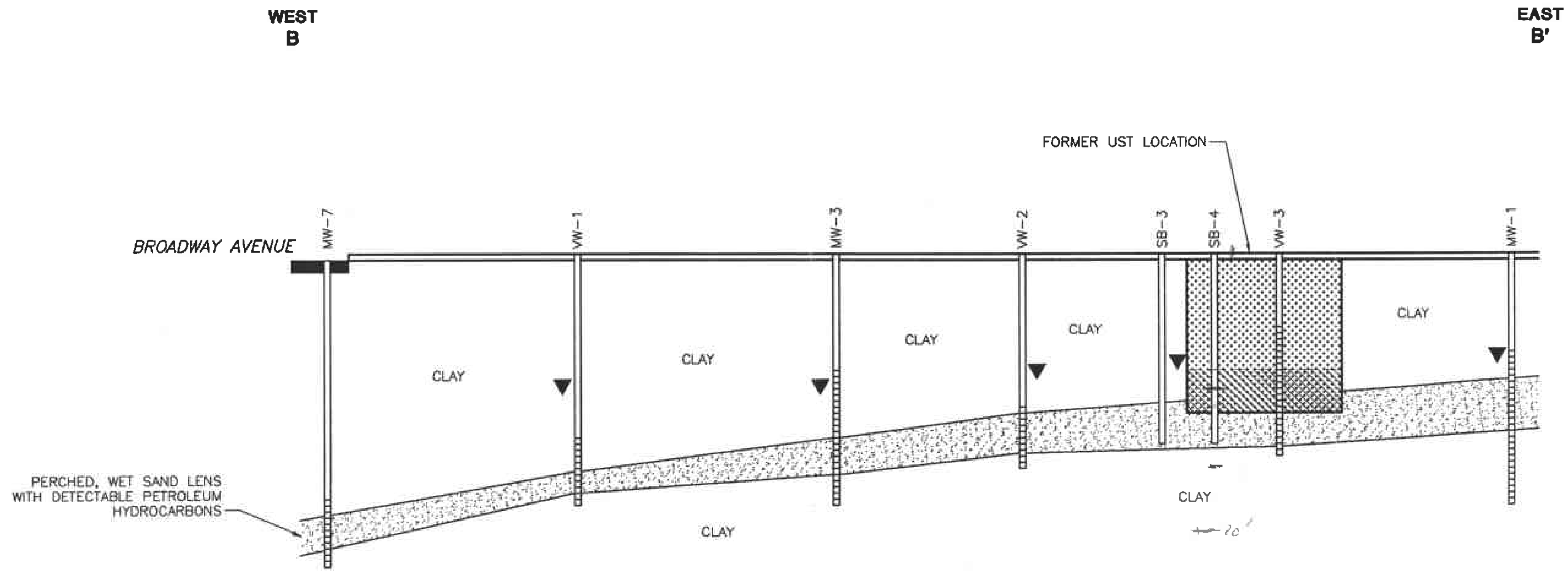
ADAPTED FROM U.S.G.S. OAKLAND WEST 7.5 MINUTE TOPOGRAPHIC QUADRANGLE, 1959, PHOTOREVISED 1980.

ESE Environmental Science & Engineering, Inc.	DATE 8/93 REVISED 5/23/95	VICINITY MAP	FIGURE NO. 1
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	CAD FILE 50931001	CORE RESOURCE, INC. PROPERTY #4286 2740 BROADWAY OAKLAND, CALIFORNIA	PROJ. NO. 6-93-5093


BROADWAY AVENUE
AUTOMOBILE INTERIOR SERVICE
AUTOMOBILE EXCHANGE SERVICE (AES)
N
A
MW-6
MW-5
28th STREET
SB-4
VW-3
MW-1
B'
VW-1
MW-3
VW-2
SB-3
ENTRANCE
MW-7
B
MW-4
A'
OFFICES
SHOWROOM
RAMP TO SECOND FLOOR
PARKING LOT
HALLWAY
GARAGE
PARKING LOT
OFFICES
LEGEND
MW-3 MONITORING WELL
MW-5 ABANDONED MONITORING WELL
VW-1 VADOSE MONITORING WELL
SB-3 SOIL BORING
A —— A' LINE OF GEOLOGIC CROSS-SECTION
FORMER UNDERGROUND TANK AREA
SCALE
0
20 FEET
ESE
Environmental Science & Engineering, Inc.
4090 NELSON AVENUE, SUITE J
CONCORD, CA 94520
DATE 3/94
REVISED 5/23/95
CAD FILE 50932006
SITE MAP
CORE RESOURCE, INC. PROPERTY #4286
2740 BROADWAY
OAKLAND, CALIFORNIA
FIGURE NO. 2
PROJ. NO. 6-93-5093



Environmental Science & Engineering, Inc.	DATE 7/21/94	NORTH-SOUTH ORIENTED SCHEMATIC CROSS-SECTION A-A'	FIGURE NO. 3
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	REVISED 5/23/95 CAD FILE 50931007	CORE RESOURCE, INC. PROPERTY #4286 2740 BROADWAY OAKLAND, CALIFORNIA	PROJ. NO. 6-93-5093



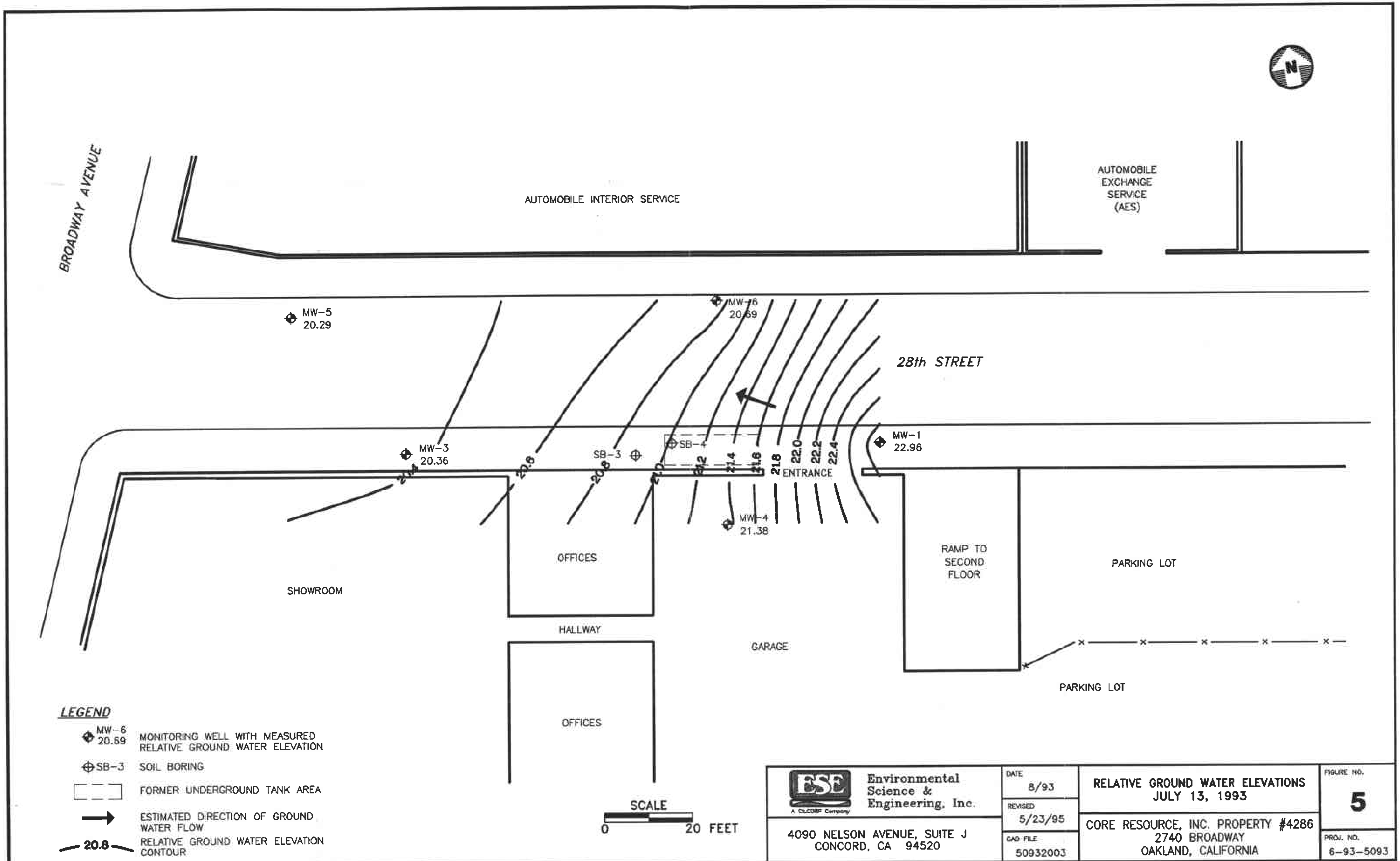
LEGEND

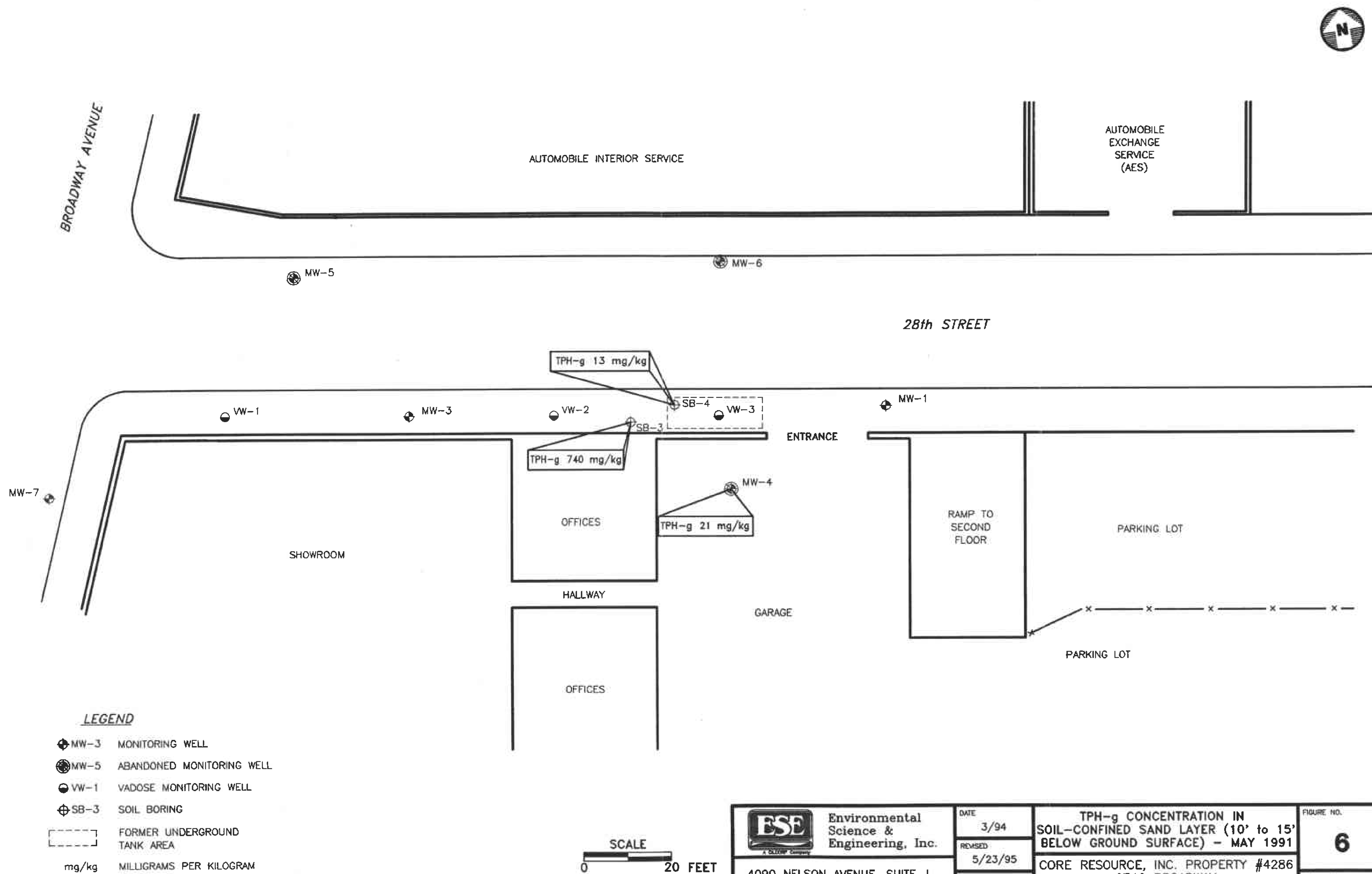
- CLAY
- SAND
- PEA GRAVEL BACKFILL
- GROUND WATER WITH DETECTED HIGH CONCENTRATIONS OF PETROLEUM HYDROCARBONS
- ▼ MEASURED WATER LEVEL (7/1/94)
- MONITORING WELL BLANK CASING OR SOIL BORING
- MONITORING WELL SCREENED INTERVAL

0 10 20

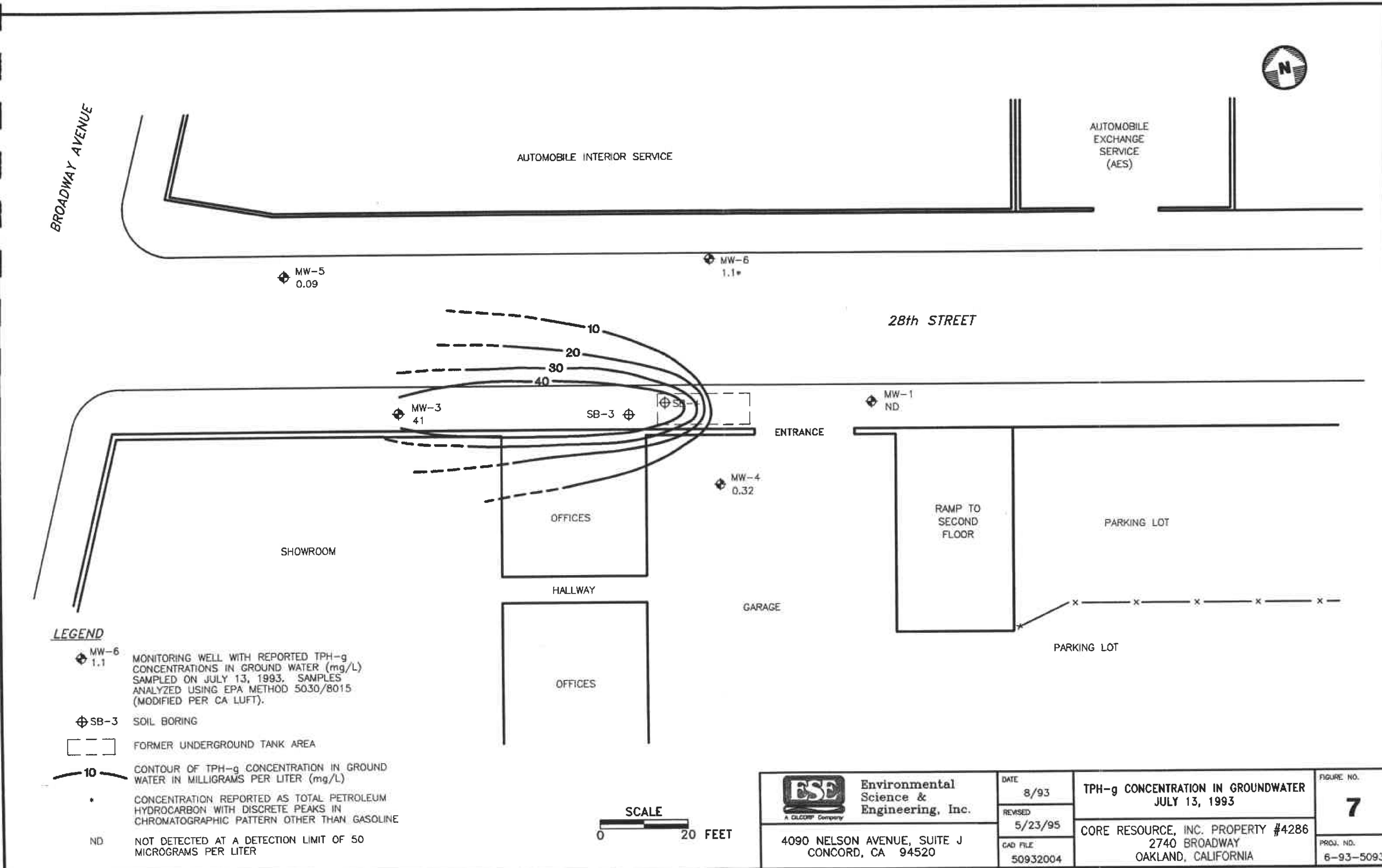
SCALE IN FEET
2X VERTICAL EXAGGERATION

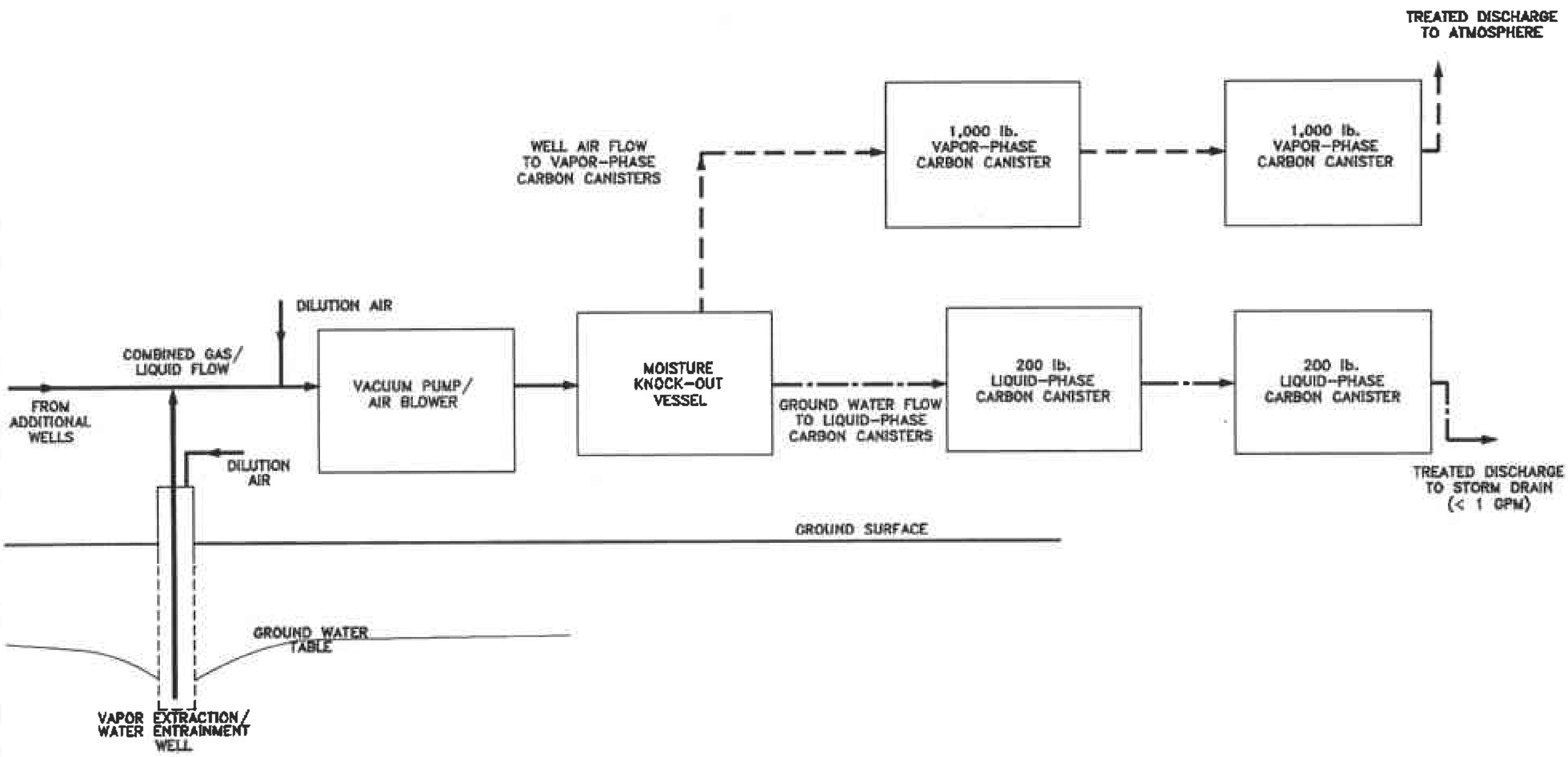
ESE Environmental Science & Engineering, Inc.	DATE 7/21/94	WEST-EAST ORIENTED SCHEMATIC CROSS-SECTION B-B'	FIGURE NO. 4
	REVISED 5/23/95		
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	CAD FILE 50931008	CORE RESOURCE, INC. PROPERTY #4286 2740 BROADWAY OAKLAND, CALIFORNIA	PROJ. NO. 6-93-5093


BROADWAY AVENUE
AUTOMOBILE INTERIOR SERVICE
AUTOMOBILE EXCHANGE SERVICE (AES)
28th STREET
MW-5 20.29
MW-6 20.69
MW-3 20.36
MW-1 22.96
MW-4 21.38
SB-3
SB-4
20.4
20.6
20.8
21.0
21.2
21.4
21.6
21.8
22.0
22.2
22.4
ENTRANCE
SHOWROOM
OFFICES
HALLWAY
OFFICES
GARAGE
RAMP TO SECOND FLOOR
PARKING LOT
PARKING LOT
LEGEND
MW-6 20.69 MONITORING WELL WITH MEASURED RELATIVE GROUND WATER ELEVATION
SB-3 SOIL BORING
FORMER UNDERGROUND TANK AREA
ESTIMATED DIRECTION OF GROUND WATER FLOW
20.8 RELATIVE GROUND WATER ELEVATION CONTOUR
SCALE
0
20 FEET
ESE Environmental Science & Engineering, Inc.
A CILCORP Company
4090 NELSON AVENUE, SUITE J
CONCORD, CA 94520
DATE 8/93
REVISED 5/23/95
CAD FILE 50932003
RELATIVE GROUND WATER ELEVATIONS
JULY 13, 1993
CORE RESOURCE, INC. PROPERTY #4286
2740 BROADWAY
OAKLAND, CALIFORNIA
FIGURE NO. 5
PROJ. NO. 6-93-5093



ESE Environmental Science & Engineering, Inc.	DATE 3/94	TPH-g CONCENTRATION IN SOIL-CONFINED SAND LAYER (10' to 15' BELOW GROUND SURFACE) - MAY 1991	FIGURE NO. 6
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	REVISED 5/23/95 CAD FILE 50932007	CORE RESOURCE, INC. PROPERTY #4286 2740 BROADWAY OAKLAND, CALIFORNIA	PROJ. NO. 6-93-5093

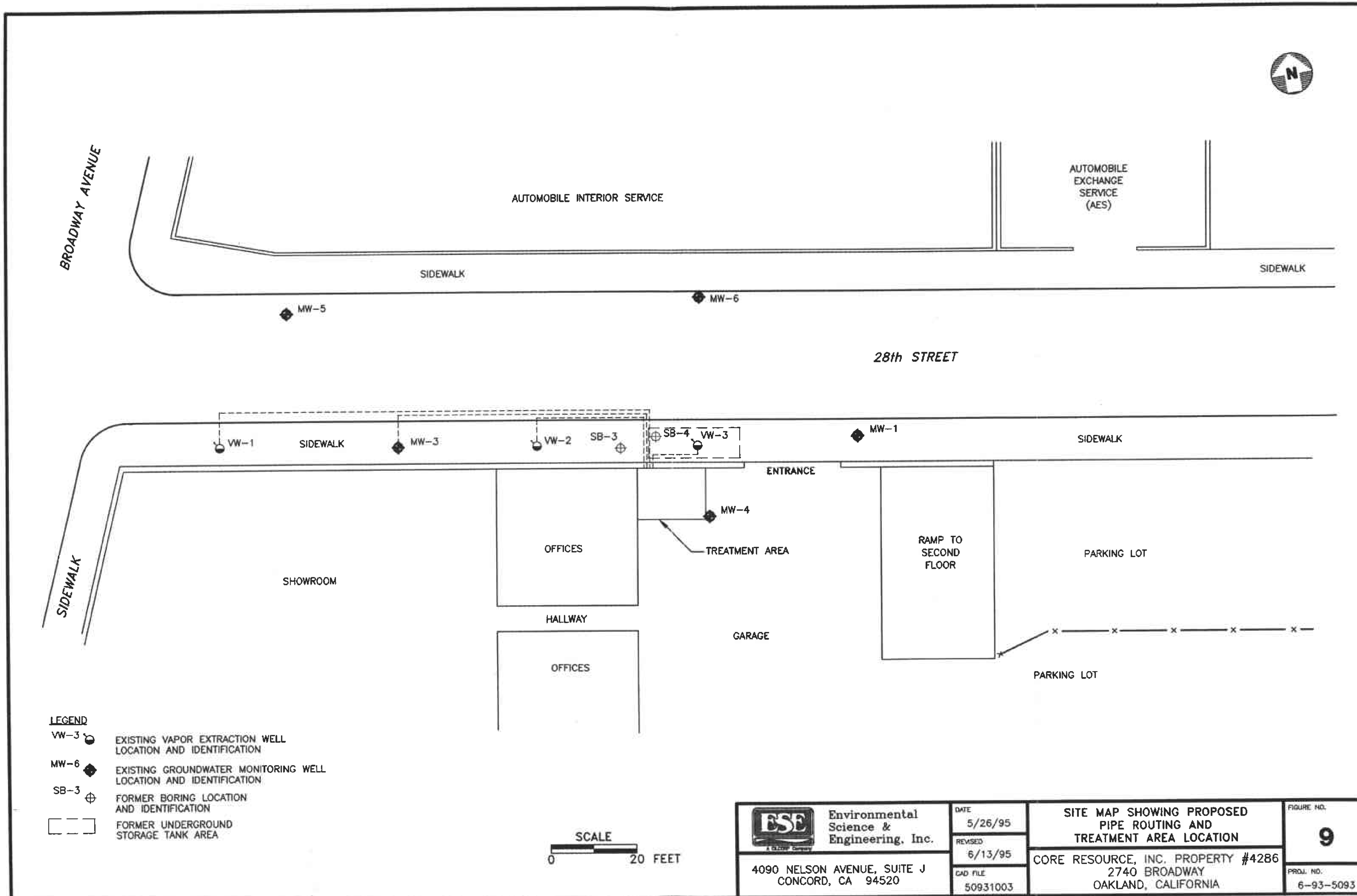

BROADWAY AVENUE
AUTOMOBILE INTERIOR SERVICE
AUTOMOBILE EXCHANGE SERVICE (AES)
N
MW-5
0.09
MW-6
1.1*
28th STREET
10
20
30
40
MW-3
41
SB-3
MW-1
ND
ENTRANCE
MW-4
0.32
OFFICES
SHOWROOM
HALLWAY
GARAGE
RAMP TO SECOND FLOOR
PARKING LOT
PARKING LOT
OFFICES
LEGEND
MW-6 1.1 MONITORING WELL WITH REPORTED TPH-g CONCENTRATIONS IN GROUND WATER (mg/L) SAMPLED ON JULY 13, 1993. SAMPLES ANALYZED USING EPA METHOD 5030/8015 (MODIFIED PER CA LUFT).
SB-3 SOIL BORING
FORMER UNDERGROUND TANK AREA
10 CONTOUR OF TPH-g CONCENTRATION IN GROUND WATER IN MILLIGRAMS PER LITER (mg/L)
* CONCENTRATION REPORTED AS TOTAL PETROLEUM HYDROCARBON WITH DISCRETE PEAKS IN CHROMATOGRAPHIC PATTERN OTHER THAN GASOLINE
ND NOT DETECTED AT A DETECTION LIMIT OF 50 MICROGRAMS PER LITER
SCALE
0
20 FEET
ESE
Environmental Science & Engineering, Inc.
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520
DATE 8/93
REVISED 5/23/95
CAD FILE 50932004
TPH-g CONCENTRATION IN GROUNDWATER JULY 13, 1993
CORE RESOURCE, INC. PROPERTY #4286 2740 BROADWAY OAKLAND, CALIFORNIA
FIGURE NO. 7
PROJ. NO. 6-93-5093



LEGEND

———	SOIL VAPOR AND GROUND WATER
— —	SOIL VAPOR
—·—	GROUND WATER
<	LESS THAN

ESE Environmental Science & Engineering, Inc. (A CILCORP Company)	DATE 5/19/95	WATER ENTRAINMENT AND VAPOR EXTRACTION PROCESS FLOW DIAGRAM	FIGURE NO. 8
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	REVISED	CORE RESOURCE, INC. 2740 BROADWAY OAKLAND, CALIFORNIA	PROJ. NO. 6-93-5093
	CAD FILE WE-VEPFB		



N
BROADWAY AVENUE
AUTOMOBILE INTERIOR SERVICE
AUTOMOBILE EXCHANGE SERVICE (AES)
SIDEWALK
SIDEWALK
MW-5
MW-6
28th STREET
VW-1
SIDEWALK
MW-3
VW-2
SB-3
SB-4
VW-3
MW-1
SIDEWALK
ENTRANCE
MW-4
TREATMENT AREA
OFFICES
SHOWROOM
SIDEWALK
HALLWAY
GARAGE
RAMP TO SECOND FLOOR
PARKING LOT
PARKING LOT
OFFICES
LEGEND
VW-3 EXISTING VAPOR EXTRACTION WELL LOCATION AND IDENTIFICATION
MW-6 EXISTING GROUNDWATER MONITORING WELL LOCATION AND IDENTIFICATION
SB-3 FORMER BORING LOCATION AND IDENTIFICATION
FORMER UNDERGROUND STORAGE TANK AREA
SCALE
0
20 FEET
ESE
Environmental Science & Engineering, Inc.
4090 NELSON AVENUE, SUITE J
CONCORD, CA 94520
DATE 5/26/95
REVISED 6/13/95
CAD FILE 50931003
SITE MAP SHOWING PROPOSED PIPE ROUTING AND TREATMENT AREA LOCATION
CORE RESOURCE, INC. PROPERTY #4286
2740 BROADWAY
OAKLAND, CALIFORNIA
FIGURE NO. 9
PROJ. NO. 6-93-5093

APPENDIX A

EAST BAY MUNICIPAL UTILITY DISTRICT - GROUND WATER DISCHARGE LIMITATIONS

GROUNDWATER PERMIT INFORMATION

The District regulates discharges of groundwater generated during site remediation. Limits are applied for a specific pollutant based on the average background concentrations observed at the influent of the District's wastewater treatment plant. If the background level for a pollutant is less than 5 ug/l, the District limit is 5 ug/l.

For example, groundwater contaminated by gasoline has revealed significant concentrations of Total Petroleum Hydrocarbons (TPH), Lead, Benzene, Toluene, Ethylbenzene and Xylene. In this case the District will establish limits of:

TPH	No limit,	not a specific pollutant;
Metals	varies	(POTW background levels);
Benzene	5 ug/l	(POTW background level <0.5 ug/l, therefore District limit is 5 ug/l);
Toluene	7 ug/l	(POTW background);
Ethylbenzene	5 ug/l	(POTW background level 1 ug/l, therefore District limit is 5 ug/l);
Xylene	7 ug/l	(POTW background)

Prior to discharging wastewater into the sanitary sewer, the site owner must apply for and receive a Wastewater Discharge Permit. A typical Permit application includes the following information:

- o Site history indicating how the contamination originated and land use of prior tenants.
- o Sample results from the various monitoring wells for heavy metals, EPA 624 and for any other pollutants suspected to have contaminated the site.
- o A plot map indicating the location of the contamination plume.
- o A description of the groundwater treatment facilities.
- o The TU must be equipped for continuous free product removal or adequate fail-safe device to shut off the recovery well when free product is detected at applicable sites.
- o The expected <u>average</u> discharge rate from the treatment unit.
- o The application must be signed by a representative of the company required to remediate the site.

[revised 08/93]

(2) Wastewater which creates a fire or explosion hazard including, but not limited to, discharges prohibited by the Federal Pretreatment Regulations.

(3) Garbage, except ground garbage from residential and commercial premises where food is prepared and consumed.

d. Prohibited Locations. Except for sewer construction and maintenance by public agencies and contractors, no person shall discharge any wastewater directly into a manhole or other opening in a community sewer system other than through side sewers approved by the public agency owning the system; provided that the Manager may grant permission for such direct discharges, upon written application, at locations approved by the public agency and upon payment of applicable sewage disposal charges to the District.

Section 3
Limitations on Discharges

a. Wastewater Strength Limits. No person shall discharge wastewater from a side sewer into a community sewer if the strength of the wastewater exceeds the following:

(1)	Arsenic	2	mg/l
(2)	Cadmium	1	mg/l
(3)	Chlorinated Hydrocarbons (total identifiable)	.5	mg/l
(4)	Copper	5	mg/l
(5)	Cyanide	5	mg/l
(6)	Iron	100	mg/l
(7)	Lead	2	mg/l
(8)	Mercury	0.05	mg/l
(9)	Nickel	5	mg/l
(10)	Oil and Grease	100	mg/l
(11)	pH - not less than	5.5	mg/l
(12)	Phenolic compounds	100	mg/l
(13)	Silver	1	mg/l
(14)	Temperature	150°F	
(15)	Total Chromium	2	mg/l
(16)	Zinc	5	mg/l

b. Additional Wastewater Strength Limits. Wastewater strength limits for constituents not listed in Section 3a may be established in a wastewater discharge permit based on available treatment technology, existing wastewater conditions in the District's facilities or other factors as determined by the Manager.

The Manager may also establish wastewater strength limits on the wastewater discharge permits at locations within a premise whenever non-process water may dilute the wastewater discharging from side sewers.