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SITE CLOSURE AND GROUNDWATER MONITORING REPORT

GRAND AUTO #43
4240 EAST 14TH STREET,
OAKLAND, CALIFORNIA

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August 15, 2000

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SITE CLOSURE
AND GROUNDWATER MONITORING REPORT

GRAND AUTO #43
4240 EAST 14TH STREET,
OAKLAND, CALIFORNIA

I. EXECUTIVE SUMMARY

This report was prepared to document that the residual chlorinated solvents, tetrachloroethylene (PCE) and its common degradational products, trichloroethene (TCE) and cis-1,2-dichloroethene (cis-1,2-DCE), in the shallow groundwater of the Grand Auto Retail Store #43, located at 4240 East 14th Street, Oakland, California does not pose as an unacceptable risk to human health or the environment. This was accomplished by 1) redeveloping and sampling the five on-site groundwater wells to demonstrate that the residual contamination in the groundwater is natural attenuating and likely from off-site source(s), 2) updating the previously completed American Society for Testing and Materials (ASTM) Tier 1 risk assessment by discounting the groundwater ingestion pathway by the completion of an 1/2 mile radius well survey, and 3) comparing maximum, on-site groundwater contamination concentrations to recently developed, Oakland specific, Tier 1 risk based screening levels (RBSLs) to document that this is a low risk case and candidate for "No Further Action" status by the Alameda County Health Care Services (ACHCS), the lead oversite agency, as per regulations and guidelines of the Regional Water Quality Control Board (RWQCB), San Francisco Bay Region, the lead State agency in charge of protecting the groundwater quality of the Greater Oakland Area.

The redevelopment and sampling of the existing five on-site groundwater monitoring wells, MW-1 through MW-4 and HC-1, occurred during the week of November 1, 1999. The groundwater elevations measured during this investigation ranged from a low of 3.09 feet above mean sea level (MSL) from wells HC-1 and MW-3 located along the western side of the investigated area to a high of 3.16 feet above MSL from well MW-4 located along the southeastern side of the subject property. As compared to previous groundwater levels, the measurements conducted during this investigation continued to show a gradual increase in groundwater levels since the California drought years of the late 1980s and early 1990s. Based on groundwater elevations measured during this sampling event, the groundwater flow direction is generally to the west with an extremely flat gradient of 0.002 feet per foot.

Chlorinated solvents were detected in groundwater samples collected from all five monitoring wells sampled during this investigation. Concentrations of PCE ranged from a high of 150 parts per billion (ppb) from MW-3 located towards the center of the study area to a low of 7.6 ppb from MW-2 located at the northeast boundary of the subject property. TCE and cis-1,2-DCE followed similar trends as PCE but at lower concentrations. The only other HVOCs reported from this sampling event above their respective laboratory detection limits were dichlorodifluoromethane (Freon 12) and carbon tetrachloride. Freon 12 was reported in all five groundwater wells ranging from a high of 62 ppb from MW-1 to a low of 14 ppb from MW-3. Carbon tetrachloride was only reported in one

Is there info on the PCE release from the dry cleaner that is SE of subject property?

groundwater sample. Carbon tetrachloride was reported from MW-2 at 1 ppb. Other HVOCs previously reported, including 1,1,1-trichloroethane (1,1,1-TCA), 1,2-dichloroethane (1,2-DCA), vinyl chloride and chloroform were not reported above respective laboratory detection limits from this sampling event.

Total petroleum hydrocarbon as gasoline (TPH-g) was only reported above its laboratory detection limit in one of the five groundwater samples. TPH-g was reported at 61 ppb from MW-3. None of the gasoline constituents benzene, toluene, ethylbenzene, and total xylenes (BTEX) compounds or Methyl t-Butyl Ether (MTBE) were reported above their respective laboratory detection limits in any of the groundwater samples. Based on the lack of reportable concentrations of BTEX and MTBE and only low levels of TPH-g, petroleum hydrocarbons are not considered an unacceptable risk to human health or the environment.

The chlorinated solvent concentrations have generally decreased since the last sampling period conducted in 1996. The maximum concentration of PCE measured in this sampling event,150 ppb, is well below the historic maximum concentration of 340 ppb reported from a 1994 sampling event. Similar decreasing trends were noted for TCE and cis-1,2 DCE.

Ratios of the chlorinated solvents are commonly used to assess the likely source and age of contaminant releases. This is based on the assumption that most PCE plumes originate as a pure product of PCE as the result from leakage or spillage from dry cleaning facilities, and through time, the PCE will naturally biodegrade to TCE and cis-1,2-DCE and ultimately vinyl chloride as the plume disperses in the down gradient flow direction.

The ratios of PCE to TCE and cis-1,2-DCE from this investigation coupled with the flat groundwater gradient indicate that this plume likely originated from a dry cleaner located southeast of the subject property since the bulk of the chlorinated solvents are PCE (about 80 percent) with lesser amounts of TCE and cis-1,2-DCE (about 20 percent). That is, by the time the PCE from the dry cleaners had migrated on to the subject property, approximately 20 percent of the PCE had degraded to TCE or cis-1,2-DCE. This PCE to TCE and cis-1,2-DCE ratio was observed in all of the wells sampled except for MW-2 which currently has about equal amounts of PCE to TCE. Historically, TCE has been reported to be more than 7 times higher than PCE in MW-2 indicating that the TCE from this location is not solely a degradational product of PCE. However, the levels of TCE in this well have significantly decreased from a high of 130 ppb in September 1994 to 8.1 ppb in November 1999 which is only slightly above the drinking water standard (MCL) of 5 ppb.

AllWest reviewed and updated the previously completed ASTM, Tier 1 RBCA assessment prepared by Hart Crowser (September 27, 1996) for the subject property. The focus of the update was two-fold. Firstly, the update was performed to document that the groundwater ingestion pathway is incomplete by conducting a well survey of the area. Secondly, the existing site data was compared to published risk based action levels to document that the residual site contaminants are not an unacceptable risk to human health or the environment.

In order to determine if the groundwater in the vicinity of the subject property is being used as a drinking water source, AllWest contacted the County of Alameda, Public Works Agency to locate all permitted wells in the area. The search radius was set at an 1/2 mile radius of the subject property. The radius of 1/2 mile was selected since, based on contaminant data distributions and degradational trends, it is highly unlikely that contaminants from the subject site have migrated significantly (more than 1/8 mile) off the subject property. A total of 34 wells reported to be within the search radius. The majority or 27 of the 34 wells were noted as groundwater monitoring wells. Also noted on the survey were three extraction wells associated with groundwater remediation activities, three soil borings as part of remedial investigation activities and one destroyed well. No groundwater supply wells for industrial, agricultural, municipal or residential uses were identified within 1/2 mile of the subject property.

The maximum site groundwater concentrations were compared to the recently compiled, City of Oakland specific, Tier 1 RBSLs. The Tier 1 carcinogenic RBSL recently developed for the inhalation of PCE vapors being emitted from the groundwater into indoor commercial structures was recently set at 3,300 ppb (Oakland Urban Land Development Program: Guidance Document, City of Oakland Public Works Department, January 1, 2000). This value is well above the maximum on-site concentration of 340 ppb reported in June 1994 and the most recent concentration reported of 120 ppb in November 1999. Similarly, the maximum concentrations of the other contaminants TCE, cis-1,2-DCE, 1,1,1-TCA, 1,2-DCA, chloroform, carbon tetrachloride and vinyl chloride reported from the site groundwater were at least one order of magnitude lower than their respective Oakland Tier 1 RBSLs.

In conclusion, the results of this groundwater sampling event indicate that the shallow groundwater of the subject property is impacted with chlorinated solvents. The spatial distribution of the chlorinated solvents do not indicate a clear source area due to similar contaminant concentrations and the flat hydraulic gradient of the area. However, based on the ratio of PCE to TCE and cis-1,2-DCE, the likely source of the bulk of the chlorinated solvents is the existing or former dry cleaners located southeast of the subject property. Based on site specific results and current health risk based action levels, it is unlikely that the residual contamination in the site groundwater poses as an unacceptable risk to human health or the environment. AllWest recommends that ACHCS grant "no further action status" for the residual chlorinated solvents in the groundwater of the subject property and request approval to abandon the existing five on-site groundwater wells.

II. INTRODUCTION

This report presents the results of recent field and research activities for the Grand Auto Retail Store #43, Oakland, California. Included in this report is an abbreviated site setting and investigation history including the previous completed risk assessment, a description of field activities, a summary of analytical results, our interpretation of the data, summary of agency files reviewed, results of an 1/2 mile well survey and an update to a previously completed risk assessment with regards with Oakland specific RBSLs. Supporting information such as site figures, sampling logs, and laboratory reports are included as attachments or appendices to this report.

A. Site Setting

The approximately 1.2 acre Grand Auto retail facility is located at the northwest corner of High Street and International Boulevard (formerly 14th Street) in Oakland, California. The site currently is used as an auto service and retail merchandise facility. Previously the site also was used for retail gasoline sales and had underground fuel storage tanks and a car wash with an associated drainage sump. The underground fuel tanks were removed in 1986. The car wash drainage sump was removed in August 1992. During October 1993, the remaining fuel conveyance piping associated with the former underground fuel storage tanks was excavated and removed from the site.

When environmental activities were initiated at the subject property, the former Super Tire store at 4256 East 14th Street (currently All Mufflers Discounted) located southeast of the subject property was included as part of the Grand Auto site. Subsequently, the former Super Tire store was considered by both PACCAR and ACEHS as a separate site. In its letter to PACCAR dated December 27, 1993, ACEHS indicated that no further action was required for soil-related issues at the former Super Tire store.

B. Site Geology and Hydrology

The site is located on an alluvial plain on the east side of San Francisco Bay. According to the Preliminary Engineering Geologic Information Map, Oakland and Vicinity (1967), the site surface soils are mapped as Qu (Undifferentiated Quaternary deposits) which may include the Qtc (Temescal Formation, dark alluvium) and Qts (alluvial materials derived from the Qsu and Qsl (upper and lower members of the San Antonia Formation, clay, silt sand and gravel mixtures)). In general, these Quaternary alluvial deposits consist of unconsolidated clay, silt, sand, and gravel. Bedrock underlying the alluvium in the area consists primarily of the Mesozoic Franciscan Formation. The depth to bedrock in the area of the site is unknown but is assumed to be over 100 feet below the ground surface.

Several soil borings were completed to depths of up to 46 feet below ground surface (bgs) at the site and adjacent former Super Tire site. The borings indicate that the site is underlain by an irregularly layered sequence of silty to gravelly sand lenses separated by clayey silt. As much as 20 feet of imported fill material has been reported at some areas of the site. However, the site is not in an area mapped as Qf (artificial fill) like those areas by the Oakland Coliseum located approximately 2 miles south of the subject property.

Unconfined groundwater was previously reported to first occur at depths between 25 and 35 feet bgs. However, during the drilling of well MW-1, wet soil was encountered at 8 feet bgs indicating a possible discontinuous zone of perched groundwater. No other wet or perched zones were noted in other borings drilled at the subject property.

The groundwater gradient in this area is very flat, thus the determination of the groundwater flow direction is difficult to assess. Regional, groundwater is typically reported to flow from

the east to the west from the Oakland Hills towards the San Francisco Bay. However, based on San Leandro Bay located approximately 3/4 mile south of the site, the water body that separates the City of Oakland from the main island of the City of Alameda and from Bay Farm Peninsula, the groundwater may have greater southerly flow component than commonly reported.

Historically, groundwater elevations in well MW-2 located on the northeast side of the site and MW-4 located on the southeasterly side of the site, have consistently been reported to have slightly higher groundwater levels than other on-site wells, which indicates the local groundwater flow follows the regional flow to the west. Conversely, at the Unocal Station at 4251 East 14th Street, located approximately 300 feet southwest of the subject site, groundwater was reported to fluctuate between the southwest, east-northeast and northeast directions based on sampling in the early 1990s. A second nearby UST site, U-Haul at 5330 14th Street, notes that groundwater first occurs between 18 and 22 feet bgs and flows to the south and southwest at a gradient of 0.001 feet per foot. In summary, the site groundwater flow direction appears to follow the regional groundwater flow direction to the west but locally, variations in the groundwater flow direction has been reported in this area.

C. Historical Site Use

A detailed description of historical uses of the subject property and surrounding area was compiled in a Phase I Environmental Site Assessment (ESA) by AllWest Environmental (August 10, 1995). In summary, the earliest available recorded use of the property is as a dance hall in 1903. Site use between 1903 and 1946 is unknown. Around 1946, an L-shaped building was constructed on the site. This building was used as office space and for auto repair and painting. The date of demolition of this building is not known.

In 1960 or 1961, the present building was constructed for use as a Safeway grocery store. Grand Auto leased the building from the property owner in 1971 and, in 1971, installed pump islands and three 10,000-gallon underground storage tanks for retail gasoline sales. The tanks were subsequently removed in 1986 and the remaining associated conveyance piping was removed in 1993. Grand Auto also operated a car wash at the site from approximately 1972 to 1986. The drainage sump associated with the car wash was removed in August 1992.

D. Historical Use of the Surrounding Area

In addition to residential housing, numerous commercial operations have existed in the areas immediately adjacent to the site. Various adjacent or nearby parcels have been used as retail gasoline stations, auto repair shops, auto paint shops, auto transmission repair shops, auto dealerships and most notably, retail dry cleaners which commonly use PCE, the target contaminant, as part of their on-site activities. In many cases, these parcels have been used for these purposes since the late 1940's or early 1950's.

PCE detection soil sample beneath sump @ 8.5' bgs. If GW is at 36' bgs, then there is a PCE source on site.
Any S.S. from deeper depths for HVOCs?

E. Previous Investigations and Remedial Actions

Underground Tank Removal

The underground fuel tanks at the site were reportedly removed in 1986. In July 1992, Hart Crowser performed a site investigation as outlined in "Sampling and Analysis Plan, Grand Auto/Super Tire Facilities," July 5, 1992. The investigation included drilling two borings in the assumed vicinity of the former location of the underground fuel storage tanks (Figure 2). Analyses of soil samples from these borings did not indicate significant petroleum hydrocarbon concentrations (Hart Crowser, 1992b).

Drainage Sump Removal and Installation of MW-1

The car wash drainage sump and surrounding soil were removed on August 7, 1992. Hart Crowser collected a soil sample "S2C" from beneath the sump at the bottom of the excavation, 8.5 feet below ground surface (bgs). Analyses of the sample indicated the presence of petroleum hydrocarbons and low concentrations of PCE in the soil beneath the sump. A groundwater monitoring well, MW-1, was installed approximately 10 feet southwest of the sump, in a down to cross gradient direction. Despite some slightly wet conditions encountered at 8 feet bgs, free groundwater was not encountered until approximately 36 feet bgs. Hart Crowser speculated that the shallow, wet zone may indicate a discontinuous perched zone of groundwater at the site at approximately 8 feet bgs. The results of this phase of the investigation were summarized in the "Preliminary Site Investigation Report" (Hart Crowser, 1992b).

Groundwater Well Installations of MW-2 through MW-4 and HC-1

During April 1993, Hart Crowser drilled five soil borings and converted three of them to underground monitoring wells, MW-2, MW-3 and MW-4 at the Grand Auto Store. A groundwater monitoring well, HC-1, was also installed at this time at the adjacent, former Super Tire Facility. Two of the soil borings were completed in the area of the former car wash sump. Soil samples these two borings indicated that the TPH and PCE detected immediately below the sump in sample "S2C" were neither laterally nor vertically widespread. The wells were developed and sampled in April 1993. The results of this phase of the assessment were summarized in a report, "Supplemental Site Investigation," (Hart Crowser, 1993).

Conveyance Piping Removal

In October 1993, fuel conveyance piping associated with the former underground fuel storage tanks was excavated and removed from the site. Verification soil samples were taken from the base of the excavation at four locations. Each sample was analyzed for total petroleum hydrocarbons as gasoline (TPH-g) and benzene, toluene, ethylbenzene, and xylenes (BTEX). TPH-g and BTEX were not detected in any of the samples analyzed.

what about PCE in soil beneath the sump at 8.5' bgs?

Between February 1994 and May 1996, Hart Crowser sampled the five groundwater wells six more times. The groundwater elevations and analytical results from these sampling events are presented in Table 2 and Table 3, respectively.

Facility Closure Report for Super Tire

As previously noted, when environmental activities were initiated at the subject property, the former Super Tire store at 4256 East 14th Street (currently All Mufflers Discounted) located southeast of the subject property was included as part of the Grand Auto site. Subsequently, the former Super Tire store was considered by both PACCAR and ACEHS as a separate site. In its letter to PACCAR dated December 27, 1993, ACEHS indicated that no further action was required for soil-related issues at the former Super Tire store.

Facility Closure Report for Grand Auto

Hart Crowser submitted a Facility Closure Report on February 16, 1996 requesting site closure. The request was based on the following:

- Potential onsite sources related to Grand Auto operations (USTs, pump islands, associated piping, and car wash sump) have been investigated and/or successfully remediated, thus are no longer considered to be sources;
- Investigations of these potential onsite sources did not indicate evidence of a source of halogenated VOCs (chlorinated solvents) to the groundwater; and
- Several potential offsite sources of halogenated VOCs (chlorinated solvents) exist.

Hart Crowser recommended case closure for the site since the environmental issues associated with potential onsite sources of chemicals have been addressed. Halogenated VOCs remain in site groundwater, but these are 1) unrelated to the onsite sources that have been addressed; and 2) likely to be the result of releases at one or more of the numerous offsite potential sources located in the immediate vicinity of the site. Hart Crowser recommended abandonment of the remaining groundwater monitoring wells after the closure certification is approved by ACHCS and RWQCB (Hart Crowser, 1996a).

Risk Assessment

In order to obtain site closure for soil portion of the site, Hart Crowser completed an ASTM, Tier 1, RBCA assessment for the subject property (September 27, 1996). The risk assessment was prepared to meet the closure requirements of the ACHCS and the RWQCB. The risk assessment was conducted in accordance with the framework developed by the American Society of Testing Materials (ASTM), designated the Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites (RBCA) Tier 1 analysis.

The RBCA Tier 1 evaluation is a risk-based analysis to develop non-site-specific values for direct and indirect exposure pathways utilizing conservative exposure assumptions for potential pathways and various property use categories. In Tier 1 analysis, a table of Risk-Based Screening Levels (RBSLs) are derived for standard exposure scenarios using current Reasonable Maximum Exposure (RME) and toxicological parameters as recommended by the EPA. Site conditions are then compared against the appropriate RBSLs to determine whether site conditions satisfy the criteria for regulatory closure or warrant a more site-specific evaluation (ASTM, 1995).

The risk assessment was conducted to evaluate the probability and magnitude of adverse impacts to human health associated with actual or potential exposures to site related chemicals remaining at the Grand Auto Supply site. Based on an evaluation of existing site data, the exposure pathways that were quantitatively assessed were the inhalation of vapors volatilizing from subsurface soils and the inhalation of vapors volatilizing from groundwater. The compounds considered in the subsurface soils exposure pathway were PCE and benzene, toluene, ethylbenzene, and xylene (BTEX). The compounds considered in the groundwater exposure pathway were chlorinated solvents and excluded BTEX since none have been detected in the groundwater since 1994. The exposure models utilized in this risk assessment assumed that the receptors were on site, at the location of the boring or well with the highest detected concentration for each compound of concern, in accordance with the Tier 1 evaluation guidance (ASTM, 1995). To account for all possible future uses of the site, RBSLs were calculated for both residential and commercial/industrial uses.

These RBSLs correspond to a chemical concentration in the selected environmental media resulting in a non-carcinogenic hazard quotient (HQ) of 1 and a carcinogenic risk level of one in a million (1×10^{-6}). The RBSLs were compared with the maximum concentration of the chemical found in the corresponding media on site. The use of the maximum detected concentration of chemical is a conservative assumption and will overestimate the actual or potential risks associated with current site conditions.

No on-site concentrations were noted above the RBSLs in subsurface soil or from vapors in soil from groundwater under either the residential or industrial exposure scenario. Therefore, Hart Crowser (1996b) concluded that the residual presence of chemicals in subsurface soils does not pose an unacceptable risk to human health under current or potential future use scenarios, and the site satisfies the conditions for regulatory site closure from a human health risk perspective. A copy of the risk assessment is included as Appendix C of this report.

Closure Letter for Site Soils

Based on the Hart Crowser risk assessment (1996b), ACHCS concluded in December 30, 1996 letter to PACCAR that the soils on-site do not pose a threat to public health.

Data Gaps

The only pathway not addressed in Hart Crowser risk assessment (1996b) is the ingestion of groundwater[1]. As part of this study, AllWest completed a well survey for potential drinking water wells within 1/2 mile of the subject property. Results of this survey as presented in Section VII of this report indicate that there are no drinking water wells within 1/2 mile of the subject property.

III. PURPOSE AND SCOPE OF WORK

A. Purpose of the Investigation

The purpose of this report is to present findings from the recent groundwater sampling of the five on-site groundwater monitoring wells to show the residual contamination in the site groundwater are natural attenuating, update the previously completed ASTM Tier 1 Risk assessment by discounting the groundwater ingestion pathway by the completion of a well survey and the comparison to recently developed risk based screening levels to document that this is low risk case and candidate for no further action status by ACHCS and RWQCB.

B. Scope of Work

The scope of work consisted of the following tasks:

1) Prepare a site specific workplan and health & safety plan for the planned investigative activities.

2) Inspect and redevelop the five existing groundwater wells. Based on field observations, one well was replaced outside of a parking stall and a second well vault was repaired.

3) Sampling the five on-site groundwater wells for target contaminants.

4) Maintain collected groundwater samples under chain-of-custody and transport the samples to a California Department of Health Services (DHS) certified analytical laboratory for petroleum hydrocarbons and chlorinated solvents by EPA approved methods.

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[1]Although the ACEHS only noted in their December 30, 1996 letter that the risk assessment by Hart Crowser only reviewed the "inhalation of vapors volatilizing from **subsurface soils** to ambient air and indoor air" the risk assessment also reviewed the "inhalation of vapors volatilizing from **groundwater** to ambient air and indoor air" and reported, like soil, the volitization of contaminants in the groundwater to ambient and indoor air does represent an unacceptable risk to human or the environment.

5) Complete an 1/2 mile radius well survey to located potential off-site receptors.

6) Update the previous risk assessment.

7) Compare maximum groundwater results to recently developed Oakland specific Tier 1 RBSLs.

8) Prepare this written report summarizing the investigation findings.

IV. FIELD ACTIVITIES

A. Well Inspection

The integrity of each of the five existing groundwater monitoring wells was assessed on the first day of field activities. This included the inspection of the well heads including vault covers, locks and well caps as well as checking the well annulus for blockage by lowering a tape measure to the bottom of the well.

B. Well Redevelopment

Since the wells have not been sampled since 1996, the wells were redeveloped prior to sampling. Redevelopment included purging a minimum of six well volumes (65 to 70 gallons) from each well to remove accumulated sediments from inside the well casing and surrounding filter pack. Redevelopment was considered complete when the color, clarity, pH, temperature and conductivity of the groundwater stabilizes over time. All purged groundwater was temporarily placed on-site in 55-gallon until they were removed and disposed of at an off-site facility under applicable federal, state and local regulations.

C. Groundwater Sampling

To assess the current groundwater contaminant concentrations, the existing five groundwater monitoring wells were sampled. Prior to groundwater sampling, a proper purging process was performed at each well. The purpose of well purging is to allow fresh and more representative groundwater to recharge the well. Prior to well purging, an electric water depth sounder was lowered into the well casing to measure the depth to the water to the nearest 0.01 feet. A clear disposable Teflon bailer was then lowered into the well casing and partially submerged. Upon retrieval of the clear bailer, the surface of the water column retained in the bailer was carefully examined for any floating product or product sheen.

After all initial measurements were completed and recorded, the well was purged by a disposable bailer. A minimum of 3 well volumes of groundwater were purged and groundwater characteristics (temperature, pH, and conductivity) were monitored at each well volume interval. Purging was considered complete when indicators are stabilized

(consecutive readings within 10% of each other) and the purged water is relatively free of sediments. All purged groundwater was temporarily placed on-site in 55-gallon drums until a proper disposal method is determined based on analytical results.

Groundwater sampling was conducted after the water level has recovered to at least 80% of the initial level, recorded prior to purging. The groundwater samples were collected by a disposable bailer. Groundwater from the first bailer was discarded to condition the bailer. Groundwater from the second bailer was measured in the field for physical parameters including temperature, pH and conductivity. Groundwater to be submitted for chemical analyses, was carefully transferred to appropriate sample bottle furnished by the analytical laboratory. All sample bottles had a Teflon lined septum/cap and were filled so that no headspace was present. Then the sample bottles were labeled and immediately placed on ice to preserve the chemical characteristics of its content.

To prevent cross contamination, all groundwater sampling equipment that come in contact with the groundwater was thoroughly decontaminated prior to sampling. A dedicated disposable bailer was used to collect the groundwater samples to avoid cross contamination. Sample handling, storage, and transport procedures described in the following sections were employed.

D. Analytical Program

The groundwater samples collected from each of the five wells were transported to Chromalab of Pleasanton, California, a California Department of Health Services (DHS) certified analytical laboratory for chemical analyses. The samples were analyzed to detect the presence of total petroleum hydrocarbons (TPH) in the gasoline range (TPH-g), the gasoline constituents benzene, toluene, ethylbenzene, and total xylenes (BTEX) compounds, and Methyl t-Butyl Ether (MTBE) by EPA Method 8015m/8020 and halogenated volatile organic compounds (HVOCs) including chlorinated solvents by EPA Method 8010.

E. Quality Assurance/Quality Control Program

Sample Preservation, Storage and Handling

To prevent the loss of constituents of interest, samples were preserved by storing them in an ice chest cooled to 4 °C with crushed ice immediately after collection and during transportation to the laboratory. The groundwater samples were placed in 40 millimeter glass vial preserved with HCL acid to keep the pH below 2. The standard chain-of-custody protocols as presented below were followed through all stages of sample handling.

Field Quality Control Samples

To detect the occurrence of cross-contamination during sampling and to reduce the probability of false-positive results, a trip blank was prepared by the laboratory and taken to

the field and included in each shipment of samples sent to the laboratory for chemical analyses. Also one field duplicate sample from HC-1 was included in this round of groundwater sampling for chemical analysis.

Chain-Of-Custody Program

All samples collected for this project were transported under strict chain-of-custody protocols. The chain-of-custody program allowed for the tracing of possession and handling of individual samples from the time of field collection through laboratory analysis. The document included the signature of the collector, date and time of collection, sample number, number and type of sample containers including preservatives, parameters requested for analysis, signatures of persons and inclusive dates involved in the chain of possession. Upon delivery to the laboratory the document included the name of person receiving the samples, and date and time samples were received. Copies of the chain-of-custody form is included in LABORATORY RESULT Section of this report.

Decontamination Procedures and Waste Disposal

During field sampling all down-hole tools were thoroughly cleaned prior to sampling. All sampling equipment was thoroughly cleaned in an Alconox (or other phosphate-free detergent) solution and rinsed with potable water and then by DI water prior to use. Disposable sampling devices were employed where applicable to reduce the frequency of re-using the same equipment. Rinsate water from decontamination was contained in 55-gallon drums and stored temporarily on-site. Only those drums that meet Department of Transportation (DOT) specifications will be used. Proper disposal methods for these drummed materials will be determined based on analytical findings.

V. FIELD INVESTIGATION FINDINGS

A. Well Head Inspection

The five existing groundwater wells, MW-1, MW-2, MW-3, MW-4 and HC-1 were inspected on November 1, 1999, the day first day of field activities. In general, the bolts on the well vault covers were very tight as the result of the wells not having been opened since 1996. The only exception was well MW-3 which bolts were relatively loose. The well locks were corroded and were replaced by AllWest on December 8, 1999. Two of the well locking caps, wells MW-1 and MW-2, were in poor shape and were also replaced by AllWest.

The integrity of each well casing was assessed by lowing a measuring tape to bottom of the well. All wells appeared to free of blockage. The depth to groundwater and the amount of sediment in the well casing were also measured in all five wells and recorded on the well redevelopment log sheets (Appendix A). In general, all of the wells appeared to be in good working condition, except as noted below, with less than 6 inches of sediment accumulation

in the bottom of the wells prior to well redevelopment. The well construction details for the five wells are presented in Table 1.

Of special note, an oil emulsion type fluid was observed around the casing in the well vault of MW-3. This well is located in a well used parking stall where various customers were observed working on their vehicles. It is plausible that waste oil has leaked from vehicles parked over the well and coupled with the looseness of the well cover resulted in oil to accumulate in the well vault. Based on these observations, AllWest recommended that this well be properly destroyed and replaced outside of, but adjacent to the parking stall. Under permit from the Alameda County Public Works Agency, AllWest supervised Bay Area Exploration, a California licensed C-57 drilling contractor, for the destruction of MW-3 and installation of MW-3A on May 25, 2000 following applicable state and local regulations. A copy of the well log, well installation application and standard well installation procedures are presented in Appendix B.

A second concern noted by AllWest, is that the well vault for MW-4 appeared to be loosely set in the asphalt pavement. AllWest recommended and subsequently replaced this well vault on May 25, 2000 to avoid potential runoff into the well.

B. Groundwater Observations

Well Redevelopment

The five groundwater wells were redeveloped on November 1 and 2, 1999 following procedures presented in Section IV of this report. A minimum of six well volumes (65 to 70 gallons) were purged from each well with submersible pump. In general, groundwater from the initial well volume (10 to 12 gallons) appeared tan and cloudy. However, in each case, the groundwater became clear after two well volumes (20 to 24 gallons) were removed from the well. The field parameters of pH, conductivity and temperature all leveled off by the end of purging.

Well Sampling

The five groundwater wells were sampled on November 4, 1999 following procedures discussed in Section IV of this report. The groundwater was observed during purging and sampling to have a tan color. Field parameters measured were all within normal ranges for shallow groundwater in this portion of Oakland. pH measured in the samples ranged 7 to 8. Conductivity levels were measured between 338 uS to 512 uS. Temperatures were measured between 65.6 to 71.5. °F.

Groundwater Depth and Gradient

The depth to groundwater ranged between 25.24 feet below ground surface (bgs) in HC-1 to 27.40 feet bgs in MW-1. In comparison to mean sea level (MSL), groundwater ranged from

a low of 3.09 feet MSL from wells HC-1 and MW-3 to a high of 3.16 feet MSL from MW-4. As compared to previous groundwater levels, the measurements conducted during this investigation continued to show a gradual increase from the California drought years of the late 1980s and early 1990s. For detailed information of groundwater elevations with time, please see Table 2 and the accompany hydrograph for the five wells.

As noted during previous investigations, the groundwater gradient is very flat. The groundwater flow direction during the investigation was generally to the west at a gradient of 0.002 feet per foot (Figure 3).

C. Analytical Results

The collected groundwater samples were forwarded to Chromalab of Pleasanton, California, a state certified analytical laboratory, for chemical analyses. The samples were analyzed to detect the presence of total petroleum hydrocarbons (TPH) in the gasoline range (TPH-g), the gasoline constituents benzene, toluene, ethylbenzene, and total xylenes (BTEX) compounds, and Methyl t-Butyl Ether (MTBE) by EPA Method 8015m/8020 and halogenated volatile organic compounds (HVOCs) including chlorinated solvents by EPA Method 8010.

Halogenated Volatile Organic Compounds Results (HVOCs)

PCE and its common degradational products, TCE and cis-1,2-DCE, were detected in all five groundwater samples collected during this investigation. Concentrations of PCE ranged from a high of 150 parts per billion (ppb) from MW-3 located towards the center of the property to a low of 7.6 ppb from MW-2 located along the northeast boundary of the property. TCE and cis-1,2-DCE followed similar trends as PCE but at lower concentrations. The maximum concentrations of TCE and cis-1,2-DCE were reported from MW-3 at 24 ppb and 14 ppb, respectively. The lowest concentrations of TCE and cis-1,2 DCE were reported from MW-2 at 14 ppb and 1.9 ppb, respectively.

The only other HVOCs reported from this sampling event above their respective laboratory detection limits included dichlorodifluoromethane (Freon 12) and carbon tetrachloride. Freon 12 was reported in all five groundwater wells ranging from a high of 62 ppb from MW-1 to a low of 14 ppb from MW-3. Carbon tetrachloride was only reported in one groundwater sample. Carbon tetrachloride was reported from MW-2 at 1 ppb. Other HVOCs previously reported, including 1,1,1-TCA, 1,2-DCA, vinyl chloride and chloroform were not reported above their respective laboratory detection limit from this sampling event.

Gasoline (TPH-g), BTEX and MTBE Results

TPH-g was only reported above its laboratory detection limit in one of the five groundwater samples. TPH-g was reported from 61 ppb from MW-3. No BTEX or MTBE were reported above their respective laboratory detection limit in any of the groundwater samples.

Are these dry cleaners drop off only or
do they have "cleaning" machines

Laboratory QA/QC

A review of laboratory internal quality assurance/quality control (QA/QC) report indicates the method blank and sample spike data are within the laboratory recovery limits. The results reported from the field duplicate samples from HC-1 were remarkably similar. No target contaminants were reported above their respective laboratory detection limits in the trip blank. The laboratory QA/QC report indicated that the groundwater samples were analyzed within the acceptable EPA holding time. Based on the laboratory QA/QC report, the analysis data from Chromalab are considered to be of good quality. A copy of the laboratory analytical reports and chain-of-custody records are presented in the LABORATORY RESULTS section of this report. A summary of the analytical results is presented on Table 3.

VI. AGENCY FILE REVIEW

Files were reviewed at the City of Oakland Fire Department (OFD) and at the ACHCS for nearby groundwater contamination sites and for the dry cleaners located southeast of the subject property. The files for groundwater contamination sites were reviewed to assess regional groundwater gradient and flow direction conditions as well as groundwater quality of the area. The files for the existing dry cleaning facility, Family One Hour Cleaners, located at 4330 A, East 14th Street and the former dry cleaners located at 1460 High Street, were reviewed to assess for potential violations or records of spillage of PCE at these facilities.

Currently, ACHCS is transferring files of some of their leaky underground storage tank (LUST) sites in Oakland to the OFD. All closed and new LUST files have been reportedly transferred to OFD with open sites like the subject property still under ACHCS jurisdiction. The logistics of the transfer has resulted in that many of the requested files were not available for review or only contained limited information.

Files were reviewed at the OFD on October 26, 1999 and at ACHCS on November 12, 1999. Files for the following facilities (Figure 5) were requested by AllWest for review:

- Family One Hour Cleaners, 4330 A, East 14th Street
- Former Della's 1 Hour Cleaner, 1460 High Street
- Unocal, 4251 East 14th Street
- Southern Pacific, 1421 High Street
- Continental Volvo, 4030 East 14th Street
- Pressure Cast Products, 4201 14th Street
- U-Haul, 5330 14th Street

Family One Hour Cleaners, 4330 A, East 14th Street

Only limited information was available at the OFD for this dry cleaning facility. ACHCS did not have any files available for this site. Files at the OFD consisted of inspection report and facility questionnaire both dated September 3, 1992. The inspection report did not note any violations. The questionnaire indicated that the dry cleaners has been in operation since 1984 and has a RCRA ID number of CAD0981967417.

Della's 1-Hour Cleaners, 1460 High Street

No files were available for review at either the OFD or at ACHCS for this address. However, Oakland City Directories indicated that the Della's 1-Hour Cleaners operated at this location from 1980 to 1989 and was previously in use by Daisies Cleaners from 1969 through 1973 and by Rogers Cleaners from 1963 through 1969.

Unocal, 4251 East 14th Street

Only limited information was available at the OFD on this LUST site. ACHCS did not have any files available for this site. Files at the OFD were limited and did not contain any groundwater flow direction or quality data information. However, a Phase I ESA completed by AllWest (August 10, 1995) for the subject property indicated that USTs were removed from this Unocal station in the early 1990s and that the groundwater flow direction has fluctuated between the southwest, east-northeast and northeast. TPH-g up to 480 parts per million (ppm) and benzene up to 12 ppb were reported in the groundwater samples collected from the Unocal station.

Southern Pacific, 1421 High Street

Only limited information was available at the OFD for this address. ACHCS did not have any files available for this site. Files at the OFD indicated that the this address was an auto service facility since at least the early 1990s which had a 30 gallon solvent waste tank on the property. Currently the site is occupied by Mission Auto Body and Repair. No information concerning Southern Pacific use of the site or groundwater data was available for review for this address.

Continental Volvo, 4030 East 14th Street

Only limited information was available at the OFD for this LUST site. ACHCS did not have any files available for this site. Files at the OFD indicated that a 500 gallon waste oil tank was located under the sidewalk along the east side of the shop. No information of the status of the UST or groundwater data was available for review for the site.

Pressure Cast Products, 4201 14th Street

Only limited information was available at the OFD for this LUST site. ACHCS did not have any files available for this site. Files at the Oakland Fire Department indicate that a 500 gallon waste oil UST and a 300 gallon "unknown" UST were removed from the site. The site was granted closure on July 16, 1996. No groundwater data was available for review for this facility.

U-Haul, 5330 14th Street

Information for this facility was available at the both the OFD and at ACHCS. Files reviewed indicated that 5 USTs were removed from the site in 1994. Four groundwater wells installed indicated that groundwater first occurs between 18 and 22 feet bgs and flows to the south and southwest at a gradient of 0.001 feet per foot. Samples indicated that groundwater is impacted with gasoline and BTEX compounds. No chlorinated solvents were reported but the SVOC, naphthalene, was reported in the soil at 50,000 ppb and in the groundwater at 17 ppb. The case was recently closed on July 8, 1998.

VII. WELL SURVEY RESULTS

In order to determine if the groundwater in the vicinity of the subject property is being used as drinking water source, AllWest contacted the County of Alameda, Public Works Agency to locate all permitted wells in the area. The search radius was set at an 1/2 mile radius of the subject property (Figure 6). The radius of 1/2 mile was selected since, based on contaminant data distributions and degradational trends, it is highly unlikely that contaminants from the subject site have migrated significantly (more than 1/8 mile) off the subject property. The following seven sites including the subject property contained one or more of the listed 34 wells within the search radius.

- Grand Auto (Subject Property), 4240 East 14th Street, 6 monitoring wells (MW-1 listed twice)
- Unocal, 4251 East 14th Street, 6 monitoring and 3 extraction wells
- Commercial Fueling, 4301 San Leandro Street, 4 monitoring wells and 1 boring
- Clorox, 850 42nd Avenue, 7 monitoring wells
- Chevron, 4265 Foothill Boulevard, 4 monitoring wells and 1 boring
- Integrated Environmental Systems, 499 High Street, 1 destroyed well
- Dunne Quality Paints, 1007 41st Avenue, 1 boring

There majority or 27 of the 34 wells were noted as groundwater monitoring wells. Also noted on the survey were 3 extraction wells associated with the groundwater remediation activities, three soil borings as part of remedial investigation activities and one destroyed well. No groundwater supply wells for industrial, agricultural, municipal or residential uses were identified within 1/2 mile of the subject property.

VIII. UPDATED RISK ASSESSMENT

AllWest reviewed and updated the previously completed ASTM, Tier 1 RBCA assessment prepared by Hart Crowser (September 27, 1996) for the subject property. For a summary of this risk assessment, please see Section II of this report.

The focus of the update was two-fold. Firstly, the update was performed to document that the groundwater ingestion pathway is incomplete by conducting a well survey of the area. Secondly, the existing site data was compared to published risk based action levels to document that the residual site contaminants are not an unacceptable risk to human health or the environment. The maximum site groundwater concentrations were compared to recently compiled, City of Oakland specific, Tier 1 RBSLs.

Lack of Drinking Water Pathway

As presented in the previous section, there are no drinking water wells within 1/2 mile of the subject property, thus groundwater ingestion pathway appears to be incomplete.

Comparison to Oaklands Specific RBSLs

In order to apply Oakland RBCA levels to the subject property, the following fundamental concerns were initially addressed.

Oakland RBCA Eligibility Checklist

CRITERIA	YES	NO
• Is there any continuing, *primary* source of a chemical of concern, such as a leaking container, tank or pipe? (This does *not* include residual sources.)	☐	☒
• Is there any mobile or potentially-mobile free product?	☐	☒
• Are there more than five chemicals of concern at the site at a concentration greater than the lowest applicable Oakland RBCA level?	☐	☒
• Is there a preferential vapor migration pathway-such as a gravel channel or a utility corridor-that is less than 1 meter from *both* of the following? 1) A source area containing a volatile chemical of concern 2) A structure where inhalation of indoor air vapors is of concern	☐	☒
• Do *both* of the following conditions exist? 1) groundwater is at depths less than 300 cm (10 feet) 2) Inhalation of volatilized chemicals of concern from groundwater in indoor or outdoor air is a pathway of concern but groundwater ingestion is not	☐	☒
• Are there any existing on-site or off-site structures intended for future use where inhalation of indoor air vapors from either soil or groundwater is of concern *and* one or more of the following four conditions is present? 1) Chemicals of concern located less than one meter below the structure		

2) A slab-on-grade foundation less than 15 cm (6 inches) thick
3) An enclosed, below-grade space (e.g., a basement) that has floors or walls less than 15 cm (6 inches) thick
4) A crawl space that is not ventilated ☐ ☒

- Are there any immediate, acute health risks to humans associated with contamination at the site, including explosive levels of a chemical? ☐ ☒
- Are there any existing or potential exposure pathways to nearby ecological receptors, such as endangered species, wildlife refuge areas, wetlands, surface water bodies or other protected areas? ☐ ☒

Since based on available data, all of the answers were found "no" for the subject property, the site is eligible to use Oakland Tier 1, RBSLs.

Site Soils

As per the previous completed risk assessment by Hart Crowser (September 26, 1996) and ACEHS concurrence letter (December 30, 1996), the site soils were found not to pose as an unacceptable risk to human health or the environment. Since these have deemed acceptable, no further discussion of the site soils are presented in this report. For a summary of the risk assessment, please see Section II of this report.

Site Groundwater

The maximum concentrations of chlorinated solvents in the site's groundwater reported historically from the 15 sampling events from September 1992 through November 1999 in the sites groundwater for PCE, TCE, cis-1,2-DCE and vinyl chloride were 340 ppb, 130 ppb, 36 ppb, 0.9 ppb, respectively. The maximum values of other contaminants reported in the site groundwater include dichlorodifluoromethane (Freon 12) at 110 ppb, chloroform 2.6 ppb, 1,1,1-TCA at 0.9 ppb, 1,2-DCA at 1.9 ppb and carbon tetrachloride at 1 ppb. However, the following contaminants, 1,1,1-TCA, 1,2-DCA, vinyl chloride and chloroform were not reported above their respective laboratory detection limit from latest sampling event conducted in November, 1999. Likewise no BTEX or MTBE were reported above their respective laboratory detection limit in any of the groundwater samples collected from this November 1999 sampling event as well any of the sampling events conducted since 1994. Since BTEX compounds and MTBE have not been detected in the groundwater for over 5 years, they have been excluded from the Tier I RBSLs screening.

The Tier 1 carcinogenic RBSL recently developed for the City of Oakland with regards to the inhalation of PCE vapors being emitted from the groundwater into indoor commercial structures was recently set at 3,300 ppb (Oakland Urban Land Development Program: Guidance Document, City of Oakland Public Works Department, January 1, 2000). This value is well above the maximum on-site concentration of 340 ppb reported in June 1994

and the most recent concentration reported of 120 ppb in November 1999. Similarly, the maximum concentrations of the other contaminants TCE, cis-1,2-DCE, 1,1,1-TCA, 1,2-DCA, chloroform, carbon tetrachloride and vinyl chloride reported from the site groundwater were at least one order of magnitude lower than their respective Oakland Tier 1 RBSLs.

Based on site specific results and current health risk based action levels, it is unlikely that the residual contamination in the site groundwater poses as an unacceptable risk to human health or the environment.

IX. DISCUSSION OF FINDINGS

Spatial Distribution of Contaminants

The spatial distribution of the chlorinated solvents observed during this and previous groundwater sampling events do not indicate a clear trend due to similar concentrations and the flat hydraulic gradient. However, based on sampling results, it appears that the chlorinated solvents contamination is found up and down gradient of the subject property and may be a regional occurrence. Furthermore, the coarse grained sands and gravels noted in the boring logs of the monitoring wells would generally promote the spread of the contaminants. Conversely, the flat hydraulic gradient would generally impede the migration of contaminants.

Contaminant Trend Analyses

The chlorinated solvent concentrations have generally decreased since the last sampling period. The maximum concentration of PCE from this sampling round is 150 ppb which is well below the historic maximum concentration of 340 ppb reported from a 1994 sampling event. Similar decreasing trends were noted for TCE and cis-1,2 DCE. For further details on the contaminant concentrations over time, please see the attached charts to Table 3.

Ratios of the chlorinated solvents are commonly used to assess the likely source and age of contaminant releases. This is based on the assumption that most PCE plumes originate as a pure product of PCE as the result from leakage or spillage from dry cleaning facilities, and through time, the PCE will naturally biodegrade to TCE and cis-1,2-DCE and ultimately vinyl chloride as the plume disperses in the down gradient flow direction.

The ratios of PCE to TCE and cis-1,2-DCE from this investigation coupled with the flat groundwater gradient indicate that this plume likely originated from a dry cleaners located southeast of the subject property since the bulk of the chlorinated solvents are PCE (about 80 percent) with lesser amounts of TCE and cis-1,2-DCE (about 20 percent).

That is, by the time the PCE from the dry cleaners has migrated on to the subject property, approximately 20 percent of the PCE has degraded to TCE or cis-1,2-DCE.

This PCE to TCE and cis-1,2-DCE ratio was observed in all of the wells sampled except for MW-2 which currently has about equal amounts of PCE to TCE. Historically, TCE has been reported to be more than 7 times higher than PCE indicating that the TCE from this location is not solely a degradational product of PCE. However, as previously noted, the levels of TCE in this well have significantly decreased from a high of 130 ppb in September 1994 to 8.1 ppb in November 1999 which is only slightly above the drinking water standard (MCL) of 5 ppb.

Comparison to Drinking Water Standards

The chlorinated solvents concentrations for PCE, TCE and cis-1,2-DCE from this sampling event were all above their respective drinking water standards, the maximum concentration levels (MCLs). The maximum concentration of PCE of 150 ppb is approximately 30 times the MCL of 5 ppb. The maximum concentration of TCE of 24 ppb is approximately 5 times the MCL of 5 ppb. The maximum concentration of cis-1,2-DCE of 14 ppb is approximately 2.5 times the MCL of 6 ppb. The maximum concentration of Freon 12 from this investigation is 62 ppb. Currently there are no MCLs for Freon 12 but the California Department of Health Services has set a state action level of 1,000 ppb which is similar to various USEPA action levels. The maximum concentration of carbon tetrachloride of 1 ppb is twice the California MCL of 0.5 ppb but five times less than the USEPA MCL of 5 ppb.

TPH-g was reported in one sample at 61 ppb. Although there is no MCL for TPH-g, the lack of BTEX compounds reported in the groundwater indicated that these lighter end hydrocarbons are below regulatory action levels.

Comparison to Oakland RBSLs

The Tier 1 carcinogenic RBSL recently developed for the City of Oakland with regards to the inhalation of PCE vapors being emitted from the groundwater into indoor commercial structures was recently set at 3,300 ppb. This value is well above the maximum on-site concentration of 340 ppb reported in June 1994 and the most recent concentration reported of 120 ppb in November 1999. Similarly, the maximum concentrations of the other contaminants TCE, cis-1,2-DCE, 1,1,1-TCA, 1,2-DCA, chloroform, carbon tetrachloride and vinyl chloride reported from the site groundwater were at least one order of magnitude lower than their respective Oakland Tier 1 RBSLs.

X. CONCLUSIONS AND RECOMMENDATIONS

The results of this groundwater sampling event indicate that the shallow groundwater of the subject property is impacted with chlorinated solvents. The spatial distribution of the chlorinated solvents do not indicate a clear source area due to similar contaminant concentrations and the flat hydraulic gradient of the area. However, based on the ratio of PCE to TCE and cis-1,2-DCE, the likely source of the bulk of the chlorinated solvents is the former or existing dry cleaners located southeast of the subject property.

Based on site specific results and current health risk based action levels, it is unlikely that the residual contamination in the site groundwater poses as an unacceptable risk to human health or the environment. AllWest recommends that ACHCS grant no further action status for the residual chlorinated solvents in the groundwater of the subject property and request approval to abandon the existing five on-site groundwater wells.

XI. REPORT LIMITATIONS

The work described in this report is performed in accordance with the Environmental Consulting Agreement between PACCAR and AllWest Environmental, dated September 20, 1999. AllWest has prepared this report for the exclusive use of PACCAR for this particular project and in accordance with generally accepted practices at the time of the work. No other warranties, certifications or representation, either expressed or implied are made as to the professional advice offered. The services provided for PACCAR were limited to their specific requirements; the limited scope allows for AllWest to form no more than an opinion of the actual site conditions.

The conclusions and recommendations contained in this report are made based on observed conditions existing at the site, laboratory test results of the submitted samples, and interpretation of a limited data set. It must be recognized that changes can occur in subsurface conditions due to site use or other reasons. Furthermore, the distribution of chemical concentrations in the subsurface can vary spatially and over time. The results of chemical analysis are valid as of the date and at the sampling location only. AllWest cannot be held accountable for the accuracy of the test data from an independent laboratories nor for any analyte quantities falling below the recognized standard detection limits for the method utilized by the independent laboratories.

XII. REFERENCES

- AllWest Environmental, Phase I Environmental Site Assessment, Grand Auto Store No. 43, Oakland, California, 1995.
- ASTM E 1739, Standard Guide for Risk-Based Corrective Action Applied at Petroleum Released Sites, 1995.
- Hart Crowser, Sampling and Analysis Plan, Grand Auto/Super Tire Facilities, 1992a.
- Hart Crowser, Preliminary Site Investigation Report, Grand Auto/Super Tire Facilities, 1992b.
- Hart Crowser, Supplemental Site Investigation Report, Grand Auto/Super Tire Facilities, 1993.
- Hart Crowser, Facility Closure Report, Grand Auto Supply, 1996a.
- Hart Crowser, Risk Assessment, Grand Auto Supply, 1996b.
- Environmental Protection Agency, Region 9, Preliminary Remedial Goals, 1999
- Oakland Urban Land Development Program: Guidance Document, City of Oakland Public Works Department, January 1, 2000

Table 1 - Well Construction Details and Field Parameters

Grand Auto #43
4240 East 14th Street Oakland, California
Oakland, California

AllWest Project Number 99287.25A

Well Number	Surface Elevation (ft MSL)	Top of Casing (ft MSL)	Total Depth (ft bgs)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Well Diameter (inches)
MW-1	30.8	30.53	43	33	43	4
MW-2	30.7	30.41	45	31	45	4
MW-3	30.7	30.31	45	30	45	4
MW-3A	NA	NA	41	20	41	4
MW-4	29.5	29.08	45	30	45	4
HC-1	28.7	28.33	42	30	42	4

Well Number	pH	Conduc. (uS)	Temp. (°F)
MW-1	7.40	470	71.5
MW-2	7.03	419	71.5
MW-3	7.01	338	71.3
MW-4	7.82	472	67.8
HC-1	7.50	512	65.6

Notes: MW-3 was replaced by MW-3A on May 25, 2000
bgs = below ground surface
MSL = mean sea level
Elevations relative to City of Oakland datum
Field parameters measured prior to sampling on November 4, 1999

TABLE 2 - Groundwater Elevations

Grand Auto #43
4240 East 14th Street
Oakland, California

Project Number 99287.25A

Well Number	Top of Well Casing Feet Above MSL	Depth to Groundwater Feet bgs	Groundwater Elevation Feet Above MSL	Date Collected
MW-1	30.53	27.40	3.13	4-Nov-99
MW-1	30.53	28.18	2.35	10-May-96
MW-1	30.53	29.34	1.19	15-Sep-95
MW-1	30.53	30.83	-0.30	31-Jan-95
MW-1	30.53	32.44	-1.91	20-Sep-94
MW-1	30.53	33.04	-2.51	7-Jun-94
MW-1	30.53	34.60	-4.07	18-Feb-94
MW-1	30.53	35.30	-4.77	17-Nov-93
MW-1	30.53	34.93	-4.40	4-Aug-93
MW-1	30.53	35.45	-4.92	5-May-93
MW-2	30.41	27.28	3.13	4-Nov-99
MW-2	30.41	28.06	2.35	10-May-96
MW-2	30.41	29.19	1.22	15-Sep-95
MW-2	30.41	30.71	-0.30	31-Jan-95
MW-2	30.41	32.40	-1.99	20-Sep-94
MW-2	30.41	32.92	-2.51	7-Jun-94
MW-2	30.41	34.46	-4.05	18-Feb-94
MW-2	30.41	35.18	-4.77	17-Nov-93
MW-2	30.41	34.79	-4.38	4-Aug-93
MW-2	30.41	35.32	-4.91	5-May-93
MW-3	30.31	27.22	3.09	4-Nov-99
MW-3	30.31	27.96	2.35	10-May-96
MW-3	30.31	29.11	1.20	15-Sep-95
MW-3	30.31	30.62	-0.31	31-Jan-95
MW-3	30.31	32.30	-1.99	20-Sep-94
MW-3	30.31	32.83	-2.52	7-Jun-94
MW-3	30.31	34.38	-4.07	18-Feb-94
MW-3	30.31	35.13	-4.82	17-Nov-93
MW-3	30.31	34.70	-4.39	4-Aug-93
MW-3	30.31	35.22	-4.91	5-May-93
MW-4	29.08	25.92	3.16	4-Nov-99
MW-4	29.08	26.70	2.38	10-May-96
MW-4	29.08	27.86	1.22	15-Sep-95
MW-4	29.08	29.38	-0.30	31-Jan-95
MW-4	29.08	31.07	-1.99	20-Sep-94
MW-4	29.08	31.60	-2.52	7-Jun-94
MW-4	29.08	33.14	-4.06	18-Feb-94
MW-4	29.08	33.90	-4.82	17-Nov-93
MW-4	29.08	33.47	-4.39	4-Aug-93
MW-4	29.08	33.98	-4.90	5-May-93
HC-1	28.33	25.24	3.09	4-Nov-99
HC-1	28.33	26.02	2.31	10-May-96
HC-1	28.33	27.16	1.17	15-Sep-95
HC-1	28.33	28.65	-0.32	31-Jan-95
HC-1	28.33	30.30	-1.97	20-Sep-94
HC-1	28.33	30.84	-2.51	7-Jun-94
HC-1	28.33	32.41	-4.08	18-Feb-94
HC-1	28.33	33.16	-4.83	17-Nov-93
HC-1	28.33	32.75	-4.42	4-Aug-93
HC-1	28.33	33.26	-4.93	5-May-93

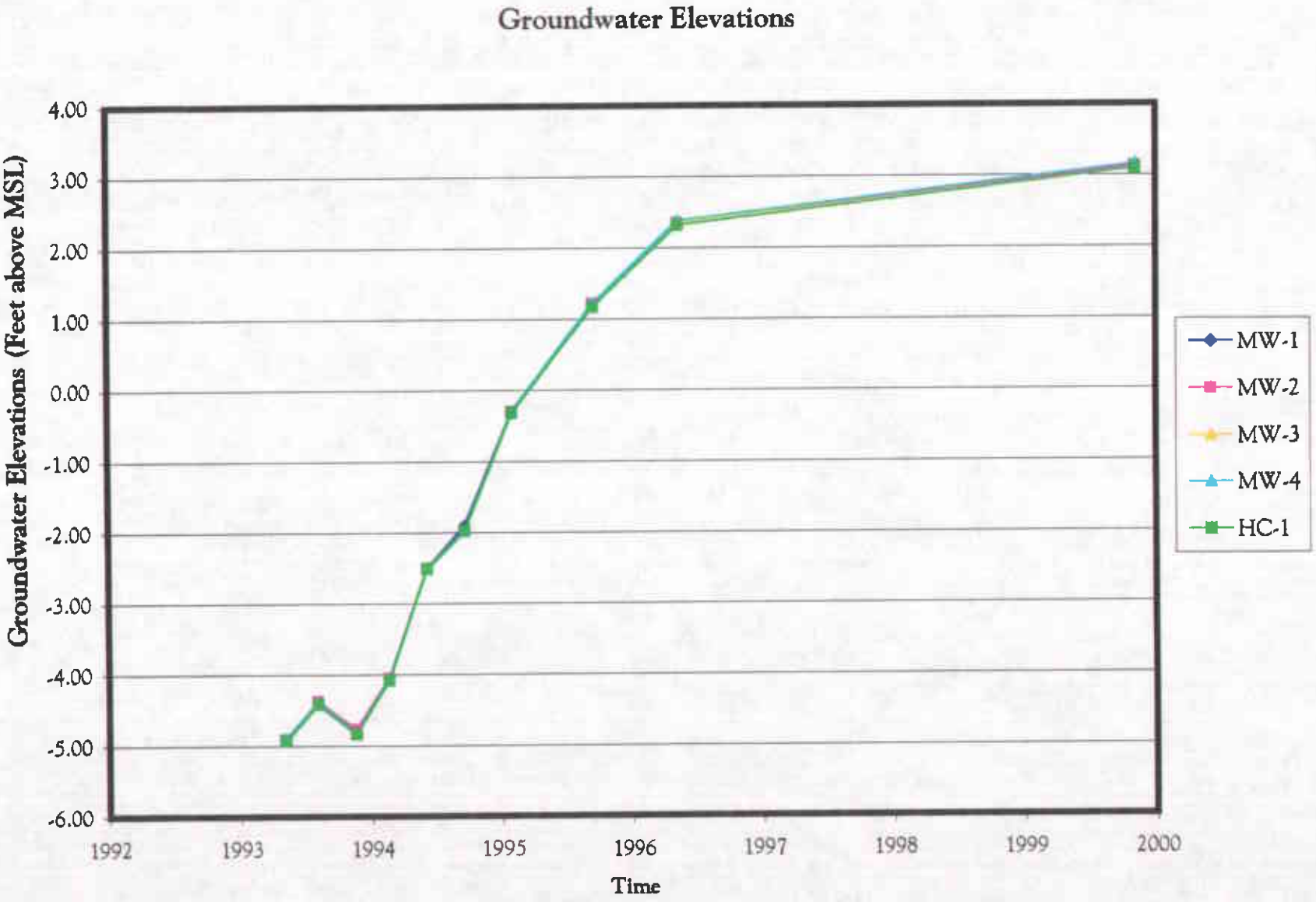

Groundwater Elevations
Groundwater Elevations (Feet above MSL)
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
1992
1993
1994
1995
1996
1997
1998
1999
2000
Time
MW-1
MW-2
MW-3
MW-4
HC-1

TABLE 3 - Groundwater Analytical Results
4240 East 14th Street
Oakland, California

Project Number 99287.25A
All results in parts per billion (ppb)

Location	PCE	TCE	cis-1,2 DCE	FREON 12	Chloro-form	1,1,1-TCA	1,2-DCA	Vinyl Chloride	Carbon Tetrachloride	TPH-g	All others	Date Collected
MW-1	120	17	6.6	62	ND	ND	ND	ND	ND	ND	ND	4-Nov-99
MW-1	270	24	4.3	NR	2.6	ND 1.3	ND 1.3	ND 1.3	ND	NR	ND	10-May-96
MW-1	200	25	6.8	NR	1.4	ND 0.5	ND 0.5	ND 0.5	ND	ND	ND	15-Sep-95
MW-1	54	13	9.7	NR	ND 1	ND 1	ND 1	ND 2	ND	ND	ND	31-Jan-95
MW-1	54	13	9.3	NR	ND 1	ND 1	ND 1	ND 2	ND	ND	ND	31-Jan-95
MW-1	270	37	19	NR	ND 5	ND 5	ND 5	ND 5	ND	ND	ND	20-Sep-94
MW-1	270	36	18	NR	ND 5	ND 5	ND 5	ND 5	ND	ND	ND	20-Sep-94
MW-1	200	28	25	NR	1.6	ND 0.5	ND 0.5	ND 0.5	ND	ND	ND	7-Jun-94
MW-1	340	35	22	NR	1.5	ND 0.5	ND 0.5	ND 0.5	ND	ND	ND	7-Jun-94
MW-1	200	25	12	NR	1	ND 0.5	ND 0.5	ND 0.5	ND	ND	ND	18-Feb-94
MW-1	230	28	15	NR	1.8	ND 0.5	ND 0.5	ND 1	ND	ND	ND	17-Nov-93
MW-1	290	23	10	NR	ND 5	ND 5	ND 5	ND 10	ND	ND	ND	4-Aug-93
MW-1	300	22	8.7	37	1	ND 0.5	ND 0.5	ND 1	ND	ND	ND	26-Apr-93
MW-1	300	22	8.7	110	1.1	0.6	ND 0.5	ND 1	ND	ND	ND	26-Apr-93
MW-1	220	28	14	NR	ND 3	ND 3	ND 1	--	ND	ND	ND	19-Jan-93
MW-1	310	26	11	NR	1.1	ND 0.5	ND 0.6	--	ND	ND	ND	10-Sep-92

Notes:
ND = not detected above laboratory method reporting limit (MRL)
NR = not reported
DUP-1 is from HC-1
The number behind ND is the detection limit

TABLE 3 - Groundwater Analytical Results
4240 East 14th Street
Oakland, California

Project Number 99287.25A
All results in parts per billion (ppb)

Location	PCE	TCE	cis-1,2 DCE	FREON 12	Chloro-form	1,1,1-TCA	1,2-DCA	Vinyl Chloride	Carbon Tetrachloride	TPH-g	All others	Date Collected
MW-2	7.6	8.1	1.9	55	ND	ND	ND	ND	1	ND	ND	4-Nov-99
MW-2	7.2	51	13	NR	ND 1	ND 1	ND 1	ND 1	ND	NR	ND	10-May-96
MW-2	6.3	52	17	NR	ND 0.5	ND 0.5	ND 0.5	0.8	ND	ND	ND	15-Sep-95
MW-2	6.5	69	17	NR	ND 0.5	ND 0.5	0.9	0.9	ND	ND	ND	15-Sep-95
MW-2	3	60	17	NR	ND1	ND 1	ND 1	ND2	ND	ND	ND	31-Jan-95
MW-2	6	130	36	NR	ND 5	ND 5	ND 5	ND 5	ND	ND	ND	20-Sep-94
MW-2	6.9	120	31	NR	ND 0.5	ND 0.5	1.8	ND 0.5	ND	ND	ND	7-Jun-94
MW-2	4.8	75	25	NR	ND 0.5	ND 0.5	1.5	ND 0.5	ND	ND	ND	18-Feb-94
MW-2	6.1	32	8.7	NR	ND 0.5	ND 0.5	ND 0.5	ND 1	ND	ND	ND	17-Nov-93
MW-2	7.2	110	22	NR	ND 1.2	ND 1.2	ND 1.2	ND 2.4	ND	ND	ND	4-Aug-93
MW-2	7.5	32	8.5	31	0.9	0.6	0.6	ND 1	ND	ND	ND	26-Apr-93

Notes:
ND = not detected above laboratory method reporting limit (MRL)
NR = not reported
DUP-1 is from HC-1
The number behind ND is the detection limit

TABLE 3 - Groundwater Analytical Results
4240 East 14th Street
Oakland, California

Project Number 99287.25A
All results in parts per billion (ppb)

Location	PCE	TCE	cis-1,2 DCE	FREON 12	Chloro-form	1,1,1-TCA	1,2-DCA	Vinyl Chloride	Carbon Tetrachloride	TPH-g	All others	Date Collected
MW-3	150	24	14	14	ND	ND	ND	ND	ND	61	ND	4-Nov-99
MW-3	160	25	7.2	NR	ND 1	ND 1	ND 1	ND 1	ND	NR	ND	10-May-96
MW-3	170	25	6.2	NR	ND 0.5	ND 0.5	ND 0.5	ND 0.5	ND	ND	ND	15-Sep-95
MW-3	160	34	6.2	NR	ND 1	ND 1	ND 1	ND 5	ND	ND	ND	31-Jan-95
MW-3	240	37	11	NR	ND 5	ND 5	ND 5	ND 5	ND	ND	ND	20-Sep-94
MW-3	160	34	8.3	NR	0.6	0.6	ND 0.5	ND 0.5	ND	ND	ND	7-Jun-94
MW-3	85	19	5	NR	0.7	ND 0.5	ND 0.5	ND 0.5	ND	ND	ND	18-Feb-94
MW-3	170	29	12	NR	1.3	0.8	ND 0.5	ND 1	ND	ND	ND	17-Nov-93
MW-3	170	28	ND 5	NR	ND 5	ND 5	ND 5	ND 10	ND	ND	ND	4-Aug-93
MW-3	79	21	9.7	35	ND 0.5	0.8	ND 0.5	ND 1	ND	ND	ND	26-Apr-93

Notes:
ND = not detected above laboratory method reporting limit (MRL)
NR = not reported
DUP-1 is from HC-1
The number behind ND is the detection limit

TABLE 3 - Groundwater Analytical Results
4240 East 14th Street
Oakland, California

Project Number 99287.25A
All results in parts per billion (ppb)

Location	PCE	TCE	cis-1,2 DCE	FREON 12	Chloro-form	1,1,1-TCA	1,2-DCA	Vinyl Chloride	Carbon Tetrachloride	TPH-g	All others	Date Collected
MW-4	61	10	2.2	41	ND	ND	ND	ND	ND	ND	ND	4-Nov-99
MW-4	190	22	2.5	NR	ND 1.3	ND 1.3	ND 1.3	ND 1.3	ND	NR	ND	10-May-96
MW-4	160	24	4.4	NR	ND 0.5	ND 0.5	ND 0.5	ND 0.5	ND	ND	ND	15-Sep-95
MW-4	140	20	4.7	NR	ND 1	ND 1	ND 1	ND 5	ND	ND	ND	31-Jan-95
MW-4	220	32	5	NR	ND 5	ND 5	ND 5	ND 5	ND	ND	ND	20-Sep-94
MW-4	140	28	7.1	NR	0.9	0.9	ND 0.5	ND 0.5	ND	ND	ND	7-Jun-94
MW-4	120	31	6	NR	1.9	0.7	ND 0.5	ND 0.5	ND	ND	ND	18-Feb-94
MW-4	87	20	6.6	NR	1	ND 0.5	ND 0.5	ND 1	ND	ND	ND	17-Nov-93
MW-4	110	16	ND 5	NR	ND 5	ND 5	ND 5	ND 10	ND	ND	ND	4-Aug-93
MW-4	78	17	3.9	28	0.6	ND 0.5	ND 0.5	ND 1	ND	ND	ND	26-Apr-93

Notes:
ND = not detected above laboratory method reporting limit (MRL)
NR = not reported
DUP-1 is from HC-1
The number behind ND is the detection limit

TABLE 3 - Groundwater Analytical Results
4240 East 14th Street
Oakland, California

Project Number 99287.25A
All results in parts per billion (ppb)

Location	PCE	TCE	cis-1,2 DCE	FREON 12	Chloro-form	1,1,1-TCA	1,2-DCA	Vinyl Chloride	Carbon Tetrachloride	TPH-g	All others	Date Collected
HC-1	100	17	8.7	43	ND	ND	ND	ND	ND	ND	ND	4-Nov-99
HC-1	200	27	13	NR	ND 5	ND 5	ND 5	ND 5	ND	NR	ND	10-May-96
HC-1	170	27	14	NR	ND 0.5	ND 0.5	ND 0.5	ND 0.5	ND	ND	ND	15-Sep-95
HC-1	120	27	11	NR	ND 1	ND 1	ND 1	ND 5	ND	ND	ND	31-Jan-95
HC-1	190	37	15	NR	ND 5	ND 5	ND 5	ND 5	ND	ND	ND	20-Sep-94
HC-1	180	42	22	NR	1	ND 0.5	ND 0.5	ND 0.5	ND	ND	ND	7-Jun-94
HC-1	140	30	13	NR	0.7	ND 0.5	ND 0.5	ND 0.5	ND	ND	ND	18-Feb-94
HC-1	150	22	11	NR	0.6	ND 0.5	ND 0.5	ND 0.5	ND	ND	ND	18-Feb-94
HC-1	130	27	16	NR	1.1	0.7	ND 0.6	ND 2	ND	ND	ND	17-Nov-93
HC-1	83	27	15	NR	ND 0.5	ND 0.5	ND 0.5	ND 1	ND	ND	ND	4-Aug-93
HC-1	46	22	13	47	ND 0.5	ND 0.5	ND 0.5	ND 1	ND	ND	ND	26-Apr-93

Notes:
ND = not detected above laboratory method reporting limit (MRL)
NR = not reported
DUP-1 is from HC-1
The number behind ND is the detection limit

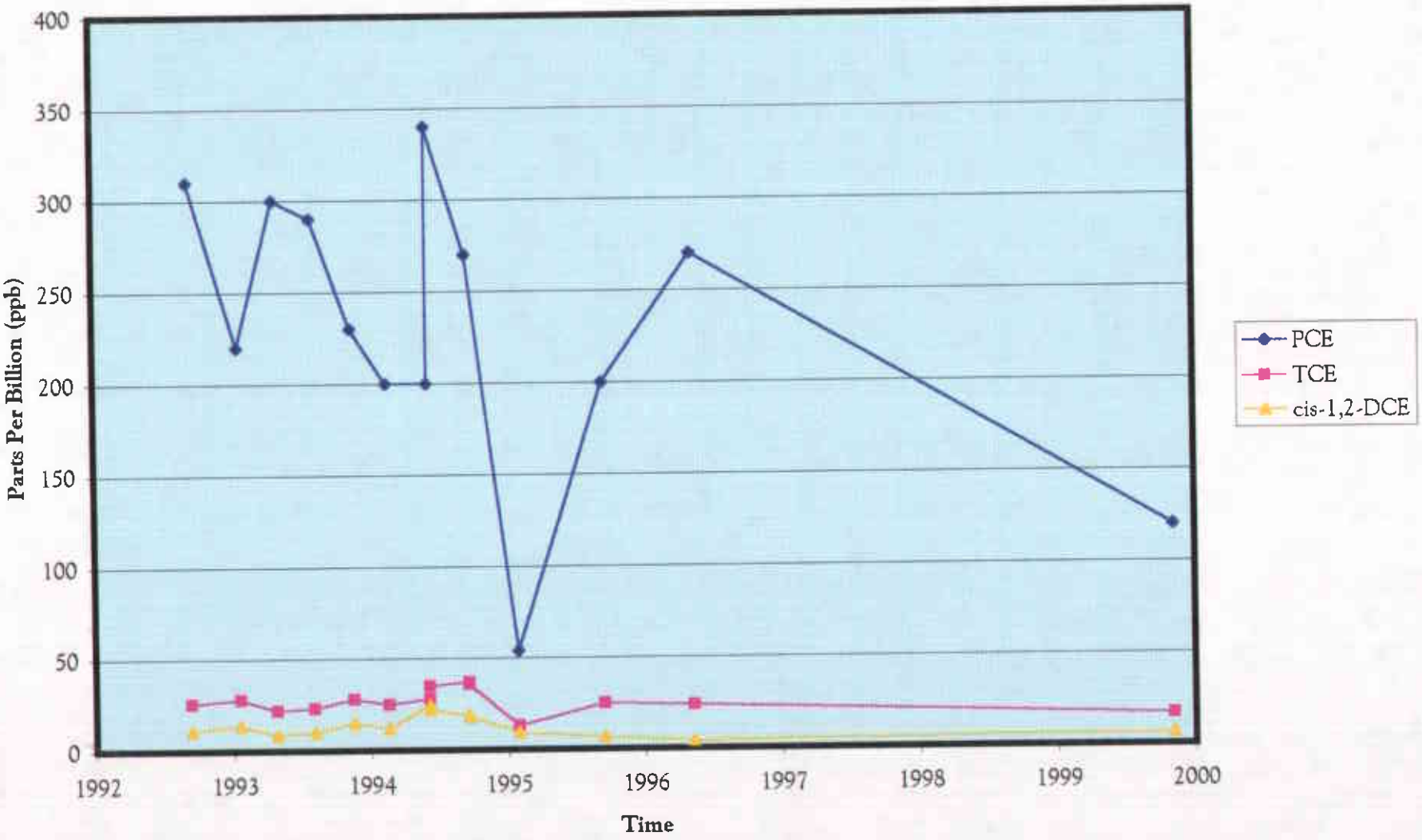
TABLE 3 - Groundwater Analytical Results
4240 East 14th Street
Oakland, California

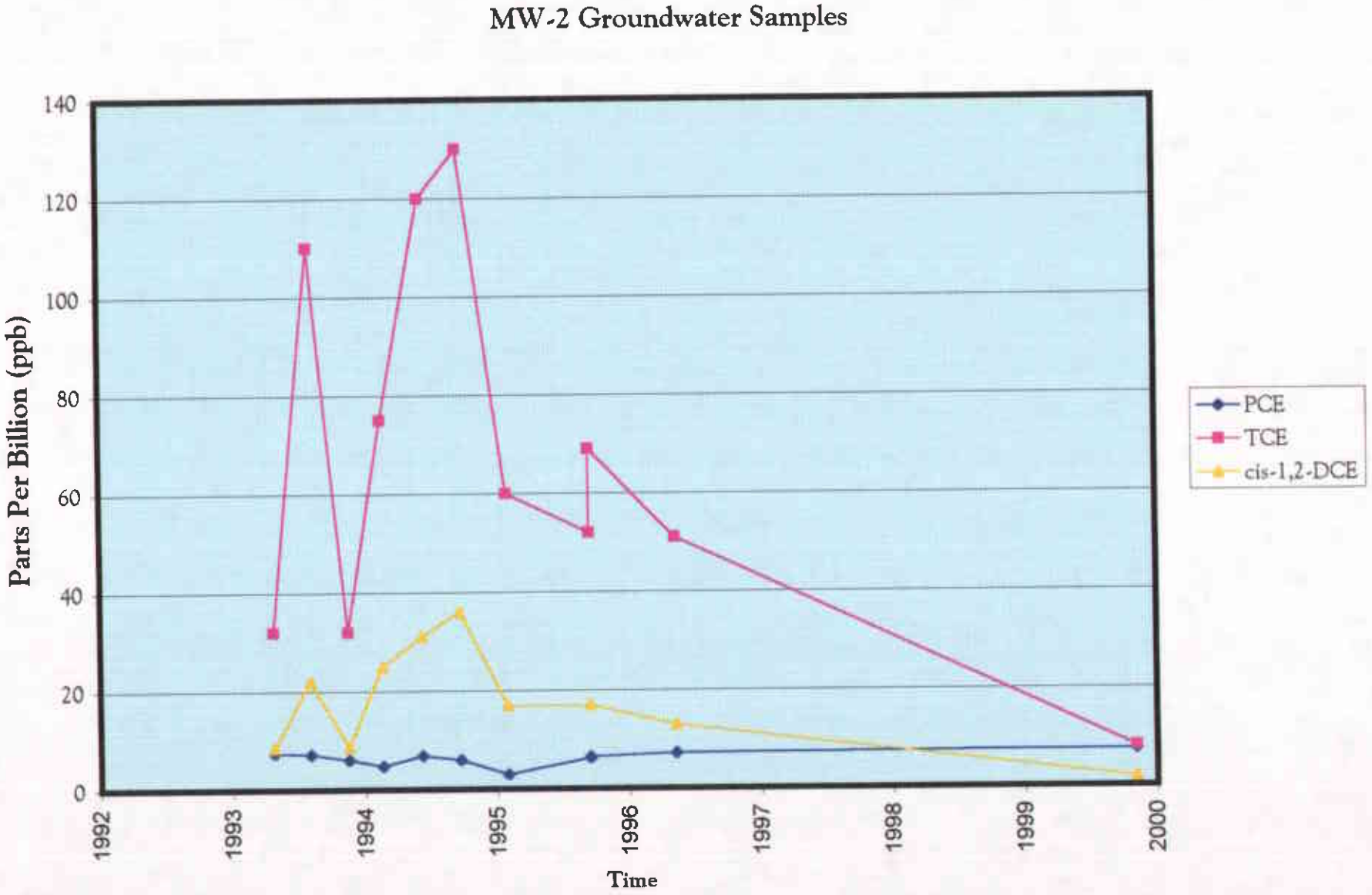
Project Number 99287.25A
All results in parts per billion (ppb)

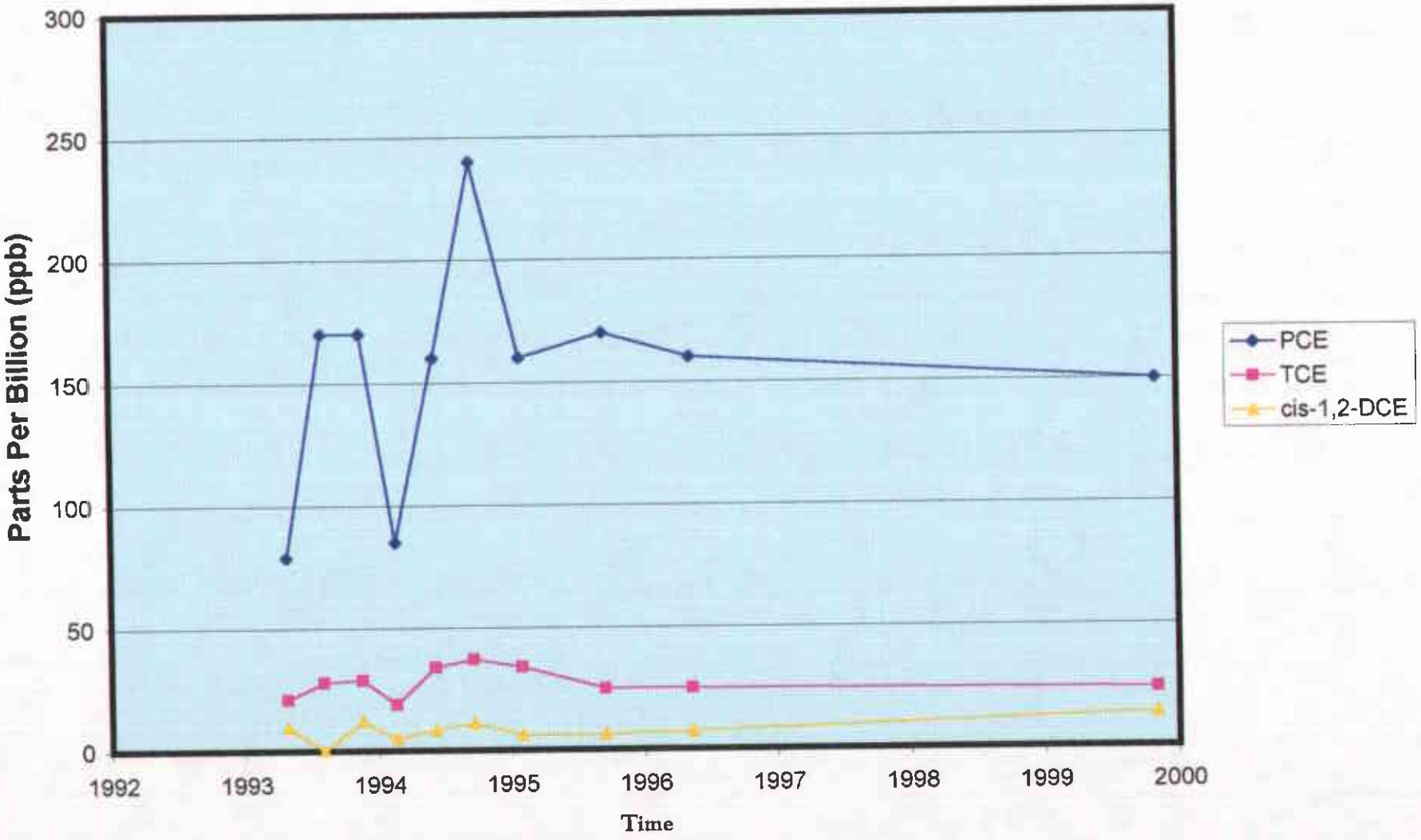
Location	PCE	TCE	cis-1,2 DCE	FREON 12	Chloro-form	1,1,1-TCA	1,2-DCA	Vinyl Chloride	Carbon Tetrachloride	TPH-g	All others	Date Collected
TRIP BLANK	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4-Nov-99
DUP-1	100	17	8.1	41	ND	ND	ND	ND	ND	ND	ND	4-Nov-99
Maximum	340	130	36	110	2.6	0.9	1.8	0.9	1	ND	ND	4-Nov-99
Minimum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4-Nov-99
Oakland Tier 1												
GW Indoor (C)	3,300	11,000	NA	NA	12,000	NA	11,000	59	260	NA	NA	
GW Indoor (H)	>sol	230,000	1,000,000	NA	800,000	> sol	830,000	NA	7,800	NA	NA	
GW Outdoor (C)	51,000	150,000	NA	NA	130,000	NA	69,000	960	4200	NA	NA	
GW Outdoor (H)	>sol	>sol	>sol	NA	>sol	> sol	5,000,000	NA	130,000	NA	NA	

Notes:
ND = not detected above laboratory method reporting limit (MRL)
NR = not reported
DUP-1 is from HC-1
The number behind ND is the detection limit

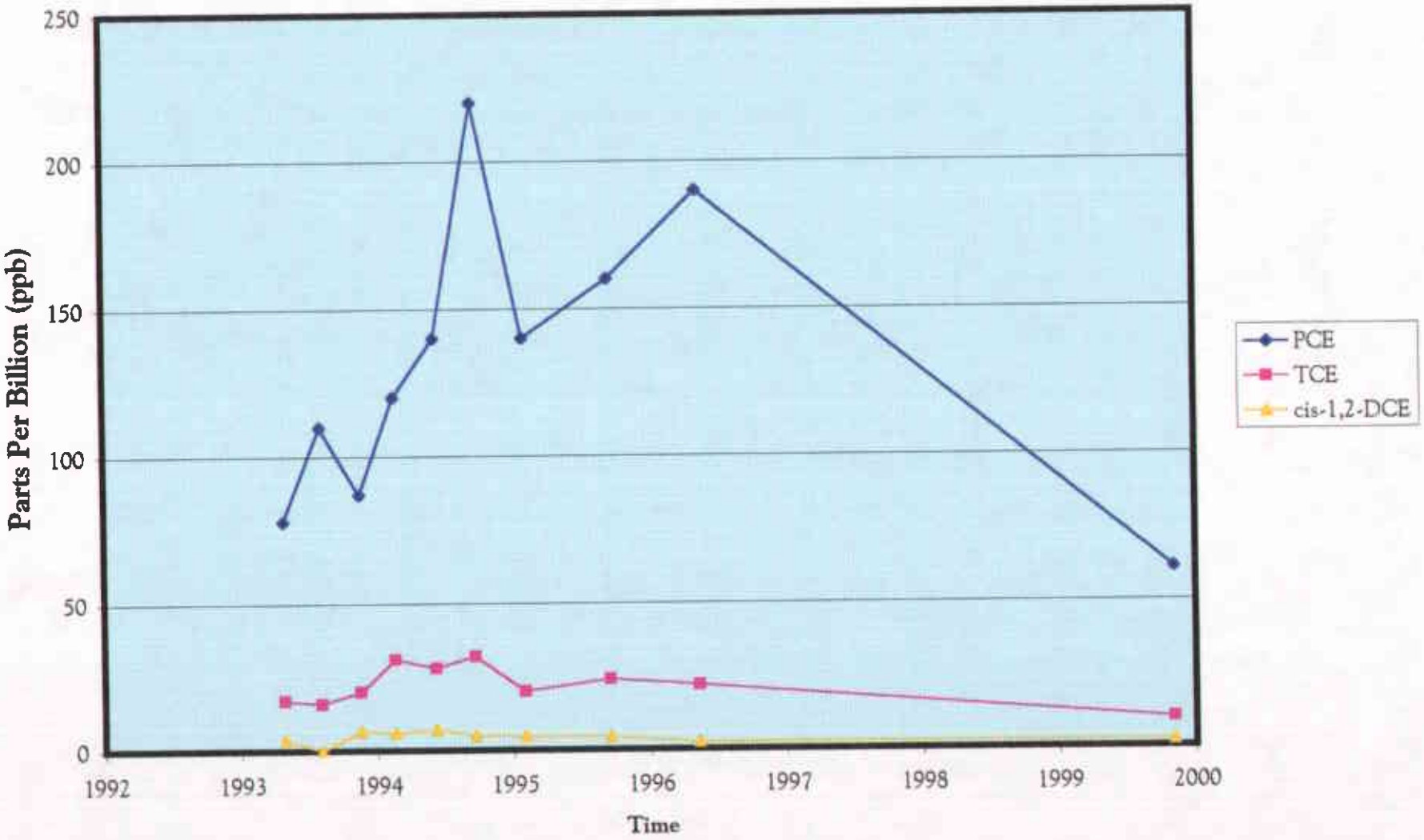
MW-1 Groundwater Samples



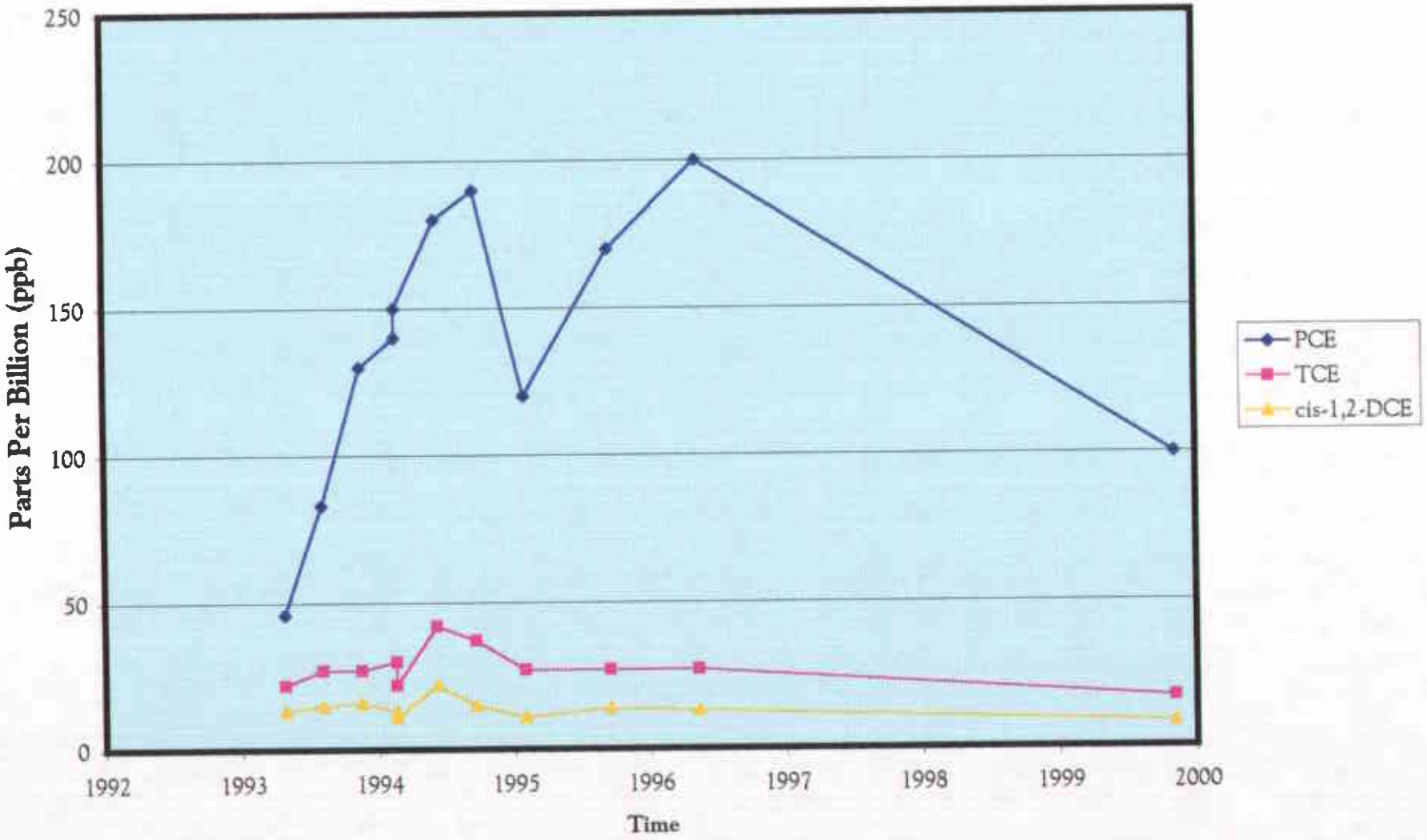

MW-2 Groundwater Samples
Parts Per Billion (ppb)
140
120
100
80
60
40
20
0
1992
1993
1994
1995
1996
1997
1998
1999
2000
Time
PCE
TCE
cis-1,2-DCE


MW-3 Groundwater Samples
300
250
200
150
100
50
0
Parts Per Billion (ppb)
1992
1993
1994
1995
1996
1997
1998
1999
2000
Time
PCE
TCE
cis-1,2-DCE

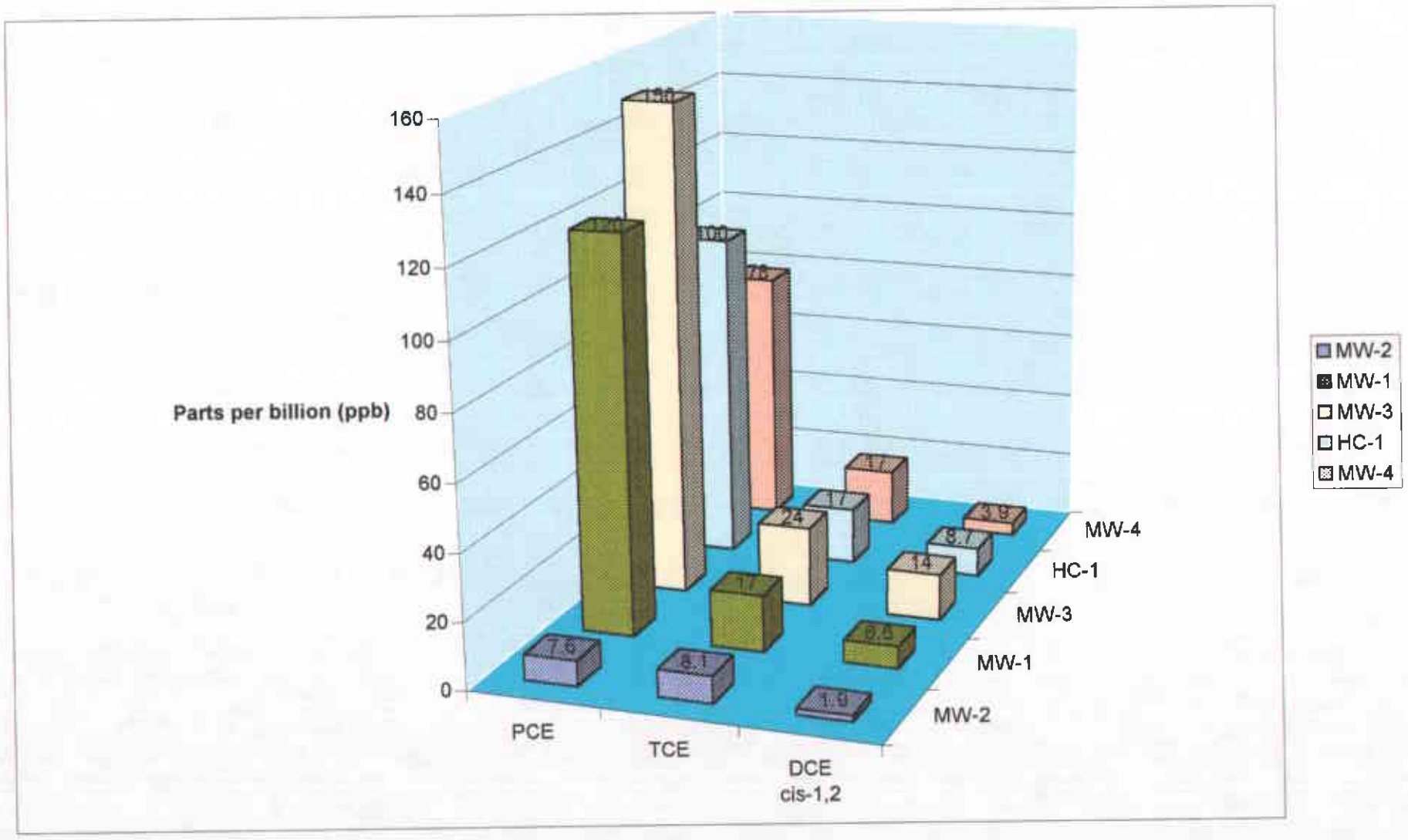
MW-4 Groundwater Samples



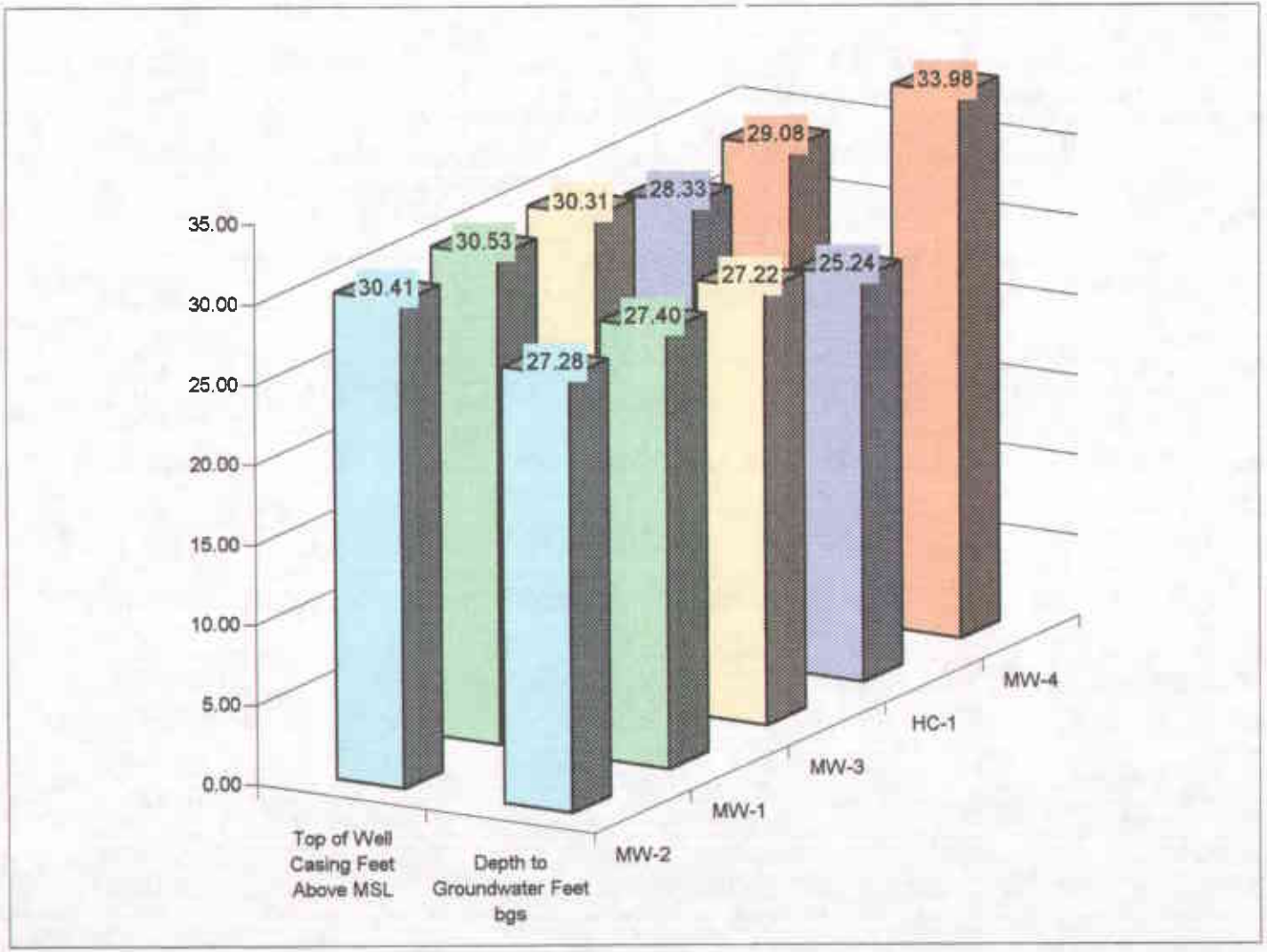
HC-1 Groundwater Samples

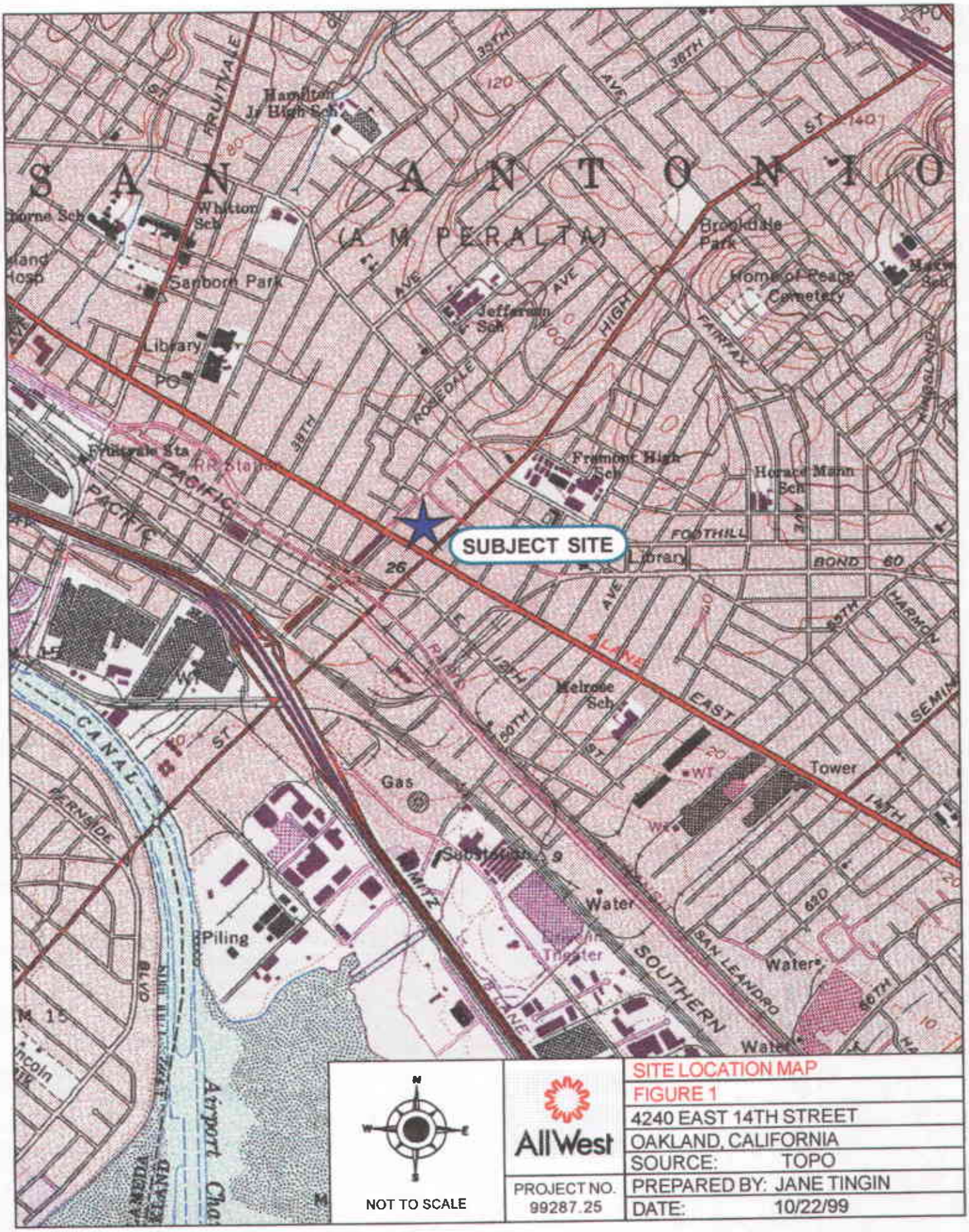


PCE vs. TCE vs. cis-1,2 DCE



PCE vs. TCE vs. cis-1,2 DCE



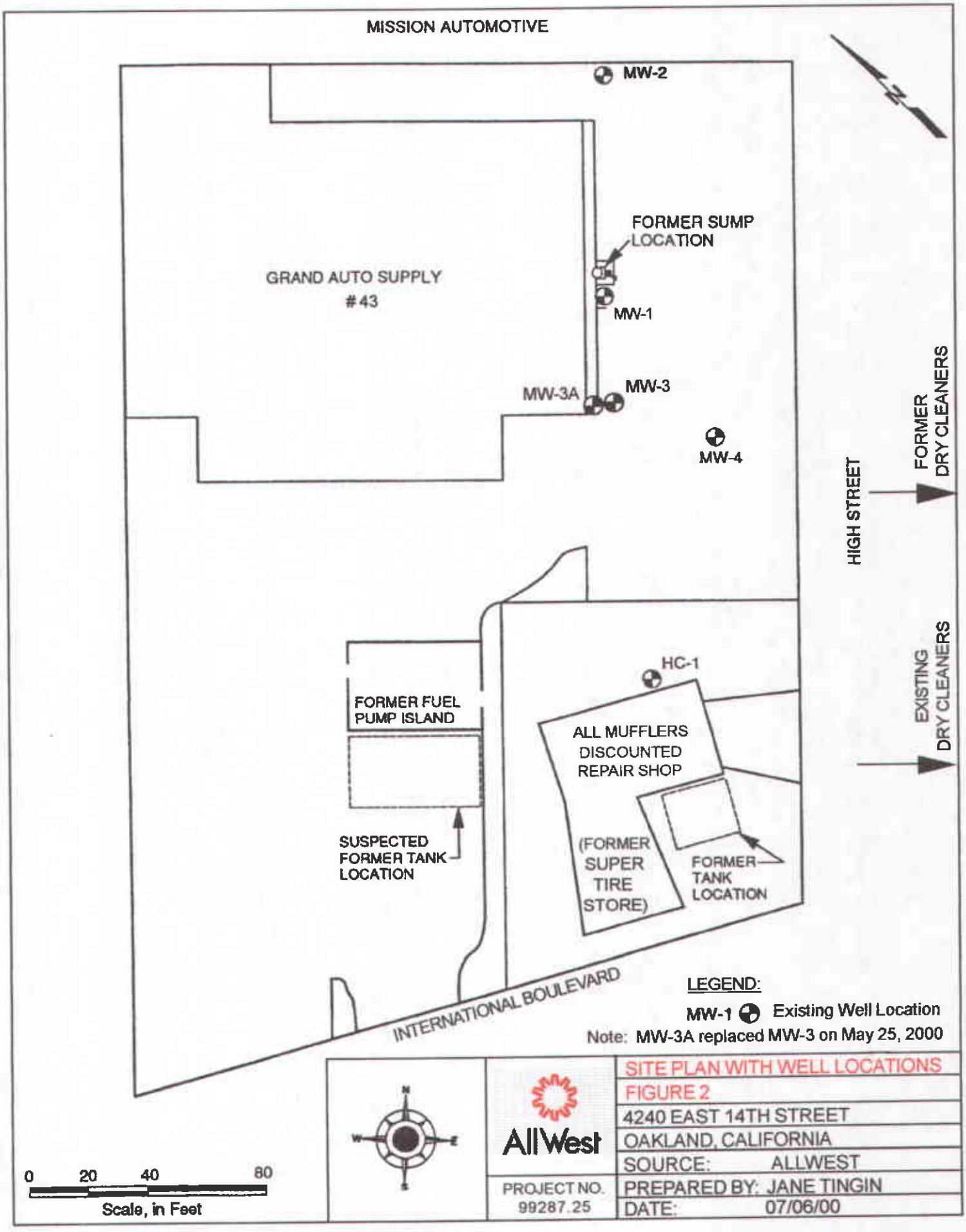


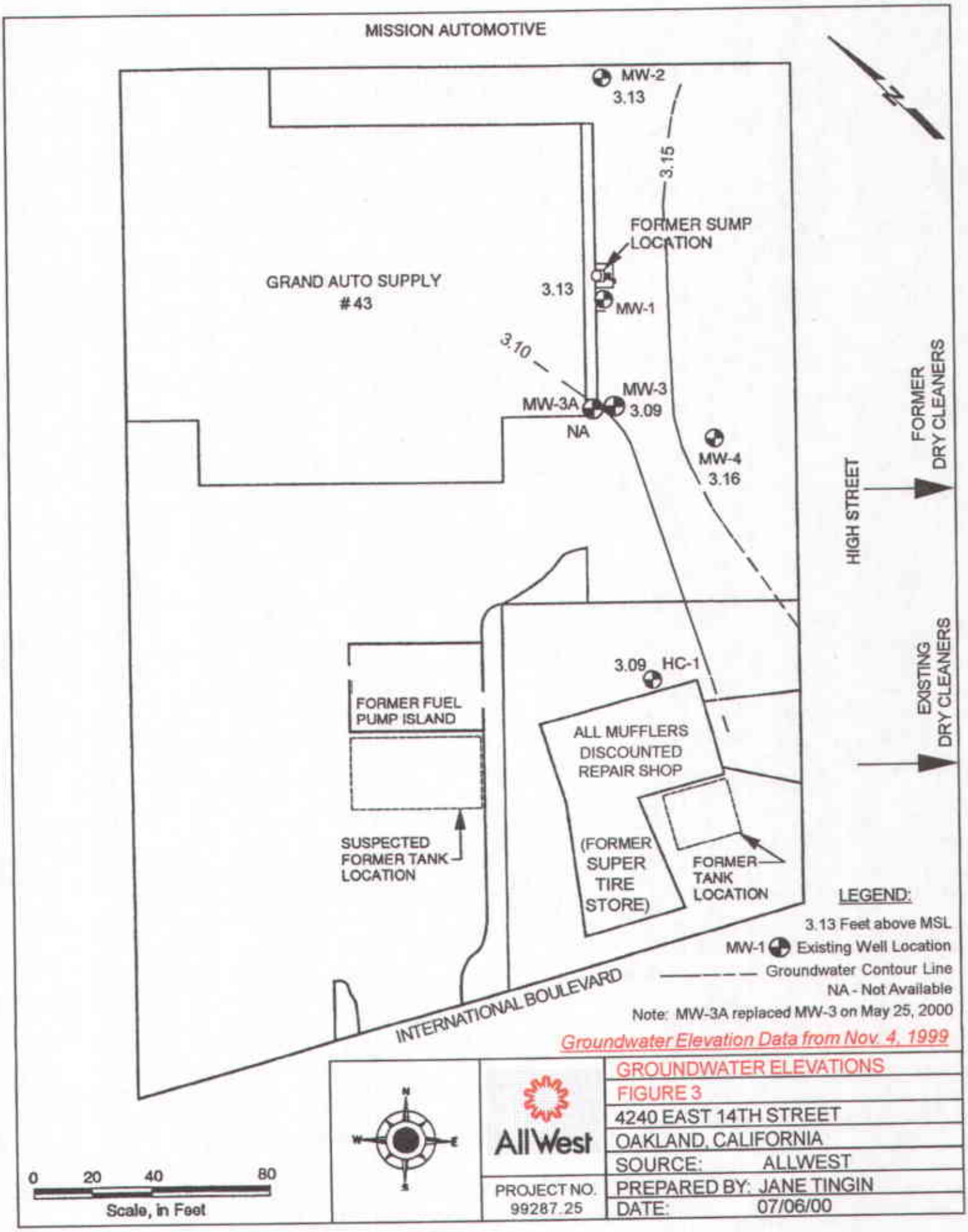
NOT TO SCALE

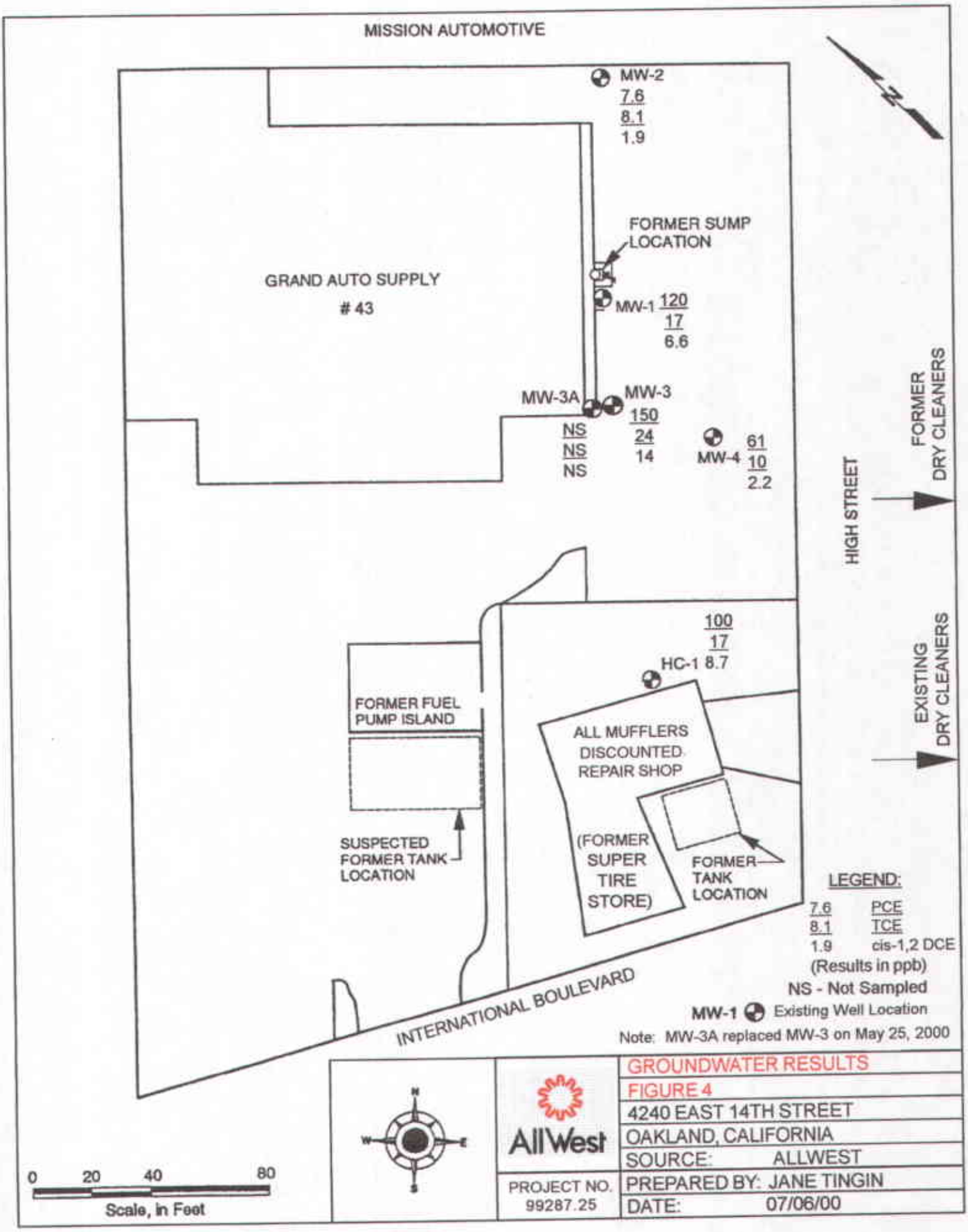
AllWest

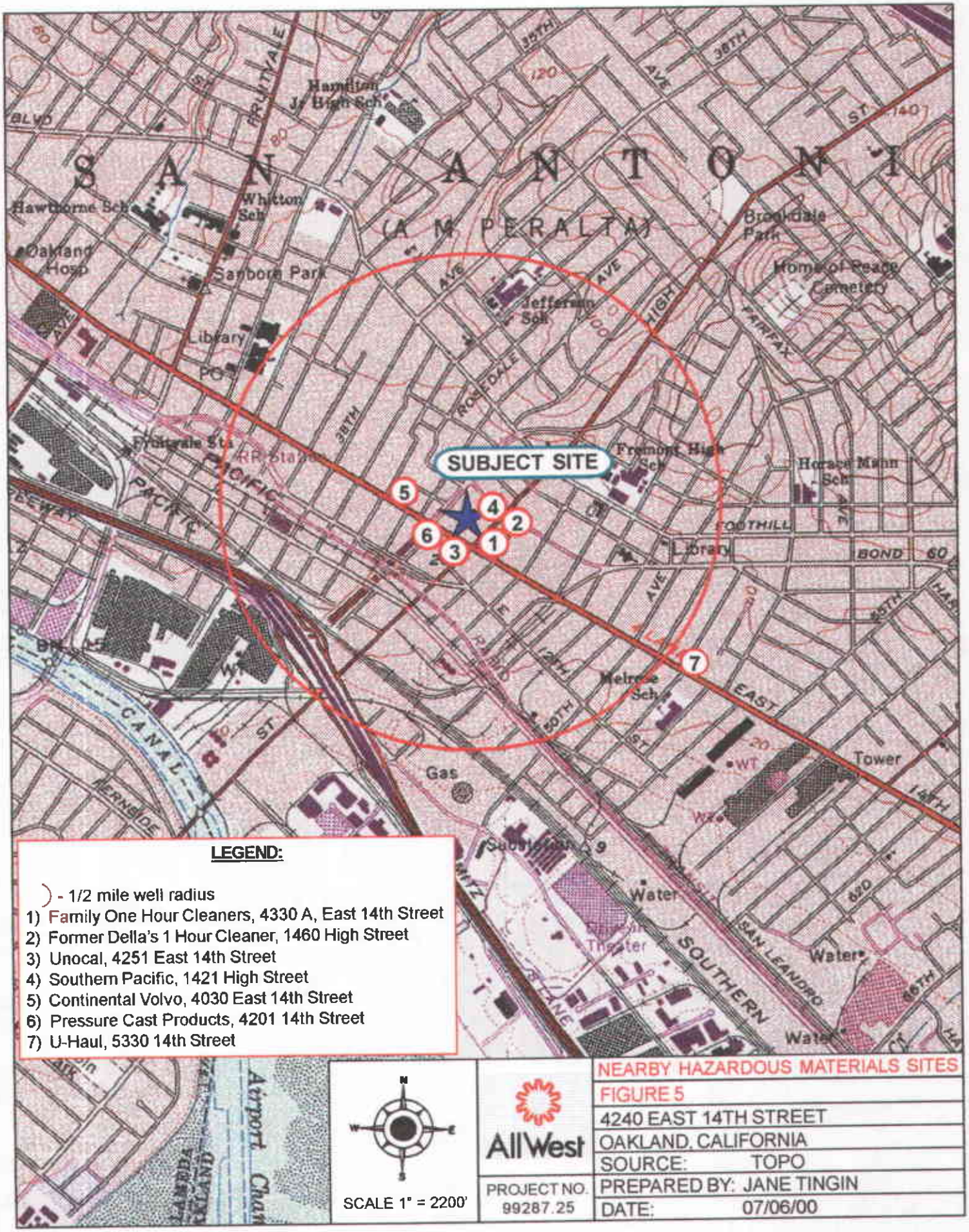
PROJECT NO. 99287.25

SITE LOCATION MAP	
FIGURE 1	
4240 EAST 14TH STREET	
OAKLAND, CALIFORNIA	
SOURCE:	TOPO
PREPARED BY:	JANE TINGIN
DATE:	10/22/99


MISSION AUTOMOTIVE
MW-2
FORMER SUMP LOCATION
GRAND AUTO SUPPLY #43
MW-1
MW-3A
MW-3
MW-4
HIGH STREET
FORMER DRY CLEANERS
EXISTING DRY CLEANERS
HC-1
FORMER FUEL PUMP ISLAND
ALL MUFFLERS DISCOUNTED REPAIR SHOP
(FORMER SUPER TIRE STORE)
FORMER TANK LOCATION
SUSPECTED FORMER TANK LOCATION
INTERNATIONAL BOULEVARD
LEGEND:
MW-1 Existing Well Location
Note: MW-3A replaced MW-3 on May 25, 2000
0 20 40 80
Scale, in Feet
AllWest
PROJECT NO. 99287.25
SITE PLAN WITH WELL LOCATIONS
FIGURE 2
4240 EAST 14TH STREET
OAKLAND, CALIFORNIA
SOURCE: ALLWEST
PREPARED BY: JANE TINGIN
DATE: 07/06/00


MISSION AUTOMOTIVE
MW-2
3.13
3.15
FORMER SUMP LOCATION
GRAND AUTO SUPPLY
#43
3.13
MW-1
3.10
MW-3
MW-3A
3.09
NA
MW-4
3.16
HIGH STREET
FORMER DRY CLEANERS
EXISTING DRY CLEANERS
3.09
HC-1
FORMER FUEL PUMP ISLAND
ALL MUFFLERS DISCOUNTED REPAIR SHOP
(FORMER SUPER TIRE STORE)
FORMER TANK LOCATION
SUSPECTED FORMER TANK LOCATION
INTERNATIONAL BOULEVARD
LEGEND:
3.13 Feet above MSL
MW-1 Existing Well Location
Groundwater Contour Line
NA - Not Available
Note: MW-3A replaced MW-3 on May 25, 2000
Groundwater Elevation Data from Nov. 4, 1999
N
W
E
S
0
20
40
80
Scale, in Feet
AllWest
PROJECT NO. 99287.25
GROUNDWATER ELEVATIONS
FIGURE 3
4240 EAST 14TH STREET
OAKLAND, CALIFORNIA
SOURCE: ALLWEST
PREPARED BY: JANE TINGIN
DATE: 07/06/00


MISSION AUTOMOTIVE
MW-2
7.6
8.1
1.9
FORMER SUMP LOCATION
GRAND AUTO SUPPLY
43
MW-1 120
17
6.6
MW-3A
MW-3
150
24
14
NS
NS
NS
MW-4 61
10
2.2
HIGH STREET
FORMER DRY CLEANERS
EXISTING DRY CLEANERS
100
17
HC-1 8.7
FORMER FUEL PUMP ISLAND
ALL MUFFLERS DISCOUNTED REPAIR SHOP
(FORMER SUPER TIRE STORE)
FORMER TANK LOCATION
SUSPECTED FORMER TANK LOCATION
INTERNATIONAL BOULEVARD
LEGEND:
7.6 PCE
8.1 TCE
1.9 cis-1,2 DCE
(Results in ppb)
NS - Not Sampled
MW-1 Existing Well Location
Note: MW-3A replaced MW-3 on May 25, 2000
0 20 40 80
Scale, in Feet
AllWest
PROJECT NO. 99287.25
GROUNDWATER RESULTS
FIGURE 4
4240 EAST 14TH STREET
OAKLAND, CALIFORNIA
SOURCE: ALLWEST
PREPARED BY: JANE TINGIN
DATE: 07/06/00



LEGEND:

) - 1/2 mile well radius

1) Family One Hour Cleaners, 4330 A, East 14th Street
2) Former Della's 1 Hour Cleaner, 1460 High Street
3) Unocal, 4251 East 14th Street
4) Southern Pacific, 1421 High Street
5) Continental Volvo, 4030 East 14th Street
6) Pressure Cast Products, 4201 14th Street
7) U-Haul, 5330 14th Street

SCALE 1" = 2200'

AllWest

PROJECT NO. 99287.25

NEARBY HAZARDOUS MATERIALS SITES
FIGURE 5
4240 EAST 14TH STREET
OAKLAND, CALIFORNIA
SOURCE: TOPO
PREPARED BY: JANE TINGIN
DATE: 07/06/00

LEGEND:

) - 1/2 mile well radius

Subject Site: 6 monitoring wells (MW-1 listed twice)

1) Unocal, 4251 East 14th Street, 6 monitoring and 3 extraction wells R0759
2) Commercial Fueling, 4301 San Leandro Street, 4 monitoring wells and 1 boring
3) Clorox, 850 42nd Avenue, 7 monitoring wells
4) Chevron, 4265 Foothill Boulevard, 4 monitoring wells and 1 boring
5) Integrated Environmental Systems, 499 High Street, 1 destroyed well
6) Dunne Quality Paints, 1007 41st Avenue, 1 boring R0713

SCALE 1" = 2200'

AllWest

PROJECT NO. 99287.25

WELL SURVEY RESULTS	
FIGURE 6	
4240 EAST 14TH STREET	
OAKLAND, CALIFORNIA	
SOURCE:	TOPO
PREPARED BY:	JANE TINGIN
DATE:	07/06/00

Allwest Environmental
One Sutter Street, Suite 600
San Francisco, CA 94104-4923

Attn.: Mr Robert Horwath

Project: 99275.25
Paccaw High

Dear Mr. Horwath

Attached is our report for your samples received on Thursday November 4, 1999. This report has been reviewed and approved for release. Reproduction of this report is permitted only in its entirety.

Please note that any unused portion of the samples will be discarded after December 4, 1999 unless you have requested otherwise. We appreciate the opportunity to be of service to you. If you have any questions, please call me at (925) 484-1919.

Sincerely,

Vincent Vancil

CHROMALAB, INC.

Environmental Services (SDB)

Submission #: 1999-11-0089

To: **Allwest Environmental**
Attn.: Robert Horwath

Test Method: 8010
Prep Method: 5030

Halogenated Volatile Organic Compounds

Sample ID:	**MW-1**	Lab Sample ID:	**1999-11-0089-001**
Project:	99275.25 Paccaw High	Received:	11/04/1999 13:32
		Extracted:	11/08/1999 21:09
Sampled:	11/04/1999 11:30	QC-Batch:	1999/11/08-01.26
Matrix:	Water		

Compound	Result	Rep.Limit	Units	Dilution	Analyzed	Flag
Dichlorodifluoromethane	62	1.0	ug/L	1.00	11/08/1999 21:09	
Vinyl chloride	ND	0.50	ug/L	1.00	11/08/1999 21:09	
Chloroethane	ND	0.50	ug/L	1.00	11/08/1999 21:09	
Trichlorofluoromethane	ND	0.50	ug/L	1.00	11/08/1999 21:09	
1,1-Dichloroethene	ND	0.50	ug/L	1.00	11/08/1999 21:09	
Methylene chloride	ND	5.0	ug/L	1.00	11/08/1999 21:09	
trans-1,2-Dichloroethene	ND	0.50	ug/L	1.00	11/08/1999 21:09	
cis-1,2-Dichloroethene	6.6	0.50	ug/L	1.00	11/08/1999 21:09	
1,1-Dichloroethane	ND	0.50	ug/L	1.00	11/08/1999 21:09	
Chloroform	ND	3.0	ug/L	1.00	11/08/1999 21:09	
1,1,1-Trichloroethane	ND	0.50	ug/L	1.00	11/08/1999 21:09	
Carbon tetrachloride	ND	0.50	ug/L	1.00	11/08/1999 21:09	
1,2-Dichloroethane	ND	0.50	ug/L	1.00	11/08/1999 21:09	
Trichloroethene	17	0.50	ug/L	1.00	11/08/1999 21:09	
1,2-Dichloropropane	ND	0.50	ug/L	1.00	11/08/1999 21:09	
Bromodichloromethane	ND	0.50	ug/L	1.00	11/08/1999 21:09	
2-Chloroethylvinyl ether	ND	0.50	ug/L	1.00	11/08/1999 21:09	
trans-1,3-Dichloropropene	ND	0.50	ug/L	1.00	11/08/1999 21:09	
cis-1,3-Dichloropropene	ND	0.50	ug/L	1.00	11/08/1999 21:09	
1,1,2-Trichloroethane	ND	0.50	ug/L	1.00	11/08/1999 21:09	
Tetrachloroethene	120	2.0	ug/L	4.00	11/09/1999 13:15	
Dibromochloromethane	ND	0.50	ug/L	1.00	11/08/1999 21:09	
Chlorobenzene	ND	0.50	ug/L	1.00	11/08/1999 21:09	
Bromoform	ND	2.0	ug/L	1.00	11/08/1999 21:09	
1,1,2,2-Tetrachloroethane	ND	0.50	ug/L	1.00	11/08/1999 21:09	
1,3-Dichlorobenzene	ND	0.50	ug/L	1.00	11/08/1999 21:09	
1,4-Dichlorobenzene	ND	0.50	ug/L	1.00	11/08/1999 21:09	
1,2-Dichlorobenzene	ND	0.50	ug/L	1.00	11/08/1999 21:09	
Trichlorotrifluoroethane	ND	2.0	ug/L	1.00	11/08/1999 21:09	
Chloromethane	ND	1.0	ug/L	1.00	11/08/1999 21:09	
Bromomethane	ND	1.0	ug/L	1.00	11/08/1999 21:09	
Surrogate(s)						
1-Chloro-2-fluorobenzene	103.1	50-150	%	1.00	11/08/1999 21:09	

Halogenated Volatile Organic Compounds

Allwest Environmental

✉ One Sutter Street, Suite 600
San Francisco, CA 94104-4923

Attn: Robert Horwath

Phone: (415) 391-2510 Fax: (415) 391-2008

Project #: 99275.25

Project: Paccaw High

Samples Reported

Sample ID	Matrix	Date Sampled	Lab #
MW-1	Water	11/04/1999 11:30	1
MW-2	Water	11/04/1999 12:15	2
MW-3	Water	11/04/1999 10:30	3
MW-4	Water	11/04/1999 09:30	4
HC-1	Water	11/04/1999 08:15	5
TRIP BLANK	Water	11/04/1999 07:00	6
DUP-1	Water	11/04/1999	7

To: **Allwest Environmental**
Attn.: Robert Horwath

Test Method: 8010
Prep Method: 5030

Halogenated Volatile Organic Compounds

Sample ID:	**MW-2**	Lab Sample ID:	**1999-11-0089-002**
Project:	99275.25 Paccaw High	Received:	11/04/1999 13:32
		Extracted:	11/08/1999 23:37
Sampled:	11/04/1999 12:15	QC-Batch:	1999/11/08-01.26
Matrix:	Water		

Compound	Result	Rep.Limit	Units	Dilution	Analyzed	Flag
Dichlorodifluoromethane	55	1.0	ug/L	1.00	11/08/1999 23:37	
Vinyl chloride	ND	0.50	ug/L	1.00	11/08/1999 23:37	
Chloroethane	ND	0.50	ug/L	1.00	11/08/1999 23:37	
Trichlorofluoromethane	ND	0.50	ug/L	1.00	11/08/1999 23:37	
1,1-Dichloroethene	ND	0.50	ug/L	1.00	11/08/1999 23:37	
Methylene chloride	ND	5.0	ug/L	1.00	11/08/1999 23:37	
trans-1,2-Dichloroethene	ND	0.50	ug/L	1.00	11/08/1999 23:37	
cis-1,2-Dichloroethene	1.9	0.50	ug/L	1.00	11/08/1999 23:37	
1,1-Dichloroethane	ND	0.50	ug/L	1.00	11/08/1999 23:37	
Chloroform	ND	3.0	ug/L	1.00	11/08/1999 23:37	
1,1,1-Trichloroethane	ND	0.50	ug/L	1.00	11/08/1999 23:37	
Carbon tetrachloride	1.0	0.50	ug/L	1.00	11/08/1999 23:37	
1,2-Dichloroethane	ND	0.50	ug/L	1.00	11/08/1999 23:37	
Trichloroethene	8.1	0.50	ug/L	1.00	11/08/1999 23:37	
1,2-Dichloropropane	ND	0.50	ug/L	1.00	11/08/1999 23:37	
Bromodichloromethane	ND	0.50	ug/L	1.00	11/08/1999 23:37	
2-Chloroethylvinyl ether	ND	0.50	ug/L	1.00	11/08/1999 23:37	
trans-1,3-Dichloropropene	ND	0.50	ug/L	1.00	11/08/1999 23:37	
cis-1,3-Dichloropropene	ND	0.50	ug/L	1.00	11/08/1999 23:37	
1,1,2-Trichloroethane	ND	0.50	ug/L	1.00	11/08/1999 23:37	
Tetrachloroethene	7.6	0.50	ug/L	1.00	11/08/1999 23:37	
Dibromochloromethane	ND	0.50	ug/L	1.00	11/08/1999 23:37	
Chlorobenzene	ND	0.50	ug/L	1.00	11/08/1999 23:37	
Bromoform	ND	2.0	ug/L	1.00	11/08/1999 23:37	
1,1,2,2-Tetrachloroethane	ND	0.50	ug/L	1.00	11/08/1999 23:37	
1,3-Dichlorobenzene	ND	0.50	ug/L	1.00	11/08/1999 23:37	
1,4-Dichlorobenzene	ND	0.50	ug/L	1.00	11/08/1999 23:37	
1,2-Dichlorobenzene	ND	0.50	ug/L	1.00	11/08/1999 23:37	
Trichlorotrifluoroethane	ND	2.0	ug/L	1.00	11/08/1999 23:37	
Chloromethane	ND	1.0	ug/L	1.00	11/08/1999 23:37	
Bromomethane	ND	1.0	ug/L	1.00	11/08/1999 23:37	
Surrogate(s)						
1-Chloro-2-fluorobenzene	108.7	50-150	%	1.00	11/08/1999 23:37	

To: **Allwest Environmental**
Attn.: Robert Horwath

Test Method: 8010
Prep Method: 5030

Halogenated Volatile Organic Compounds

Sample ID:	**MW-3**	Lab Sample ID:	**1999-11-0089-003**
Project:	99275.25 Paccaw High	Received:	11/04/1999 13:32
		Extracted:	11/09/1999 14:53
Sampled:	11/04/1999 10:30	QC-Batch:	1999/11/09-01.25
Matrix:	Water		

Sample/Analysis Flag: o (See Legend & Note section)

Compound	Result	Rep.Limit	Units	Dilution	Analyzed	Flag
Dichlorodifluoromethane	14	5.0	ug/L	5.00	11/09/1999 14:53	
Vinyl chloride	ND	2.5	ug/L	5.00	11/09/1999 14:53	
Chloroethane	ND	2.5	ug/L	5.00	11/09/1999 14:53	
Trichlorofluoromethane	ND	2.5	ug/L	5.00	11/09/1999 14:53	
1,1-Dichloroethene	ND	2.5	ug/L	5.00	11/09/1999 14:53	
Methylene chloride	ND	25	ug/L	5.00	11/09/1999 14:53	
trans-1,2-Dichloroethene	ND	2.5	ug/L	5.00	11/09/1999 14:53	
cis-1,2-Dichloroethene	14	2.5	ug/L	5.00	11/09/1999 14:53	
1,1-Dichloroethane	ND	2.5	ug/L	5.00	11/09/1999 14:53	
Chloroform	ND	15	ug/L	5.00	11/09/1999 14:53	
1,1,1-Trichloroethane	ND	2.5	ug/L	5.00	11/09/1999 14:53	
Carbon tetrachloride	ND	2.5	ug/L	5.00	11/09/1999 14:53	
1,2-Dichloroethane	ND	2.5	ug/L	5.00	11/09/1999 14:53	
Trichloroethene	24	2.5	ug/L	5.00	11/09/1999 14:53	
1,2-Dichloropropane	ND	2.5	ug/L	5.00	11/09/1999 14:53	
Bromodichloromethane	ND	2.5	ug/L	5.00	11/09/1999 14:53	
2-Chloroethylvinyl ether	ND	2.5	ug/L	5.00	11/09/1999 14:53	
trans-1,3-Dichloropropene	ND	2.5	ug/L	5.00	11/09/1999 14:53	
cis-1,3-Dichloropropene	ND	2.5	ug/L	5.00	11/09/1999 14:53	
1,1,2-Trichloroethane	ND	2.5	ug/L	5.00	11/09/1999 14:53	
Tetrachloroethene	150	2.5	ug/L	5.00	11/09/1999 14:53	
Dibromochloromethane	ND	2.5	ug/L	5.00	11/09/1999 14:53	
Chlorobenzene	ND	2.5	ug/L	5.00	11/09/1999 14:53	
Bromoform	ND	10	ug/L	5.00	11/09/1999 14:53	
1,1,2,2-Tetrachloroethane	ND	2.5	ug/L	5.00	11/09/1999 14:53	
1,3-Dichlorobenzene	ND	2.5	ug/L	5.00	11/09/1999 14:53	
1,4-Dichlorobenzene	ND	2.5	ug/L	5.00	11/09/1999 14:53	
1,2-Dichlorobenzene	ND	2.5	ug/L	5.00	11/09/1999 14:53	
Trichlorotrifluoroethane	ND	10	ug/L	5.00	11/09/1999 14:53	
Chloromethane	ND	5.0	ug/L	5.00	11/09/1999 14:53	
Bromomethane	ND	5.0	ug/L	5.00	11/09/1999 14:53	
Surrogate(s)						
1-Chloro-2-fluorobenzene	77.0	50-150	%	1.00	11/09/1999 14:53	

To: **Allwest Environmental**

Attn.: Robert Horwath

Test Method: 8010

Prep Method: 5030

Halogenated Volatile Organic Compounds

Sample ID:	**MW-4**	Lab Sample ID:	**1999-11-0089-004**
Project:	99275.25 Paccaw High	Received:	11/04/1999 13:32
		Extracted:	11/09/1999 01:16
Sampled:	11/04/1999 09:30	QC-Batch:	1999/11/08-01.26
Matrix:	Water		

Compound	Result	Rep.Limit	Units	Dilution	Analyzed	Flag
Dichlorodifluoromethane	41	1.0	ug/L	1.00	11/09/1999 01:16	
Vinyl chloride	ND	0.50	ug/L	1.00	11/09/1999 01:16	
Chloroethane	ND	0.50	ug/L	1.00	11/09/1999 01:16	
Trichlorofluoromethane	ND	0.50	ug/L	1.00	11/09/1999 01:16	
1,1-Dichloroethene	ND	0.50	ug/L	1.00	11/09/1999 01:16	
Methylene chloride	ND	5.0	ug/L	1.00	11/09/1999 01:16	
trans-1,2-Dichloroethene	ND	0.50	ug/L	1.00	11/09/1999 01:16	
cis-1,2-Dichloroethene	2.2	0.50	ug/L	1.00	11/09/1999 01:16	
1,1-Dichloroethane	ND	0.50	ug/L	1.00	11/09/1999 01:16	
Chloroform	ND	3.0	ug/L	1.00	11/09/1999 01:16	
1,1,1-Trichloroethane	ND	0.50	ug/L	1.00	11/09/1999 01:16	
Carbon tetrachloride	ND	0.50	ug/L	1.00	11/09/1999 01:16	
1,2-Dichloroethane	ND	0.50	ug/L	1.00	11/09/1999 01:16	
Trichloroethene	10	0.50	ug/L	1.00	11/09/1999 01:16	
1,2-Dichloropropane	ND	0.50	ug/L	1.00	11/09/1999 01:16	
Bromodichloromethane	ND	0.50	ug/L	1.00	11/09/1999 01:16	
2-Chloroethylvinyl ether	ND	0.50	ug/L	1.00	11/09/1999 01:16	
trans-1,3-Dichloropropene	ND	0.50	ug/L	1.00	11/09/1999 01:16	
cis-1,3-Dichloropropene	ND	0.50	ug/L	1.00	11/09/1999 01:16	
1,1,2-Trichloroethane	ND	0.50	ug/L	1.00	11/09/1999 01:16	
Tetrachloroethene	61	0.50	ug/L	1.00	11/09/1999 01:16	
Dibromochloromethane	ND	0.50	ug/L	1.00	11/09/1999 01:16	
Chlorobenzene	ND	0.50	ug/L	1.00	11/09/1999 01:16	
Bromoform	ND	2.0	ug/L	1.00	11/09/1999 01:16	
1,1,2,2-Tetrachloroethane	ND	0.50	ug/L	1.00	11/09/1999 01:16	
1,3-Dichlorobenzene	ND	0.50	ug/L	1.00	11/09/1999 01:16	
1,4-Dichlorobenzene	ND	0.50	ug/L	1.00	11/09/1999 01:16	
1,2-Dichlorobenzene	ND	0.50	ug/L	1.00	11/09/1999 01:16	
Trichlorotrifluoroethane	ND	2.0	ug/L	1.00	11/09/1999 01:16	
Chloromethane	ND	1.0	ug/L	1.00	11/09/1999 01:16	
Bromomethane	ND	1.0	ug/L	1.00	11/09/1999 01:16	
Surrogate(s)						
1-Chloro-2-fluorobenzene	99.4	50-150	%	1.00	11/09/1999 01:16	

To: **Allwest Environmental**

Attn.: Robert Horwath

Test Method: 8010

Prep Method: 5030

Halogenated Volatile Organic Compounds

Sample ID:	**HC-1**	Lab Sample ID:	**1999-11-0089-005**
Project:	99275.25 Paccaw High	Received:	11/04/1999 13:32
		Extracted:	11/09/1999 02:05
Sampled:	11/04/1999 08:15	QC-Batch:	1999/11/08-01.26
Matrix:	Water		

Compound	Result	Rep.Limit	Units	Dilution	Analyzed	Flag
Dichlorodifluoromethane	43	1.0	ug/L	1.00	11/09/1999 02:05	
Vinyl chloride	ND	0.50	ug/L	1.00	11/09/1999 02:05	
Chloroethane	ND	0.50	ug/L	1.00	11/09/1999 02:05	
Trichlorofluoromethane	ND	0.50	ug/L	1.00	11/09/1999 02:05	
1,1-Dichloroethene	ND	0.50	ug/L	1.00	11/09/1999 02:05	
Methylene chloride	ND	5.0	ug/L	1.00	11/09/1999 02:05	
trans-1,2-Dichloroethene	ND	0.50	ug/L	1.00	11/09/1999 02:05	
cis-1,2-Dichloroethene	8.7	0.50	ug/L	1.00	11/09/1999 02:05	
1,1-Dichloroethane	ND	0.50	ug/L	1.00	11/09/1999 02:05	
Chloroform	ND	3.0	ug/L	1.00	11/09/1999 02:05	
1,1,1-Trichloroethane	ND	0.50	ug/L	1.00	11/09/1999 02:05	
Carbon tetrachloride	ND	0.50	ug/L	1.00	11/09/1999 02:05	
1,2-Dichloroethane	ND	0.50	ug/L	1.00	11/09/1999 02:05	
Trichloroethene	17	0.50	ug/L	1.00	11/09/1999 02:05	
1,2-Dichloropropane	ND	0.50	ug/L	1.00	11/09/1999 02:05	
Bromodichloromethane	ND	0.50	ug/L	1.00	11/09/1999 02:05	
2-Chloroethylvinyl ether	ND	0.50	ug/L	1.00	11/09/1999 02:05	
trans-1,3-Dichloropropene	ND	0.50	ug/L	1.00	11/09/1999 02:05	
cis-1,3-Dichloropropene	ND	0.50	ug/L	1.00	11/09/1999 02:05	
1,1,2-Trichloroethane	ND	0.50	ug/L	1.00	11/09/1999 02:05	
Tetrachloroethene	100	2.0	ug/L	4.00	11/09/1999 16:32	
Dibromochloromethane	ND	0.50	ug/L	1.00	11/09/1999 02:05	
Chlorobenzene	ND	0.50	ug/L	1.00	11/09/1999 02:05	
Bromoform	ND	2.0	ug/L	1.00	11/09/1999 02:05	
1,1,2,2-Tetrachloroethane	ND	0.50	ug/L	1.00	11/09/1999 02:05	
1,3-Dichlorobenzene	ND	0.50	ug/L	1.00	11/09/1999 02:05	
1,4-Dichlorobenzene	ND	0.50	ug/L	1.00	11/09/1999 02:05	
1,2-Dichlorobenzene	ND	0.50	ug/L	1.00	11/09/1999 02:05	
Trichlorotrifluoroethane	ND	2.0	ug/L	1.00	11/09/1999 02:05	
Chloromethane	ND	1.0	ug/L	1.00	11/09/1999 02:05	
Bromomethane	ND	1.0	ug/L	1.00	11/09/1999 02:05	
Surrogate(s)						
1-Chloro-2-fluorobenzene	96.8	50-150	%	1.00	11/09/1999 02:05	

To: **Allwest Environmental**

Attn.: Robert Horwath

Test Method: 8010

Prep Method: 5030

Halogenated Volatile Organic Compounds

Sample ID:	**TRIP BLANK**	Lab Sample ID:	**1999-11-0089-006**
Project:	99275.25 Paccaw High	Received:	11/04/1999 13:32
		Extracted:	11/09/1999 02:53
Sampled:	11/04/1999 07:00	QC-Batch:	1999/11/08-01.26
Matrix:	Water		

Compound	Result	Rep.Limit	Units	Dilution	Analyzed	Flag
Dichlorodifluoromethane	ND	1.0	ug/L	1.00	11/09/1999 02:53	
Vinyl chloride	ND	0.50	ug/L	1.00	11/09/1999 02:53	
Chloroethane	ND	0.50	ug/L	1.00	11/09/1999 02:53	
Trichlorofluoromethane	ND	0.50	ug/L	1.00	11/09/1999 02:53	
1,1-Dichloroethene	ND	0.50	ug/L	1.00	11/09/1999 02:53	
Methylene chloride	ND	5.0	ug/L	1.00	11/09/1999 02:53	
trans-1,2-Dichloroethene	ND	0.50	ug/L	1.00	11/09/1999 02:53	
cis-1,2-Dichloroethene	ND	0.50	ug/L	1.00	11/09/1999 02:53	
1,1-Dichloroethane	ND	0.50	ug/L	1.00	11/09/1999 02:53	
Chloroform	ND	3.0	ug/L	1.00	11/09/1999 02:53	
1,1,1-Trichloroethane	ND	0.50	ug/L	1.00	11/09/1999 02:53	
Carbon tetrachloride	ND	0.50	ug/L	1.00	11/09/1999 02:53	
1,2-Dichloroethane	ND	0.50	ug/L	1.00	11/09/1999 02:53	
Trichloroethene	ND	0.50	ug/L	1.00	11/09/1999 02:53	
1,2-Dichloropropane	ND	0.50	ug/L	1.00	11/09/1999 02:53	
Bromodichloromethane	ND	0.50	ug/L	1.00	11/09/1999 02:53	
2-Chloroethylvinyl ether	ND	0.50	ug/L	1.00	11/09/1999 02:53	
trans-1,3-Dichloropropene	ND	0.50	ug/L	1.00	11/09/1999 02:53	
cis-1,3-Dichloropropene	ND	0.50	ug/L	1.00	11/09/1999 02:53	
1,1,2-Trichloroethane	ND	0.50	ug/L	1.00	11/09/1999 02:53	
Tetrachloroethene	ND	0.50	ug/L	1.00	11/09/1999 02:53	
Dibromochloromethane	ND	0.50	ug/L	1.00	11/09/1999 02:53	
Chlorobenzene	ND	0.50	ug/L	1.00	11/09/1999 02:53	
Bromoform	ND	2.0	ug/L	1.00	11/09/1999 02:53	
1,1,2,2-Tetrachloroethane	ND	0.50	ug/L	1.00	11/09/1999 02:53	
1,3-Dichlorobenzene	ND	0.50	ug/L	1.00	11/09/1999 02:53	
1,4-Dichlorobenzene	ND	0.50	ug/L	1.00	11/09/1999 02:53	
1,2-Dichlorobenzene	ND	0.50	ug/L	1.00	11/09/1999 02:53	
Trichlorotrifluoroethane	ND	2.0	ug/L	1.00	11/09/1999 02:53	
Chloromethane	ND	1.0	ug/L	1.00	11/09/1999 02:53	
Bromomethane	ND	1.0	ug/L	1.00	11/09/1999 02:53	
Surrogate(s)						
1-Chloro-2-fluorobenzene	87.4	50-150	%	1.00	11/09/1999 02:53	

To: **Allwest Environmental**

Attn.: Robert Horwath

Test Method: 8010

Prep Method: 5030

Halogenated Volatile Organic Compounds

Sample ID:	**DUP-1**	Lab Sample ID:	**1999-11-0089-007**
Project:	99275.25 Paccaw High	Received:	11/04/1999 13:32
		Extracted:	11/09/1999 03:42
Sampled:	11/04/1999	QC-Batch:	1999/11/08-01.26
Matrix:	Water		

Compound	Result	Rep.Limit	Units	Dilution	Analyzed	Flag
Dichlorodifluoromethane	41	1.0	ug/L	1.00	11/09/1999 03:42	
Vinyl chloride	ND	0.50	ug/L	1.00	11/09/1999 03:42	
Chloroethane	ND	0.50	ug/L	1.00	11/09/1999 03:42	
Trichlorofluoromethane	ND	0.50	ug/L	1.00	11/09/1999 03:42	
1,1-Dichloroethene	ND	0.50	ug/L	1.00	11/09/1999 03:42	
Methylene chloride	ND	5.0	ug/L	1.00	11/09/1999 03:42	
trans-1,2-Dichloroethene	ND	0.50	ug/L	1.00	11/09/1999 03:42	
cis-1,2-Dichloroethene	8.1	0.50	ug/L	1.00	11/09/1999 03:42	
1,1-Dichloroethane	ND	0.50	ug/L	1.00	11/09/1999 03:42	
Chloroform	ND	3.0	ug/L	1.00	11/09/1999 03:42	
1,1,1-Trichloroethane	ND	0.50	ug/L	1.00	11/09/1999 03:42	
Carbon tetrachloride	ND	0.50	ug/L	1.00	11/09/1999 03:42	
1,2-Dichloroethane	ND	0.50	ug/L	1.00	11/09/1999 03:42	
Trichloroethene	17	0.50	ug/L	1.00	11/09/1999 03:42	
1,2-Dichloropropane	ND	0.50	ug/L	1.00	11/09/1999 03:42	
Bromodichloromethane	ND	0.50	ug/L	1.00	11/09/1999 03:42	
2-Chloroethylvinyl ether	ND	0.50	ug/L	1.00	11/09/1999 03:42	
trans-1,3-Dichloropropene	ND	0.50	ug/L	1.00	11/09/1999 03:42	
cis-1,3-Dichloropropene	ND	0.50	ug/L	1.00	11/09/1999 03:42	
1,1,2-Trichloroethane	ND	0.50	ug/L	1.00	11/09/1999 03:42	
Tetrachloroethene	100	2.0	ug/L	4.00	11/09/1999 17:21	
Dibromochloromethane	ND	0.50	ug/L	1.00	11/09/1999 03:42	
Chlorobenzene	ND	0.50	ug/L	1.00	11/09/1999 03:42	
Bromoform	ND	2.0	ug/L	1.00	11/09/1999 03:42	
1,1,2,2-Tetrachloroethane	ND	0.50	ug/L	1.00	11/09/1999 03:42	
1,3-Dichlorobenzene	ND	0.50	ug/L	1.00	11/09/1999 03:42	
1,4-Dichlorobenzene	ND	0.50	ug/L	1.00	11/09/1999 03:42	
1,2-Dichlorobenzene	ND	0.50	ug/L	1.00	11/09/1999 03:42	
Trichlorotrifluoroethane	ND	2.0	ug/L	1.00	11/09/1999 03:42	
Chloromethane	ND	1.0	ug/L	1.00	11/09/1999 03:42	
Bromomethane	ND	1.0	ug/L	1.00	11/09/1999 03:42	
Surrogate(s)						
1-Chloro-2-fluorobenzene	94.2	50-150	%	1.00	11/09/1999 03:42	

To: **Allwest Environmental**
Attn.: Robert Horwath

Test Method: 8010
Prep Method: 5030

Batch QC Report

Halogenated Volatile Organic Compounds

Method Blank | **Water** | **QC Batch # 1999/11/08-01.26**

MB: 1999/11/08-01.26-001 | Date Extracted: 11/08/1999 11:55

Compound	Result	Rep.Limit	Units	Analyzed	Flag
Dichlorodifluoromethane	ND	1.0	ug/L	11/08/1999 11:55	
Vinyl chloride	ND	0.5	ug/L	11/08/1999 11:55	
Chloroethane	ND	0.5	ug/L	11/08/1999 11:55	
Trichlorofluoromethane	ND	0.5	ug/L	11/08/1999 11:55	
1,1-Dichloroethene	ND	0.5	ug/L	11/08/1999 11:55	
Methylene chloride	ND	5.0	ug/L	11/08/1999 11:55	
trans-1,2-Dichloroethene	ND	0.5	ug/L	11/08/1999 11:55	
cis-1,2-Dichloroethene	ND	0.5	ug/L	11/08/1999 11:55	
1,1-Dichloroethane	ND	0.5	ug/L	11/08/1999 11:55	
Chloroform	ND	0.5	ug/L	11/08/1999 11:55	
1,1,1-Trichloroethane	ND	0.5	ug/L	11/08/1999 11:55	
Carbon tetrachloride	ND	0.5	ug/L	11/08/1999 11:55	
1,2-Dichloroethane	ND	0.5	ug/L	11/08/1999 11:55	
Trichloroethene	ND	0.5	ug/L	11/08/1999 11:55	
1,2-Dichloropropane	ND	0.5	ug/L	11/08/1999 11:55	
Bromodichloromethane	ND	0.5	ug/L	11/08/1999 11:55	
2-Chloroethylvinyl ether	ND	0.5	ug/L	11/08/1999 11:55	
trans-1,3-Dichloropropene	ND	0.5	ug/L	11/08/1999 11:55	
cis-1,3-Dichloropropene	ND	0.5	ug/L	11/08/1999 11:55	
1,1,2-Trichloroethane	ND	0.5	ug/L	11/08/1999 11:55	
Tetrachloroethene	ND	0.5	ug/L	11/08/1999 11:55	
Dibromochloromethane	ND	0.5	ug/L	11/08/1999 11:55	
Chlorobenzene	ND	0.5	ug/L	11/08/1999 11:55	
Bromoform	ND	2.0	ug/L	11/08/1999 11:55	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	11/08/1999 11:55	
1,3-Dichlorobenzene	ND	0.5	ug/L	11/08/1999 11:55	
1,4-Dichlorobenzene	ND	0.5	ug/L	11/08/1999 11:55	
1,2-Dichlorobenzene	ND	0.5	ug/L	11/08/1999 11:55	
Trichlorotrifluoroethane	ND	2.0	ug/L	11/08/1999 11:55	
Chloromethane	ND	1.0	ug/L	11/08/1999 11:55	
Bromomethane	ND	1.0	ug/L	11/08/1999 11:55	
Surrogate(s)					
1-Chloro-2-fluorobenzene	100.0	50-150	%	11/08/1999 11:55	

To: **Allwest Environmental**
Attn.: Robert Horwath

Test Method: 8010
Prep Method: 5030

Batch QC Report

Halogenated Volatile Organic Compounds

Method Blank | **Water** | **QC Batch # 1999/11/09-01.25**

MB: 1999/11/09-01.25-001

Date Extracted: 11/09/1999 09:59

Compound	Result	Rep.Limit	Units	Analyzed	Flag
Dichlorodifluoromethane	ND	1.0	ug/L	11/09/1999 09:59	
Vinyl chloride	ND	0.5	ug/L	11/09/1999 09:59	
Chloroethane	ND	0.5	ug/L	11/09/1999 09:59	
Trichlorofluoromethane	ND	0.5	ug/L	11/09/1999 09:59	
1,1-Dichloroethene	ND	0.5	ug/L	11/09/1999 09:59	
Methylene chloride	ND	5.0	ug/L	11/09/1999 09:59	
trans-1,2-Dichloroethene	ND	0.5	ug/L	11/09/1999 09:59	
cis-1,2-Dichloroethene	ND	0.5	ug/L	11/09/1999 09:59	
1,1-Dichloroethane	ND	0.5	ug/L	11/09/1999 09:59	
Chloroform	ND	0.5	ug/L	11/09/1999 09:59	
1,1,1-Trichloroethane	ND	0.5	ug/L	11/09/1999 09:59	
Carbon tetrachloride	ND	0.5	ug/L	11/09/1999 09:59	
1,2-Dichloroethane	ND	0.5	ug/L	11/09/1999 09:59	
Trichloroethene	ND	0.5	ug/L	11/09/1999 09:59	
1,2-Dichloropropane	ND	0.5	ug/L	11/09/1999 09:59	
Bromodichloromethane	ND	0.5	ug/L	11/09/1999 09:59	
2-Chloroethylvinyl ether	ND	0.5	ug/L	11/09/1999 09:59	
trans-1,3-Dichloropropene	ND	0.5	ug/L	11/09/1999 09:59	
cis-1,3-Dichloropropene	ND	0.5	ug/L	11/09/1999 09:59	
1,1,2-Trichloroethane	ND	0.5	ug/L	11/09/1999 09:59	
Tetrachloroethene	ND	0.5	ug/L	11/09/1999 09:59	
Dibromochloromethane	ND	0.5	ug/L	11/09/1999 09:59	
Chlorobenzene	ND	0.5	ug/L	11/09/1999 09:59	
Bromoform	ND	2.0	ug/L	11/09/1999 09:59	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	11/09/1999 09:59	
1,3-Dichlorobenzene	ND	0.5	ug/L	11/09/1999 09:59	
1,4-Dichlorobenzene	ND	0.5	ug/L	11/09/1999 09:59	
1,2-Dichlorobenzene	ND	0.5	ug/L	11/09/1999 09:59	
Trichlorotrifluoroethane	ND	2.0	ug/L	11/09/1999 09:59	
Chloromethane	ND	1.0	ug/L	11/09/1999 09:59	
Bromomethane	ND	1.0	ug/L	11/09/1999 09:59	
Surrogate(s)					
1-Chloro-2-fluorobenzene	69.5	50-150	%	11/09/1999 09:59	

To: **Allwest Environmental**

Attn: Robert Horwath

Test Method: 8010

Prep Method: 5030

Batch QC Report

Halogenated Volatile Organic Compounds

Laboratory Control Spike (LCS/LCSD) **Water** **QC Batch # 1999/11/08-01.26**

LCS: 1999/11/08-01.26-002 Extracted: 11/08/1999 12:53 Analyzed: 11/08/1999 12:53

LCSD: 1999/11/08-01.26-003 Extracted: 11/08/1999 13:43 Analyzed: 11/08/1999 13:43

Compound	Conc. [ug/L]		Exp.Conc. [ug/L]		Recovery [%]		RPD	Ctrl. Limits [%]		Flags	
	LCS	LCSD	LCS	LCSD	LCS	LCSD	[%]	Recovery	RPD	LCS	LCSD
1,1-Dichloroethene	20.3	20.6	20.0	20.0	101.5	103.0	1.5	50-140	20		
Trichloroethene	18.9	19.1	20.0	20.0	94.5	95.5	1.1	50-150	20		
Chlorobenzene	21.7	23.0	20.0	20.0	108.5	115.0	5.8	50-150	20		
Surrogate(s)											
1-Chloro-2-fluorobenzene	20.5	22.3	20	20	102.5	111.5		50-150			

To: **Allwest Environmental**

Attn: Robert Horwath

Test Method: 8010

Prep Method: 5030

Batch QC Report

Halogenated Volatile Organic Compounds

Laboratory Control Spike (LCS/LCSD) **Water** **QC Batch # 1999/11/09-01.25**

LCS: 1999/11/09-01.25-002 Extracted: 11/09/1999 10:48 Analyzed: 11/09/1999 10:48

LCSD: 1999/11/09-01.25-003 Extracted: 11/09/1999 11:37 Analyzed: 11/09/1999 11:37

Compound	Conc. [ug/L]		Exp.Conc. [ug/L]		Recovery [%]		RPD	Ctrl. Limits [%]		Flags	
	LCS	LCSD	LCS	LCSD	LCS	LCSD	[%]	Recovery	RPD	LCS	LCSD
1,1-Dichloroethene	17.9	18.0	20.0	20.0	89.5	90.0	0.6	50-140	20		
Trichloroethene	17.2	17.2	20.0	20.0	86.0	86.0	0.0	50-150	20		
Chlorobenzene	17.5	17.0	20.0	20.0	87.5	85.0	2.9	50-150	20		
Surrogate(s)											
1-Chloro-2-fluorobenzene	14.9	14.9	20	20	74.5	74.5		50-150			

To: **Allwest Environmental**

Attn.: Robert Horwath

Test Method: 8010

Prep Method: 5030

Batch QC Report

Halogenated Volatile Organic Compounds

Matrix Spike (MS / MSD) **Water** **QC Batch # 1999/11/08-01.26**

Sample ID: **MW-1** Lab Sample ID: 1999-11-0089-001

MS: 1999/11/08-01.26-004 Extracted: 11/08/1999 21:58 Analyzed: 11/08/1999 21:58 Dilution: 1.0

MSD: 1999/11/08-01.26-005 Extracted: 11/08/1999 22:48 Analyzed: 11/08/1999 22:48 Dilution: 1.0

Compound	Conc. [ug/L]			Exp.Conc. [ug/L]		Recovery [%]		RPD	Ctrl. Limits [%]		Flags	
	MS	MSD	Sample	MS	MSD	MS	MSD	[%]	Recovery	RPD	MS	MSD
1,1-Dichloroethene	18.4	21.3	ND	20.0	20.0	92.0	106.5	14.6	50-140	20		
Trichloroethene	34.2	36.2	16.8	20.0	20.0	87.0	97.0	10.9	50-150	20		
Chlorobenzene	21.9	24.7	ND	20.0	20.0	109.5	123.5	12.0	50-150	20		
Surrogate(s)												
1-Chloro-2-fluorobenzen	22.2	23.5		20	20	111.0	117.5		50-150			

To: **Allwest Environmental**
Attn:Robert Horwath

Test Method: 8010
Prep Method: 5030

Legend & Notes

Halogenated Volatile Organic Compounds

Analysis Flags

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Reporting limits were raised due to high level of analyte present in the sample.

Gas/BTEX and MTBE

Allwest Environmental

One Sutter Street, Suite 600
San Francisco, CA 94104-4923

Attn: Robert Horwath

Phone: (415) 391-2510 Fax: (415) 391-2008

Project #: 99275.25

Project: Paccaw High

Samples Reported

Sample ID	Matrix	Date Sampled	Lab #
MW-1	Water	11/04/1999 11:30	1
MW-2	Water	11/04/1999 12:15	2
MW-3	Water	11/04/1999 10:30	3
MW-4	Water	11/04/1999 09:30	4
HC-1	Water	11/04/1999 08:15	5
TRIP BLANK	Water	11/04/1999 07:00	6
DUP-1	Water	11/04/1999	7

To: **Allwest Environmental**

Attn.: Robert Horwath

Test Method: 8020
8015M

Prep Method: 5030

Gas/BTEX and MTBE

Sample ID:	**MW-1**	Lab Sample ID:	**1999-11-0089-001**
Project:	99275.25 Paccaw High	Received:	11/04/1999 13:32
		Extracted:	11/11/1999 13:06
Sampled:	11/04/1999 11:30	QC-Batch:	1999/11/11-01.01
Matrix:	Water		

Compound	Result	Rep.Limit	Units	Dilution	Analyzed	Flag
Gasoline	ND	50	ug/L	1.00	11/11/1999 13:06	
Benzene	ND	0.50	ug/L	1.00	11/11/1999 13:06	
Toluene	ND	0.50	ug/L	1.00	11/11/1999 13:06	
Ethyl benzene	ND	0.50	ug/L	1.00	11/11/1999 13:06	
Xylene(s)	ND	0.50	ug/L	1.00	11/11/1999 13:06	
MTBE	ND	5.0	ug/L	1.00	11/11/1999 13:06	
Surrogate(s)						
Trifluorotoluene	87.7	58-124	%	1.00	11/11/1999 13:06	
Trifluorotoluene-FID	66.6	58-124	%	1.00	11/11/1999 13:06	

To: **Allwest Environmental**

Attn.: Robert Horwath

Test Method: 8020
8015M

Prep Method: 5030

Gas/BTEX and MTBE

Sample ID:	**MW-2**	Lab Sample ID:	**1999-11-0089-002**
Project:	99275.25 Paccaw High	Received:	11/04/1999 13:32
		Extracted:	11/11/1999 13:34
Sampled:	11/04/1999 12:15	QC-Batch:	1999/11/11-01.01
Matrix:	Water		

Compound	Result	Rep.Limit	Units	Dilution	Analyzed	Flag
Gasoline	ND	50	ug/L	1.00	11/11/1999 13:34	
Benzene	ND	0.50	ug/L	1.00	11/11/1999 13:34	
Toluene	ND	0.50	ug/L	1.00	11/11/1999 13:34	
Ethyl benzene	ND	0.50	ug/L	1.00	11/11/1999 13:34	
Xylene(s)	ND	0.50	ug/L	1.00	11/11/1999 13:34	
MTBE	ND	5.0	ug/L	1.00	11/11/1999 13:34	
Surrogate(s)						
Trifluorotoluene	102.9	58-124	%	1.00	11/11/1999 13:34	
4-Bromofluorobenzene-FID	71.6	50-150	%	1.00	11/11/1999 13:34	

To: **Allwest Environmental**

Attn.: Robert Horwath

Test Method: 8020
8015M

Prep Method: 5030

Gas/BTEX and MTBE

Sample ID:	**MW-3**	Lab Sample ID:	**1999-11-0089-003**
Project:	99275.25 Paccaw High	Received:	11/04/1999 13:32
		Extracted:	11/11/1999 14:01
Sampled:	11/04/1999 10:30	QC-Batch:	1999/11/11-01.01
Matrix:	Water		

Compound	Result	Rep.Limit	Units	Dilution	Analyzed	Flag
Gasoline	61	50	ug/L	1.00	11/11/1999 14:01	g
Benzene	ND	0.50	ug/L	1.00	11/11/1999 14:01	
Toluene	ND	0.50	ug/L	1.00	11/11/1999 14:01	
Ethyl benzene	ND	0.50	ug/L	1.00	11/11/1999 14:01	
Xylene(s)	ND	0.50	ug/L	1.00	11/11/1999 14:01	
MTBE	ND	5.0	ug/L	1.00	11/11/1999 14:01	
Surrogate(s)						
Trifluorotoluene	120.7	58-124	%	1.00	11/11/1999 14:01	
4-Bromofluorobenzene-FID	64.1	50-150	%	1.00	11/11/1999 14:01	

To: **Allwest Environmental**

Attn.: Robert Horwath

Test Method: 8020
8015M

Prep Method: 5030

Gas/BTEX and MTBE

Sample ID:	**MW-4**	Lab Sample ID:	**1999-11-0089-004**
Project:	99275.25 Paccaw High	Received:	11/04/1999 13:32
		Extracted:	11/11/1999 14:29
Sampled:	11/04/1999 09:30	QC-Batch:	1999/11/11-01.01
Matrix:	Water		

Compound	Result	Rep.Limit	Units	Dilution	Analyzed	Flag
Gasoline	ND	50	ug/L	1.00	11/11/1999 14:29	
Benzene	ND	0.50	ug/L	1.00	11/11/1999 14:29	
Toluene	ND	0.50	ug/L	1.00	11/11/1999 14:29	
Ethyl benzene	ND	0.50	ug/L	1.00	11/11/1999 14:29	
Xylene(s)	ND	0.50	ug/L	1.00	11/11/1999 14:29	
MTBE	ND	5.0	ug/L	1.00	11/11/1999 14:29	
Surrogate(s)						
Trifluorotoluene	97.3	58-124	%	1.00	11/11/1999 14:29	
4-Bromofluorobenzene-FID	65.8	50-150	%	1.00	11/11/1999 14:29	

To: **Allwest Environmental**

Attn.: Robert Horwath

Test Method: 8020
8015M

Prep Method: 5030

Gas/BTEX and MTBE

Sample ID:	**HC-1**	Lab Sample ID:	**1999-11-0089-005**
Project:	99275.25 Paccaw High	Received:	11/04/1999 13:32
		Extracted:	11/12/1999 10:34
Sampled:	11/04/1999 08:15	QC-Batch:	1999/11/12-05.04
Matrix:	Water		

Compound	Result	Rep.Limit	Units	Dilution	Analyzed	Flag
Gasoline	ND	50	ug/L	1.00	11/12/1999 10:34	
Benzene	ND	0.50	ug/L	1.00	11/12/1999 10:34	
Toluene	ND	0.50	ug/L	1.00	11/12/1999 10:34	
Ethyl benzene	ND	0.50	ug/L	1.00	11/12/1999 10:34	
Xylene(s)	ND	0.50	ug/L	1.00	11/12/1999 10:34	
MTBE	ND	5.0	ug/L	1.00	11/12/1999 10:34	
Surrogate(s)						
4-Bromofluorobenzene	90.1	50-150	%	1.00	11/12/1999 10:34	
4-Bromofluorobenzene-FID	83.5	50-150	%	1.00	11/12/1999 10:34	

To: **Allwest Environmental**

Attn.: Robert Horwath

Test Method: 8020
8015M

Prep Method: 5030

Gas/BTEX and MTBE

Sample ID:	**TRIP BLANK**	Lab Sample ID:	**1999-11-0089-006**
Project:	99275.25 Paccaw High	Received:	11/04/1999 13:32
		Extracted:	11/12/1999 12:50
Sampled:	11/04/1999 07:00	QC-Batch:	1999/11/12-05.04
Matrix:	Water		

Compound	Result	Rep.Limit	Units	Dilution	Analyzed	Flag
Gasoline	ND	50	ug/L	1.00	11/12/1999 12:50	
Benzene	ND	0.50	ug/L	1.00	11/12/1999 12:50	
Toluene	ND	0.50	ug/L	1.00	11/12/1999 12:50	
Ethyl benzene	ND	0.50	ug/L	1.00	11/12/1999 12:50	
Xylene(s)	ND	0.50	ug/L	1.00	11/12/1999 12:50	
MTBE	ND	5.0	ug/L	1.00	11/12/1999 12:50	
Surrogate(s)						
Trifluorotoluene	99.3	58-124	%	1.00	11/12/1999 12:50	
4-Bromofluorobenzene-FID	82.6	50-150	%	1.00	11/12/1999 12:50	

CHROMALAB, INC.

Environmental Services (SDB)

Submission #: 1999-11-0089

To: **Allwest Environmental**

Attn.: Robert Horwath

Test Method: 8020
8015M

Prep Method: 5030

Gas/BTEX and MTBE

Sample ID:	**DUP-1**	Lab Sample ID:	**1999-11-0089-007**
Project:	99275.25 Paccaw High	Received:	11/04/1999 13:32
		Extracted:	11/12/1999 13:18
Sampled:	11/04/1999	QC-Batch:	1999/11/12-05.04
Matrix:	Water		

Compound	Result	Rep.Limit	Units	Dilution	Analyzed	Flag
Gasoline	ND	50	ug/L	1.00	11/12/1999 13:18	
Benzene	ND	0.50	ug/L	1.00	11/12/1999 13:18	
Toluene	ND	0.50	ug/L	1.00	11/12/1999 13:18	
Ethyl benzene	ND	0.50	ug/L	1.00	11/12/1999 13:18	
Xylene(s)	ND	0.50	ug/L	1.00	11/12/1999 13:18	
MTBE	ND	5.0	ug/L	1.00	11/12/1999 13:18	
Surrogate(s)						
4-Bromofluorobenzene	90.3	50-150	%	1.00	11/12/1999 13:18	
4-Bromofluorobenzene-FID	83.8	50-150	%	1.00	11/12/1999 13:18	

To: **Allwest Environmental**

Attn.: Robert Horwath

Test Method: 8020
8015M

Prep Method: 5030

Batch QC Report

Gas/BTEX and MTBE

Method Blank **Water** **QC Batch # 1999/11/11-01.01**

MB: 1999/11/11-01.01-001

Date Extracted: 11/11/1999 04:36

Compound	Result	Rep.Limit	Units	Analyzed	Flag
Gasoline	ND	50	ug/L	11/11/1999 04:36	
Benzene	ND	0.5	ug/L	11/11/1999 04:36	
Toluene	ND	0.5	ug/L	11/11/1999 04:36	
Ethyl benzene	ND	0.5	ug/L	11/11/1999 04:36	
Xylene(s)	ND	0.5	ug/L	11/11/1999 04:36	
MTBE	ND	5.0	ug/L	11/11/1999 04:36	
Surrogate(s)					
Trifluorotoluene	69.0	58-124	%	11/11/1999 04:36	
4-Bromofluorobenzene-FID	55.4	50-150	%	11/11/1999 04:36	

To: **Allwest Environmental**

Attn.: Robert Horwath

Test Method: 8020
8015M

Prep Method: 5030

Batch QC Report

Gas/BTEX and MTBE

Method Blank | **Water** | **QC Batch # 1999/11/12-05.04**

MB: 1999/11/12-05.04-001

Date Extracted: 11/12/1999 06:55

Compound	Result	Rep.Limit	Units	Analyzed	Flag
Gasoline	ND	50	ug/L	11/12/1999 06:55	
Benzene	ND	0.5	ug/L	11/12/1999 06:55	
Toluene	ND	0.5	ug/L	11/12/1999 06:55	
Ethyl benzene	ND	0.5	ug/L	11/12/1999 06:55	
Xylene(s)	ND	0.5	ug/L	11/12/1999 06:55	
MTBE	ND	5.0	ug/L	11/12/1999 06:55	
Surrogate(s)					
Trifluorotoluene	90.2	58-124	%	11/12/1999 06:55	
4-Bromofluorobenzene-FID	79.4	50-150	%	11/12/1999 06:55	

To: **Allwest Environmental**

Test Method: 8020
8015M

Attn: Robert Horwath

Prep Method: 5030

Batch QC Report

Gas/BTEX and MTBE

Laboratory Control Spike (LCS/LCSD) **Water** **QC Batch # 1999/11/11-01.01**

LCS: 1999/11/11-01.01-002 Extracted: 11/11/1999 05:04 Analyzed: 11/11/1999 05:04

LCSD: 1999/11/11-01.01-003 Extracted: 11/11/1999 05:32 Analyzed: 11/11/1999 05:32

Compound	Conc. [ug/L]		Exp.Conc. [ug/L]		Recovery [%]		RPD	Ctrl. Limits [%]		Flags	
	LCS	LCSD	LCS	LCSD	LCS	LCSD	[%]	Recovery	RPD	LCS	LCSD
Gasoline	525	624	500	500	105.0	124.8	17.2	75-125	20		
Benzene	113	116	100.0	100.0	113.0	116.0	2.6	77-123	20		
Toluene	114	117	100.0	100.0	114.0	117.0	2.6	78-122	20		
Ethyl benzene	112	115	100.0	100.0	112.0	115.0	2.6	70-130	20		
Xylene(s)	329	337	300	300	109.7	112.3	2.3	75-125	20		
Surrogate(s)											
Trifluorotoluene	544	544	500	500	108.8	108.8		58-124			
4-Bromofluorobenzene-FI	377	461	500	500	75.4	92.2		50-150			

To: **Allwest Environmental**

Attn: Robert Horwath

Test Method: 8020
8015M

Prep Method: 5030

Batch QC Report

Gas/BTEX and MTBE

Laboratory Control Spike (LCS/LCSD) **Water** **QC Batch # 1999/11/12-05.04**

LCS: 1999/11/12-05.04-002 Extracted: 11/12/1999 07:22 Analyzed: 11/12/1999 07:22

LCSD: 1999/11/12-05.04-003 Extracted: 11/12/1999 07:50 Analyzed: 11/12/1999 07:50

Compound	Conc. [ug/L]		Exp.Conc. [ug/L]		Recovery [%]		RPD	Ctrl. Limits [%]		Flags	
	LCS	LCSD	LCS	LCSD	LCS	LCSD	[%]	Recovery	RPD	LCS	LCSD
Gasoline	525	523	500	500	105.0	104.6	0.4	75-125	20		
Benzene	102	93.6	100.0	100.0	102.0	93.6	8.6	77-123	20		
Toluene	104	95.0	100.0	100.0	104.0	95.0	9.0	78-122	20		
Ethyl benzene	105	96.3	100.0	100.0	105.0	96.3	8.6	70-130	20		
Xylene(s)	303	280	300	300	101.0	93.3	7.9	75-125	20		
Surrogate(s)											
Trifluorotoluene	525	396	500	500	105.0	79.2		58-124			
4-Bromofluorobenzene-FI	406	424	500	500	81.2	84.8		50-150			

To: **Allwest Environmental**

Attn:Robert Horwath

Test Method: 8015M
8020

Prep Method: 5030

Legend & Notes

Gas/BTEX and MTBE

Analyte Flags

g

Hydrocarbon reported in the gasoline range does not match our gasoline standard.

CHROMALAB, INC.

Environmental Services (SDB) (DOHS 1094)

99-11-0089

1220 Quarry Lane • Pleasanton, California 94566-4756
(925) 484-1919 • Fax (925) 484-1096

Reference #: 48899

Chain of Custody

DATE _____ PAGE _____ OF _____

PROJ. MGR Rosemary Howard
COMPANY Amoco Environmental
ADDRESS One Sutter St #600
San Francisco, CA.
SAMPLERS (SIGNATURE) (415)391-2510 (PHONE NO.)
(FAX NO.)

SAMPLE ID.	DATE	TIME	MATRIX	PRESERV.	TPH-(EPA 8015,8020) ☒ Gas w/ ☒ BTEX ☒ MTBE	PURGEABLE AROMATICS BTEX (EPA 8020)	TPH-Diesel (EPA 8015M)	TEPH (EPA 8015M) ☐ Diesel ☐ M.O. ☐ Other	PURGEABLE HALOCARBONS, (HVOCs) (EPA 8010)	VOLATILE ORGANICS (VOCs) (EPA 8260)	SEMIVOLATILES (EPA 8270)	TOTAL OIL AND GREASE (SM 5520 B+F, E+F)		☐ PESTICIDES(EPA 8080) ☐ PCB's (EPA 8080)	PNA's by ☐ 8270 ☐ 8310	☐ Spec. Cond. ☐ TSS ☐ TDS	LUFT METALS: Cd, Cr, Pb, Ni, Zn	CAM 17 METALS (EPA 6010/7470/7471)	TOTAL LEAD	☐ W.E.T. (STLC) ☐ TCLP	☐ Hexavalent Chromium ☐ pH (24 hr hold time for H20)				NUMBER OF CONTAINERS
MW-1	11/4/99	11:30	W	HCl	X				X																6
MW-2	"	12:15	"	"	X				X																6
MW-3	"	10:30	"	"	X				X																6
MW-4	"	9:30	"	"	X				X																6
HC-1	"	8:15	"	"	X				X																6
Trip Blank	"	7:00	"	"	X				X																4
DUP-1	"	—	"	"	X				X																6

PROJECT INFORMATION

PROJECT NAME: Arco Hilton
PROJECT NUMBER 99275.25 99287.25
P.O. #

TAT: STANDARD 5-DAY | | | 24 | 48 | 72 | OTHER

SAMPLE RECEIPT

TOTAL NO. OF CONTAINERS	
HEAD SPACE	
TEMPERATURE	
CONFORMS TO RECORD	

SPECIAL INSTRUCTIONS/COMMENTS:
Report: ☐ Routine ☐ Level 2 ☐ Level 3 ☐ Level 4 ☐ Electronic Report

	1.	2.	3
RELINQUISHED BY	R. Navarro		
(SIGNATURE) (TIME)	13:32		
(PRINTED NAME) (DATE)	11/4/99		
(COMPANY)	Amoco		
RECEIVED BY			
(SIGNATURE) (TIME)			
(PRINTED NAME) (DATE)			
(COMPANY)			
RECEIVED BY (LABORATORY)			Denise Harrington
(SIGNATURE) (TIME)			D. Harrington 1332
(PRINTED NAME) (DATE)			Chromalab 11/4/99
(COMPANY) / (LAB)			

LIMITATIONS OF LIABILITY

ChromaLab, Inc. performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of ChromaLab, Inc. shall be the re-perform work at its own expense, and ChromaLab, Inc. shall have no other liability whatsoever, and in no event shall ChromaLab, Inc. be liable, whether in contract or tort, or otherwise for any incidental consequential or special damages, including but not limited to, damages in any way connected with the use or interpretation of information or analysis provided by ChromaLab, Inc.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding times and splitting of samples in the field.

Groundwater Monitoring Well Pump Test Log

Project No.: 99287.25 Project Name: Paccar High wells

Well No.: MW-1 Well Location: Oakland

Well Depth: 43.80 (ft.) Casing Diameter: 4 (in.)

Depth to Water: 27.38 (ft.) Date: 11/2/99 Time: 10:34

Water Column in Well: 16.42 (ft.) Well Volume: 10.67 (gal.)

Odor? No Free Product? No Thickness: N/A

Purging Method: Hand Pump ___ Submersible Pump * Bailer ___ Other ___

Time	pH	Conduc. (µS)	Temp. (°F)	Water Level	Volume Removed	Remark
10:37	8.04	603	74.0	25.75	5	Cloudy, 3 gpm
10:39	7.49	603	74.8	25.75	10	Clear
10:42	7.19	603	76.2	25.75	20	Clear
10:44	7.12	604	76.0	25.78	25	Clear, 3 gpm
10:47	7.03	605	76.4	25.80	30	Clear
10:50	7.16	610	76.9	25.80	40	Clear, 3 gpm
10:53	7.05	623	76.8	25.80	55	Clear
10:56	7.03	626	76.1	25.80	65	Clear

Remark: _____

_____

_____

Sampler: R.Ravelo Date/Time: 11/2/99

well pump

Groundwater Monitoring Well Pump Test Log

Project No.: 99287.25 Project Name: Paccar High wells

Well No.: MW-2 Well Location: Oakland

Well Depth: 46.18 (ft.) Casing Diameter: 4 (in.)

Depth to Water: 27.28 (ft.) Date: 11/1/99 Time: 14:00

Water Column in Well: 18.90 (ft.) Well Volume: 12.29 (gal.)

Odor? No Free Product? No Thickness: N/A

Purging Method: Hand Pump ___ Submersible Pump * Bailer ___ Other ___

Time	pH	Conduc. (µS)	Temp. (°F)	Water Level	Volume Removed	Remark
14:25	7.40	626	77.9	27.6	5	Tan, 2 gpm
14:28	6.97	615	77.2	27.6	20	Clear, 2.5 gpm
14:32	7.16	618	77.6	27.7	25	Clear, 2.5 gpm
14:36	6.99	612	76.0	27.7	35	Clear
14:39	6.86	617	77.0	27.7	45	Clear
14:45	6.85	607	75.0	27.7	60	Clear
14:51	6.99	613	74.3	27.7	70	Clear, 2.5 gpm

Remark: _____

_____

_____

Sampler: B. Horwath, R.Ravelo Date/Time: 11/1/99

well pump aw1

Groundwater Monitoring Well Pump Test Log

Project No.: 99287.25 Project Name: Paccar High wells

Well No.: MW-3 Well Location: Oakland

Well Depth: 43.2 (ft.) Casing Diameter: 4 (in.)

Depth to Water: 27.18 (ft.) Date: 11/2/99 Time: 9:30 AM

Water Column in Well: 16.02 (ft.) Well Volume: 10.41 (gal.)

Odor? No Free Product? No Thickness: N/A

Purging Method: Hand Pump ___ Submersible Pump * Bailer ___ Other ___

Time	pH	Conduc. (µS)	Temp. (°F)	Water Level	Volume Removed	Remark
9:35	7.55	382	70.7	27.65	5	Tan, 2.8 gpm
9:40	7.28	452	72.3	27.65	10	Clear
9:42	6.95	473	73.5	27.70	25	Clear, 2.9 gpm
9:45	6.96	478	73.1	27.70	30	Clear
9:48	7.06	482	72.6	27.70	40	Clear, 3 gpm
9:50	6.93	485	73.3	27.70	45	Clear
9:52	6.88	485	73.1	27.70	55	Clear
9:56	7.08	481	72.5	27.70	65	Clear, 3 gpm

Remark: _____

_____

_____

Sampler: R.Ravelo Date/Time: 11/2/99

well pump

Groundwater Monitoring Well Pump Test Log

Project No.: 99287.25 Project Name: Paccar High wells

Well No.: MW-4 Well Location: Oakland

Well Depth: 44.38 (ft.) Casing Diameter: 4 (in.)

Depth to Water: 25.92 (ft.) Date: 11/2/99 Time: 8:14

Water Column in Well: 18.46 (ft.) Well Volume: 12.02 (gal.)

Odor? No Free Product? No Thickness: N/A

Purging Method: Hand Pump ___ Submersible Pump * Bailer ___ Other ___

Time	pH	Conduc. (µS)	Temp. (°F)	Water Level	Volume Removed	Remark
8:25	7.87	702	69.8	25.92	5	Clear, 2.5 gpm
8:29	7.58	635	69.6	26.25	10	Clear
8:33	7.32	595	69.5	26.25	22	Clear
8:37	7.17	585	69.3	26.25	27	Clear, 2.5 gpm
8:40	8.00	562	69.4	26.25	40	Clear, 2.8 gpm
8:45	7.34	579	69.3	26.25	55	Clear
8:48	7.10	582	69.9	26.25	65	Clear
8:53	7.12	580	69.0	26.25	70	Clear, 2.8 gpm

Remark: _____

_____

_____

Sampler: R.Ravelo Date/Time: 11/2/99

well pump

Groundwater Monitoring Well Pump Test Log

Project No.: 99287.25 Project Name: Paccar High wells

Well No.: HC-1 Well Location: Oakland

Well Depth: 42.71 (ft.) Casing Diameter: 4 (in.)

Depth to Water: 25.25 (ft.) Date: 11/1/99 Time: 13:00

Water Column in Well: 17.46 (ft.) Well Volume: 11.35 (gal.)

Odor? No Free Product? No Thickness: N/A

Purging Method: Hand Pump ___ Submersible Pump * Bailer ___ Other ___

Time	pH	Conduc. (µS)	Temp. (°F)	Water Level	Volume Removed	Remark
13:00	7.28	665	75.6	25.25	5	Tan, 2 gpm
13:03	7.30	680	74.8	25.4	10	Lt. Gray, 2 gpm
13:10	7.32	700	83.6	25.5	15	Clear
13:22	7.37	663	77.5	25.5	20	Clear
13:31	7.48	635	75.3	25.6	35	Clear, 2.5 gpm
13:36	6.92	622	74.6	25.7	55	Clear, 2.5 gpm
13:41	6.96	622	74.6	25.7	70	Clear, 2.5 gpm

Remark: _____

_____

_____

Sampler: B. Horwath, R.Ravelo Date/Time: 11/1/99

well pump

GROUNDWATER MONITORING WELL SAMPLING FIELD LOG

Project No.: 99287.25 Project Name: Paccar

Well No.: MW-1 Well Location: Oakland
Well Depth: 43.80 (ft.) Casing Diameter: 4 (in.)

Depth to Water: 27.40 (ft.) Date: 11/4/1999 Time: 10:44 AM

Water Column in Well: 16.40 (ft.) Well Volume: 10.66 (gal.)

Odor? No Free Product? No Thickness: N/A

Purging Method: Hand Pump ___ Submersible Pump ___ Bailer x Other N/A

Time	pH	Conduc. (µS)	Temp. (°F)	Water Level	Volume Removed	Remarks
10:58	7.49	374	72.8	-	11	Tan
11:07	7.38	435	71.3	-	22	Tan
11:21	7.40	470	71.5	-	32	Tan

Purging Start Time: 10:44 AM Purging Stop Time: 11:21 AM

Total Volume Purged: 32 (gal.) Well Dewater? No

Water Level Prior to Sampling: - (ft.) Time: _____

Sampling Method: Teflon Bailer ____ Disposable Bailer x Sampling Pump ___

Sample Collected: 6 x40 ml Sample No.: MW-1

Remarks: _____

_____

_____

_____

Sampler: R. Ravelo Date/Time: 11-4-99 11:30 AM

-

PC8/C/RAF?99287.25

GROUNDWATER MONITORING WELL SAMPLING FIELD LOG

Project No.: 99287.25 Project Name: Paccar

Well No.: MW-2 Well Location: Oakland
Well Depth: 46.18 (ft.) Casing Diameter: 4 (in.)

Depth to Water: 27.28 (ft.) Date: 11/4/1999 Time: 11:34 AM

Water Column in Well: 18.90 (ft.) Well Volume: 12.29 (gal.)

Odor? No Free Product? No Thickness: N/A

Purging Method: Hand Pump ___ Submersible Pump ___ Bailer x Other N/A

Time	pH	Conduc. (µS)	Temp. (°F)	Water Level	Volume Removed	Remarks
11:45	6.99	423	72.4	-	12	Tan
11:53	7.01	412	71.8	-	25	Tan
12:09	7.03	419	71.5	-	37	Tan

Purging Start Time: 11:34 AM Purging Stop Time: 12:09 PM

Total Volume Purged: 37 (gal.) Well Dewater? No

Water Level Prior to Sampling: - (ft.) Time: _____

Sampling Method: Teflon Bailer ____ Disposable Bailer x Sampling Pump ___

Sample Collected: 6 x40 ml Sample No.: MW-2

Remarks: _____

_____

_____

_____

Sampler: R. Ravelo Date/Time: 11-4-99 12:15 PM

GROUNDWATER MONITORING WELL SAMPLING FIELD LOG

Project No.: 99287.25 Project Name: Paccar

Well No.: MW-3 Well Location: Oakland
Well Depth: 43.20 (ft.) Casing Diameter: 4 (in.)

Depth to Water: 27.22 (ft.) Date: 11/4/1999 Time: 9:44 AM
Water Column in Well: 15.98 (ft.) Well Volume: 10.39 (gal.)

Odor? No Free Product? No Thickness: N/A

Purging Method: Hand Pump ___ Submersible Pump ___ Bailer x Other N/A

Time	pH	Conduc. (µS)	Temp. (°F)	Water Level	Volume Removed	Remarks
9:57	6.94	305	68.8	-	10.5	Tan
10:07	6.56	322	70.7	-	21	Tan
10:21	7.01	338	71.3	-	31.5	Tan

Purging Start Time: 9:44 AM Purging Stop Time: 10:21 AM

Total Volume Purged: 31.50 (gal.) Well Dewater? No

Water Level Prior to Sampling: - (ft.) Time: _____

Sampling Method: Teflon Bailer ____ Disposable Bailer x Sampling Pump ___

Sample Collected: 6 x40 ml Sample No.: MW-3

Remarks: _____

_____

_____

_____

Sampler: R. Ravelo Date/Time: 11-4-99 10:30 AM

-

PC8/C/RAF?99287.25

GROUNDWATER MONITORING WELL SAMPLING FIELD LOG

Project No.: 99287.25 Project Name: Paccar

Well No.: MW-4 Well Location: Oakland
Well Depth: 44.38 (ft.) Casing Diameter: 4 (in.)

Depth to Water: 25.92 (ft.) Date: 11/4/1999 Time: 8:41 AM

Water Column in Well: 18.46 (ft.) Well Volume: 12 (gal.)

Odor? No Free Product? No Thickness: N/A

Purging Method: Hand Pump ___ Submersible Pump ___ Bailer x Other N/A

Time	pH	Conduc. (µS)	Temp. (°F)	Water Level	Volume Removed	Remarks
9:01	7.84	452	68.3	-	12	Tan
9:09	7.93	482	68.9	-	24	Tan
9:24	7.82	472	67.8	-	36	Tan

Purging Start Time: 8:41 AM Purging Stop Time: 9:24 AM

Total Volume Purged: 36 (gal.) Well Dewater? No

Water Level Prior to Sampling: - (ft.) Time: _____

Sampling Method: Teflon Bailer ____ Disposable Bailer x Sampling Pump ___

Sample Collected: 6 x40 ml Sample No.: MW-4

Remarks: _____

_____

_____

_____

Sampler: R. Ravelo Date/Time: 11-4-99 9:30 AM

PC8/C/RAF799287.25

GROUNDWATER MONITORING WELL SAMPLING FIELD LOG

Project No.: 99287.25 Project Name: Paccar

Well No.: HC-1 Well Location: Oakland
Well Depth: 42.71 (ft.) Casing Diameter: 4 (in.)

Depth to Water: 25.24 (ft.) Date: 11/4/1999 Time: 7:28 AM

Water Column in Well: 17.47 (ft.) Well Volume: 11.35 (gal.)

Odor? No Free Product? No Thickness: N/A

Purging Method: Hand Pump ___ Submersible Pump ___ Bailer x Other N/A

Time	pH	Conduc. (µS)	Temp. (°F)	Water Level	Volume Removed	Remarks
7:45	8.10	545	64.9	-	11	Tan
7:54	7.56	527	65.2	-	22	Tan
8:05	7.50	512	65.6	-	34.5	Tan

Purging Start Time: 7:28 AM Purging Stop Time: 8:05 AM

Total Volume Purged: 34.5 (gal.) Well Dewater? No

Water Level Prior to Sampling: - (ft.) Time: _____

Sampling Method: Teflon Bailer ____ Disposable Bailer x Sampling Pump ___

Sample Collected: 6 x40 ml & Dup #1 6 x 40 ml Sample No.: HC-1

Remarks: _____

_____

_____

_____

Sampler: R. Ravelo Date/Time: 11-4-99 8:15 AM

Groundwater Monitoring Well Pump Test Log

Project No.: 99287.25 Project Name: Paccar High

Well No.: MW-3A Well Location: Oakland

Well Depth: 35.90 (ft.) Casing Diameter: 4 (in.)

Depth to Water: 25.93 (ft.) Date: 5/31/00 Time: 9:20

Water Column in Well: 9.97 (ft.) Well Volume: 6.48 (gal.)

Odor? _____ Free Product? _____ Thickness: _____

Purging Method: Hand Pump____ Submersible Pump X Bailer X Other____

Purging Start Time: 9:20 Purging Stop Time: 11:54

Total Volume Purged: 105 (gal.) Well Dewater? _____

Time	pH	Conduc. (μS)	Temp. (°C)	Water Level	Volume Removed	Remark
-	7.55	1042	79.2	-	5 gl	4 gpw - Brown
9:32	7.50	1065	77.6	27.6	10 gl	4 gpw - Brown
-	7.92	1012	75.4	-	15 gl	4 gpw - Brown
9:44	7.78	948	75.2	27.4	20 gl	4 gpw - Brown
9:50	8.58	904	84.1	29.30	25	4 gpw - Brown
10:00	8.10	838	82.7	30.8	35	3.5 gpw
10:15	7.95	841	81.8	30	40	2 gpw
10:25	7.86	839	81.6	32	-	6 gpw Light Brown
10:40	7.79	847	81.5	33	50	6 gpw Light Brown

Sampler: R. Ravelo Date/Time: 5/31/00

pc9/A:\99287-25.mw3a

Groundwater Monitoring Well Pump Test Log

Project No.: 99287.25 Project Name: Paccar High

Well No.: MW-3A con't. Well Location: Oakland

Well Depth: 35.90 (ft.) Casing Diameter: 4 (in.)

Depth to Water: 25.93 (ft.) Date: 5/31/00 Time: 9:20

Water Column in Well: 9.97 (ft.) Well Volume: 6.48 (gal.)

Odor? _____ Free Product? _____ Thickness: _____

Purging Method: Hand Pump____ Submersible Pump X Bailer X Other____

Purging Start Time: 9:20 Purging Stop Time: 11:54

Total Volume Purged: 105 (gal.) Well Dewater? _____

Time	pH	Conduc. (μS)	Temp. (°C)	Water Level	Volume Removed	Remark
10:55	7.79	583	79.5	34.7	65	6 gpw Light Brown
11:38	7.66	578	78.7	31.7	75	1.5 gpw - Tan
11:50	7.58	569	78.4	33.9	85	4 gpw - Tan
11:54	7.44	582	79.8	32.7	105	6 gpw - Tan

Sampler: R. Ravelo Date/Time: 5/31/00

pc9/A:\99287-25.mw3a2

ALAMEDA COUNTY PUBLIC WORKS AGENCY

WATER RESOURCES SECTION
399 ELMHURST ST. HAYWARD CA. 94544-1395
PHONE (510) 670-5554 MARLON MAGALLANES/FRANK CODD (510) 670-5783
FAX (510)783-1939

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT GRAND Auto #43
4240 EAST 14TH STREET
OAKLAND, CALIFORNIA

FOR OFFICE USE
PERMIT NUMBER W00-234
WELL NUMBER
APN

CLIENT
Name PACCAR INC (Lisa Robbins)
Address PO BOX 1518 Phone 425-468-7199
City Bellevue Zip 98009

APPLICANT
Name Robert M. Horwath, REA 5925
Address 1 Sutter #600 Fax 415-991-2008
City San Francisco Phone 415-991-2510
Zip 94104

TYPE OF PROJECT Destroy old well + replace with new well + repair 2nd well.

Well Construction		Geotechnical Investigation	
Cathodic Protection	☐	General	☐
Water Supply	☐	Contamination	☐
Monitoring		Well Destruction	X

PROPOSED WATER SUPPLY WELL USE:

New Domestic	☐	Replacement Domestic	☐
Municipal	☐	Irrigation	☐
Industrial	☐	Other	☐

DRILLING METHOD:

Mud Rotary	☐	Air Rotary	☐	Auger	X
Cable	☐	Other	☐		

DRILLER'S LICENSE NO. C-57 522125

WELL PROJECTS
Drill Hole Diameter 10 in. Maximum
Casing Diameter 4 in. Depth 45 ft.
Surface Seal Depth ft. Number MW-3A
See ATTACHED COC

GEOTECHNICAL PROJECTS
Number of Borings Maximum
Hole Diameter in. Depth ft.

ESTIMATED STARTING DATE MAY 22, 2000 (ASAP)
ESTIMATED COMPLETION DATE 1-DAY

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE Robert M. Horwath DATE 5/16/00

Rev.4-1-00

PERMIT CONDITIONS
Circled Permit Requirements Apply

(G) GENERAL
(1.) A permit application should be submitted so as to arrive at the ACPWA office five days prior to proposed starting date.
(2.) Submit to ACPWA within 60 days after completion of permitted work the original Department of Water Resources Well Completion Report.
(3.) Permit is void if project not begun within 90 days of approval date

B. WATER SUPPLY WELLS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved.

C. GROUNDWATER MONITORING WELLS INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

D. GEOTECHNICAL
Backfill bore hole by tremie with cement grout or cement grout/sand mixture. Upper two-three feet replaced in kind or with compacted cuttings.

E. CATHODIC
Fill hole above anode zone with concrete placed by tremie.

(F.) WELL DESTRUCTION
See attached.

G. SPECIAL CONDITIONS

APPROVED Frank L. Codd DATE 5-16-00

FAXED 5-16-00

Well Installation Procedures

The groundwater well, MW-3A was installed on May 25, 1999, under the direction of an AllWest State Registered Geologist. Well installation was performed by Bay Area Exploration, a well drilling contractor with valid C-57 license. The groundwater monitoring wells were installed inside soil borings advanced by a CME-75 truck-mounted drilling rig with 10-inch outside diameter (OD) hollow-stem continuous flight augers.

During the boring advancement, a field geologist from AllWest was present to collect soil samples, to conduct field screening, and to maintain a log of the drilling activities. The boring logs contained pertinent information on boring advancement and soil conditions, in particular the lithology of site soils and physical characteristics that suggest potential contamination. A copy of the boring logs as well as the log legends are included in Appendix B of this report. Soil cores were generated from the boring at intervals of 5 feet using the standard penetration test (SPT) sampler. The soil cores were field screened for classification and contamination indication purposes and preserved for potential chemical or physical testing laboratory analyses.

After the soil boring advancement was complete, the well casing was lowered into the borehole through the center of the hollow stem augers. The augers were then generally removed one section at a time while the sand filter pack was being placed around the well casing. The bottom of the well casings were all set a depth of 41 feet bgs. Well casings were composed of 4-inch diameter, schedule-40, PVC pipes. The 21-foot screen section of the casing had factory-slotted 0.02-inch perforations and extended from a depth of 20 feet bgs to the base of the well casing. The blank (non-perforated) section was then added to the screen section to complete the well casing to a few inches bgs.

Pre-washed #3 Monterey sands were placed around the screen section of the well casing to form a filter pack. The filter pack was placed from the bottom of the well to one foot above the screen section. A one-foot bentonite seal was placed above the filter pack to prevent surface water infiltration. The remaining length of the annular space in the borehole was backfilled with neat cement grout up to a foot below the ground surface. The uppermost foot of the well casing was protected by a traffic-rated well vault set in concrete. A water-tight locking end-cap was placed on top of the well casing to prevent surface water intrusion and unauthorized access. Soil cuttings generated during the well installation were contained in Deportment of Transportation (DOT) approved 55-gallon steel drums and stored onsite for future disposal.

UNIFIED SOIL CLASSIFICATION SYSTEM

PRIMARY DIVISIONS			GROUP SYMBOL	SECONDARY DIVISIONS
COARSE GRAINED SOIL	GRAVELS More than half of course fraction is larger than No. 4 sieve.	Clean gravels (less than 5% of fines)	GW	Well graded gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel-sand mixtures, little or no fines.
		Gravel with fines	GM	Silty gravels or gravel-sand-silt mixtures, with non-plastic fines.
			GC	Clayey gravels or gravel-sand-clay mixtures, with plastic fines.
	SANDS More than half of course fraction is smaller than No. 4 sieve.	Clean sands (less than 5% of fines)	SW	Well graded sands or gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		Sands with fines	SM	Silty sands or sand-silt mixtures, with non-plastic fines.
			SC	Clayey sands or sand-clay mixtures, with plastic fines.
FINE GRDINED SOIL	SILTS AND CLAYS Liquid Limit less than 50%		ML	Inorganic silts and very fine sands, rock flour, or clayey silts, with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS Liquid Limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils.

AllWest
AllWest Environmental, Inc.

Log of Boring: MW-3A

Project Address: 4240 East 14th Street, Oakland, California

Project Number: 99287.25A

Drilling Date: 05/25/00

Drilling Contractor: Bay Area Exploration
Drill Rig: CME-75
Auger: 10"

Sampler: Split Spoon on 10-Foot Centers
Logged By: Rafael Ravelo

Blow Count	Sample Time	Sample Interval	Depth in Feet	Well Profile	USCS Code	Soil Description
NA	10:05		1		GW	Asphalt 3" Brown sand base with some gravel, moist.
			2			*Traffic-Rated Well Vault with Locking Upper End Cap and Concrete Seal*
			3		CL	Dark brown silty clay, moist.
			4			
	10:22		5		SM	Brown silty clay sand, moist.
			6			*Cement/Bentonite Grout Backfill*
			7			
			8			
			9			
			10			
			11			
			12			
			13			
			14			*4"-Diameter 0.02"-Slotted Schedule-40 PVC Screen*
	10:39		15		SM	Brown silty sand, moist.
			16			
			17			*Bentonite Seal*
			18			
			19			*#3 Sand Filter Pack*
			20			
			21			*4" Diameter Blank Schedule 40 PVC Casing*

Notes:

Reviewed By:
R. Horwath, R.G. #5925

Drawn By:
J. Tingin

AllWest
AllWest Environmental, Inc.

Log of Boring: MW-3A

Project Address: 4240 East 14th Street, Oakland, California

Project Number: 99287.25A

Drilling Date: 05/25/00

Drilling Contractor: Bay Area Exploration

Drill Rig: CME-75

Auger: 10"

Sampler: Split Spoon on 10-Foot Centers

Logged By: Rafael Ravelo

Blow Counts	Sample Time	Sample Interval	Depth in Feet	Well Profile	USCS Code	Soil Description
	10:59		22–23		CL	Medium brown silty clay, moist, some sand and gravel particles.
			24–25			
			26–27			
	11:48		28		SM	Light brown sandy silt, very moist.
			29–32			
	12:17		33		GW	Brown poorly graded gravel, no fines, wet.
			34–39			
			40			Note: Boring terminated at 41 ' bgs.
			41			*2" Diameter, 3" long, bottom PVC cap*
			42			

Notes:

Reviewed by: R. Horwath, R.G. #5925

Drawn By: JKM Tingin

Agency Letters
for
Grand Auto #42
4240 East 14th Street
Oakland, California

RKB

This is as close as we will get to a

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

ENVIRONMENTAL HEALTH SERVICES
ENVIRONMENTAL PROTECTION (LOP)
1131 Harbor Bay Parkway Suite 250
Alameda, CA 94502-6577
(510) 567-6700
FAX (510) 337-9335

closure letter

LCR
1/7/96

December 30, 1996

Mr. Raymond Elliott
Paccar Automotive
Environmental Manager
1400 North Fourth Street
Renton, WA - 98055

Ref: **Grand Auto Supply - 4240 East 14th Street, Oakland, CA**

Dear Mr. Elliott:

I am in receipt of the document, dated October 8, 1996, prepared by HartCrowser, which includes a risk assessment to address the soil contamination found in the referenced site

The risk assessment was conducted based on the maximum concentrations of chlorinated solvents found on site. The risk for the exposure pathways "inhalation of vapors volatilizing from subsurface soils to ambient air and indoor air" were evaluated according to ASTM's Risk Based Corrective Action (RBCA).

Based on the information submitted to this Department, the soils on-site do not pose a threat to public health. However, please note that the groundwater contamination is still a concern to this Department and hence needs to be addressed.

If you have any questions, you can reach me at (510) 567-6764

Sincerely,

Madhulla Logan

Madhulla Logan
Hazardous Material Specialist

C: **Jay A. Ach,** R.G, Senior Project Geologist, HartCrowser, 353 Sacramento Suite 1140, San Francisco, CA - 94111

Post-it® Fax Note 7671	Date 12/12/96	# of pages ▶ 3
To Lisa Robbins	From Jay Ach	
Co./Dept. PACCAR Inc.	Co. Hart Crowser	
Phone #	Phone # (415) 391-1885	
Fax # (206) 453-5900	Fax #	

HARTCROWSER

Hart Crowser, Inc.
353 Sacramento, Suite 1140
San Francisco, California 94111
FAX 415.391.2216
415.391.1885

Earth and Environmental Technologies

December 13, 1996

Ms, Madhula Logan
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway, Room 250
Alameda, CA 94502

Re: Derivation of Parameters for Risk Assessment
Grand Auto Supply
4240 East 14th Street
Oakland, California J-6077

Dear Ms. Logan:

Hart Crowser is pleased to respond to your request for additional discussion of the derivation of parameters used in the risk assessment for the Grand Auto store at 4240 East 14th Street in Oakland, California. Attached is a memorandum regarding the parameters that was prepared by our risk assessment group.

The memorandum mentions "a site west of Oakland" where soil test data was collected. The soil test data are from the publicly available *Remedial Investigation Report* for the Varian Associates, Inc. site at 611 Hansen Way in Palo Alto, California. The report is dated May 22, 1992, and was submitted to the Department of Toxic Substances Control. While this site is across the Bay from Oakland, the soils, geology, and stratigraphy are all quite similar to those at the Grand Auto site. Both sites are in the gently sloping Bay plain, approximately midway between the hills and the Bay margin. We believe that the soil test data from the Varian site provide a better approximation of actual conditions at the Grand Auto site than do the default RBCA values.

Please call me at (415) 391-1885 if you have any additional questions or need additional information.

Sincerely,

HART CROWSER, INC.

Jay A. Ach, R.G.
Senior Project Geologist

enclosure

cc: Ms. Lisa Robbins, PACCAR

Site Specific Parameters Derivation

The depth to groundwater was assumed to be 27 feet (upper value in the range reported by Hart Crowser, 1996). The depth to subsurface soil sources was assumed to be 8 feet, which is the location of the highest detected soil concentrations of chemicals of concern.

Parameter assumptions for total porosity, bulk density, and volumetric air and water contents were developed from laboratory soil test data collected from a site just west of Oakland, where soil types and depositional environment are similar to those at the Grand Auto site.

Total porosities of 39.7, 37.6, and 44.4 percent (average of 41 percent) were measured for three soil samples collected above the water table. The degree of saturation ($volume_{water}$ / $volume_{voids}$) was measured as 99.7, 82.8, and 95.3 percent, respectively, for those three samples. The high degree of saturation and proximity to the water table suggests the samples would represent capillary fringe conditions within these relatively fine-grained soils. Multiplying saturation by porosity provides estimates for volumetric water content of the capillary fringe (39.5, 31.1, and 42.3 percent, respectively; average of 38 percent). Subtracting 38 percent water content from 41 percent porosity leaves 3 percent volumetric air content for the capillary fringe.

Volumetric water content in the vadose zone above the capillary fringe was assumed to be 50 percent of that in the fringe (based on general information provided in Das, 1985), or 19 percent. Subtracting 19 percent water content from 41 percent porosity leaves 22 percent volumetric air content for the vadose zone soils. Volumetric water and air content in foundation and wall cracks was assumed to be the same as in the vadose soils.

Soil bulk density was measured as 103.5, 105.2, and 93.7 pcf in the three samples, with an average of 101 pcf or 1.6 g/cc. The thickness of the capillary fringe was estimated based on the type of soils (ea. fine-grained).

REFERENCES

Das, B.M., 1985. Principles of Geotechnical Engineering. PWS Publishers, Boston. 571 p.

Hart Crowser, Inc., 1996. Facility Closure Report, Grand Auto Supply, Oakland, California, February 16, 1996.

Table 3 - Soil, Building, Surface, and Subsurface Parameters Used in Generating Tier 1 RBSLs

Parameters	Definitions, Units	Residential	Commercial/Industrial
d	lower depth of sufficient soil zone, cm	100 cm	100 cm
D^{air}	diffusion coefficient in air, cm^2/sec	chemical-specific	chemical-specific
D^{wat}	diffusion coefficient in water, cm^2/sec	chemical-specific	chemical-specific
ER	enclosed-space air exchange rate, S^{-1}	0.00014 s^{-1}	0.00023 s^{-1}
f_{oc}	fraction of organic carbon in soil, g-C/g-soil	0.01	0.01
H	henry's law constant, $(cm^3\text{-}H_2O)/(cm^3\text{-air})$	chemical-specific	chemical-specific
h_{cap}	thickness of capillary fringe, cm	100 cm	**100 cm**
h_v	thickness of vadose zone, cm	820.8 cm	**820.8 cm**
k_{oc}	carbon-water sorption coefficient, $cm^3\text{-}H_2O/g\text{-}C$	chemical-specific	chemical-specific
k_s	soil-water sorption coefficient, $cm^3\text{-}H_2O/g\text{-soil}$	$f_{oc} \times k_{oc}$	$f_{oc} \times k_{oc}$
L_B	enclosed-space volume/infiltration area ratio, cm	200 cm	300 cm
L_{crack}	enclosed-space foundation or wall thickness, cm	15 cm	15 cm
L_{gw}	depth to groundwater = $h_{cap} + h_v$ cm	920.8 cm	**920.8 cm**
L_s	depth to subsurface soil sources, cm	243.2 cm	**243.2 cm**
S	pure component solubility in water, $mg/L\text{-}H_2O$	chemical-specific	chemical-specific
U_{air}	wind speed above ground surface in ambient mixing zone, cm/sec	225 cm/sec	225 cm/sec
W	width of source area parallel to wind, or groundwater flow direction, cm	1500 cm	1500 cm
δ_{air}	ambient air mixing zone height, cm	200 cm	200 cm
η	areal fraction of cracks in foundations/walls, cm^2-cracks/cm^2-total area	0.01 cm^2-cracks/cm^2-total area	**0.01 cm^2-cracks/cm^2-total area**
θ_{acap}	volumetric air content in capillary fringe soils, $cm^3\text{-air}/cm^3\text{-soil}$	0.03 $cm^3\text{-air}/cm^3\text{-soil}$	**0.03 $cm^3\text{-air}/cm^3\text{-soil}$**
θ_{acrack}	volumetric air content in foundation/wall cracks, $cm^3\text{-air}/cm^3$ total volume	0.22 $cm^3\text{-air}/cm^3$ total volume	**0.22 $cm^3\text{-air}/cm^3$ total volume**
θ_{av}	volumetric air content in vadose zone soils, $cm^3\text{-air}/cm^3\text{-soil}$	0.22 $cm^3\text{-air}/cm^3\text{-soil}$	**0.22 $cm^3\text{-air}/cm^3\text{-soil}$**
θ_T	total soil porosity, $cm^3/cm^3\text{-soil}$	0.41 $cm^3/cm^3\text{-soil}$	**0.41 $cm^3/cm^3\text{-soil}$**
θ_{wcap}	volumetric water content in capillary fringe soils, $cm^3\text{-}H_2O/cm^3\text{-soil}$	0.38 $cm^3\text{-}H_2O/cm^3$-soil	**0.38 $cm^3\text{-}H_2O/cm^3\text{-soil}$**
θ_{wcrack}	volumetric water content in foundation/wall cracks, $cm^3\text{-}H_2O/cm^3$ total volume	0.19 $cm^3\text{-}H_2O/cm^3$ total volume	**0.19 $cm^3\text{-}H_2O/cm^3$ total volume**
θ_{wv}	volumetric water content in vadose zone soils, $cm^3\text{-}H_2O/cm^3\text{-soil}$	0.19 $cm^3\text{-}H_2O/cm^3$-soil	**0.19 $cm^3\text{-}H_2O/cm^3\text{-soil}$**
ρ_b	soil bulk density, $g\text{-soil}/cm^3\text{-soil}$	1.6 g/cm^3	**1.6 g/cm^3**
τ	averaging time for vapor flux, sec	7.88×10^8 sec	**7.88×10^8 sec**

Parameters derived for site-specific use are listed in bold type.

HARTCROWSER

Earth and Environmental Technologies

Hart Crowser, Inc.
353 Sacramento, Suite 1140
San Francisco, California 94111
FAX 415.391.2216
415.391.1885

October 8, 1996

Ms. Madhula Logan
Hazardous Materials Division
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Room 250
Alameda, California 94502

Re: Request for Closure/Site Soil
Grand Auto Supply
4240 East 14th Street
Oakland, California J-6077

Dear Ms. Logan:

On behalf of PACCAR Automotive, Inc. (PAI), Hart Crowser, Inc., requests closure for the soil portion of the site at 4240 East 14th Street in Oakland, California (the Site), which is currently occupied by a Grand Auto store.

Hart Crowser, in our "Facility Closure Report," dated February 16, 1996, previously requested closure for this Site. (A copy of the report is attached to the enclosed risk assessment.) This report was prepared to meet the closure requirements of the Alameda County Health Care Services Agency (ACHCSA) and the California Regional Water Quality Control Board - San Francisco Region (RWQCB). The facility closure request was based on the following:

- The known potential onsite sources of petroleum hydrocarbons (underground storage tanks (USTs), UST-associated piping, and car wash sump) have been removed, along with the bulk of the sump-related soil that contained petroleum hydrocarbons;

- Petroleum hydrocarbons have not been detected in site groundwater for five quarters of groundwater monitoring;

- The available chemical data suggest that the former car wash sump was not a likely source of halogenated volatile organic compounds (VOCs) to groundwater;

- No other potential sources of halogenated VOCs related to Grand Auto operations are known or suspected at the site. We therefore concluded that the halogenated VOCs present in site groundwater are due to a source unrelated to Grand Auto operations;

- Numerous potential offsite sources of halogenated VOCs exist in the immediate vicinity of the site. We have not identified any documents indicating that environmental investigations pertaining to halogenated VOCs have been conducted at these potential offsite sources.

In the meeting between Hart Crowser, PAI, and you, held at your office on June 22, 1996, you indicated that Alameda County would grant closure for the soil portion of the Site at this time, provided an ASTM-style risk assessment indicated that soil remaining at the Site posed no significant threat to human health. At the request of PAI, Hart Crowser completed a risk assessment for the soil portion of the Site, following ASTM RBCA (Tier I) guidelines (the Risk Assessment). A copy of the Risk Assessment, dated September 27, 1996, is enclosed. The Risk Assessment indicated that residual chemicals at the Site *do not* exceed Risk-Based Screening Levels (RBSLs). The RBSLs correspond to chemical concentrations in various environmental media at the Site, where the concentrations result in a non-carcinogenic hazard quotient of 1 and a carcinogenic risk level of 1×10^{-6}. The Risk Assessment concluded, therefore, that the presence of residual chemicals in Site soil does not pose unacceptable risks to human health under all current Site use or potential future Site use scenarios.

Hart Crowser believes that we have now satisfied the requirements for closure of the soil portion of the Site, as set forth in our meeting on June 22, 1996. We therefore request that you please consider closure of the soil portion of the Site at your earliest convenience.

Please call Jay Ach at (415) 391-1885 if you have any questions or require further information.

Sincerely

HART CROWSER, INC.

Jay A. Ach, R.G.
Senior Project Geologist

Taku Fuji
Project Toxicologist

REGISTERED PROFESSIONAL GEOLOGIST
JAY A. ACH
No. 4595
STATE OF CALIFORNIA

cc: Ms. Lisa Robbins, PACCAR, Inc.
Mr. Raymond Elliott, PACCAR Automotive, Inc.

enclosure:
Risk Assessment, dated September XX, 1996

Hart Crowser 1996 Risk Assessment
for
Grand Auto #42
4240 East 14th Street
Oakland, California

RISK ASSESSMENT

Grand Auto Supply
4240 East 14th Street
Oakland, California

October 8, 1996

J-6077

Submitted to:

PACCAR Automotive, Inc.
1400 N. 4th Street
Renton, WA 98055

Submitted by:

Hart Crowser, Inc.
353 Sacramento Street, Suite 1140
San Francisco, California 94111

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APPENDIX A
TOXICITY PROFILES OF SELECTED CHEMICALS OF CONCERN A-1

ATTACHMENT 1

Facility Closure Report
Grand Auto Supply
4240 East 14th Street
Oakland, California
Hart Crowser, Inc.
February 16, 1996

ACRONYMS

ASTM	American Society of Testing Materials
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CPF	Cancer Potency Factor
EDI	Estimated Daily Intake
EPA	US Environmental Protection Agency
EPC	Exposure Point Concentration
HEAST	Health Effects Assessment Summary Table
HI	Hazard Index
HQ	Hazard Quotient
IRIS	Integrated Risk Information System
NOAEL	No Observable Adverse Effects Level
PCE	Perchloroethylene
PQL	Practical Quantitation Limit
PRG	Preliminary Remediation Goal
RBC	Risk-Based Concentrations
RBCA	Risk-Based Corrective Action
RBSL	Risk-Based Screening Level
RfD	Reference Dose
RME	Reasonable Maximum Exposure
TPH	Total Petroleum Hydrocarbons
UCL	Upper Confidence Level
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
μg/kg	micrograms per kilogram
mg/kg	milligrams per kilogram

RISK ASSESSMENT
GRAND AUTO SUPPLY
4240 EAST 14TH STREET
OAKLAND, CALIFORNIA

EXECUTIVE SUMMARY

On behalf of PACCAR Automotive, Inc., Hart Crowser, Inc. has prepared this risk assessment for the Grand Auto Supply store located at 4240 East 14th Street in Oakland, California. This risk assessment has been prepared to meet the closure requirements of the Alameda County Health Care Services Agency and the California Regional Water Quality Control Board - San Francisco Region. This risk assessment was conducted in accordance with the framework developed by the American Society of Testing Materials (ASTM), designated the Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites (RBCA) Tier 1 analysis.

The RBCA Tier 1 evaluation is a risk-based analysis to develop non-site-specific values for direct and indirect exposure pathways utilizing conservative exposure assumptions for potential pathways and various property use categories. In the Tier 1 analysis, a table of Risk-Based Screening Levels (RBSLs) are derived for standard exposure scenarios using current Reasonable Maximum Exposure (RME) and toxicological parameters as recommended by the EPA. Site conditions are then compared against the appropriate RBSLs to determine whether site conditions satisfy the criteria for regulatory closure or warrant a more site-specific evaluation (ASTM, 1995).

This risk assessment was conducted to evaluate the probability and magnitude of adverse impacts to human health associated with actual or potential exposures to site-related chemicals remaining in soils at the Grand Auto Supply site. Based on an evaluation of existing site data, the exposure pathways that were quantitatively assessed were the inhalation of vapors volatilizing from subsurface soils and the inhalation of vapors volatilizing from groundwater. The compounds considered in the subsurface soils exposure pathway were perchloroethylene (PCE) and benzene, toluene, ethylbenzene, and xylenes (BTEX). The compounds considered in the groundwater exposure pathway were chlorinated solvents. The exposure models utilized in this risk assessment assumed that the receptors were on site, at the location of the boring or well with the highest detected concentration for each compound of concern, in accordance with the Tier 1 evaluation guidance (ASTM, 1995). To

account for all possible future uses of the site, RBSLs were calculated for both residential and commercial/industrial uses.

The RBSLs for each exposure scenario and detected chemical from the site are presented in Table 5. These RBSLs correspond to a chemical concentration in the selected environmental media resulting in a non-carcinogenic hazard quotient (HQ) of 1 and a carcinogenic risk level of 1×10^{-6}. These RBSLs were compared with the maximum concentration of the chemical found in the corresponding media on site. The use of the maximum detected concentration of chemical is a conservative assumption and will overestimate the actual or potential risks associated with current site conditions.

No exceedences are noted of RBSLs in subsurface soil or from vapors in soil from groundwater under either the residential or industrial exposure scenario. Therefore, the residual presence of chemicals in subsurface soils does not pose an unacceptable risk to human health under current or potential future use scenarios, and the site satisfies the conditions for regulatory site closure from a human health risk perspective.

1.0 INTRODUCTION

This risk assessment was prepared by Hart Crowser, Inc. as part of the Facility Closure Report for Grand Auto Supply property in Oakland California. The risk assessment framework developed by the American Society of Testing Materials (ASTM), designated the Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites (RBCA) was used. This risk assessment followed the guidelines set forth for a Tier I Level RBCA Evaluation.

The RBCA Tier 1 evaluation is a risk-based analysis to develop non-site-specific values for direct and indirect exposure pathways utilizing conservative exposure assumptions for potential pathways and various property use categories (for example, residential and industrial). In the Tier 1 analysis, a table of Risk Based Screening Levels (RBSLs) is derived for standard exposure scenarios using current Reasonable Maximum Exposure (RME) and toxicological parameters as recommended by the EPA. Site conditions are then compared against the appropriate RBSLs to determine whether site conditions satisfy the criteria for regulatory closure or warrant a more site-specific evaluation (ASTM, 1995).

This baseline risk assessment has been conducted to evaluate the probability and magnitude of adverse impacts on human health associated with actual or potential exposure to soil-related chemicals at the Grand

Auto Supply property in Oakland California. The section below summarize the history and current status of the site. Additional information about the site can be found in the "Facility Closure Report" prepared by Hart Crowser (1996) that is included in this document as Attachment 1.

1.1 Site Background and History

The Grand Auto Supply retail facility is located on an approximately 1.2-acre site. The site is used as an auto service and retail merchandise facility. Previously, the site also was used for retail gasoline sales and had fuel underground storage tanks (USTs) and a car wash with an associated drainage sump. The USTs were removed in 1986, and the car wash drainage sump and surrounding soil were removed in 1992. During October 1993, the remaining fuel conveyance piping associated with the former fuel USTs was excavated and removed from the site.

Historical Use

The earliest available recorded use of the property is as a dance hall in 1903. Site use between 1903 and 1946 is unknown (AllWest Environmental, 1995). Around 1946, an L-shaped building was constructed on the site. This building was used as office space and for auto repair, auto body repair, and auto painting shops. The date of demolition of this building is not known.

In 1960 or 1961, the present building was constructed for use as a Safeway grocery store. Grand Auto Supply leased the building from the property owners in 1971 and, in 1972, installed pump islands and three 10,000-gallon USTs for retail gasoline sales. The USTs were subsequently removed in 1986 and the remaining associated conveyance piping was removed in 1993. Grand Auto Supply also operated a car wash at the site from approximately 1972 to 1986. The drainage sump associated with the car wash was removed in August 1992.

Site Investigation and Remediation

The USTs at the site were removed in 1986. In July 1992, Hart Crowser performed a site investigation as outlined in "Sampling and Analysis Plan, Grand Auto/Super Tire Facilities," (Hart Crowser, 1992a). The investigation included drilling two borings in the assumed vicinity of the location of the former USTs. No petroleum hydrocarbons were detected in soil samples from borings located in the vicinity of the former UST excavation.

The car wash drainage sump and surrounding soil were removed on August 7, 1992. Hart Crowser collected a soil sample from beneath the sump at the bottom of the excavation, 8.5 feet below ground surface. Analyses of the sample indicated the presence of petroleum hydrocarbons and low concentrations of perchloroethylene (PCE) in the soil beneath the sump. A groundwater monitoring well was installed within 10 feet southwest of the sump. Despite some slightly wet conditions encountered at a depth of 8 feet groundwater was not encountered until an approximate depth of 36 feet. The shallow, wet zone may indicate a discontinuous perched water-bearing zone at the site. The results of this phase of the investigation were summarized in the "Preliminary Site Investigation Report" (Hart Crowser, 1992b).

During April 1993, Hart Crowser drilled five soil borings and converted three of them to groundwater monitoring wells. An off-site groundwater monitoring well (HC-1) was also installed at the adjacent Super Tire facility. Two of the soil borings (B-8 and B-9) were completed in the area of the former car wash sump. Soil samples from B-8 and B-9 indicated that the TPH and PCE detected immediately below the sump were neither laterally nor vertically widespread.

During October 1993, fuel conveyance piping associated with the former fuel USTs was excavated and removed from the site. Verification soil samples were collected from the base of the excavation and analyzed for total petroleum hydrocarbons as gasoline (TPH-G) and benzene, toluene, ethylbenzene and xylenes (BTEX). TPH-G and BTEX were not detected in any of the samples analyzed.

1.2 Local and Regional Hydrology

The site is located on the alluvial plain on the east side of San Francisco Bay (the Bay). As is typical for the Bay margin, the area around the site is underlain by Quaternary alluvial deposits, consisting of unconsolidated clay, silt, sand, and gravel. Bedrock underlying the alluvium in the area consists primarily of the Mesozoic-age Franciscan Formation; depth to bedrock in the area of the site is unknown.

Several soil borings were completed to depths of up to 46 feet at the site and the adjacent Super Tire site. The borings indicate that the site is underlain by an irregularly layered sequence of silty to gravelly sand lenses separated by clayey silt. As much as 20 feet of imported fill material may exist in some areas of the site.

Unconfined groundwater was generally encountered at depths of approximately 35 feet. The available groundwater elevation data indicate

that the groundwater gradient is nearly flat at the site. It can be assumed from regional geology and hydrology that groundwater flow in the area is generally westerly, toward San Francisco Bay.

Potential Beneficial Uses of Groundwater

The site is located in an area where groundwater in deep, regional aquifers is considered to have beneficial uses. The Alameda County Department of Public Works indicated the presence of industrial and irrigation supply wells within one mile of the site. In general, these wells are completed to depths of several hundred feet.

Shallow groundwater in the area is separated from the deep, regional aquifers by significant thickness of silt and clay, which act as regional aquitards. There are no known or documented uses of shallow groundwater in the vicinity of the site (Alameda County, 1988).

1.3 Extent of Contamination in Soils

No petroleum hydrocarbons were detected in soil samples from borings located in the vicinity of the former UST excavation. No petroleum hydrocarbons were detected in soil samples from the piping excavation. Low concentrations of TPH-G and BTEX were detected in site soil during excavation and removal of the car wash sump. Overexcavation of the sump was completed to the extent practicable, and the overexcavation successfully removed the bulk of the visibly stained soil. The highest concentrations of TPH-G detected in soil in place is 310 µg/kg from beneath the car wash sump, at a depth of 8 feet. No further excavation was performed in this area because of the proximity to the existing building.

PCE was detected at a concentration of 104 µg/kg in the soil sample collected from beneath the car wash sump at a depth of 8 feet. Soil samples from the two subsequent soil borings completed in this area indicated a limited lateral and vertical extent of the PCE detected. Samples from depths of 10 to 11 feet indicated concentrations of PCE at or below detection limits (5 µg/kg). Samples from depths of 16 and 21 feet did not indicate the presence of detectable concentrations of PCE. A sample collected at a depth of 25 feet indicated 30 µg/kg of PCE. These data suggest that the volume of soil containing PCE is limited and that PCE concentrations within the soil are low. Additionally, given that (1) the sample at 25 feet is locate near the water table and (2) that approximately 15 feet of clean soil separates this depth from the base of the sump excavation, it is reasonable to assume that the low concentration of PCE

detected at 25 feet is the result of either direct contact with, or vapor migration from the PCE in groundwater immediately below.

PCE was detected in soil at lower concentrations than recorded in groundwater samples from the adjacent monitoring well. This suggests that the soil in the sump area did not act as a source of PCE to groundwater. PCE binds preferentially to soil organic matter rather than solubilize in water, as indicated by a positive log K_{oc} (K_{oc}=2.56). This tendency indicates that for soil to act as a source of PCE to groundwater, the soil must have a higher concentration of PCE than the groundwater it is in contact with. Because site data indicate that soil concentrations are lower than groundwater concentrations, it is unlikely that the site is a source of PCE to groundwater.

Several soil samples collected during various phases of the site investigations were analyzed for metals—cadmium (Cd), chromium (Cr), nickel (Ni), lead (Pb), and zinc (Zn). With the exception of cadmium, low concentrations of the metals were detected. However, these metals all occur naturally in soil in background concentrations and the concentrations detected at this site fall within or near typical background concentrations (Hart Crowser, 1996).

To determine whether the metal concentrations present in surface soils at the site required further evaluation in the RBCA Tier 1 risk assessment, the concentrations of metals were compared against EPA Region 9 Preliminary Remediation Goals (PRGs). The PRGs are risk-based screening level concentrations of chemicals published by EPA Region 9 for use in screening chemicals of concern for actual or potential human health risks. Generally, at sites where chemical concentrations fall below the corresponding PRG, no further action or study is warranted for the evaluation of human health risks. The concentration of metals detected in site soils were below their respective PRGs indicating that no unacceptable risks are present at the site because of metals in surface soils (Hart Crowser, 1996). Therefore, there was no further evaluation of these heavy metals in the risk assessment.

1.4 Extent of Contamination in Groundwater

Groundwater monitoring at the site began in 1992. Halogenated volatile organic compounds (VOCs) consistently have been detected in site groundwater samples. PCE has been detected in all five monitoring wells, with the highest concentrations typically found in MW-1. Trichloroethylene (TCE) and cis-1,2-dichloroethylene (cis-1,2-DCE) have been detected in all five monitoring wells. The highest concentration of

TCE and cis-1,2-DCE typically have been reported in the samples from MW-2, located at the assumed upgradient boundary of the site.

The distribution of halogenated VOCs within site groundwater indicates that halogenated VOCs in groundwater are not restricted to the site boundaries. Furthermore, with the exception of PCE, the maximum concentration of VOCs in site groundwater have been detected in well MW-2, at the upgradient site boundary. This would indicate the presence of an off-site, upgradient source.

2.0 EXPOSURE ASSESSMENT

As presented in Tables 1 and 5 of the site closure report (presented as Attachment 1, Hart Crowser, 1996), a few VOCs remain in the subsurface soil and groundwater at the Grand Auto Supply site. BTEX and PCE were detected at low concentrations in several borings. The highest concentrations were measured at an 8-foot depth under the location of the former car wash sump. Chlorinated solvents were also detected in groundwater, located 27 to 35 feet below ground surface. They include PCE, TCE, cis-1,2-DCE, chloroform, 1,1,1-trichloroethane (1,1,1-TCA), 1,2-dichloroethane (1,2-DCA), vinyl chloride (VC), and freon 12. The closure report indicated that the remaining halogenated solvents in site groundwater were likely the result of releases at one or more of the numerous off-site potential sources located in the immediate vicinity of the site. The compounds identified as compounds of concern in the Tier 1 evaluation are BTEX and the chlorinated solvents detected in monitoring events performed after 1993.

2.1 Potential Exposure Pathways

The potential exposure pathways present at the site were determined by evaluating the site physical features that may influence human exposures for both current and future use scenarios. An exposure pathway is the course a chemical takes from the source to the exposed receptor. Chemical intake is how a chemical enters a receptor after contact, e.g., by ingestion, inhalation, or dermal absorption. These two components are considered together in identifying potential exposure pathways. A complete exposure pathway consists of the following elements:

- A source and mechanism of chemical release;
- A migration pathway;

- An exposure route through which chemical uptake by the receptor occurs; and

- A receptor group who may come into contact with site chemicals.

When these four elements are present, the exposure pathway is considered complete. If one or more of the components is missing, the exposure pathway is incomplete and exposure cannot occur.

Based on an evaluation of site data, the potential exposure pathways to human receptors at the Grand Auto Supply site include the following:

1. Surficial soil ingestion and absorption;
2. Inhalation of dust generated by wind erosion of surficial soil;
3. Inhalation of vapors volatilizing from surface soils in ambient air or in indoor air;
4. Inhalation of vapors volatilizing from subsurface soils in ambient air or in indoor air; and
5. Inhalation of vapors volatilizing from groundwater through the soil to ambient air or indoor air.

As reported in the site closure report (Hart Crowser, 1996) impacted surficial soils were removed along with the car wash drainage sump and the fuel conveyance piping. Verification soil samples collected subsequent to soil excavation revealed no detectable concentrations of petroleum hydrocarbons in surface soils as all known potential sources of chemicals related to Grand Auto Supply operations at the site have been removed. Therefore, it is assumed that no impacted surficial soil remains on the site. Moreover, much of the site is currently paved further reducing the potential exposure of human receptors to surface soil. As a result, exposure pathway numbers 1, 2, and 3, involving surficial soil, are not considered complete exposure pathways applicable to the site.

The exposure pathways retained for evaluation in this risk assessment are numbers 4—the inhalation of vapors volatilizing from subsurface soils and 5—the inhalation of vapors volatilizing from groundwater through the soil. Based on site data, the compounds considered in exposure pathway number 4 are PCE and BTEX. The compounds considered in exposure pathway number 5 are chlorinated solvents. The exposure pathways to be utilized in this risk assessment assumed that the receptors were on site, at the location of the boring or well with the highest detected concentration for each compound of concern, in accordance with the Tier 1 evaluation guidance (ASTM, 1995). To account for all possible current and future uses of the site, RBSLs were calculated for both residential and commercial/industrial uses.

3.0 TOXICITY ASSESSMENT

Toxicity assessments for risk assessments are generally accomplished in two steps: hazard identification and dose-response assessment. The first step, hazard identification, is the process of determining whether exposure to a chemical can cause an increase in the incidence of a particular adverse health effect (e.g., cancer, birth defects) and whether the adverse health effect is likely to occur in humans. The second step, dose-response evaluation, is the process of quantitatively evaluating the toxicity information and characterizing the relationship between the dose of the chemical administered or received and the incidence of adverse health effects in the exposed population. From this quantitative dose-response relationship, toxicity values are derived that can be used to estimate the incidence or potential for adverse effects as a function of human exposure to the chemical.

The EPA has performed the toxicity assessment step for numerous chemicals and has made available the resulting toxicity information and toxicity values (see discussion below), which have undergone extensive peer review. The types of values available for calculating RBSLs and the sources and uses of such toxicity values are presented in the following sections. Toxicity profiles for selected chemicals of concern are presented in Appendix A.

3.1 Types of Toxicity Values for Quantifying Risks

Toxicity and risk assessments vary for different chemicals depending upon whether non-carcinogenic or carcinogenic responses (i.e., endpoints) are used to assess potential risks. These criteria, in turn, are based on the endpoints observed from laboratory or epidemiological studies with the chemicals. Some chemicals of potential concern may result in both non-carcinogenic and carcinogenic effects, although in many cases the EPA has published toxicity criteria for only the most sensitive type of toxic effect supporting the most restrictive toxicological criteria.

Reference Doses (RfDs). Reference doses are used to quantitatively evaluate non-carcinogenic toxicity of a specific chemical. Reference doses are established at levels associated with no adverse effect, the "no observed adverse effect level" (NOAEL). In general, the RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

The RfDs are developed from an analysis of the available toxicological literature from which a critical study is selected. The selection of a critical study is made by professional judgment, and also considers factors such as the quality of the study, the relevance of the study to human exposures, and other factors. Good quality human toxicological data are preferred to animal studies. If no human data are available, the study on the most sensitive species is selected as the critical study. Similarly, the toxic effect manifested at the lowest exposure level is (generally) selected as the critical effect.

Cancer Potency Factors (CPFs). The toxicity of potential human carcinogens are evaluated differently. It is assumed for carcinogens that no threshold concentrations exist below which adverse effects may not occur. Probabilistic methods based on chemical-specific dose-response curves are used to establish slope factors, which are then used to quantify potential risks from exposure to carcinogens.

Dose-response curves are generated in laboratory studies using high chemical concentrations. The dose-response curve is fitted to a linearized multi-stage model that extrapolates the slope of the curve from high experimental concentrations to low concentrations at which people are typically exposed. The final cancer potency slope factor (CPF) is based on the 95% upper confidence level (UCL) of the extrapolated slope of the dose-response curve. Because of the non-threshold assumption and the UCL statistical procedure, the use of published slope factors provides a conservative upper-bound estimate of potential risks associated with exposure.

3.2 Use of Toxicity Values in Calculating RBSLs

This section presents the general equations used to calculate RBSLs for carcinogenic and non-carcinogenic chemicals. In the case of compounds that have been classified as carcinogens, the RBSLs are based on the general equation:

Risk = average lifetime intake (mg/kg-day) x potency factor $(mg/kg\text{-}day)^{-1}$

where intake depends on exposure parameters (ingestion rate, exposure duration, and so forth), the source concentration, and transport rates between the source and receptor. The potency factor is selected after reviewing a number of sources, including the EPA Integrated Risk Information System (IRIS) database (EPA, 1996a), EPA Health Effects Assessment Summary Tables (HEAST) (EPA, 1995), and peer-reviewed sources. The RBSL values presented in Table 5 correspond to probabilities of adverse health effects at the 1×10^{-6} risk level for the specified exposure

scenario. Note that this risk value does not reflect the probability for the specific exposure to occur. Therefore, the actual risk to a population for these RBSLs is lower than 1 x 10^{-6} (ASTM, 1995).

In the case of compounds that have not been classified as carcinogens, the RBSLs are based on the following general equation:

Hazard Quotient = average intake (mg/kg-day)/reference dose (mg/kg-day)

where the intake depends on exposure parameters (ingestion rate, exposure duration, and so forth), the source concentration, and transport rates between the source and receptor. The reference dose is selected after reviewing a number of sources, including the EPA IRIS database (EPA, 1996a), EPA HEAST (EPA, 1995), and peer-reviewed sources. The RBSL values presented in Table 5 correspond to hazard quotients of unity resulting from the specified exposure. Note this hazard quotient value does not reflect the probability for the specified exposure scenario to occur. Therefore, the actual potential impact to a population for these RBSLs is lower than a hazard quotient of unity.

4.0 CALCULATION OF RBSLs

Tier 1 risk-based screening levels (RBSLs) were calculated for the chemicals of concern at the Grand Auto Supply site in Oakland, California, in accordance with the Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites (ASTM, 1995). Table 1 provides a list of the equations used and Tables 2 and 3 provide the modeling parameters for the site. Table 4 presents chemical-specific data including the toxicity values used in the calculation of the RBSL. Table 5 shows the RBSLs for carcinogenic and non-carcinogenic effects as well as the maximum detected concentration of the chemical in subsurface soil or groundwater samples at the site.

Tier 1 RBSLs are derived for standard exposure scenarios using current RME and toxicological parameters as recommended by the EPA. The points of exposure and points of compliance are assumed to be located within close proximity to the source area or the area where the highest concentrations of the chemicals of concern have been identified. Additivity of risks is not explicitly considered in this evaluation.

The equations used are presented in Table 1. The assumptions behind these models are presented below. In the scenarios involving inhalation of outdoor vapors, no pavement is assumed in the modeling of vapor diffusion. Therefore results can be expected to overestimate the actual

risks present at the site as a substantial portion of the site is currently paved.

4.1 Groundwater—Inhalation of Outdoor Vapors

In this case, chemical intake is a result of inhalation of outdoor vapors which originate from dissolved chemicals in groundwater located some distance below ground surface.

The relationship between outdoor air and dissolved groundwater concentrations is represented by the "volatilization factor," VF_{wamb} [$(mg/m^3\text{-air})/(mg/L\text{-}H_2O)$]. It is based on the following assumptions:

- A constant dissolved chemical concentration in groundwater;
- Linear equilibrium partitioning between dissolved chemicals in groundwater and chemical vapors at the groundwater table;
- Steady-state vapor- and liquid-phase diffusion through the capillary fringe and vadose zones to ground surface;
- No loss of chemical as it diffuses toward ground surface (that is, no biodegradation); and
- Steady well-mixed atmospheric dispersion of the emanating vapors within the breathing zone as modeled by a "box model" for air dispersion.

4.2 Groundwater—Inhalation of Enclosed-Space (Indoor) Vapors

In this case, chemical intake results from the inhalation of vapors in enclosed spaces. The chemical vapors originate from dissolved chemicals in groundwater located some distance below ground surface.

For simplicity, the relationship between enclosed-space air and dissolved groundwater concentrations is represented by the "volatilization factor" VF_{wesp} [$(mg/m^3\text{-air})/(mg/L\text{-}H_2O)$]. It is based on the following assumptions:

- A constant dissolved chemical concentration in groundwater;
- Equilibrium partitioning between dissolved chemicals in groundwater and chemical vapors at the groundwater table;
- Steady-state vapor- and liquid-phase diffusion through the capillary fringe, vadose zone, and foundation cracks;
- No loss of chemical as it diffuses toward ground surface (that is, no biodegradation); and
- Steady, well-mixed atmospheric dispersion of the emanating vapors within the enclosed space, where the convective transport into the

building through foundation cracks or openings is negligible in comparison with diffusive transport.

4.3 Subsurface Soils—Inhalation of Outdoor Vapors

In this case, chemical intake is a result of inhalation of outdoor vapors which originate from chemicals contained in subsurface soils located some distance below ground surface.

For simplicity, the relationship between outdoor air and soil concentration is represented in the "volatilization factor," VF_{samb} [(mg/m^3-air)/kg-soil)]. It is based on the following assumptions:

- A constant chemical concentration in subsurface soils;
- Linear equilibrium partitioning within the soil matrix between sorbed, dissolved, and vapor phases, where the partitioning is a function of constant chemical- and soil-specific parameters;
- Steady-state vapor- and liquid-phase diffusion through the vadose zone to ground surface;
- No loss of chemical as it diffuses toward ground surface (that is, no biodegradation); and
- Steady well-mixed atmospheric dispersion of the emanating vapors within the breathing zone as modeled by a "box model" for air dispersion.

4.4 Subsurface Soils—Inhalation of Enclosed Space (Indoor) Vapors

In this case, chemical intake is a result of inhalation of enclosed-space vapors which originate from chemicals contained in subsurface soils located some distance below ground surface.

For simplicity, the relationship between indoor air and soil concentrations is represented by the "volatilization factor," VF_{sesp} [(mg/m^3-air)/kg-soil)]. It is based on the following assumptions:

- A constant chemical concentration in subsurface soils;
- Linear equilibrium partitioning within the soil matrix between sorbed, dissolved, and vapor phases, where the partitioning is a function of constant chemical- and soil-specific parameters;
- Steady-state vapor- and liquid-phase diffusion through the vadose zone and foundation cracks;
- No loss of chemical as it diffuses toward ground surface (that is, no biodegradation); and
- Well-mixed atmospheric dispersion of the emanating vapors within the enclosed space.

The exposure parameters are presented in Table 2 as obtained from the Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites (ASTM, 1995). Since additivity of risks is not considered, a conservative target excess cancer risk of 1×10^{-6} was selected. Soil, building, surface, and subsurface parameters are listed in Table 3. The depth to groundwater was assumed to be 27 feet (upper value in the range reported by Hart Crowser, 1996). The depth to subsurface soil sources was assumed to be 8 feet, which is the location of the highest detected soil concentrations of chemicals of concern. Porosity data were selected based on test data, soil descriptions, and engineering judgment. Other non-chemical-specific parameters retained their values as presented in ASTM (1995). Chemical-specific data are shown in Table 4.

5.0 RISK CHARACTERIZATION

In the risk characterization step of a risk assessment, the chemical intakes estimated in the exposure assessment are combined with the appropriate critical toxicity values identified in the toxicity assessment. The results are the estimated cancer risks and non-carcinogenic health hazards posed by the modeled exposures. In a RBCA Tier 1 analysis, this step is modified by incorporating the exposure parameters along with toxicity values and a predetermined level of acceptable risk in calculating RBSLs for specific media and chemicals of concern. For this risk assessment, RBSLs were calculated for subsurface soils and groundwater evaluating the exposure pathways presented in Section 2.1. RBSLs were calculated under both residential and industrial exposure scenarios with residential exposure considered the "worst-case future" exposure scenario for this site. The residential use scenario is considered a "worst-case" exposure scenario as it utilizes a higher level of exposure duration and frequency than the commercial/industrial use scenario (Table 2). It is assumed that if site chemical concentrations are below the appropriate residential RBSLs, that the current site conditions pose no unacceptable human health risks for all possible present and future uses of the property.

The RBSLs for each exposure scenario and constituents of concern are presented along with the maximum detected concentration of site chemicals in subsurface soil and groundwater samples in Table 5. As previously stated, these RBSLs correspond to a chemical concentration in the selected environmental media resulting in a non-carcinogenic hazard quotient of 1 and a carcinogenic risk level 1×10^{-6}. These RBSLs were compared with the maximum concentration of the chemical found in the corresponding media on site. The use of the maximum detected concentration of chemical is a conservative assumption and will overestimate the actual or potential risks associated with current site conditions.

No exceedences are noted of RBSLs in either subsurface soil or from vapors in the soil from groundwater under either the residential or industrial exposure scenario. In subsurface soil, both benzene and PCE have maximum detected concentrations within an order of magnitude of their respective RBSL but are still below the RBSL even under the most conservative or protective use scenarios. The remaining chemicals detected in subsurface soils are several orders of magnitude below their respective RBSLs. Therefore, the residual presence of chemicals in subsurface soils, including potential vapors, does not pose an unacceptable risk to human health under current or potential future site uses and the site satisfies the conditions for regulatory site closure from a human health risk perspective.

6.0 REFERENCES

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7.0 LIMITATIONS

Work for this project was performed, and this report prepared, in accordance with generally accepted professional practices for the nature and conditions of the work completed in the same or similar localities, at the time the work was performed. It is intended for the exclusive use of PACCAR Automotive, Inc. for specific application to the referenced property. This report is not meant to represent a legal opinion. No other warranty, express or implied, is made.

Any questions regarding our work and this report, the presentation of the information, and the interpretation of the data are welcome and should be referred to the undersigned.

We trust that this report meets your needs.

Sincerely,

HART CROWSER, INC.

TAKU FUJI, M.S.P.H.
Project Toxicologist

TF:sca/sde/tml
RAIDOC.RPT

Table 1 - Equations Used to Develop Tier 1 Risk-Based Screening Level (RBSLs)

Medium	Exposure Route	Risk-Based Screening Level (RBSL)
Carcinogenic Effects		
Air	inhalation	$RBSL_{air}\left[\frac{\mu g}{m^3\text{-}air}\right] = \frac{TR \times BW \times AT_c \times 365\frac{days}{years} \times 10^3\frac{\mu g}{mg}}{SF_i \times IR_{air} \times EF \times ED}$
Groundwater	enclosed-space (indoor) vapor inhalation[D]	$RBSL_w\left[\frac{mg}{L\text{-}H_2O}\right] = \frac{RBSL_{air}\left[\frac{\mu g}{m^3\text{-}air}\right]}{VF_{wesp}} \times 10^{-3}\ \frac{mg}{\mu g}$
Groundwater	ambient (outdoor) vapor inhalation[D]	$RBSL_w\left[\frac{mg}{L\text{-}H_2O}\right] = \frac{RBSL_{air}\left[\frac{\mu g}{m^3\text{-}air}\right]}{VF_{wamb}} \times 10^{-3}\ \frac{mg}{\mu g}$
Subsurface soil	ambient (outdoor) vapor inhalation[D]	$RBSL_s\left[\frac{mg}{kg\text{-}soil}\right] = \frac{RBSL_{air}\left[\frac{\mu g}{m^3\text{-}air}\right]}{VF_{samb}} \times 10^{-3}\ \frac{mg}{\mu g}$
Subsurface soil	enclosed space (indoor) vapor inhalation[D]	$RBSL_s\left[\frac{mg}{kg\text{-}soil}\right] = \frac{RBSL_{air}\left[\frac{\mu g}{m^3\text{-}air}\right]}{VF_{sesp}} \times 10^{-3}\ \frac{mg}{\mu g}$
Non-carcinogenic Effects		
Air	inhalation	$RBSL_{air}\left[\frac{\mu g}{m^3\text{-}air}\right] = \frac{THQ \times RID_i \times BW \times AT_n \times 365\frac{days}{years} \times 10^3\ \frac{\mu g}{mg}}{IR_{air} \times EF \times ED}$
Groundwater	enclosed-space (indoor) vapor inhalation[D]	$RBSL_w\left[\frac{mg}{L\text{-}H_2O}\right] = \frac{RBSL_{air}\left[\frac{\mu g}{m^3\text{-}air}\right]}{VF_{wesp}} \times 10^{-3}\ \frac{mg}{\mu g}$

Table 1 - Continued

Medium	Exposure Route	Risk-Based Screening Level (RBSL)
Groundwater[C]	ambient (outdoor) vapor inhalation[D]	$RBSL_w \left[\frac{mg}{L\text{-}H_2O}\right] = \frac{RBSL_{air}\left[\frac{\mu g}{m^3\text{-}air}\right]}{VF_{wamb}} \times 10^{-3} \frac{mg}{\mu g}$
Subsurface soil[C]	ambient (outdoor) vapor inhalation[D]	$RBSL_s \left[\frac{mg}{kg\text{-}soil}\right] = \frac{RBSL_{air}\left[\frac{\mu g}{m^3\text{-}air}\right]}{VF_{samb}} \times 10^{-3} \frac{mg}{\mu g}$
Subsurface soil[C]	enclosed space (indoor) vapor inhalation[D]	$RBSL_s \left[\frac{mg}{kg\text{-}soil}\right] = \frac{RBSL_{air}\left[\frac{\mu g}{m^3\text{-}air}\right]}{VF_{sesp}} \times 10^{-3} \frac{mg}{\mu g}$
Volatilization Factors (VF_i), and Effective Diffusion Coefficients (D^{eff}_i)		
VF_{wesp}	Groundwater - enclosed-space vapors	$VF_{wesp} \left[\frac{(mg/m^3\text{-}air)}{(mg/L\text{-}H_2O)}\right] = \frac{H\left[D^{eff}_{ws}/\frac{L_{GW}}{ER\ L_B}\right]}{1 + \left[\frac{D^{eff}_{ws}/L_{GW}}{ER\ L_B}\right] + \left[\frac{D^{eff}_{ws}/L_{GW}}{(D^{eff}_{crack}/L_{crack})}\eta\right]} \times 10^3 \frac{L}{m^3}$
VF_{wamb}	Groundwater - ambient (outdoor) vapors	$VF_{wamb} \left[\frac{(mg/m^3\text{-}air)}{(mg/L\text{-}H_2O)}\right] = \frac{H}{1 + \left[\frac{U_{air}\delta_{air}L_{GW}}{WD^{eff}_{ws}}\right]} \times 10^3 \frac{L}{m^3}$
VF_{samb}	Subsurface soils - ambient air	$VF_{samb} \left[\frac{(mg/m^3\text{-}air)}{(mg/kg\text{-}soil)}\right] = \frac{H\rho_s}{[\theta_{ws} + \kappa_s\rho_s + H\theta_{as}]\left(1 + \frac{U_{air}\delta_{air}L_s}{D^{eff}_s W}\right)} X\ 10^3 \frac{cm^3\text{-}kg}{m^3\text{-}g}$
VF_{sesp}	Subsurface soil - enclosed-space vapors	$VF_{sesp} \left[\frac{(mg/m^3\text{-}air)}{(mg/kg\text{-}soil)}\right] = \frac{\frac{H\rho_s}{(\theta_{ws} + k_s\rho_s + H\theta_{as})}\left[\frac{D^{eff}_s/L_s}{ER\ L_B}\right]}{1 + \left[\frac{D^{eff}_s/L_s}{ER\ L_B}\right] + \left[\frac{D^{eff}_s/L_s}{(D^{eff}_{crack}/L_{crack})\eta}\right]} \times 10^3 \frac{cm^3\text{-}kg}{m^3\text{-}g}$

Table 1 - Continued

Medium	Exposure Route	Risk-Based Screening Level (RBSL)
D_s^{eff}	Effective diffusion coefficient in soil based on vapor-phase concentration	$D_s^{eff}\left[\frac{cm^2}{\sec}\right] = D^{air}\frac{\theta_{as}^{3.33}}{\theta_T^2} + D^{wat}\frac{1}{H}\frac{\theta_{ws}^{3.33}}{\theta_T^2}$
D_{crack}^{eff}	Effective diffusion coefficient through foundation cracks	$D_{crack}^{eff}\left[\frac{cm^2}{\sec}\right] = D^{air}\frac{\theta_{acrack}^{3.33}}{\theta_T^2} + D^{wat}\frac{1}{H}\frac{\theta_{wcrack}^{3.33}}{\theta_T^2}$
D_{cap}^{eff}	Effective diffusion coefficient through capillary fringe	$D_{cap}^{eff}\left[\frac{cm^2}{\sec}\right] = D^{air}\frac{\theta_{acap}^{3.33}}{\theta_T^2} + D^{wat}\frac{1}{H}\frac{\theta_{wcap}^{3.33}}{\theta_T^2}$
D_{ws}^{eff}	Effective diffusion coefficient between groundwater and soil surface	$D_{ws}^{eff}\left[\frac{cm^2}{\sec}\right] = (h_{cap} + h_v)\left[\frac{h_{cap}}{D_{cap}^{eff}} + \frac{h_v}{D_s^{eff}}\right]-1$

Note: D: These equations simply define the "cross-media partitioning factors," VFij

Table 2 - Exposure Parameters

Parameters	Definitions, Units	Residential	Commercial/Industrial
AT_c	averaging time for carcinogens, years	70 years	70 years
AT_n	averaging time for non-carcinogens, years	30 years	25 years
BW	adult body weight, kg	70 kg	70 kg
ED	exposure duration, years	30 years	25 years
EF	exposure frequency, days/years	350 days/year	250 days/year
IR_{air}-indoor	daily indoor inhalation rate, m^3/day	15 m^3/day	20 m^3/day
IR_{air}-outdoor	daily outdoor inhalation rate, m^3/day	20 m^3/day	20 m^3/day
$RBSL_i$	risk-based screening level for media i, mg/kg-soil, mg/L-H_2O, or $\mu g/m^3$-air	chemical-, media-, and exposure route-specific	chemical-, media-, and exposure route-specific
RfD_i	inhalation chronic reference dose, mg/kg-day	chemical-specific	chemical-specific
SF_i	inhalation cancer slope factor, $(mg/kg\text{-}day)^{-1}$	chemical-specific	chemical-specific
THQ	target hazard quotient for individual constituents, unitless	1.0	1.0
TR	target excess individual lifetime cancer risk, unitless	10^{-6}	10^{-6}
VF_i	volatilization factor, (mg/m^3-air)/(mg/kg-soil) or (mg/m^3-air)/(mg/L-H_2O)	chemical- and media-specific	chemical- and media-specific

Table 3 - Soil, Building, Surface, and Subsurface Parameters Used in Generating Tier 1 RBSLs

Parameters	Definitions, Units	Residential	Commercial/Industrial
d	lower depth of sufficient soil zone, cm	100 cm	100 cm
D^{air}	diffusion coefficient in air, cm^2/sec	chemical-specific	chemical-specific
D^{wat}	diffusion coefficient in water, cm^2/sec	chemical-specific	chemical-specific
ER	enclosed-space air exchange rate, S^{-1}	0.00014 s^{-1}	0.00023 s^{-1}
f_{oc}	fraction of organic carbon in soil, g-C/g-soil	0.01	0.01
H	henry's law constant, $(cm^3\text{-}H_2O)/(cm^3\text{-air})$	chemical-specific	chemical-specific
h_{cap}	thickness of capillary fringe, cm	100 cm	5 cm
h_v	thickness of vadose zone, cm	820.8 cm	820.8 cm
k_{oc}	carbon-water sorption coefficient, $cm^3\text{-}H_2O/g\text{-}C$	chemical-specific	chemical-specific
k_s	soil-water sorption coefficient, $cm^3\text{-}H_2O/g\text{-soil}$	$f_{oc} \times k_{oc}$	$f_{oc} \times k_{oc}$
L_B	enclosed-space volume/infiltration area ratio, cm	200 cm	300 cm
L_{crack}	enclosed-space foundation or wall thickness, cm	15 cm	15 cm
L_{GW}	depth to groundwater = $h_{cap} + h_{vs}$ cm	920.8 cm	920.8 cm
L_s	depth to subsurface soil sources, cm	243.2 cm	243.2 cm
S	pure component solubility in water, $mg/L\text{-}H_2O$	chemical-specific	chemical-specific
U_{air}	wind speed above ground surface in ambient mixing zone, cm/sec	225 cm/sec	225 cm/sec
W	width of source area parallel to wind, or groundwater flow direction, cm	1500 cm	1500 cm
δ_{air}	ambient air mixing zone height, cm	200 cm	200 cm
η	areal fraction of cracks in foundations/walls, $cm^2\text{-cracks}/cm^2\text{-total area}$	0.01 cm^2-cracks/cm^2-total area	0.01 cm^2-cracks/cm^2-total area
θ_{acap}	volumetric air content in capillary fringe soils, $cm^3\text{-air}/cm^3\text{-soil}$	0.03 cm^3-air/cm^3-soil	0.38 cm^3-air/cm^3-soil
θ_{acrack}	volumetric air content in foundation/wall cracks, $cm^3\text{-air}/cm^3$ total volume	0.22 cm^3-air/cm^3 total volume	0.26 cm^3-air/cm^3 total volume
θ_{as}	volumetric air content in vadose zone soils, $cm^3\text{-air}/cm^3\text{-soil}$	0.22 cm^3-air/cm^3-soil	0.26 cm^3-air/cm^3-soil
θ_T	total soil porosity, $cm^3/cm^3\text{-soil}$	0.41 cm^3/cm^3-soil	0.38 cm^3/cm^3-soil
θ_{wcap}	volumetric water content in capillary fringe soils, $cm^3\text{-}H_2O/cm^3\text{-soil}$	0.38 $cm^3\text{-}H_2O/cm^3$-soil	0.342 $cm^3\text{-}H_2O/cm^3$-soil
θ_{wcrack}	volumetric water content in foundation/wall cracks, $cm^3\text{-}H_2O/cm^3$ total volume	0.19 $cm^3\text{-}H_2O/cm^3$ total volume	0.12 $cm^3\text{-}H_2O/cm^3$ total volume
θ_{ws}	volumetric water content in vadose zone soils, $cm^3\text{-}H_2O/cm^3\text{-soil}$	0.19 $cm^3\text{-}H_2O/cm^3$-soil	0.12 $cm^3\text{-}H_2O/cm^3$-soil
ρ_s	soil bulk density, g-soil/cm^3-soil	1.6 g/cm^3	1.7 g/cm^3
τ	averaging time for vapor flux, sec	7.88 x 10^8 sec	7.88 x 10^8 sec

Table 4 - Chemical-Specific Parameters

Parameter	Unit	PCE	TCE	cis-1,2-DCE	Chloroform	1,1,1-TCA	1,2-DCA	Vinyl Chloride	Benzene	Toluene	Ethyl-benzene	Xylenes
RfDi	mg/kg-day			1.00E-02 (1)		3.00E+00 (3)				1.14E-02 (3)	2.86E-01 (3)	2.00E-01 (3)
SFi	(mg/kg-day)-1	2.03E-03 (1)	1.70E-02 (2)		8.10E-02 (3)		9.10E-02 (3)	3.00E-01 (3)	2.90E-02 (3)			
Dair	cm2/s	7.20E-02 (4)	7.90E-02 (4)	1.39E-01 (5)	1.04E-01 (4)	7.80E-04 (4)	1.04E-01 (4)	1.06E-01 (4)	9.30E-02 (6)	8.50E-02 (6)	7.60E-02 (6)	7.20E-02 (6)
Dwat	cm2/s	8.20E-06 (4)	9.10E-06 (4)	1.12E-05 (5)	1.00E-05 (4)	8.80E-06 (4)	9.90E-06 (4)	1.23E-05 (4)	1.10E-05 (6)	9.40E-06 (6)	8.50E-06 (6)	8.50E-06 (6)
H	atm-m3/mol	2.30E-02 (7)	9.10E-03 (7)	7.50E-03 (7)	3.80E-03 (7)	3.00E-02 (7)	1.10E-03 (7)	1.10E-02 (7)				
H	cm3-H2O/cm3-air	9.40E-01	3.72E-01	3.07E-01	1.55E-01	1.23E+00	4.50E-02	4.50E-01	2.20E-01 (6)	2.60E-01 (6)	3.20E-01 (6)	2.90E-01 (6)
log(koc)		2.56E+00 (7)	2.10E+00 (7)	2.17E+00 (7)	1.64E+00 (7)	1.76E+00 (7)	7.10E-01 (7)	9.10E-01 (7)	1.58E+00 (6)	2.13E+00 (6)	1.98E+00 (6)	2.38E+00 (6)
koc	cm3-H2O/g-C	3.63E+02 (7)	1.26E+02 (7)	1.48E+02 (7)	4.37E+01 (7)	5.75E+01 (7)	5.13E+00 (7)	8.13E+00 (7)	3.80E+01 (6)	1.35E+02 (6)	9.55E+01 (6)	2.40E+02 (6)
S	mg/L	1.50E+02 (7)	1.10E+03 (7)	8.00E+02 (7)	8.20E+03 (7)	4.40E+03 (7)	8.69E+03 (7)	2.76E+03 (7)	1.78E+03 (7)	1.52E+02 (7)	5.15E+02 (7)	1.75E+02 (7)

(1) Provisional values provided by EPA Superfund Health Risk Technical Support Center (EPA, 1996b).

(2) HEAST (EPA, 1991)

(3) HEAST (EPA, 1995)

(4) Data from: Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF) - Air Emission Models, Documentation, EPA, Dec 1987 (PB88-198619)

(5) Data estimated with equations from Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF) - Air Emission Models, Documentation, EPA, Dec 1987 (PB88-198619)

(6) Data from ASTM E 1739-95, Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites, 1995.

(7) Data from Facility Closure Report, Grand Auto Supply, Oakland, California, prepared by Hart Crowser Inc., February 16, 1996.

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Table 5 - RBSL Table

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Consitutent of Concern	RBSL for Non-Carcinogenic Effects: Residential	RBSL for Non-Carcinogenic Effects: Commercial/ Industrial	RBSL for Carcinogenic Effects: Residential	RBSL for Carcinogenic Effects: Commercial/ Industrial	Maximum Detected Concentrations (1)	Units
Benzene						
Air indoor			0.392	0.493		µg/m3-air
Air outdoor			0.294	0.493		µg/m3-air
subsurface soil to ambiant air			0.020	0.034	0.011	mg/kg-soil
subsurface soil to indoor air			0.013	0.040	0.011	mg/kg-soil
Ethylbenzene						
Air indoor	1390	1460				µg/m3-air
Air outdoor	1043	1460				µg/m3-air
subsurface soil to ambiant air	128	180			0.064	mg/kg-soil
subsurface soil to indoor air	81	210			0.064	mg/kg-soil
Toluene						
Air indoor	56	58				µg/m3-air
Air outdoor	42	58				µg/m3-air
subsurface soil to ambiant air	8	11			0.065	mg/kg-soil
subsurface soil to indoor air	5	12			0.065	mg/kg-soil
Xylenes						
Air indoor	973	1022				µg/m3-air
Air outdoor	730	1022				µg/m3-air
subsurface soil to ambiant air	239	335			1.5	mg/kg-soil
subsurface soil to indoor air	151	392			1.5	mg/kg-soil
Perchloethylene (PCE)						
Air indoor	48.7	51.1	5.594	7.048		µg/m3-air
Air outdoor	37	51	4.195	7.048		µg/m3-air
Groundwater to indoor vapor	>S	>S	79.635	595.424	0.3	mg/L-H_2O
Groundwater to outdoor vapor	>S	>S	33.646	56.526	0.3	mg/L-H_2O
subsurface soil to ambiant air	6	8	0.643	1.081	0.104	mg/kg-soil
subsurface soil to indoor air	4	9	0.407	1.264	0.104	mg/kg-soil
Trichloroethylene (TCE)						
Air indoor			0.668	0.842		µg/m3-air
Air outdoor			0.501	0.842		µg/m3-air
Groundwater to indoor vapor			14.142	105.699	0.13	mg/L-H_2O
Groundwater to outdoor vapor			5.971	10.032	0.13	mg/L-H_2O
Cis-1,2-Dichloroethylene						
Air indoor	49	51				µg/m3-air
Air outdoor	37	51				µg/m3-air
Groundwater to indoor vapor	780.25	>S			0.036	mg/L-H_2O
Groundwater to outdoor vapor	329.50	461.31			0.036	mg/L-H_2O
Chloroform						
Air indoor			0.140	0.177		µg/m3-air
Air outdoor			0.105	0.177		µg/m3-air
Groundwater to indoor vapor			3.447	25.745	0.0019	mg/L-H_2O
Groundwater to outdoor vapor			1.454	2.442	0.0019	mg/L-H_2O
1,1,1-Trichloroethane						
Air indoor	14600	15330				µg/m3-air
Air outdoor	10950	15330				µg/m3-air
Groundwater to indoor vapor	>S	>S			0.0009	mg/L-H_2O
Groundwater to outdoor vapor	>S	>S			0.0009	mg/L-H_2O
1,2-Dichloroethane						
Air indoor			0.125	0.157		µg/m3-air
Air outdoor			0.094	0.157		µg/m3-air
Groundwater to indoor vapor			4.077	30.375	0.0018	mg/L-H_2O
Groundwater to outdoor vapor			1.712	2.876	0.0018	mg/L-H_2O
Vinyl Chloride						
Air indoor			0.038	0.048		µg/m3-air
Air outdoor			0.028	0.048		µg/m3-air
Groundwater to indoor vapor			0.547	4.087	0.0009	mg/L-H_2O
Groundwater to outdoor vapor			0.231	0.388	0.0009	mg/L-H_2O

>S = above maximum solubility of compound.

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(1) Data from Hart Crowser, 1996

APPENDIX A
TOXICITY PROFILES OF SELECTED CHEMICALS OF CONCERN

APPENDIX A
TOXICITY PROFILES OF SELECTED CHEMICALS OF CONCERN

This appendix provides toxicity profiles for the seven chemicals detected at the highest concentrations in either subsurface soil or groundwater samples at the Grand Auto property.

BENZENE

Benzene is a colorless liquid with a pleasant odor. Benzene found in the environment is from both natural processes and human activities. Natural sources, which include volcanoes and forest fires, account for a small amount of benzene in the environment. Various industries use benzene to make other chemicals, such as styrene, cumene, and cyclohexane. Benzene is also used for manufacturing of some types of rubber, lubricants, dyes, detergents, drugs, and pesticides.

Physical-Chemical Properties

Benzene is considered to be highly volatile with a vapor pressure of 95 mm Hg at 25°C. It is also soluble in water with a solubility of 1,780 mg/L at 25°C. Because of its physical-chemical properties, benzene released to the environment partitions mainly to the atmosphere.

Mammalian Toxicology

Pharmacokinetics. Data from both human and animals consistently indicate that benzene is rapidly absorbed through the lungs. Although experimentally acquired data are not available on oral absorption of benzene in humans, case reports of accidental and incidental poisonings suggest that benzene is rapidly absorbed from the gastrointestinal tract. The efficient absorption of oral doses in animals is well-documented. Benzene can be absorbed through the skin, but the rate of absorption is much lower than that for inhalation. Following absorption into the body, benzene is widely distributed to tissues, with the relative uptake dependent on the perfusion of the tissue by blood (ATSDR, 1992).

Inhalation Toxicity. Acute inhalation exposure to high concentrations of benzene has caused death. Lethality in humans following inhalation exposure has been attributed to asphyxiation, respiratory arrest, central nervous system depression, or cardiac collapse (Winek and Collom, 1971). Based on case studies, it has been estimated that exposure to a benzene

concentration of 20,000 ppm for 5 to 10 minutes is likely to be fatal (Flury, 1928).

Both human and animal studies have shown that benzene exerts toxic effects on various parts of the hematological system. All major types of blood cells are affected (erythrocytes, leukocytes, and platelets). In the less severe cases of toxicity, specific deficiencies occur in individual types of blood elements. A more severe effect occurs when there is hypoplasia of the bone marrow that results in ineffective hematopoiesis so that all types of blood cells are found in reduced numbers (ATSDR, 1992).

Oral Toxicity. Lethality in humans following oral exposure has been attributed to respiratory arrest, central nervous system depression, or cardiac collapse. Oral lethal doses in humans have been estimated to be about 125 mg/kg (Thienes and Haley, 1972). Accidental ingestion and/or attempted suicide with lethal oral doses have produced the following signs and symptoms: staggering gate, vomiting, shallow rapid pulse, somnolence, and loss of consciousness, followed by delirium, pneumonitis, collapse, and then central nervous system depression, coma, and death (Thienes and Haley, 1972).

Carcinogenicity. It is established that exposure to commercial benzene or benzene-containing mixtures can cause damage to the hematopoietic system including pancytopenia with subsequent manifestation of leukemia (Aksoy et al., 1974). A series of studies (Infante et al., 1977; Rinsky et al., 1981 and 1987) analyzing the mortality of workers exposed to benzene at two rubber hydrochloride manufacturing locations demonstrated excess risk of leukemia.

Benzene is considered to be a human carcinogen by EPA, OSHA, the World Health Organization, and the International Agency for Research on Cancer (IARC). EPA (1986) has verified the weight-of-evidence classification of carcinogenicity of benzene as EPA Group A, based on a sufficient level of human evidence supported by a sufficient level of animal evidence. There are still questions regarding both the mechanisms of benzene carcinogenesis and the most appropriate models for developing human risk estimates.

The inhalation Cancer Potency Factor (CPF) of 0.0290 $(mg/kg\text{-}day)^{-1}$ used in this risk assessment was taken from HEAST (EPA, 1995).

LOROETHENE, *CIS* AND *TRANS* ISOMERS

1,2-Dichloroethene (1,2-DCE), also known as acetylene dichloride, is a chlorinated aliphatic compound, which can be released to the atmosphere and groundwater via wastewater discharge during its production and use as a solvent. It also may be released during its use in the manufacture of perfumes, lacquers, and thermoplastics. 1,2-DCE, predominately the *cis*-isomer, is also a product formed during the degradation of higher chlorinated ethenes such as PCE and TCE by reductive dehalogenation. There are no known naturally occurring sources of 1,2-DCE.

hemical Properties

1,2-DCE is a colorless liquid having a sweet, pleasant odor. It is very volatile, with a isomer-specific vapor pressure of 273 and 395 mm Hg at 30°C for *cis*- and *trans*- isomers, respectively. The aqueous solubility of *cis*- and *trans*- vary by almost a factor of 2; however, both isomers are very soluble in water. 1,2-DCE is soluble in acetone, ethanol, and ether, and is very soluble in benzene and chloroform.

an Toxicology

Inhalation Toxicity. Comparatively little information is reported in the literature on the toxic and carcinogenic properties of either the *cis*- or *trans*- isomers of 1,2 DCE. One reference reported that the *trans*- isomer is twice as toxic to mammals as the *cis*- isomer. 1,2-DCE's toxicity has been studied by both the inhalation and oral pathways. Gradiski et al. (1978) reported an LC_{50} of 21,723 ppm for *trans*-dichloroethene in mice exposed for 6 hours. The primary target tissue identified for inhalation exposure were the lungs, the liver, and the central nervous system. Freundt et al. (1977) studied pathological changes in rats following repeated exposures to 200 ppm *trans*-dichloroethene. These authors observed increases of pulmonary capillary hyperemia, alveolar septal distation, and pulmonary edema. The livers of these animals displayed lipid accumulation and fatty degradation. These results have several shortcomings. There was no statistical analysis of these data, and only a small number of animals were included in this study. Neurological effects of dichloroethene were studied by Lehman and Schmidt-Kehl (1936). Humans exposed to 4.8 mg/L dichloroethene had a variety of symptoms including nausea, drowsiness, vertigo, and intracranial pressure.

Oral Toxicity. Oral exposure demonstrated the same target tissues as inhalation. Chronic exposure to low concentrations of 1,2-DCE in drinking water lead to no observable changes in mice (Barnes et al., 1985). However, Freundt et al. (1977) described increased pulmonary edema in

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Available data suggest that ethylbenzene is rapidly distributed throughout the body following inhalation and oral exposure. It is accumulated primarily in the intestine, liver, kidney, and fat, which provides some basis for ethylbenzene-induced toxicity observed in the liver and kidney (ATSDR, 1990).

Systemic Toxicity. In general, data on the toxic effects of ethylbenzene in humans and animals are limited. Moderate upper respiratory irritation accompanied by chest constriction has been reported in humans exposed by inhalation to ethylbenzene (Yant et al., 1930). Animal studies support these findings and show more severe effects with increased doses (De Ceaurriz et al., 1981; Nielsen and Alarie, 1982).

No hepatotoxic effects in humans have been reported in the literature. Inhalation studies in animals suggest that biochemical changes and histopathological alterations in the liver may be related to dose and duration of exposure to ethylbenzene (Cragg et al., 1989; Elovaara et al., 1985).

The principal effect in humans acutely exposed to high concentrations of ethylbenzene has been central nervous system toxicity (dizziness, vertigo). Complete recovery has been shown to occur if the exposure is not prolonged (ATSDR, 1990).

Carcinogenicity. No association between increased cancer incidence in humans and exposure to ethylbenzene has been reported in the literature. The only chronic bioassay available showed a significant increase in tumors in rats orally exposed to ethylbenzene (Maltoni et al., 1985). These results are inconclusive, given the weaknesses of the study (e.g., only one dose was tested and no survival data were provided). Therefore, the relevance of ethylbenzene-induced carcinogenicity to public health cannot be ascertained (ATSDR, 1990).

The EPA has classified ethylbenzene as a Group D agent (EPA, 1996). This classification applies to those chemical agents for which there is inadequate evidence of carcinogenicity in animals.

The inhalation RfD of 0.2857 mg/kg-day used in this risk assessment was taken from HEAST (EPA, 1995).

PERCHLOROETHYLENE

Perchloroethylene (PCE), also known as tetrachloroethene, is a chlorinated aliphatic compound commonly used as a solvent. Sources of vapor-phase

PCE to the environment include fugitive air emissions from dry cleaning and metal degreasing industries. Wastewater discharges from metal finishing, laundries, and aluminum forming industries, organic chemical and plastics manufacturing, and municipal treatment plants may also contain PCE.

Physical-Chemical Properties

PCE is a colorless liquid having a sweet, chloroform-like odor. PCE is quite volatile having a vapor density of 5.7 which is greater than the vapor density of atmospheric air. The saturation concentration of PCE in air is 126 gm/m^3 at 20°C and 210 gm/m^3 at 30°C. PCE is soluble in water and is miscible with other solvents including alcohol, ether, chloroform, benzene, and hexane.

Mammalian Toxicology

Pharmacokinetics. PCE is readily absorbed through the lung and to a lesser degree through skin, mucous membranes, or following ingestion. PCE has been reported to reach steady-state concentrations in the blood of humans within 2 hours of continuous exposure. Once in the bloodstream, PCE tends to distribute to body fat. PCE ratios in fat:liver of greater than 6:1 and a brain:blood ratio of 8:1 have been reported. Metabolism is relatively slow, with only a few percent of the dose excreted as metabolites, the major one being trichloroacetic acid. Other known metabolites in humans include trichloroethanol, inorganic chloride, and trans-1,2-dichloroethylene. PCE uptake via inhalation or skin absorption is eliminated primarily by respiration; the half-life for elimination of PCE from fat stores via expired air has been reported to be 65 to 71.5 hours (HDSB, 1995).

Inhalation Toxicity. PCE has been extensively studied as a hepatotoxin from both oral and inhalation exposures. Inhalation of PCE has produced lung irritations in humans but no respiratory lesions have been reported in animal studies (Coler and Rossmiller, 1953). Rats exposed to 1,600 ppm PCE over a three-month period exhibited an increase in mortality (NTP, 1986). A two-year carcinogenicity study of rats exposed to 200 and 400 ppm PCE also demonstrated increased mortality resulting from lesions other than neoplasms (NTP, 1986). The primary target tissues of PCE by inhalation exposure are the liver and the central nervous system. Macroscopic liver changes such as increased liver weight and cirrhosis have been described (Rowe et al., 1952), as well as microscopic changes in hepatocyte vacuolization and enlargement (Kjellstrand et al., 1984).

Oral Toxicity. Oral exposure to PCE has been demonstrated to be toxic with single dose LD_{50} of 3,500 mg/kg in rats (Chaudhuri and Mukerji, 1947). Chronic oral administration of 475 mg/kg PCE has lead to increased mortality among rats over an 18-month period (NCI, 1977). Primary target organs from oral exposure the liver, kidney, spleen, and some central nervous system effects. Hepatic lesions consist of hepatocyte hypertrophy, centrilobular necrosis, and hepatocyte vacuolization (Buben and O'Flaherty, 1985). This study reported a NOAEL of 20 mg/kg-day which has been used by the EPA to establish an oral RfD of 0.01 mg/kg-day (EPA, 1996a).

Carcinogenicity. The data concerning genotoxicity and carcinogenicity of PCE are very inconsistent. Direct evidence of DNA interaction with PCE or any metabolites has not been demonstrated, and epidemiological studies have been difficult to interpret. In most epidemiological studies, subjects exposed to PCE were simultaneously exposed to other organic solvents. A study from Woburn, Massachusetts, reported an increase in childhood leukemia from drinking water contaminated with 21 μg/kg PCE and 267 μg/kg TCE (Lagakos et al., 1986). This study was complicated by methodological problems and lack of exposure data.

The carcinogenicity of PCE has been documented in animal studies (NCI, 1977; NTP, 1986). Hepatocellular neoplasms have been identified by both oral and inhalation pathways. The validity of these studies have been questioned because of a very high rate of spontaneous neoplasms in the control Fisher 344 rats (ATSDR, 1991). In rat studies, a glutathione conjugate has been identified as extremely mutagenic (Goldsworthy and Popp, 1987). Green et al. (1990) demonstrated that humans may not form this conjugate. Buben and O'Flaherty (1985) suggested the formation of a reactive epoxide as the genotoxic species. The formation of this genotoxic species is cytochrome P-450 mediated.

The evidence of animal tumorigenicity and similar metabolism to vinyl chloride has lead IARC to classify PCE as a Group 2B "possible" human carcinogen. The EPA has previously classified PCE as a Group B2 probable human carcinogen (EPA, 1996a); however, this classification is being currently reviewed. Questions about the carcinogenicity data and the applicability to humans are to be addressed in the revised classification.

The inhalation CPF of 0.00203 $(mg/kg\text{-}day)^{-1}$ used in this risk assessment is a provisional value developed by the EPA Superfund Health Risk Technical Support Center, part of the Chemical Mixtures Branch of ECAO-Cincinnati (EPA, 1996b).

TOLUENE

Toluene, also known as methyl benzene, is an organic solvent used in the manufacture of paints, lacquers, adhesives, rubber, paint thinners, and in printing. Toluene naturally occurs in crude oil and is isolated in the process of making gasoline and other fuels from crude oil, in making coke from coal, and as a by-product in the manufacture of styrene.

Toluene emissions to the environment primarily consist of direct release to the atmosphere, an estimated 680 x 10^3 metric tons per year from automobile exhaust and 370 x 10^3 metric tons from sources other than exhausts such as paints and solvents (EPA, 1981). Toluene releases also occur to soil and water by industrial releases, spills, and leaking underground storage tanks.

Physical-Chemical Properties

Toluene is quite volatile having a vapor pressure of 28.4 at 25°C. It will not significantly hydrolyze in soil or water under normal environmental conditions. If toluene is released into water, its concentration will decrease as a result of evaporation and biodegradation (Howard, 1990).

Mammalian Toxicology

Inhalation Toxicity. The effects of toluene intoxication have been studied primarily by the inhalation exposure pathway. In Great Britain, around 80 deaths a year are associated with solvent abuse that include exposure to toluene (Anderson et al., 1985). Deaths were attributed to cardiac arrhythmias, central nervous system depression, asphyxia, hepatic failure, and renal failure (Anderson et al., 1985). The primary target of toluene appears to be the central nervous system. Human exposures of 100 mg/kg toluene have demonstrated minor central nervous system depression (Baelem et al., 1985). Moderate exposures of 200 to 800 mg/kg result in initial excitatory effects followed by narcosis (EPA, 1985). High levels of exposure are associated with more serious neurological effects such as ataxia, tremors, atrophy, and impaired speech, vision, and hearing (King et al., 1981; Suzuki et al., 1983).

Animal studies have shown that toluene intoxication produces significant changes in neurotransmitters (Ikeda et al., 1986). In addition, Kyrklund et al., (1987) demonstrated morphological changes to the brain from toluene exposure. These authors describe decreased brain weight and loss of gray matter in rats continuously exposed to 320 ppm for 30 days. Cardiac arrhythmias are not the result of direct cardiac toxicity but an indirect neurological effect. In rats chronically exposed to 300 ppm, no

histopathological lesions could be found (CIIT, 1980). Although studies have shown increased liver weight caused by solvent exposure, the liver does not appear to be a primary target of toluene toxicity (ATSDR, 1993). Studies of solvent abusers have shown some renal toxicities; however, these studies are confounded by the presence of solvents other than toluene. Animal inhalation studies of toluene have failed to demonstrate renal abnormalities; therefore, the kidney is not considered a primary target organ.

Oral Toxicity: No human data were available regarding the health effects of ingested toluene. Oral toxicity studies in animals have focused primarily on lethal effects. LD_{50} values range from 5,500 to 7,300 mg/kg in rats. No systemic toxicities were associated with oral exposure in any test animal. An NTP (1989) carcinogenesis study reported significantly increased liver and kidney weights in rats exposed to doses of 625 mg/kg or more.

Carcinogenicity. Studies of toluene reveal no carcinogenic potential for this compound; however, human data are lacking. Retrospective mortality studies of oil refinery workers exposed to toluene indicated no increase in cancer-related deaths (Wen et al., 1985). Toluene did not produce increases of tumor incidence in chronically treated rats (CIIT, 1980) and was negative for mutation assays (Bos et al., 1981). These studies have lead the EPA to classify toluene as a Group D, non-carcinogenic compound.

The inhalation RfD of 0.011429 mg/kg-day used in this risk assessment was taken from HEAST (EPA, 1995).

TRICHLOROETHENE

Trichloroethene (TCE) is a chlorinated aliphatic compound commonly used as a solvent. The primary sources of vapor-phase TCE to the environment are metal degreasing and dry cleaning industries.

Physical-Chemical Properties

TCE is a clear, colorless liquid with a chloroform-like odor. TCE is quite volatile with a vapor density of 4.53 which is greater than the vapor density of atmospheric air. The saturation concentration of TCE in air is 5.38 mg/m^3 at 25°C and 760 mm Hg. TCE is moderately soluble in water and is soluble in organic solvents including alcohol, ether, chloroform, and acetone.

Mammalian Toxicology

Pharmacokinetics. TCE concentrations in blood during inhalation rapidly equilibrates with alveolar gas concentrations in the lung. The blood:air partition coefficient for TCE in humans ranges from 9 to 15. An average of 11 percent of the absorbed dose of TCE is eliminated unchanged by the lung (half-life of 5 hours); 2 percent of the dose is eliminated as trichloroethanol by the lung (half-life 10 to 12 hours); 58 percent is eliminated as urinary metabolites (half-life approximately 41 hours); and the remainder is metabolized by unknown pathways (HSDB, 1995). Other known metabolites of TCE in humans include trichloroacetic acid, urochloralic acid, monochloroacetic acid, and chloroform.

Inhalation Toxicity. TCE has been extensively studied both in laboratory animals and human epidemiology. The primary target of TCE is the central nervous system. Central nervous system effects by inhalation exposure have been demonstrated but a threshold has not been well-defined. Nomiyama and Nomiyama (1977) reported severe drowsiness in human subjects after 1 to 4 hour exposures to $\leq$ 27 mg/kg TCE. Acute inhalation exposure to TCE causes irritation in the mucous membranes with associated conjunctivitis and rhinitis. Acute inhalation exposures may also cause headache, dizziness, and sleepiness, or rapid coma with eventual death from hepatic or renal failure. Chronic effects of inhalation exposure can include liver and kidney lesions, nerve degeneration, and psychic disturbances (HDSB, 1995).

Oral Toxicity. Unlike similar compounds, TCE does not appear to be overly hepatotoxic. Animal inhalation studies have been reported reversible liver enlargements following acute and subchronic exposures. Human studies on patients anesthetized with TCE demonstrated similar findings (Defalque, 1961). Ingestion produces a burning sensation in the mouth, along with nausea, vomiting, and abdominal pain (HDSB, 1995).

Oral administration of 1,000 mg/kg TCE to rats over a 10-day period failed to show any cytotoxic effects to the liver (Goldsworthy and Popp, 1987). Buben and O'Flaherty (1985) illustrated that intermediate periods of exposure to TCE had a dose-related enlargement of livers in animals exposed to 100 mg/kg or higher.

Carcinogenicity. The carcinogenic classification of TCE has been subject to great debate. The IARC has determined that the data for TCE is inadequate for classification as a Group 3 human carcinogen. The EPA had rated TCE as a Group B2 possible human carcinogen. This ranking was based upon an EPA study and possible childhood leukemia linked with

groundwater contamination in Woburn, Massachusetts. This classification is currently under review by the EPA (1996a).

The inhalation CPF of 0.0170 $(mg/kg\text{-}day)^{-1}$ used in this risk assessment was taken from HEAST (EPA, 1991).

XYLENES

Xylenes are a class of similar chemicals which form a clear liquid with a strong, sweet odor. They are used as solvents, in making drugs, dyes, insecticides, lacquers and enamels, and in gasoline for airplanes. Xylenes also occur naturally in petroleum and coal tar and is formed during forest fires.

Physical-Chemical Properties

Xylenes are a very volatile class of compounds and would be expected to partition to the atmosphere from surface soil and surface water. When spilled on land, xylenes volatilizes or leaches into the ground (ATSDR, 1994).

Mammalian Toxicology

Pharmacokinetics. Studies in humans and animals have shown that xylenes are well absorbed by the inhalation and oral routes. Approximately 60% of inspired xylene is retained and approximately 90% of ingested xylene is absorbed. Absorption of xylene also occurs by the dermal route, but to a much lesser extent than by the inhalation or oral routes. Following absorption, xylene is rapidly distributed throughout the body by way of the systemic circulation. In the blood, xylene is primarily bound to serum proteins and accumulates primarily in adipose tissue (ATSDR, 1994).

Systemic Toxicity. Short-term exposure of humans to high levels of xylene can cause irritation of the skin, eyes, nose, and throat; difficulty in breathing; impaired function of the lungs; delayed response to a visual stimulus; impaired memory; and possible changes in the liver and kidney. Both short- and long-term exposure to high concentrations of xylene can also cause a number of effects on the nervous system, such as headaches, lack of muscle coordination, dizziness, confusion, and changes in one's sense of balance. Humans exposed to very high levels of xylene for a short period of time have died. Most of the information on long-term exposure to xylene is from studies of workers employed in industries that make or use xylene. Those workers were exposed to levels of xylene in

air far greater than the levels normally encountered by the general population (ATSDR, 1994).

Results of studies with animals indicate that large amounts of xylene can cause changes in the liver and harmful effects on the kidneys, lungs, heart, and nervous system. Short-term exposure to very high concentrations of xylene causes death in some animals, as well as muscular spasms, incoordination, hearing loss, changes in behavior, changes in organ weights, and changes in enzyme activity. Long-term exposure to low concentrations of xylene has not been well-studied in animals (ATSDR, 1994).

Carcinogenicity. Information from animal studies is not adequate to determine whether xylene causes cancer in humans. Neither IARC nor EPA have found adequate information to determine that xylene is carcinogenic. Currently, EPA classifies xylene as a Group D agent (EPA, 1996a). This classification applies to those chemical agents for which there is inadequate evidence of carcinogenicity in animals.

The inhalation RfD of 0.2000 mg/kg-day used in this risk assessment was taken from HEAST (EPA, 1995).

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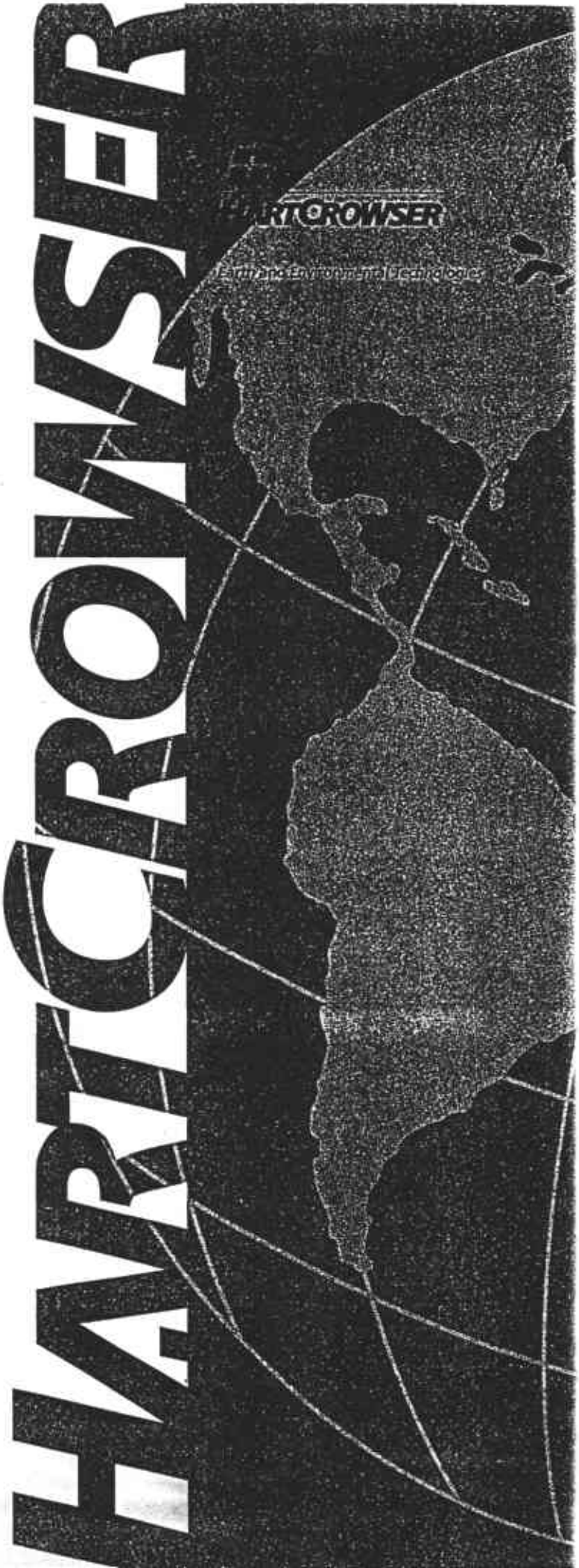
ATTACHMENT 1
FACILITY CLOSURE REPORT
GRAND AUTO SUPPLY
4240 EAST 14TH STREET
OAKLAND, CALIFORNIA
HART CROWSER, INC.
FEBRUARY 16, 1996

FACILITY CLOSURE REPORT

Grand Auto Supply
4240 East 14th Street
Oakland, California

J-6077

February 16, 1996



FACILITY CLOSURE REPORT

Grand Auto Supply
4240 East 14th Street
Oakland, California

February 16, 1996

J-6077

Submitted to:

PACCAR Automotive, Inc.
1400 N. 4th Street
Renton, WA 98055

Submitted by:

Hart Crowser, Inc.
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1.0 INTRODUCTION

On behalf of PACCAR Automotive, Inc. (PACCAR), Hart Crowser, Inc., has prepared this facility closure report for the Grand Auto store at 4240 East 14th Street in Oakland, California (the site). This report has been prepared to meet the closure requirements of the Alameda County Health Care Services Agency (ACHCSA) and the California Regional Water Quality Control Board - San Francisco Region (RWQCB). This facility closure request is based on the following:

- The known potential onsite sources of petroleum hydrocarbons (underground storage tanks (USTs), UST-associated piping, and car wash sump) have been removed, along with the bulk of the sump-related soil that contained petroleum hydrocarbons;

- Petroleum hydrocarbons have not been detected in site groundwater for five quarters of groundwater monitoring;

- The available chemical data suggest that the former car wash sump was not a likely source of halogenated volatile organic compounds (VOCs) to groundwater;

- No other potential sources of halogenated VOCs related to Grand Auto operations are known or suspected at the site. We therefore conclude that the halogenated VOCs present in site groundwater are due to a source unrelated to Grand Auto operations;

- Numerous potential offsite sources of halogenated VOCs exist in the immediate vicinity of the site. We have not identified any documents indicating that environmental investigations pertaining to halogenated VOCs have been conducted at these potential offsite sources.

This report includes sections that discuss the history of the site, the local hydrogeology, the soil and groundwater investigations completed to date, the removal actions completed onsite, and the nature and extent of chemicals present in soil and groundwater. The

potential for offsite sources of the chemicals remaining in site groundwater is discussed. Additionally, this report provides our rationale for requesting facility closure at this time.

2.0 SITE DESCRIPTION

The Grand Auto retail facility is located on an approximately 1.2 acre site (Figure 1). The site currently is used as an auto service and retail merchandise facility. Previously, the site also was used for retail gasoline sales, and had underground fuel storage tanks and a car wash with an associated drainage sump. The underground fuel tanks were removed in 1986. The car wash drainage sump was removed in August 1992. During October 1993, the remaining fuel conveyance piping associated with the former underground fuel storage tanks was excavated and removed from the site.

When environmental activities were initiated at the site, the former Super Tire store at 4256 East 14th Street was included as part of the Grand Auto site. Subsequently, the former Super Tire store was considered by both PACCAR and ACHCSA as a separate site. In it's letter to PACCAR dated December 27, 1993, ACHCSA indicated that no further action was required for soil-related issues at the former Super Tire store.

3.0 HISTORICAL SITE USE

The earliest available recorded use of the property is as a dance hall in 1903. Site use between 1903 and 1946 is unknown. Around 1946, an L-shaped building was constructed on the site. This building was used as office space and for auto repair, auto body repair, and auto painting shops. The date of demolition of this building is not known.

In 1960 or 1961, the present building was constructed for use as a Safeway grocery store. Grand Auto leased the building from the property owner in 1971 and, in 1972, installed pump islands and three 10,000-gallon underground storage tanks for retail gasoline sales. The tanks were subsequently removed in 1986 and the remaining

associated conveyance piping was removed in 1993. Grand Auto also operated a car wash at the site from approximately 1972 to 1986. The drainage sump associated with the car wash was removed in August 1992.

4.0 HISTORICAL USE OF THE SURROUNDING AREA

In addition to residential housing, numerous commercial operations have existed in the areas immediately adjacent to the site. Various adjacent or nearby parcels have been used as retail gasoline stations, auto repair shops, auto paint shops, auto transmission repair shops, auto dealerships, and retail dry cleaners. In many cases, these parcels have been used for these purposes since the late 1940's or early 1950's (Figure 2).

A detailed description of historical uses of adjacent properties was compiled by AllWest Environmental (August 10, 1995). The historical use sections of AllWest's document is included herein as Appendix A.

5.0 SITE INVESTIGATION AND REMEDIATION

5.1 *Work Chronology*

The underground fuel tanks at the site were removed in 1986. In July 1992, Hart Crowser performed a site investigation as outlined in "Sampling and Analysis Plan, Grand Auto/Super Tire Facilities," July 6, 1992. The investigation included drilling two borings (B-4 and B-5) in the assumed vicinity of the former location of the underground fuel storage tanks (Figure 3). Analyses of soil samples from these borings did not indicate significant petroleum hydrocarbon concentrations (Table 1).

The car wash drainage sump and surrounding soil were removed on August 7, 1992 (Figure 3). Hart Crowser collected a soil sample (S2C) from beneath the sump at the bottom of the excavation, 8.5 feet below ground surface (ft BGS). Analyses of the sample indicated the presence of petroleum hydrocarbons and low concentrations of

tetrachloroethylene (PCE) in the soil beneath the sump (Table 1). A groundwater monitoring well (MW-1) was installed within ten feet southwest of the sump, approximately the downgradient direction. Despite some slightly wet conditions encountered at 8 ft BGS, free groundwater was not encountered until approximately 36 ft BGS. The shallow, wet zone may indicate a discontinuous perched zone of groundwater at the site at approximately 8 ft BGS. The results of this phase of the investigation were summarized in the "Preliminary Site Investigation Report" (Hart Crowser, November 20, 1992).

During April 1993, Hart Crowser drilled five soil borings (B-8 to B-12) and converted three of them to groundwater monitoring wells (MW-2, MW-3, MW-4; see Figure 3 and Table 2). We also installed an off-site groundwater monitoring well (HC-1) at the adjacent Super Tire facility. Two of the soil borings, B-8 and B-9, were completed in the area of the former car wash sump. Soil samples from B-8 and B-9 indicated that the TPH and PCE detected immediately below the sump in sample S2C were neither laterally nor vertically widespread.

The wells were developed and sampled in April 1993. The results of this phase of the assessment were summarized in a report, "Supplemental Site Investigation," June 18, 1993.

During October 1993, fuel conveyance piping associated with the former underground fuel storage tanks was excavated and removed from the site. Verification soil samples were taken from the base of the excavation at the four locations shown on Figure 3. Each sample was analyzed for total petroleum hydrocarbons as gasoline (TPH-G) and benzene, toluene, ethylbenzene, and xylenes (BTEX). TPH-G and BTEX were not detected in any of the samples analyzed (Table 1). This work was described in our "Quarterly Status Report," dated January 14, 1994.

5.2 *Local and Regional Hydrogeology*

The site is located on the alluvial plain on the east side of San Francisco Bay (the Bay). As is typical for the Bay margin, the area around the site is underlain by Quaternary alluvial deposits, consisting of unconsolidated clay, silt, sand, and gravel. Bedrock

underlying the alluvium in the area consists primarily of the Mesozoic-age Franciscan Formation; depth to bedrock in the area of the site is unknown.

Several soil borings were completed to depths of up to 46 ft BGS at the site and the adjacent former Super Tire site. The borings indicate that the site is underlain by an irregularly layered sequence of silty to gravelly sand lenses separated by clayey silt. As much as 20 feet of imported fill material may exist in some areas of the site.

Unconfined groundwater was generally encountered at depths of approximately 35 ft BGS. However, in well MW-1, wet soil at 8 ft BGS indicated a possible discontinuous zone of perched groundwater. The extent of such a perched zone cannot be assessed with the available data; however no potential perched zones of groundwater were noted in other borings at the site. The available groundwater elevation data indicates that the groundwater gradient is nearly flat at the site (Table 2; Figure 4). It can be assumed from regional geology and hydrogeology that groundwater flow in the area is generally westerly, toward San Francisco Bay. Groundwater elevations in well MW-2, on the east side of the site, have consistently been slightly higher than other wells, which also indicates a general westerly groundwater flow.

5.3 *Potential Beneficial Uses of Groundwater*

The site is located in an area where groundwater in deep, regional aquifers is considered to have beneficial uses (SF Basin Plan). The Alameda County Department of Public Works indicated the presence of industrial and irrigation supply wells within one mile of the site. In general, these wells are completed to depths of several hundred feet.

Shallow groundwater in the area is separated from the deep, regional aquifers by significant thicknesses of silt and clay, which act as regional aquitards (Alameda County, 1988). There are no known or documented uses of shallow groundwater in the vicinity of the site.

5.4 *Nature and Extent of Chemicals of Concern*

5.4.1 Types of Chemicals

Physical and chemical properties of gasoline, and of its component chemicals of primary toxicological concern (benzene, toluene, ethylbenzene, and xylenes) are presented in Table 3. Gasoline components are less dense than water and would be expected to form a floating layer on the water surface if present in high enough concentrations. BTEX compounds are highly volatile, relatively insoluble in water, and can migrate readily from water into soil air spaces and thence into the atmosphere. These compounds have low to moderate adsorption to soil. Of the fuel-related compounds, benzene is the primary health concern because it is a known human carcinogen.

Physical and chemical properties of the halogenated VOCs detected in site groundwater are presented in Table 4. The only halogenated VOC detected in site soil samples was tetrachloroethylene (PCE).

5.4.2 Extent of Chemicals in Soil

No petroleum hydrocarbons were detected in soil samples from borings B4 or B5, located in the vicinity of the former UST excavation (Figure 3). No petroleum hydrocarbons were detected in soil samples from the piping excavation. Low concentrations of TPH-G and BTEX were detected in site soil during the excavation and removal of the car wash sump. Overexcavation of the sump was completed to the extent practicable, and the overexcavation successfully removed the bulk of the visibly stained soil. The highest concentration of TPH-G detected in soil in place is 310 micrograms per kilogram (μg/kg) from beneath the car wash sump, at a depth of 8 ft BGS (sample S2C; Table 1). No further excavation was performed in this area due to the proximity to the existing building.

PCE was detected in the soil sample collected from beneath the car wash sump at 8 ft BGS (104 μg/kg PCE in sample S2C-8; Table 1). Soil samples from the two subsequent soil borings completed in the area (B8 and B9) indicated a limited lateral and vertical extent of the PCE detected in S2C-8. Samples from 10 to 11 ft BGS indicated

concentrations of PCE at or below detection limits (5 μg/kg). Samples from 16 and 21 ft BGS did not indicated the presence of detectable concentrations of PCE. Sample B8-25 indicated 30 μg/kg of PCE. These data suggest that the volume of soil containing PCE is small and that PCE concentrations within the soil are low. Additionally, given that (1) sample B8-25 is from near the water table and (2) that approximately 15 ft of clean soil separates this depth from the base of the sump excavation, it is reasonable to assume that the low concentration of PCE detected at 25 ft BGS is due to either direct contact with, or vapor migration from the PCE in groundwater immediately below.

PCE was also detected in low concentrations in soil samples from near the water table in wells MW-3 and MW-4 (9 and 12 μg/kg, respectively). These low concentrations also are likely to reflect the PCE present in site groundwater. No other halogenated VOCs have been detected in site soil.

Note that the PCE concentrations in soil are lower than the PCE concentrations recorded for groundwater samples from the adjacent well MW-1 (as much as 340 micrograms per liter (μg/L); Table 5). This suggests that the soil in the sump area did not act as a source of PCE to the groundwater (see Section 6.1 below). PCE tends to bind preferentially to organic material in soil, rather than to dissolve in groundwater, as indicated by a positive log K_{oc} (Table 4 and detailed discussion in Appendix B). This tendency indicates that for soil to act as a source of PCE to groundwater, the soil must have a higher concentration of PCE than the groundwater it is in contact with. Because site data indicate that soil concentrations are lower than groundwater concentrations, it is unlikely that the site soil is a source of PCE to groundwater.

Several soil samples collected during various phases of the site investigations were analyzed for the metals cadmium (Cd), chromium (Cr), hickel (Ni), lead (Pb), and zinc (Zn). With the exception of cadmium, low concentrations of the metals were detected (Table 1). However, these metals all occur naturally in soil in background concentrations. The concentrations detected fall within or near typical background concentrations (Table 6). Preliminary Remediation Goals

(PRGs) are screening-level, risk-based concentrations of chemicals published by the US EPA to be used in evaluation of human health risks at a given site (Table 7). The concentrations of PCE and metals detected in site soil samples are below their respective PRGs.

5.4.3 Extent in Groundwater

Groundwater monitoring at the site began in 1992. The groundwater monitoring program at the site included analyzing groundwater samples for TPH-G, BTEX, metals, and halogenated VOCs (Table 5). TPH-G and BTEX were not analyzed for in groundwater during any 1995 sampling event because five previous quarters of sampling indicated that petroleum hydrocarbons were not present in groundwater at the site. The five metals (Cd, Cr, Ni, Pb, Zn) were also dropped from the list of analytes in 1995, because five previous rounds of sampling indicated that the metals were not present in the groundwater.

Halogenated VOCs consistently have been detected in site groundwater samples (Table 5). For halogenated VOCs having recorded onsite concentrations that exceed their respective MCLs, historical concentration ranges are as follows:

Chemical	Range of Concentrations (μg/L)
PCE	3 to 340
TCE	13 to 130
cis-1,2-DCE	ND (<0.5) to 36
VC	ND (<0.5) to 0.9

(ND = below detection limit listed)

PCE has been detected in all five monitoring wells, with the highest concentrations typically found in MW-1. Trichloroethylene (TCE) and cis-1,2-dichloroethylene (cis-1,2-DCE) have been detected in all five monitoring wells. The highest concentrations of TCE and cis-1,2-DCE typically have been reported in the samples from MW-2. MW-2 is located at the assumed upgradient boundary of the site. Vinyl chloride (VC) was detected at the site for the first time during the September 1995 sampling round. Duplicate analyses of groundwater samples from MW-2 indicated VC concentrations of 0.8 μg/L and 0.9 μg/L, values close to the detection limit of 0.5 μg/L.

The distribution of halogenated VOCs within site groundwater indicates that halogenated VOCs in groundwater are not restricted to the site boundaries (Figure 5). Furthermore, with the exception of PCE, the maximum concentrations of VOCs in site groundwater have been detected in well MW-2, at the upgradient site boundary. An offsite, upgradient source is likely for these chemicals.

5.5 *Effectiveness of Removal Actions*

The USTs at the site were removed in 1986 and the remaining associated conveyance piping was removed in 1993. Soil samples collected at the conclusion of the piping removal action and from borings in the assumed vicinity of the former UST indicated that significant concentrations of TPH-G and BTEX did not remain in soil in the areas sampled.

The car wash sump was removed in 1992 and surrounding apparently stained soil was excavated to the maximum extent practicable without endangering the structural integrity of the building (Preliminary Site Investigation Report, Hart Crowser, November 20, 1992). A soil sample collected from the bottom of the excavation indicated low concentrations of PCE and petroleum hydrocarbons. The excavation was then backfilled and repaved.

6. 0 POTENTIAL SOURCES OF CHEMICALS PRESENT IN SOIL AND/OR GROUNDWATER

6.1 *Potential Onsite Sources of Chemicals*

All known potential sources of chemicals related to Grand Auto operations at the site (USTs and related piping; car wash sump) have been removed. The USTs and conveyance piping were potential sources of TPH-G and BTEX only. The available data indicates that the bulk of the chemicals in soil that may have been associated with these potential sources have been removed.

There is no evidence that the car wash drainage sump was used for disposal of fuels or solvents. Some discoloration of soil around the sump was noted when the sump was removed and, to the extent practicable, the discolored soil was removed. Analyses of soil from the bottom of the sump excavation indicated low concentrations of TPH-G and PCE. However, soil samples from borings B-8 and B-9, drilled directly adjacent to the sump, indicated that the TPH and PCE detected immediately below the sump were neither laterally nor vertically widespread.

While analyses of soil from beneath the sump indicated the presence of PCE, the maximum concentration in soil (104 μg/kg in sample S2C) was much less that the concentration of PCE in groundwater in adjacent well MW-1 (340 μg/L maximum). In a soil/water system, PCE is preferentially adsorbed to organic material in the soil (see discussion in Appendix B). The lower concentrations in soil than that in groundwater thereby indicates that the PCE in soil was unlikely to have served as a source of the PCE in groundwater. Therefore, it is unlikely that the car wash sump was a source to groundwater of PCE.

Other halogenated VOCs detected in site groundwater were not detected in any site soil sample or in the sample of material from the sump (Table 8). Conversely, chemicals detected in the sump sample or from the soil sample immediately beneath the sump were not detected in site groundwater. The overall difference in the "sump suite" of chemicals from the "groundwater suite" further suggests that the sump did not act as a source of chemicals to groundwater.

6.2 *Potential Offsite Sources of Chemicals*

As indicated in Section 5.4.3 above, the distribution of halogenated VOCs within site groundwater indicates that halogenated VOCs in groundwater are not restricted to the site boundaries and suggests that the occurrence of halogenated VOCs is due to an offsite source.

Potential offsite sources of halogenated VOCs include:

- Various current and past auto repair operations at various properties surrounding the site;

- The former gas station at 1455 High Street and its likely waste oil tank and auto repair operations; and

- The several generations of dry cleaners at 1460 High St. and the sewer lines servicing the dry cleaners.

Locations of these potential offsite sources are indicated on Figure 2. The potential sources are described in detail in Appendix A. A record search did not locate any environmental records pertaining to these potential offsite sources.

Environmental work has been completed at 4256 East 14th St. (Former Super Tire site), and no further action for soil at the site is required by ACHCSA. The former Super Tire site is therefore not considered a potential offsite source.

6.3 *Conclusions Regarding Potential Sources*

The above discussions of potential onsite and offsite sources of chemicals to the groundwater indicates that:

- Potential onsite sources related to Grand Auto operations (USTs, pump islands, associated piping, and car wash sump) have been investigated and/or successfully remediated, thus are no longer considered to be sources;

- Investigations of these potential onsite sources did not indicate evidence of a source of halogenated VOCs to the groundwater; and

- Several potential offsite sources of halogenated VOCs exist. We have not discovered any documents that would indicate that environmental investigations have been conducted by the owners of any of the potential offsite sources.

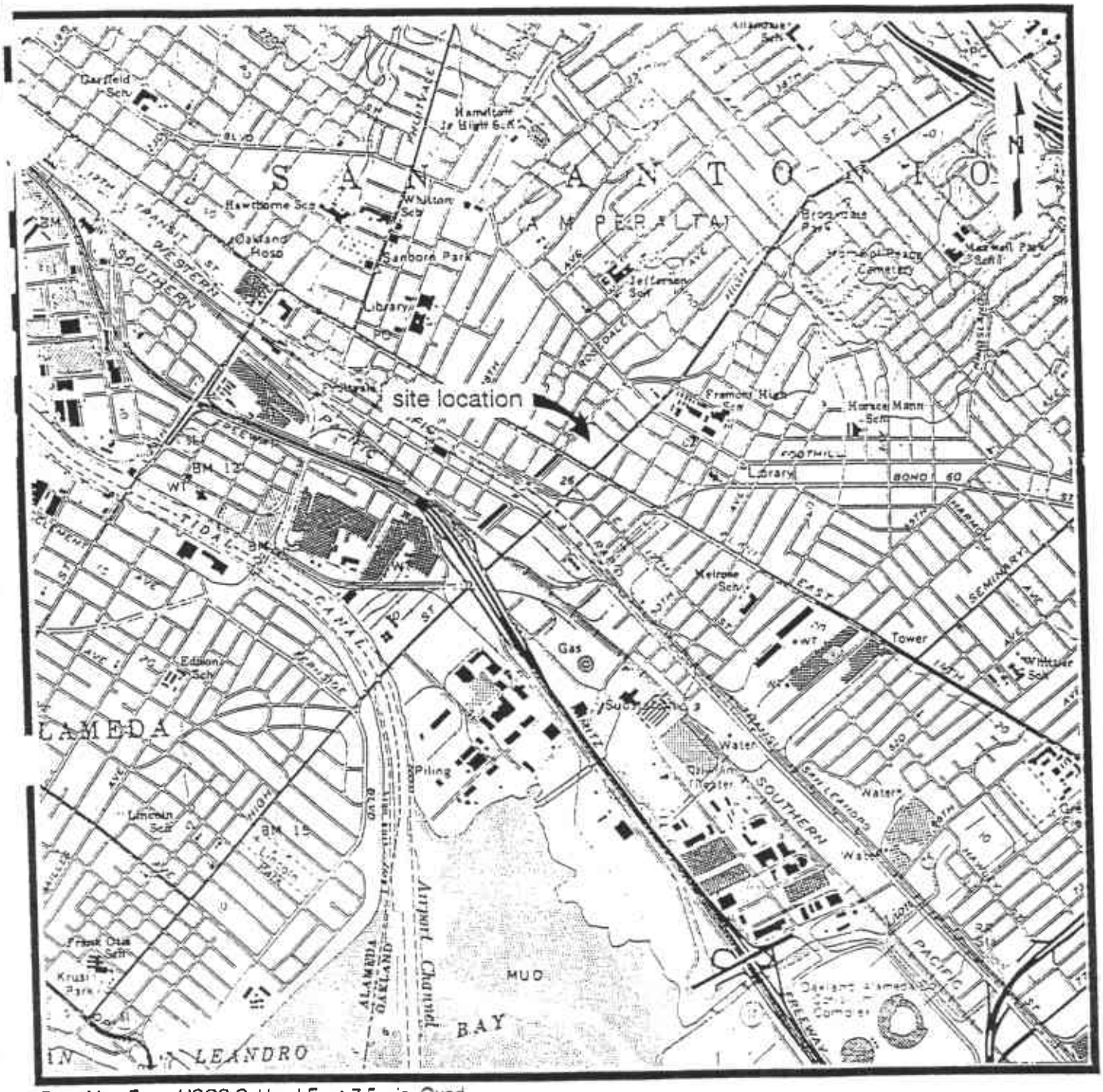
7.0 SUMMARY AND RECOMMENDATIONS

We recommend case closure for the site since the environmental issues associated with potential onsite sources of chemicals have been addressed. Halogenated VOCs remain in site groundwater, but these are 1) unrelated to the onsite sources that have been addressed; and 2) likely to be the result of releases at one or more of the numerous offsite potential sources located in the immediate vicinity of the site. We recommend abandonment of the remaining groundwater monitoring wells after the closure certification is approved by ACHCSA and RWQCB.

8.0 LIMITATIONS

Services performed by Hart Crowser have been provided in accordance with generally accepted professional practices for the nature and conditions of the work completed in the same or similar localities, at the time the work was performed. This report is not meant to represent a legal opinion. No other warranty, express or implied, is made. This report was prepared for the sole use of PACCAR Automotive, Inc.

FIGURES



Base Map From USGS Oakland East 7.5 min. Quad

LOCATION MAP
Grand Auto/Former Super Tire Site
Oakland, California

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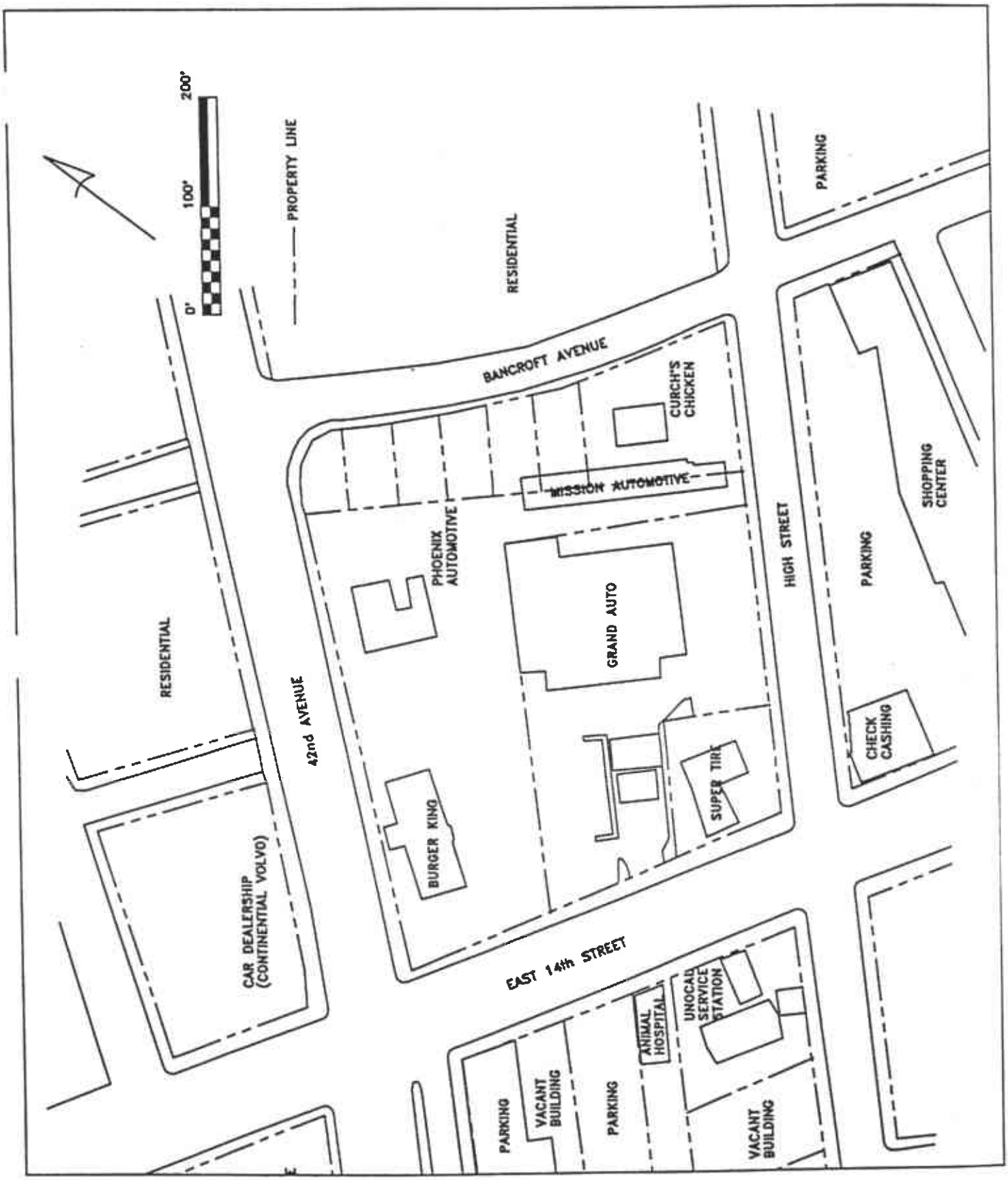
Figure 1



Current Use of Adjacent Properties
Grand Auto Supply
4240 East 14th Street
Oakland, California

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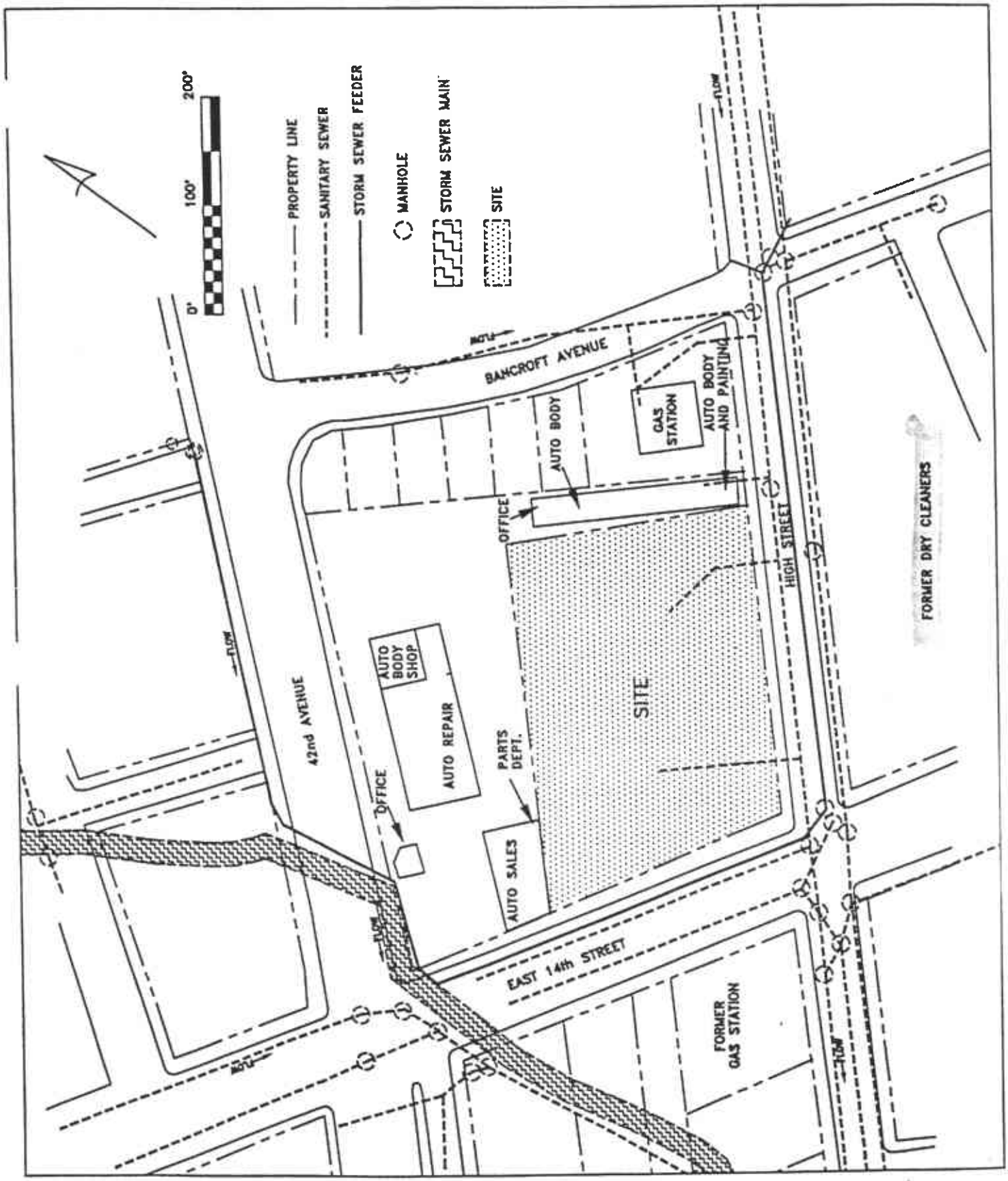
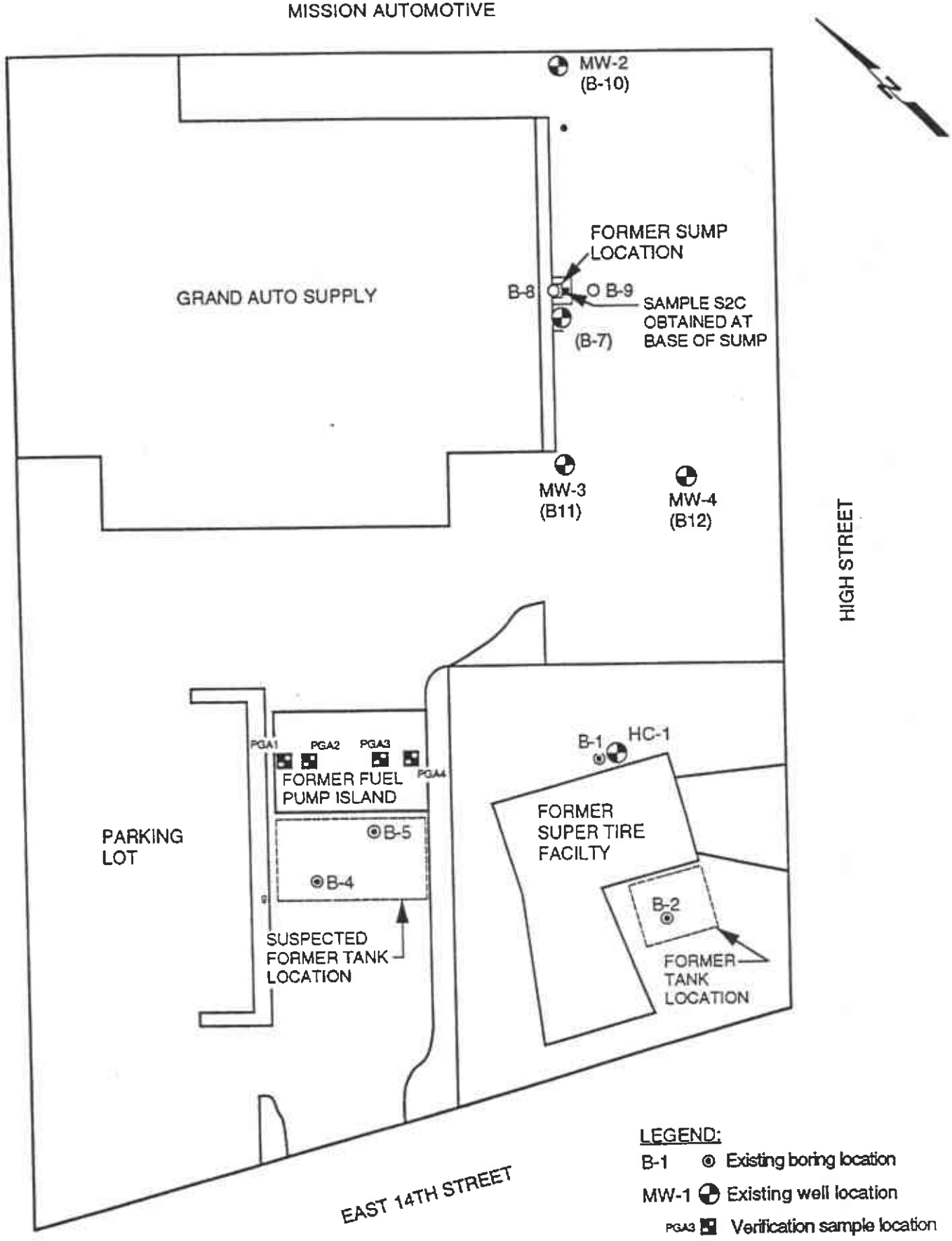
Figure 2a



Current and Former Sewer Lines and Past Use of Adjacent Properties
Grand Auto Supply
4240 East 14th Street
Oakland, California

HARTCROWSER
J-6067 2/96
Figure 2b

MISSION AUTOMOTIVE



20 40 80

Scale, in Feet

SITE PLAN

Grand Auto Store
East 14th & High Streets
Oakland, California

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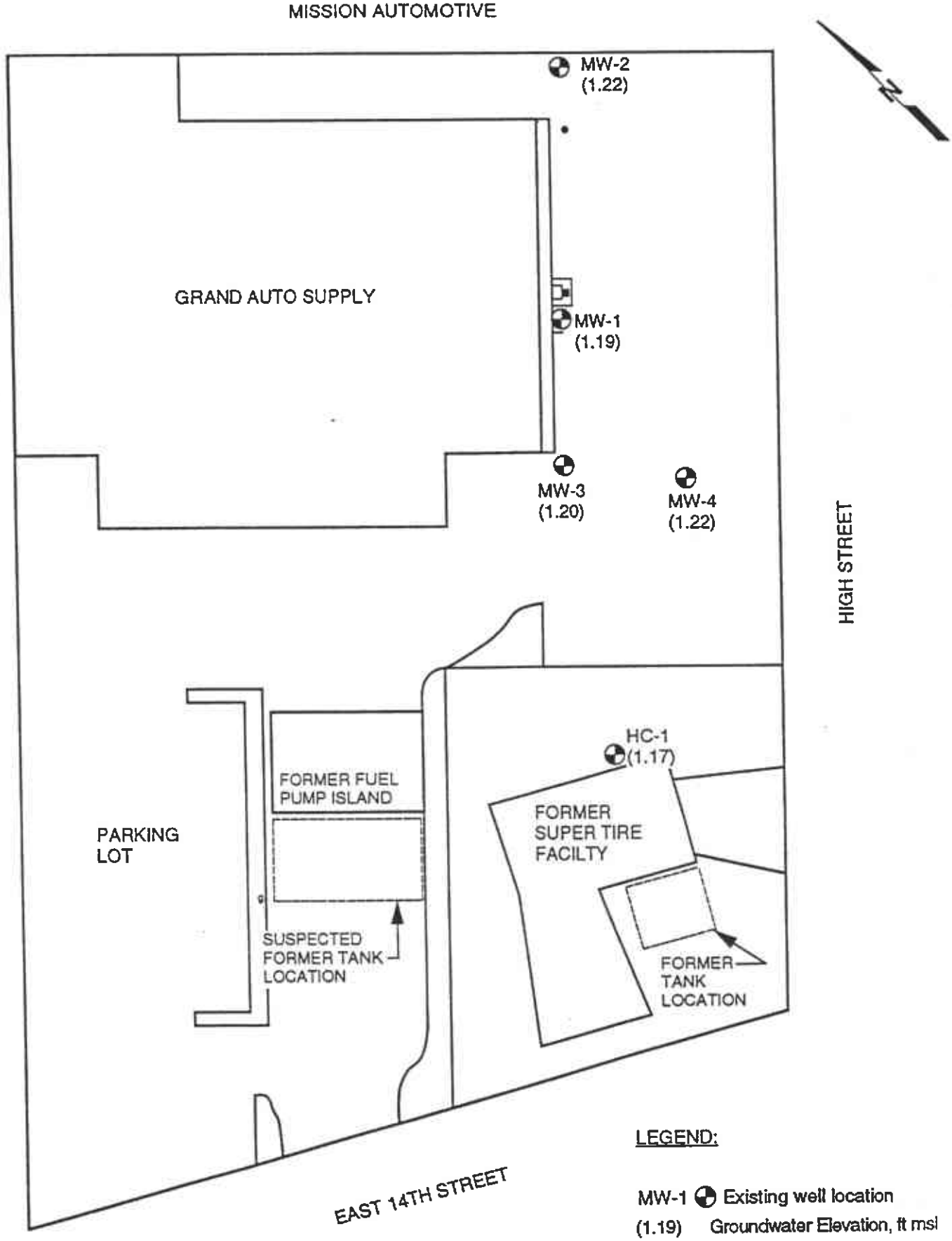
Figure 3

sd/pecos oakland site v.1

MISSION AUTOMOTIVE



LEGEND:

MW-1 ⊕ Existing well location

(1.19) Groundwater Elevation, ft msl

20 40 80

Scale, in Feet

GROUNDWATER ELEVATIONS
September 15, 1995

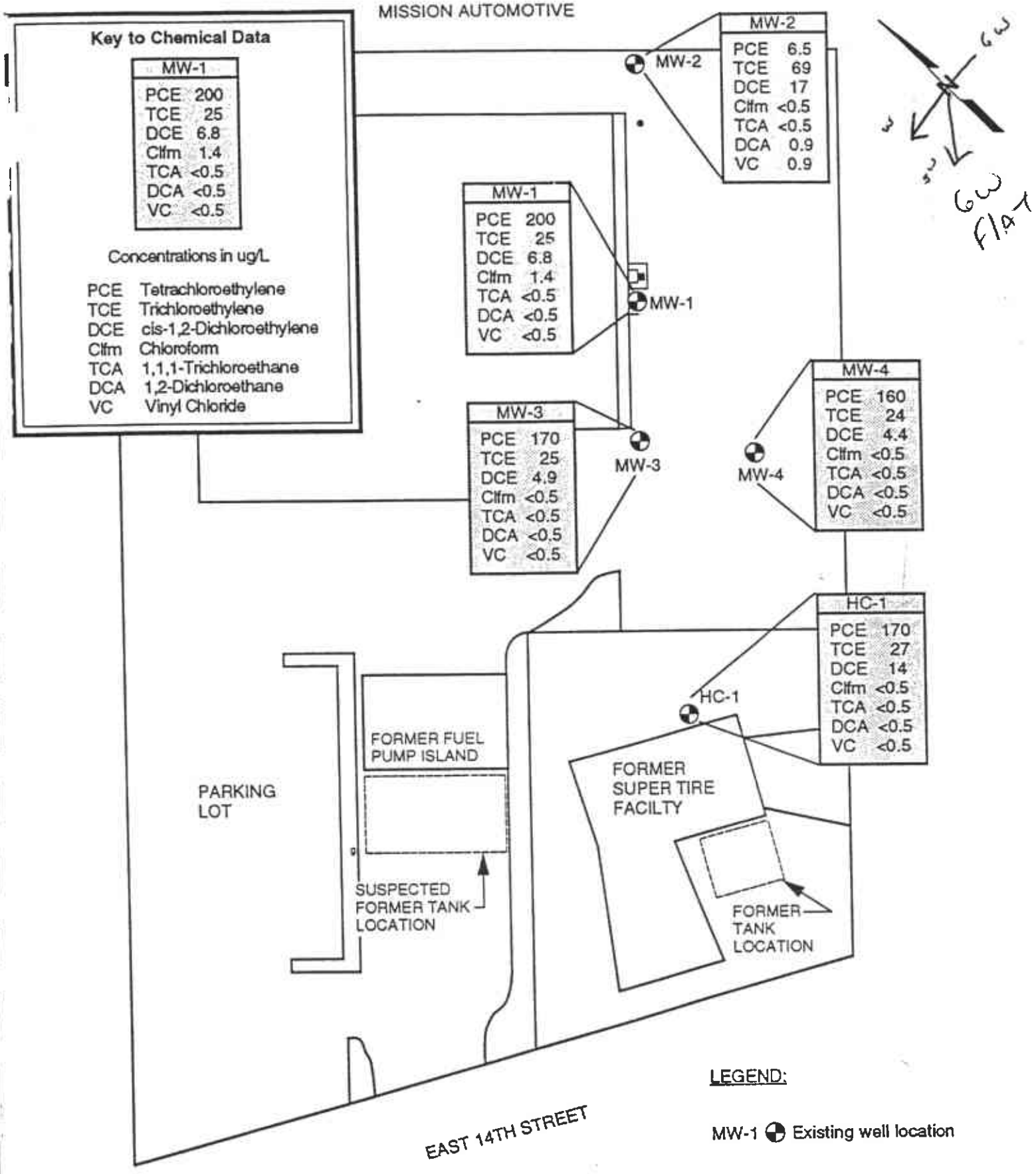
Grand Auto Store
East 14th & High Streets
Oakland, California

HARTCROWSER

J-6077 2/96

Figure 4

s/pacar oakland site v.1



VOCs IN GROUNDWATER
September 15, 1995

Grand Auto Store
East 14th & High Streets
Oakland, California

HARTCROWSER
J-6077 2/96
Figure 5

ad/pecar oakland site v.1

TABLES

TABLE 1
SUMMARY OF SOIL ANALYSES
GRAND AUTO STORE , OAKLAND, CALIFORNIA

BORING/WELL DATE	B4-21 7/16/92	B5-19 7/16/92	B5-26 7/16/92	S2C-8 8/7/92	MW2-10.5 4/14,15,16/93	MW2-35 4/14,15,16/93	MW3-35.5 4/14,15,16/93	MW4-36 4/14,15,16/93	B8-11 4/14,15,16/93
Oil & Grease	NT	NT	NT	ND<50	NT	NT	NT	NT	NT
TPH-Diesel	ND<10	ND<10	ND<10	120	ND<10	ND<10	ND<10	ND<10	ND<10
TPH-Gasoline	ND<1	ND<1	ND<1	310	ND<1	ND<1	ND<1	ND<1	ND<1
Organic Lead	ND<2	NT	ND<2	ND<2	NT	NT	NT	NT	NT
Benzene	ND<0.003	0.011	ND<0.003	ND<0.075	ND<0.003	ND<0.003	ND<0.003	ND<0.003	ND<0.003
Ethyl Benzene	ND<0.003	ND<0.003	ND<0.003	0.064	ND<0.003	ND<0.003	ND<0.003	ND<0.003	ND<0.003
Toluene	ND<0.003	ND<0.003	ND<0.003	0.065	ND<0.003	ND<0.003	ND<0.003	ND<0.003	ND<0.003
Xylenes	ND<0.003	0.003	ND<0.003	1.5	ND<0.009	ND<0.009	ND<0.009	ND<0.009	ND<0.009
PCE	NT	NT	NT	0.104	ND<0.005	ND<0.005	0.009	0.012	0.005
Other Chlorinated VOCs	NT	NT	NT	ND	ND	ND	ND	ND	ND
Cadmium	NT	NT	NT	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1
Chromium	NT	NT	NT	73	28	31	29	35	58
Lead	NT	NT	NT	9	5	ND	ND	ND	9
Nickel	NT	NT	NT	110	61	47	42	59	150
Zinc	NT	NT	NT	30	39	49	47	34	61

Notes:
ND denotes chemical not dected in sample at a concentration of x.
NT denotes analysis not performed on sample.
Concentrations listed are in milligrams per kilogram (mg/kg).

TABLE 1
SUMMARY OF SOIL ANALYSES
GRAND AUTO STORE , OAKLAND, CALIFORNIA

BORING/WELL DATE	B8-16 4/14,15,16/93	B8-21 4/14,15,16/93	B8-25 4/14,15,16/93	B9-10 4/14,15,16/93	P1-2.5 10/20/93	P2-2.5 10/20/93	P3-2.5 10/20/93	P4-2.5 10/20/93
Oil & Grease	NT	NT	NT	NT	NT	NT	NT	NT
TPH-Diesel	ND<10	ND<10	ND<10	ND<10	NT	NT	NT	NT
TPH-Gasoline	ND<1	ND<1	ND<1	ND<1	ND<1.0	ND<1.0	ND<1.0	ND<1.0
Organic Lead	NT	NT	NT	NT	NT	NT	NT	NT
Benzene	ND<0.003	ND<0.003	ND<0.003	ND<0.003	ND<0.003	ND<0.003	ND<0.003	ND<0.003
Ethyl Benzene	ND<0.003	ND<0.003	ND<0.003	ND<0.003	ND<0.003	ND<0.003	ND<0.003	ND<0.003
Toluene	ND<0.003	ND<0.003	ND<0.003	ND<0.003	ND<0.003	ND<0.003	ND<0.003	ND<0.003
Xylenes	ND<0.009	ND<0.009	ND<0.009	ND<0.009	ND<0.009	ND<0.009	ND<0.009	ND<0.009
PCE	ND<0.005	ND<0.005	0.030	ND<0.005	NT	NT	NT	NT
Other Chlorinated VOCs	ND	ND	ND<0.005	ND<0.005	NT	NT	NT	NT
Cadmium	ND<1	ND<1	ND<1	ND<1	NT	NT	NT	NT
Chromium	29	29	28	27	NT	NT	NT	NT
Lead	ND	ND	6	6	NT	NT	NT	NT
Nickel	53	43	41	72	NT	NT	NT	NT
Zinc	45	37	48	40	NT	NT	NT	NT

Notes:
ND denotes chemical not dected in sample at a concentration of x.
NT denotes analysis not performed on sample.
Concentrations listed are in milligrams per kilogram (mg/kg).

TABLE 2
MONITORING WELL DATA
September 15, 1995
Grand Auto Supply
Oakland, California

WELL	TOTAL DEPTH (feet BGS)	SCREENED INTERVAL (feet BGS)	SURFACE ELEVATION (feet above msl)	TOP OF CASING ELEVATION (feet above msl)	DEPTH TO GROUNDWATER (feet BGS)	GROUNDWATER ELEVATION (feet above msl)
MW-1	43	33-43	30.8	30.53	29.34	1.19
MW-2	45	31-45	30.7	30.41	29.19	1.22
MW-3	45	30-45	30.7	30.31	29.11	1.2
MW-4	45	30-45	29.5	29.08	27.86	1.22
HC-1	42	30-42	28.7	28.33	27.16	1.17

Notes:
1. See Figure 1 for well locations.
2. BGS = below ground surface.
3. MSL = mean seal level

TABLE 3
PHYSICAL/CHEMICAL CHARACTERISTICS OF GASOLINE AND RELATED COMPOUNDS
GRAND AUTO STORE
4240 EAST 14TH STREET
OAKLAND, CALIFORNIA

Chemical	Molecular Weight	Boiling Point (°C @ 760 mm Hg)	Vapor Pressure (psia)	Henry's Law Constant (m^3/atm/mol @ 25°C)	Solubility (mg/L @ 20°C)	Log of Octanol-Water Coefficient (log Kow)
Benzene	78.11	80.1	1.84 (25°C)	0.00555	1,780	2.13
Ethylbenzene	106.17	136	0.19 (25°C)	0.00644	152	3.15
Toluene	92.14	111	0.54 (25°C)	0.00592	515	2.69
Xylene (1)	106.16	140	0.097 (20°C)	0.00527	175	2.77
Gasoline	NA	60 to 199	7.4(21°C)	NA	100 to 200	NA

(1)Characteristics shown are for the ortho isomer.
NA - Information not located or not pertinent to chemical mixture.

TABLE 4
CHEMICAL PROPERTIES OF VOLATILE ORGANIC COMPOUNDS
GRAND AUTO STORE
4240 EAST 14TH STREET, OAKLAND, CALIFORNIA

Chemicals Detected at the Study Area	Specific Gravity (20* C)	Water Solubility (mg/l @ 20*C)	Vapor Pressure (mmHg @ 20*C)	Henry's Constant (atm-m3/mol)	Kow (Log 10)	Koc (Log 10)
CHLORINATED CHEMICALS						
Trichloroethene (TCE)	1.464	1100 [5]	58 [5]	0.0091 [1]	2.38 [7]	2.10
Tetrachloroethane (PCE)	1.623	150 [5]	14 [5]	0.023 [11]	2.52 [7]	2.56
1,1,1-Trichloroethane (1,1,1 -TCA)	1.339	4400 [3]	96 [5]	0.03 [1]	2.47 [7]	1.76
1,2-Dichlorethane (1,2-DCA)	1.235	8690 [11]	64 [11]	0.0011 [11]	1.48 [6]	0.71
cis-1,2-Dichloroethene (1,2-DCE)	1.260	800 [3]	200 [4]	0.0075 [1]	2.09 [9]	2.17
Vinyl Chloride (VC)	0.911	2763 [6]	2660 [6]	0.011 [6]	1.38 [6]	0.91
Chloroform	1.483	8,200	160	0.0038	1.95	1.64
Dichlorodifluoromethane (Freon 12)	1.183 [57]	280	4,250	0.1000	2.16	1.76

Notes:
Kow = Octanol/Water partition coefficient
Koc = Organic carbon/water partition coefficient

TABLE 5

HISTORICAL GROUNDWATER QUALITY DATA - HALOGENATED HYDROCARBONS
GRAND AUTO SUPPLY, OAKLAND

WELL	DATE	Freon 12 (µg/L)	cis-1,2-DCE (µg/L)	Chloroform (µg/L)	1,1,1-TCA (µg/L)	1,2-DCA (µg/L)	Vinyl Chloride	TCE (µg/L)	PCE (µg/L)
MW-1	9/10/92	NR	11	1.1	ND 0.5	ND 0.5	--	26	310
GC/MS	1/19/93	NR	14	ND 3	ND 3	ND 1	--	28	220
	4/26/93	37	8.7	1	ND 0.5	ND 0.5	ND 1	22	300
(d)	4/26/93	110	8.7	1.1	0.6	ND 0.5	ND 1	22	300
	8/4/93	NR	10	ND 5	ND 5	ND 5	ND 10	23	290
	11/17/93	NR	15	1.8	ND 0.5	ND 0.5	ND 1	28	230
	2/18/94	NR	12	1	ND 0.5	ND 0.5	ND 0.5	25	200
	6/7/94	NR	25	1.6	ND 0.5	ND 0.5	ND 0.5	28	200
(d)	6/7/94	NR	22	1.5	ND 0.5	ND 0.5	ND 0.5	35	340
	9/20/94	NR	19	ND 5	ND 5	ND 5	ND 5	37	270
(d)	9/20/94	NR	18	ND 5	ND 5	ND 5	ND 5	36	270
	1/31/95	NR	9.7	ND 1	ND 1	ND 1	ND 2	13	54
(d)	1/31/95	NR	9.3	ND 1	ND 1	ND 1	ND 2	13	54
	9/15/95	NR	6.8	1.4	ND 0.5	ND 0.5	ND 0.5	25	200
MW-2	4/26/93	31	8.5	0.9	0.6	0.6	ND 1	32	7.5
	8/4/93	NR	22	ND 1.2	ND 1.2	ND 1.2	ND 2.4	110	7.2
	11/17/93	NR	8.7	ND 0.5	ND 0.5	ND 0.5	ND 1	32	6.1
	2/18/94	NR	25	ND 0.5	ND 0.5	1.5	ND 0.5	75	4.8
	6/7/94	NR	31	ND 0.5	ND 0.5	1.8	ND 0.5	120	6.9
	9/20/94	NR	36	ND 5	ND 5	ND 5	ND 5	130	6
	1/31/95	NR	17	ND 1	ND 1	ND 1	ND 2	60	3
	9/15/95	NR	17	ND 0.5	ND 0.5	1.1	0.8	52	6.3
(d)	9/15/95	NR	17	ND 0.5	ND 0.5	0.9	0.9	69	6.5
MW-3	4/26/93	35	9.7	ND 0.5	0.8	ND 0.5	ND 1	21	79
	8/4/93	NR	ND 5	ND 5	ND 5	ND 5	ND 10	28	170
	11/17/93	NR	12	1.3	0.8	ND 0.5	ND 1	29	170
	2/18/94	NR	5	0.7	ND 0.5	ND 0.5	ND 0.5	19	85
	6/7/94	NR	8.3	0.6	0.6	ND 0.5	ND 0.5	34	160
	9/20/94	NR	11	ND 5	ND 5	ND 5	ND 5	37	240
	1/31/95	NR	6.2	ND 1	ND 1	ND 1	ND 5	34	160
	9/15/95	NR	4.9	ND 0.5	ND 0.5	ND 0.5	ND 0.5	25	170

TABLE 5 (cont.)

HISTORICAL GROUNDWATER QUALITY DATA - HALOGENATED HYDROCARBONS
GRAND AUTO SUPPLY, OAKLAND

WELL	DATE	Freon 12 (µg/L)	cis-1,2-DCE (µg/L)	Chloroform (µg/L)	1,1,1-TCA (µg/L)	1,2-DCA (µg/L)	Vinyl Chloride	TCE (µg/L)	PCE (µg/L)
MW-4	4/26/93	28	3.9	0.6	ND 0.5	ND 0.5	ND 1	17	78
	8/4/93	NR	ND 5	ND 5	ND 5	ND 5	ND 10	16	110
	11/17/93	NR	6.6	1	ND 0.5	ND 0.5	ND 1	20	87
	2/18/94	NR	6	1.9	0.7	ND 0.5	ND 0.5	31	120
	6/7/94	NR	7.1	0.9	0.9	ND 0.5	ND 0.5	28	140
	9/20/94	NR	5	ND 5	ND 5	ND 5	ND 5	32	220
	1/31/95	NR	4.7	ND 1	ND 1	ND 1	ND 5	20	140
	9/15/95	NR	4.4	ND 0.5	ND 0.5	ND 0.5	ND 0.5	24	160
HC-1	4/26/93	47	13	ND 0.5	ND 0.5	ND 0.5	ND 1	22	46
	8/4/93	NR	15	ND 0.5	ND 0.5	ND 0.5	ND 1	27	83
	11/17/93	NR	16	1.1	0.7	ND 0.5	ND 1	27	130
	2/18/94	NR	13	0.7	ND 0.5	ND 0.5	ND 0.5	30	140
(d)	2/18/94	NR	11	0.6	ND 0.5	ND 0.5	ND 0.5	22	150
	6/7/94	NR	22	1	ND 0.5	ND 0.5	ND 0.5	42	180
	9/20/94	NR	15	ND 5	ND 5	ND 5	ND 5	37	190
	1/31/95	NR	11	ND 1	ND 1	ND 1	ND 5	27	120
	9/15/95	NR	14	ND 0.5	ND 0.5	ND 0.5	ND 0.5	27	170

Notes: ND - Not detected at specified detection limit.
NR - Not reported.
GC/MS - Denotes that EPA Method 8240 was used, all other results for EPA Method 8010.
(d) - Denotes results are for a duplicate sample.

TABLE 6
RANGE OF TYPICAL BACKGROUND METAL CONCENTRATIONS

METAL	U.S. RANGE [1]	WESTERN U.S. MEAN [1]	SANTA CLARA COUNTY RANGE[2]	RANGE DETECTED ON-SITE
Cadmium	<1-10	1.0	<DL-14	all <1
Chromium	3-1500	38	<DL-170	28-73
Lead	<7-700	18	<DL-54	5-9
Nickel	<3-700	16	6-145	40-150
Zinc	10-2000	51	7.8-120	30-61

Note: units in mg/kg

References:
1) Final Statement of Reasons (for the development of Title 22 of the California Administrative Code), Table X, "Concentrations of Toxic Elements In Soils-Natural Levels and Concentrations Levels".
2) Background Metal Concentrations in Soils in Northern Santa Clara County, California, CM Scott, December 1991.

Table 7
Preliminary Remediation Goals (PRGs) for Soil[1]

Halogenated VOCs	Site Maximum	Residential Soil	Industrial Soil
PCE	104 ug/kg	7,000 ug/kg	25,000 ug/kg
Metals			
Cadmium	<1 mg/kg	38 mg/kg	850 mg/kg
Total Chromium	73 mg/kg	210 mg/kg	450 mg/kg
Chromium VI	NA	30 mg/kg	64 mg/kg
Nickel	150 mg/kg	1,500 mg/kg	34,000 mg/kg
Lead	9 mg/kg	130 mg/kg [(2)]	1,000 mg/kg
Zinc	61 mg/kg	23,000 mg/kg	100,000 mg/kg

NOTES

[1] from Smucker, S.J., 9/1/95, US EPA Region IX Prelinimary Remediation Goals
[2] Cal-modified PRG
NA - Not Analyzed For

TABLE 8
COMPARISON OF CHEMICAL CONCENTRATIONS
GRAND AUTO STORE
4240 EAST 14TH STREET
OAKLAND, CALIFORNIA

Chemical/Element	Concentrations		
	Sump Sample (mg/kg)	Soil Sample S2C-8 (mg/kg)	Maximum Historical Concentrations in Site Groundwater (mg/L)
Sump Suite [a]:			
Acetone	2.1	ND	ND
Ethylbenzene	0.33	0.064	ND
Dichlorobenzene	0.8	ND	ND
Lead	2800	9	ND
Arsenic	5	ND	ND
Barium	240	ND	ND
Cadmium	12	ND	ND
Copper	210	ND	ND
Mercury	0.41	ND	ND
Antimony	7	ND	ND
Vanadium	26	ND	ND
Groundwater Suite [b]:			
Benzene	ND	ND	0.0008
Freon	ND	ND	0.047
cis 1,2-DCE	ND	ND	0.036
chloroform	ND	ND	0.0019
1,1,1-TCA	ND	ND	0.0009
1,2-DCA	ND	ND	0.0018
Vinyl Chloride	ND	ND	0.0009
TCE	ND	ND	0.130
Others:			
Oil & Grease (TPH)	10,000	310	0.17
Xylene	2.5	1.5	0.001
PCE	ND	0.104	0.34
Toluene	4.6	0.065	0.0011
Chromium	68	73	0.17
Zinc	1300	61	0.21
Nickel	110	150	0.2

Notes:

[a] = In sump or soil but not in groundwater

[b] = In groundwater but not in sump or soil

APPENDIX A
AllWest Phase I Report

AllWest Environmental, Inc.

Specialists in Environmental Due Diligence and Remedial Services

One Sutter Street, Suite 600
San Francisco, Ca 94104
Tel 415.391.2510
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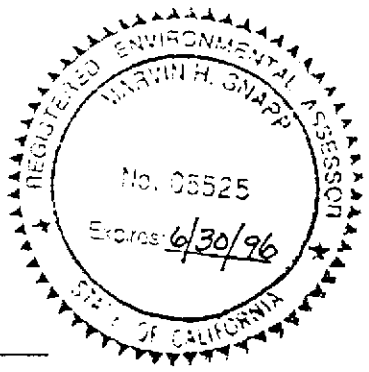
ENVIRONMENTAL SITE ASSESSMENT

Grand Auto Store No. 43
4240 East 14th Street
Oakland, California 94601

PREPARED FOR:

Mr. Raymond Elliott, CHMM
PACCAR Automotive
1400 North Fourth Street
Renton, Washington 98055

ALLWEST PROJECT NO. 95181.21
August 10, 1995



PREPARED BY:

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REVIEWED BY:

Long Ching, P.E.
Senior Project Manager

AllWest

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AllWest

I. EXECUTIVE SUMMARY

AllWest has completed an environmental site assessment of *Grand Auto Store No. 43*, 4240 East 14th Street, City of Oakland, County of Alameda, California. This was an investigation defined by the scope and limitations of ASTM Practice E 11527-93. Any exceptions to, or deletions from, this practice are described in Section III of this report. This assessment has revealed evidence of a *recognized environmental condition* at the property. The site's groundwater is contaminated with halogenated volatile organic solvents. This condition is described below and more fully in the body of the report. AllWest conducted a site visit of the subject property on July 21, 1995.

The subject property is a rectangular shaped parcel of land that comprises approximately 1.2 acres. There is one building located on the property, the *Grand Auto Store,* a concrete tilt-up structure, built on a concrete slab-on-grade foundation. The *Grand Auto* building is 16,900 square feet (sf) in size, with approximately 8,800 sf for the retails sales floor, 5,000 sf for the shop area and 3,000 sf for the backroom/storage area. This building was constructed circa 1961 and is currently utilized as an automotive parts store and repair shop.

The subject property is located in a commercial-retail area. Northwest to northeast of the subject site are commercial businesses and residential homes. Located on the subject site (at the corner of E. 14th and High Streets) is a furniture store, *American Mattress & Furniture.* East of the subject site, across High Street, is a small strip center which includes retail and commercial businesses. A *Union 76* gas station is located southeast of the subject site at the southeast corner of E. 14th and High Streets. Across E. 14th Street, southwest of the *Grand Auto* property are several small retail businesses including *California Dog and Cat Hospital* and office space. Commercial use is predominant along E. 14th and High Streets. Residential homes are located further northwest and northeast.

Industrial equipment noted on the premises include two air compressors, a grinding machine, a battery charger, and machines related to tire repair (a dynamometer and tire mounting). There are six hydraulic hoists in the shop area. The hoist cylinders and hydraulic oil reservoirs are located underground. There were no visible signs of leaks around the hoist cylinders.

Inflammable materials and petrochemicals are stored at the site. These include automotive chemicals for both on-site and retail sales purposes, cleaning solvents, and oils and batteries containing acids for shop use and retail sales. These materials are stored in a neat and orderly fashion. New motor oil and automotive coolant are stored in 250 gallons, double-lined steel aboveground tanks. Used batteries are stored on wooden pallets.

Hazardous wastes observed at the site include the generation and storage of wastes oils, coolants and used batteries. These are generated from repair activities in the automotive shop. Waste oils are stored in 55-gallon metal drums that are properly labeled and located inside of secondary containments.

There are several pole-mounted transformers located along the northeast property boundary that belong to Pacific Gas and Electric (PG&E). According to PG&E, it is unknown if the transformers contain polychlorinated biphenyls (PCBs). The transformers were observed to be in good condition with no leaks evident.

Two types of asbestos-containing resilient floor tiles were located within the building. A 12" x 12" white floor tile/mastic (sales floor) and a 9" x 9" grey floor tile (backroom and restroom). These materials were observed to be in good condition at the time of the site visit and if left undisturbed should not present a health threat to building occupants. There is approximately 11,000 square feet of the white floor tiles/mastic and 300 square feet of the grey floor tile (no asbestos was detected in the mastic).

The earliest identified use of the subject site was obtained from a Sanborn Fire Map dated 1903. It listed the site in use as a dance hall. The next identified use of the site was of a reinforced concrete, L-shaped building, that was used as automotive repair shops, auto body repair and paint shops and office space. This building was constructed in 1946 and demolished in 1960-61. The next use of the property was by *Safeway Inc.* as a grocery store from 1960-61 to 1970. The site has been occupied by *Grand Auto* since 1971.

The subject property is a recorded fuel leak on the RWQCB fuel leaks list and the Cortese List. The site was previously utilized for gasoline sales (1972 through the mid-1980s) with underground storage tanks (three 10,000 gallon USTs), and a car wash with an associated sump. The underground storage tanks were removed in 1986. Analytical results of soil samples collected from the UST pit did not reveal significant hydrocarbon contamination. Removal of the car wash drainage sump occurred in August 1992. Soil sample results indicated the presence of hydrocarbons, halogenated hydrocarbons and some metals in the soil beneath the sump. Groundwater monitoring wells installed in 1992 and 1993 have revealed the presence of total petroleum hydrocarbons ($<$ 170 ppbs) and the HVOCs- DCE, chloroform, TCE and PCE in the groundwater. The levels of HVOCs have remained consistent with a slight increase in wells MW-3, MW-4 and HC-1 during the quarterly monitoring events between September 1992 and September 1994 (PCE at a high of 310 ppb, TCE with a high of 130 ppb and DCE at a high of 36 ppb). Petroleum hydrocarbons have not been detected in the site's groundwater since early 1994 and are no longer a concern. The site is presently undergoing quarterly monitoring for the HVOCs.

The historical use of surrounding properties included businesses which routinely stored and utilized hazardous materials. The adjacent property to the northwest was occupied by several automotive dealerships between 1947 and 1978, where *Burger King* (constructed 1978) is currently located. The present building northeast of the subject site, *1421 High Street,* is

currently occupied by *Mission Auto Body and Repair and Tulleners Automotive. Mission Auto Body and Repair* has been located at this address since at least 1963. Also present at this address at various times during the 1960s through 1980s were various transmission repair shops (1967 - 1980). This property was vacant between 1962 and 1966. Prior to 1959, from at least 1947, residential houses were located along the south side of Bancroft Street between E. 42nd Avenue and High Street.

Church's Fried Chicken (1455 High Street) has been located at the southwest corner of High and Bancroft Streets (beyond *Mission Auto Body)* from circa 1980 up to the present. Prior to 1980, an *Econo Gasoline* station occupied this site dating back at least to 1973. Between 1963 and 1973 this gas station was operated by the *Douglas Oil Company.* Between 1947 and 1959 there were residential homes located at this address.

East of the subject site, which is presently the location of a small retail strip center, has been the location of several restaurants and dry cleaners since the late 1950s. *Golden City Restaurant* was located at the corner of High and E. 14th Streets between 1980 and 1990. Before that it was operated by *Chucks ChuckBurgers* from 1960 to 1980.

Also located in the center at 1460 High Street (presently a coin-operated laundry), was *Della's 1-Hour Cleaners* between 1980 and 1989. The 1975 Haines Cross Street directory listed the occupant of this address as *Country Fresh Cleaners.* Building Department records list a proposed *Postal Instant Press* occupancy on July 29, 1975 (permit No.C84842). A building department inspection form dated December 18, 1975 lists a plumbing and mechanical inspection for a print shop. The 1969 and 1973 Haines directories gives *Daisies Cleaners* as the occupant. *Rogers Dry Cleaning* was listed at this address from 1963 through 1969. This center is within 400 feet of the subject property.

Directly south, and adjacent to the subject property is the *American Furniture & Mattress (formerly Super Tire)* site. This site was occupied by an older service station building prior to 1961. This building was demolished at that time and the present building constructed for use as a service station to be operated by *Tidewater Oil Company. Phillips 66* operated a gasoline service station on the site from 1966 to circa 1972-73. *Super Tire* operated on the site between 1976 to the early 1990s.

South of the subject site is the *Union 76* gasoline station. This station has been operating as a gasoline station since the late 1950s.

AllWest reviewed the U.S. Environmental Protection Agency's (EPA) National Priorities List (NPL) sites list, the EPA Resource Conservation and Recovery Act (RCRA) database, the EPA Comprehensive Environmental Response Compensation Liability Information System (CERCLIS) sites list, California Environmental Protection Agency's Cal-Sites toxic sites list, the California Central Valley Regional Water Quality Control Board (RWQCB) fuel leak sites list, Solid Waste Active and Inactive Landfills site list, and the Hazardous Waste and Substance Sites List Cortese.

There are 46 recorded sites with some degree of soil and/or groundwater issues within a one mile radius of the *Grand Auto Store*. Because of hydraulic gradient considerations and distance from the subject property only two of these sites are considered to have any potential to impact the subject property's soil and groundwater. These are the *Unocal Station* at the southern corner of E. 14th and High Street and a former *Southern Pacific* facility at 1421 High Street.

The *Unocal Station,* at 4251 E. 14th Street is approximately 300 to 400 feet south-southwest of the subject property. *Unocal* had a waste oil underground storage tank removed in January 1990 and a gasoline UST removed in April 1992. Contamination as total petroleum hydrocarbons as gasoline (TPH-G) and the gasoline constituent benzene were detected in the soils samples and groundwater. Four groundwater monitoring wells were installed between September and November 1992. TPH-G did not exceed 480 parts per million (ppm), nor did benzene exceed 12 parts per billion (ppb) in the groundwater samples. The measured depth to groundwater averages 33 to 35 feet bgs. The groundwater flow direction has been measured to fluctuate between the southwest, and east-northeast and northeast, upgradient of the subject site. *No halogenated volatile organic compounds (HVOCs) have been detected in the groundwater on this site.*

The *Southern Pacific* facility at 1421 High Street is listed on the Cortese database as a recorded fuel leak site. This site is not found on any of the other databases reviewed by AllWest in preparation of this report. This site is not listed on the Regional Water Quality Control Board's (RWQCB) Leaking Underground Storage Tank list, nor, is it listed with the Alameda County Health Care Services Agency-Hazardous Materials Division as a recorded fuel leak site. No information at the above-referenced agencies was available regarding this site. In addition, a review of historic building permit records at the City of Oakland Building Department did not reveal any reference to *Southern Pacific* having ever occupied this site.

II. SCOPE OF WORK AND LIMITATIONS

AllWest has completed a Phase I Environmental Site Assessment (ESA) of the facility located at 4240 E. 14. Street, City of Oakland, County of Alameda, California. *AllWest* performed the ESA at the request of *PACCAR Automotive* in Renton, Washington.

The scope of work presented in this environmental site assessment is in accordance with the American Society for Testing and Materials Standard E-1527-93. It addresses potentially hazardous or toxic materials manufactured, stored, released or disposed on the site. It also addresses historical land use, natural hazards, and reviews documentation concerning air, hazardous medical waste, soil, groundwater, and solid waste contamination potentially affecting the subject site and neighboring properties. The ERNS list was not reviewed because it was not reasonably ascertainable. The state list of registered underground storage tanks was also not reviewed because all registered tanks in California are required by law to be monitored for leakage. Any site with leaking tanks or where an overspill has occurred will be included in the RWQCB Leaking Underground Storage Tank List. Only leaking tanks would result in a recognized environmental condition. The objective of the ESA was to evaluate the potential for contamination of the site's soils and/or groundwater resulting from past or present land uses, and/or from off-site contamination sources. The intent of this investigation was to address real and potential environmental impairments or risks of impairments that may represent existing or potential financial and legal liabilities to *PACCAR*, or the present property owner and their agents.

The scope of work included reviewing available reports documenting historical land use and natural hazards. *AllWest* also reviewed available documentation concerning hazardous waste, liquid and solid waste and medical or infectious waste, as well as contamination of the air, soil and groundwater that could potentially affect the subject site.

AllWest's reconnaissance was limited to inspection of the subject lot and building's interiors, including areas of potential hazardous material storage. The scope of work did not include an in-depth audit of the site or their procedures for hazardous material use, waste storage or handling prior to disposal, or for personnel safety and health training and monitoring procedures.

As part of the environmental assessment, AllWest performed a preliminary inspection of the building premises for suspect asbestos-containing materials (ACM) such as floor coverings, ceiling materials, bulk insulation, and fireproofing. The purpose of the asbestos survey was to identify major applications of asbestos based on a limited visual and physical inspection. This survey was preliminary in nature and does not constitute a comprehensive survey with complete material and attendant air sampling.

Destructive test methods were beyond the scope of *AllWest's* assessment. *AllWest* has made a reasonable effort to identify, describe, locate, and quantify inaccessible hazardous

materials. In the event of further renovation or demolition of the subject property, suspected materials should be analyzed.

Chemical or microscopic analyses of soil, groundwater, radon, formaldehyde, lead paint and other hazardous materials are not considered to be part of the scope of work unless specified as such. For materials analyzed, *AllWest* cannot be held accountable for analyte quantities falling below recognized standard detection limits for the laboratory method utilized.

Documentation and other information from personal interviews in this investigation has been provided by public and private agencies. Findings based on these data are limited to historical documentation, availability of records and recollections of persons interviewed. No warranty is implied or expressed with use of such information.

AllWest has prepared this report for *PACCAR Automotive's* exclusive use for this particular project and in accordance with generally accepted practices at the time of the investigation. No other warranties, either expressed or implied are made as to the professional advice offered. This report is not a specification for further work and should not be used to bid out any of the recommendations found within.

The user should be cognizant that strict interpretations of Federal and State of California laws by regulatory agencies that may hold a landholder of property liable for all costs of cleaning or remediating toxic contamination.

III. ENVIRONMENTAL ISSUES MATRIX

Grand Auto Store No. 43, 4240 E. 14th St., Oakland, Ca — *AllWest Project No. 95181.21*

ON-SITE ISSUES	LOCATED	REGULATORY COMPLIANCE	MSDS	HAZMAT PERMITS	O&M PROGRAM	REPAIR	WITHIN 1/2 MILE	WITHIN 1 MILE	RECOMMENDED ACTION	REFER TO PAGE
55-Gallon Drums	Yes	Yes	Yes	Yes					None	18
Above Ground Tanks	Yes	Yes	Yes	Yes					None	19
Underground Tanks	Were removed	Under investig.							Work with regulatory agency	18
Hydraulic Hoists Systems	Yes	Yes							None	17
Transformers (PCBs)	No									
Hazardous Materials	Yes	Yes	Yes	Yes					None	18
Hazardous Wastes	Yes	Yes	Not required						None	18
Asbestos Fireproofing	No									
Asbestos Bulk Insulation	No									
Asbestos Walls	No									
Asbestos Floors	Yes	Yes			No				None	16
Air Quality Issues	No									
Radon	No									
Alquist/Earthquake Zone	No									
Flood District	No									
Historical Contamination	Yes	Unknown							Work with regulatory agency	18 & 22
OFF-SITE ISSUES										
CERCLIS/NPL Sites	Yes						Yes	Yes	None	20
RCRA TSD Facilities	Yes	Unknown					No	Yes	None (downgradient)	20
DTSC Cal/Sites/SLIC/ Toxic Pits	Yes	Unknown					Yes	Yes	None (downgradient)	20
Cortese List	Yes	Unknown					Yes	Yes	Review regulatory files periodically	20
LUST	Yes	Unknown					Yes	Yes	Review regulatory files periodically	20
Sensitive Ecological Areas	No									

NOTES:

IV. SURVEY FINDINGS

A. GENERAL INFORMATION

1. PROPERTY NAME AND ADDRESS: *Grand Auto Store No. 43, 4240 E. 14th Street, Oakland, California*

2. ZONING: The subject site and vicinity is zoned C-40, Commercial Zone-Community Thoroughfare.

3. FACILITY/SITE DESCRIPTION: Improvements to the subject property include one single-story, concrete tilt-up structure that comprises 16,900 square feet. The subject property is rectangular in shape and consists of approximately 1.2 acres. The site is bounded by Bancroft Street to the northeast, High Street on the southeast, E. 14th Street to the southwest, and a *Burger King* restaurant and automotive parts and service store *(Phoenix Auto Parts & Service)* to the northwest. The building was constructed circa 1961-63. The parcel is covered with asphalt-paved parking.

4. CURRENT USE OF PROPERTY BY TENANT(S): The subject property is currently in use as an automotive shop and automotive parts store by *Grand Auto*.

5. HISTORICAL USE OF PROPERTY: *AllWest* reviewed the historical use of the property by reviewing aerial photographs at *Pacific Aerial Surveys* in Oakland, California. Photographs from the following years were examined; 1994, 1992, 1990, 1988, 1985, 1983, 1981, 1979, 1977, 1975, 1973, 1971, 1969, 1968, 1966, 1963, 1959, 1957, 1953, 1950 and 1947. One Sanborn Fire Insurance Map for 1903 was also reviewed at U.C. Berkeley's Bancroft Library. Haines Cross Street directories for the years 1994, 1990, 1985, 1975, and 1973 were researched. R.J. Polk's City Directories available for this area of Oakland were dated 1969, 1967 and 1963. These were the earliest directories available. Also reviewed was a USGS topographic map (Oakland East Quadrangle, *U.S.G.S.*, 1959, Photorevised 1980), and building permit records at the City of Oakland Building Department.

Aerial Photographs

The subject building was visible in all of the photographs between 1963 and 1994. The only significant difference in land use at the subject site in these photographs was a structure visible in the 1973 through 1985 photos located on the south side of the *Grand Auto* building. This

structure was a canopy (constructed in 1972) for the former gasoline pumps operated at the subject property.

In the 1947 to 1959 photographs, an L-shaped building was located along the northwest and northeast sides of the property. This building included a variety of automotive repair, and auto body repair and paint shops (1953 Aerial Photograph dated 1953, *HartCrowser*, 1994, Scale 1" = 40').

Historical Directories

Grand Auto was listed as the tenant on the subject property at 4240 E. 14th Street between 1973 and the present. Between 1963 and 1969, *Safeway Inc.* is listed as having a store located on the property.

Building Permit Records

4240 E. 14th Street

- The first available building permit (No. B11750) for *4240 E. 14th Street* was dated July 3, 1946 to a Vad Jelton for construction of an office building.

- The next permit was dated June 13, 1952, also to Vad Jelton, for alterations to the present building. He proposed to remodel the existing building for use as a used car office. The size of the building was listed as 261 feet x 20 feet.

- Permit No. B86276 was applied for on February 18, 1960 for new construction. The existing use of the building to be demolished was listed as two automotive repair shops. Permit No. B86375 was issued February 24, 1960 for demolition of the existing reinforced concrete building.

- A inspection form by the Oakland Building Department dated August 22, 1960, listed a *Safeway's* store under construction.

- Permit C62406 was dated October 1971 and was for *Grand Auto* to perform interior demolition for remodelling.

- Permit C64838 is dated March 7, 1972 and is for *Grand Auto* to install three 10,000-gallon gasoline USTs and a pump island.

Sanborn Fire Insurance Map

A 1903 Sanborn Map lists the subject property as being occupied by a dance hall.

Summary

In summary, the site has been occupied by the *Grand Auto* store since 1971. From approximately 1960-61 until roughly 1970-71 the building was used by *Safeway Inc.* as a grocery store. Prior to 1960-61 the site was occupied by a reinforced concrete, L-shaped building, that was used as automotive repair, auto body repair and paint shops and office space. This building was constructed circa 1946.

6. CURRENT USE OF THE SURROUNDING PROPERTY: The present use of the surrounding properties is a *Burger King* restaurant and *Phoenix Auto Parts and Service* to the west and northwest, *Mission Auto Repair, Mission Body and Fender and Churches Fried Chicken* to the northeast. East and southeast of the subject site, across High Street, is a small retail strip center which includes a check cashing store, *Lee's Donut Shop,* a New Orleans style restaurant, a coin-operated laundry, *High Street Billiards,* a *Subway Sandwich* shop, and *Western Union*. Located adjacent to and south of the subject site, at the corner of E. 14th and High Streets is a used furniture store *(American Furniture & Mattress).*

A *Union 76* gas station is located southwest of the subject site on the west corner of E. 14th and High Streets. Across E. 14th Street, to the southwest of the *Grand Auto* property are several small retail businesses including the *Dog and Cat Hospital* and offices spaces. Commercial use is predominant along E. 14th and High Streets. Residential homes are located further northwest and northeast.

7. HISTORICAL USE OF THE SURROUNDING PROPERTY: The historical documents referenced above were also reviewed to evaluate the historical use of the surrounding properties.

Northwest

The present *Burger King* restaurant (west) and the *Phoenix Auto Parts & Service* building were constructed circa 1978. Between approximately 1963 and 1978, the *Bob Phillipi Auto Dealership* was located on these parcels. An automotive dealership was located on

these parcels in all of the aerial photographs viewed from 1947 to 1978.

Beyond the adjacent parcel to the northwest, across 42nd Avenue, is *Continental Volvo's* parking lot. *Continental Volvo* has occupied this parcel since 1970. Prior to that, this site was occupied by several buildings dating back to at least 1947.

Northeast

The present building northeast of the subject site, *1421 High Street,* is currently occupied by *Mission Auto Body and Repair and Tulleners Automotive. Mission Auto Body and Repair* has been located at this address since at least 1963. Also present at this address at various times during the 1960s, 1970s and 1980s were *Beasly Transmission* (1969-1990), *Herman Transmission* (1967 - 1980). This property was undeveloped between 1962 and 1966. Prior to 1959, from at least 1947, residential houses were located along the south side of Bancroft Street between E. 42nd Avenue and High Street.

Church's Fried Chicken (1455 High Street) has been located at the southwest corner of High and Bancroft Streets (beyond *Mission Auto Body)* from circa 1980 up to the present. Prior to 1980, an *Econo Gasoline* station was located at this site dating back at least to 1973. Between 1963 and 1973 this gas station was operated by the *Douglas Oil Company.* Between 1947 and 1959 there were residential homes located at this address.

Southeast

East of the subject site, which is presently the location of a small retail strip center, has been the location of several restaurants and dry cleaners since the late 1950s. *Golden City Restaurant* was located at the corner of High and E. 14th Streets between 1980 and 1990. Before that it was operated by *Chucks ChuckBurgers* from 1960 to 1980.

Also located in the center at 1460 High Street was *Della's 1-Hour Cleaners* between 1980 and 1989. The 1975 Haines Cross Street directory listed the occupant of this address as *Country Fresh Cleaners.* Building Department records list a proposed *Postal Instant Press* occupancy on July 29, 1975 (permit No.C84842). A building department inspection form dated December 18, 1975 lists a plumbing and mechanical inspection for a print shop. The 1969 and 1973 Haines directories gives *Daisies Cleaners* as the occupant. *Rogers Dry*

Cleaning is listed at this address from 1963 through 1969. This center is within 400 feet of the subject property.

South and Southwest

Directly south and adjacent to the subject property was the former *Super Tire* store at 4256 E. 14th Street (currently *American Furniture & Mattress). Super Tire* was in operation at the site between 1980 and the early 1990s. Between 1963 and 1972-73 a *Phillips 66* gas station is listed as occupying this site. The gas station building was visible in all photographs dating between 1963 and 1994. A gas station building with a different configuration was visible in the 1947 through 1959 photographs.

Building permit records for **4256 E. 14th Street** revealed the following information

- A permit was issued November 4, 1960 to *Tidewater Oil Company* for new construction. The existing building was listed as a 20 foot x 30 foot structure and in use as a gasoline service station. The new construction was to be a 49 foot x 26 foot building also to be used as a gasoline service station.

- A permit was issued to *Tidewater Oil Company* on September 22, 1960 for the approval to reconstruct and operate a service station at 4256 E. 14th Street.

- The next permit was dated July 5, 1966 and was for *Phillips 66* to operate a service station on the site.

- The final available permit, dated May 24, 1976, was for *Grand Auto/Super Tire* to vacate the service station and to operate a retail tire sales store.

Southwest of the subject site, at the west corner of E. 14th and High Streets, is the *Union 76* gasoline station. This station has been operating as a gasoline station since the late 1950s. Northwesterly is the *California Dog & Cat Hospital* and then *Quality Tune-up & Service.*

B. PHYSICAL CHARACTERISTICS

1. TOPOGRAPHY: The site is situated on flat-lying terrain at an approximate elevation of 25-30 feet of above mean sea level.

2. VEGETATION: There is no on-site vegetation. The site's surface is paved.

3. SOILS: The soils are composed of unconsolidated fine-grained sands, silts and clays. Shallow soils are silty clays to roughly 8-10 feet below ground surface (bgs), clayey sands with gravel from 10-12 feet bgs, which are underlain by Holocene aged coarse-grained alluvium.

4. GEOLOGY: Surficial alluvial deposits are underlain by the Holocene aged alluvial deposits that consist mostly of unconsolidated sands and silts

5. HYDROLOGY: The depth to first groundwater varies between 8 to 15 feet bgs (this may be perched groundwater). The first free groundwater on the site is encountered at approximately 30 to 35 feet bgs. Surface runoff for the vicinity drains into the City of Oakland storm drain system. The regional groundwater flow for the Oakland area is towards the west-southwest. Groundwater flow, unless obstructed, follows topographic patterns towards a direction of decreasing elevation. Upgradient areas from the subject site are toward the northeast. Historical groundwater elevations recorded since 1992 have not revealed a distinct groundwater flow direction. *Grand Auto's* consultant, *HartCrowser*, reports that the groundwater gradient has remained relatively flat since measurements have been collected.

C. NATURAL HAZARDS

1. SEISMICITY: The site lies approximately one and one-half miles southwest of the Hayward-Calaveras Fault Zone. The buildings did not suffer any structural damage from the Lone-Prieta earthquake of October 1989. This site does not lie within an Alquist-Priolo Special Studies Earthquake zone. There are no recorded active fault traces that traverse the area. The main seismic hazard of the site is strong ground shaking by earthquakes generated along active faults in the region.

2. RADON: Outgassing of radon has not been identified as a problem in the City of Oakland. According to radon survey results published by the California Environmental Protection Agency's Toxic Substances Control Program (formerly Department of Health Services), the average result of measurements in Region 6, which includes Alameda County and Oakland, is 1.1 pico curies per liter of air (pCi/l). This average is well below 4 pCi/l, the level for which the U.S. Environmental Protection Agency recommends that action be taken to reduce radon.

Radon, specifically, radon isotope-22, is a colorless, odorless, tasteless radioactive gas that is produced as a natural decay product of uranium. Because uranium and radon occur in varying amounts in rocks and soils, radon is present in all the air that we breath. Furthermore, due to its radioactivity, numerous studies have shown that at elevated levels there is a link between radon and lung cancer. Anyone living in a building with elevated radon concentrations may have an increased risk of contracting lung cancer over a period of years. Concentrations of radon gas are expressed as pico curies per liter of air (pCi/l). A curie, is the amount of radiation given off by a gram of radium. Pico means one-trillionth. A picoCurie is the radiation given off by a trillionth of a gram of radium. The U.S. Environmental Protection Agency recommends that action be taken to reduce radon levels at 4.0 pCi/l of air.

3. SENSITIVE ECOLOGICAL AREAS: The site is not dependent on sole source aquifers. Coastal dunes or beaches are not found on the site, nor is the site home to critical or unique habitats. Wild and scenic rivers do not traverse the property, nor are there any special archeological resources onsite. There are no recreational areas or areas managed for conservation purposes on the property. The site is not a State of California or Federal Historical Landmark.

4. FLOODING: There has been no record of recent flooding near the site.

5. MASS WASTING: The site lot has been graded essentially flat. Mass wasting or subsidence is not considered a hazard at the site.

D. SITE CHARACTERISTICS

1. PARKING: The site's parking lot is asphalt paved. Parking is available on the easterly and southerly sides of the building. The property can be accessed from either E. 14th or High Streets.

2. ROADWAYS: The site is bounded by E. 42 Avenue on the northwest, Bancroft Street on the northeast, High Street on the southeast and E. 14th Street to the southwest.

3. FENCES: The only fencing observed on the property was along the Burger King and Grand Auto property line. This is a 6-foot high chainlink fence.

4. OUTSIDE STORAGE: There were no exterior storage facilities observed.

5. EASEMENTS: Other than public utilities, there are no recorded easements on the subject property.

6. WELLS: There are no recorded potable water wells on site. There are four groundwater monitoring wells located on the site.

7. SUMPS: There are no sumps on the site.

8. CATCH BASINS: Catch basins as storm drains are located in the parking lots to direct surface water runoff. These are connected to the Oakland municipal storm drain system.

9. PONDS: There were no surface water impoundments noted on the property.

10. SEWAGE SYSTEM: Sewage is directed into the local municipal sanitary sewage system (East Bay Municipal Utilities District-EBMUD).

11. POTABLE WATER SYSTEM: Potable water is supplied by the local municipal water system (EBMUD).

12. WASTE WATER SYSTEMS: The site does not produce waste water, with the exception of sewage.

13. POWER DISTRIBUTION SYSTEMS: Electrical power to the site is directed through a pole mounted transformers located at the northeast property line. These transformers are owned by *PG&E*. According to PG&E, it is unknown if these transformers contain polychlorinated biphenyls (PCBs). PG&E regularly inspects these transformers and in the event leakage occurs, PG&E will perform the required cleanup and take any necessary measures to prevent exposure to the public.

    Information provided to AllWest by PG&E, stated that all new transformers in the service area use dielectric fluids for cooling that do not contain PCBs. Over 99% of PG&E's former PCB-containing transformers have been removed or had their PCB-containing fluids replaced since PCBs were banned in 1977 by the United States Environmental Protection Agency (EPA).

E. ASBESTOS AND HAZARDOUS MATERIALS IN FACILITY AND OPERATIONAL SYSTEMS

1. BUILDING STRUCTURE: The subject building is a single-story, concrete tilt-up structure, built on a concrete slab-on-grade foundation. The exterior is painted concrete. The roof covering is built-up tar and gravel. There were no suspect asbestos-containing materials noted on structural framing members.

2. BUILDING MATERIALS: Typical building finish materials noted were sheetrock and sheetrock tape compound, 2'x 4' suspended ceiling tiles, two types of floor tiles and mastic, and concrete.

   As part of this environmental assessment, AllWest inspected the building premises for potential asbestos-containing materials (ACM) such as floor coverings, ceiling materials, bulk insulation, and fireproofing. Thermal insulation noted on pipes located in the building was fiberglass. Two types of resilient floor tiles (RFT) were noted in the building. These were a white 12" x 12" RFT in the sales area and a grey 9" x 9" RFT.

   A total of 6 suspect asbestos-containing material samples were collected and transported under Chain-of-Custody protocol to *Asbestos TEM Laboratories* in Berkeley, California. The materials sampled, sample number, sample location, and type and percentage of asbestos are presented in the table below.

Table I
Materials Sampled for Asbestos

Sample Number/Location	Material Description	Type and Percentage of Asbestos
P-1A Sales Floor	2'x 4' Ceiling Tile	No Asbestos Detected (ND)
P-1B Sales Floor	2'x 4' Ceiling Tile	ND
P-2A Sales Floor	12"x 12" White RFT/Mastic	5-10% chrysotile (in tile) 1-5% chrysotile (in mastic)
P-2B Sales Floor	12"x 12" White RFT/Mastic	Sample not analyzed due to prior positive
P-3A Back Room	9"x 9" Grey RFT/mastic	10-20% chrysotile in tile No asbestos detected in mastic
P-3B Restroom	9"x 9" Grey RFT/mastic	Sample not analyzed due to prior positive

The floor tiles are presently in good condition, and as such, they should not pose a health threat to building occupants.

Should the materials containing asbestos become damaged or disturbed through normal or abnormal use, or should any remodeling, renovation or demolition work take place that might disturb the asbestos-containing materials and potentially release asbestos fibers into the air, then the work should be performed by a licensed asbestos contractor. If removal is chosen as an option, the removal of asbestos should be conducted by a licensed asbestos contractor and under the guidelines of a strict technical specification.

AllWest recommends that the building tenants, contractors, and maintenance personnel be notified of the presence of asbestos in the buildings to avoid damaging the ACM.

It is also recommended that an asbestos-containing building materials Operations & Maintenance Program (O&M) be implemented. An O&M program details procedures designed to ensure that the asbestos containing building materials, whenever possible, remain undisturbed to minimize the likelihood of exposing building tenants and workers to airborne asbestos fibers.

Chain of custody records, and PLM laboratory results are included in Appendix C.

3. ELECTRICAL SYSTEMS: The main electrical panels of the building are located in the back area. No suspect PCB-containing electrical equipment was noted at the site.

4. MECHANICAL AND HVAC SYSTEMS: Fire suppression lines and a water heater were noted in the building. There was no suspect ACM noted on mechanical systems.

   Heating is provided by electric radiant heating units mounted on the ceiling.

5. BUILDING EQUIPMENT: There was no building equipment, such as elevators, escalators, or trash compactors, noted on the premises.

6. INDUSTRIAL EQUIPMENT: Industrial equipment noted on the premises include hydraulic hoists, air compressors, a grinding machine, a battery charger, and machines related to tire repair (a dynamometer and tire mounting). There are six hydraulic hoists in the shop area.

The hoist cylinders and hydraulic oil reservoirs are located underground.

F. TOXIC AND FLAMMABLE MATERIALS, COMPRESSED GASES, AND PETROCHEMICALS

1. MANUFACTURE: No known toxic materials are manufactured at the site. There was no indication of past manufacturing activities associated with toxic, flammable materials, or petrochemicals found in the historical review.

2. STORAGE: Inflammable materials and petrochemicals are stored at the site. These include automotive chemicals for both on-site and retail sales purposes, cleaning solvents, and oils and batteries containing acids for shop use and retail sales. These materials are stored in a neat and orderly fashion. Waste drums of motor oil and automotive coolant are stored in secondary containers. Used batteries are stored on wooden pallets. A Hazardous Materials Business Plan (HMBP) was reviewed during the site visit. The HMBP was current and is also on file with the Oakland Fire Department.

3. DISPOSAL: Waste oil and coolant are disposed of with *Evergreen Environmental Services* of Newark, California. Used batteries are transported off-site by the *Exide Corporation* of Sumner, Washington. The cleaning solvent tank is maintained by an outside service company, *Safety-Kleen, Inc.*

   There is no known disposal of toxic or hazardous materials on the subject property. There was no sign of intentional disposal, such as stained floor drains or wash basins. There were indications of accidental oil spills on the shop floor.

4. UNDERGROUND STORAGE TANKS: The site was previously utilized for gasoline sales with underground storage tanks (3-10,000 gallon USTs), and a car wash with an associated sump. The USTs were located in the middle of the parking lot at the front side (E. 14th) of the store. The underground storage tanks were removed in 1986. Analytical results of soil samples collected from the UST pit did not reveal significant hydrocarbon contamination.

   Removal of the car wash drainage sump occurred in August 1992. Soil sample results indicated the presence of hydrocarbons, halogenated hydrocarbons and some metals in the soil beneath the sump. Groundwater monitoring wells installed in 1992 and 1993 have revealed

the presence of total petroleum hydrocarbons (< 170 ppbs) and the HVOCs- DCE, chloroform, TCE and PCE in the groundwater. Petroleum hydrocarbons have not been detected in the site's groundwater since early 1994 and are no longer an issue. The site is presently undergoing quarterly monitoring for the HVOCs.

5. ABOVEGROUND STORAGE TANKS: The only aboveground storage tanks noted were two 250-gallon new oil containers, two 55-gallon drums for waste oil and coolant and a 55-gallon drum for cleaning solvent. These were all placed inside of secondary containers. There is a 55-gallon drum that is for used oil filters. This drum is stored on a wooden pallet.

   One of the hydraulic hoists at the site has an associated aboveground storage tank for the hoist's fluid reservoir. This is the hoist used for wheel alignment.

G. POLLUTION SOURCES, CONTROLS AND TREATMENT

1. AIR: The site has not been recorded as a source of air pollution by regulatory agencies.

2. SOIL & GROUNDWATER: The subject site is a recorded site of soil and groundwater pollution; namely the halogenated volatile organic compounds (HVOCs) DCE, chloroform, TCE, and PCE. This site is presently under the authority of the Alameda County Health Care Services Agency. Refer to Section F, paragraph 4 for discussion.

3. SOLID WASTE: Solid waste is transported by Waste Management Disposal Company.

4. HAZARDOUS WASTE: Hazardous wastes observed at the site include the generation and storage of wastes oils, coolants and used batteries. These are generated from repair activities in the automotive shop. Waste oils are stored in 55-gallon metal drums that are properly labeled and located inside of secondary containments. The used batteries are stored on wooden pallets and transported to an off-site recycling facility.

   Hazardous waste generation and storage on the property do not appear to have negatively impacted the subject property.

5. MEDICAL WASTE: No medical wastes are produced at the site.

H. OFF-SITE ENVIRONMENTAL CONCERNS

AllWest reviewed the following regulatory lists to locate sites under investigation or cleanup within a one-mile radius of the subject property: the U.S. Environmental Protection Agency's *National Priorities List (NPL), Comprehensive Environmental Response, Compensation and Liability Act (CERCLIS) List* and *Resource Conservation and Recovery Act (RCRA) Database*; the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) *Annual Work Plan* (formerly *Expenditure Plan for the Hazardous Clean-up Bond Act* of 1984 and 1990) and the *Cal-Sites/Toxic Pits List* (formerly *Abandoned Sites Program Information List*).

AllWest also reviewed the following regulatory lists to locate sites under investigation or clean up within one-half mile of the subject property: the California Office of Planning and Research *Hazardous Waste and Substances Site (Cortese) List*; the California Integrated Waste Management Board's *Active and Inactive/Closed Landfills List*; California Regional Water Quality Control Board, San Francisco Bay Region: *Leaking Underground Fuel Tanks (LUFT) Cases.*

Regulatory List	*Search Radius*	*Number of Sites*
NPL	*1 mile*	*None*
CERCLIS	*1 mile*	*2*
RCRA TSD Facilities	*1 mile*	*1*
Cal-Sites/Toxic Pits	*1 mile*	*13*
CIWMB Landfills	*½ mile*	*None*
*Cortese **	*½ mile*	*10*
LUST	*½ mile*	*31*

** Denotes sites that are also on the LUST list.*

Summary: There are 46 recorded sites on the above lists within the specified radii. These sites are listed below.

CERCLIS SITES

1.	Clorox Co., Oakland Plant	*850 42nd Avenue*	*1,320 feet sw*
2.	National Lead Co.	*47th Ave. & E. 10th St.*	*1,000 feet south*

RCRA TSD SITES

3.	American National Can Inc.	*3801 E. 8th Street*	*2,900 feet west*

CAL-SITES

3.	American National Can Inc.	*3801 E. 8th Street*	*2,900 feet west*
4.	Armor Equipment.	*1137 57th Ave.*	*4,300 feet se*
5.	Clorox Co.	High & Wattling St.	1,600 feet sw
6.	General Electric Co.	5441 E. 14th St.	3,300 feet se
7.	Arrow Sign Co.	1046 45th Ave.	1,400 feet south
8.	Owens-Illinois, Inc.	3600 Alameda Ave.	3,300 feet sw
9.	L&M Plating	920 54th Ave.	3,600 feet south
10.	Ferro Enameling Co.	1100 57th St.	4,300 feet se
11.	Quaker Oats Co.	5625 E. 14th St.	4,500 feet se
12.	Veiss-Zaken Scrap Metal & Iron	1249 49th Ave.	1,900 feet south
13.	The Learner Co.	768 46th Ave.	2,500 feet sw
14.	August Manufacturing Co.	1466 36th Ave.	2,600 feet nw
15.	Volvo GM Heavy Truck Corp.	750 50th Ave.	2,800 feet south

LEAKING UNDERGROUND STORAGE TANK AND CORTESE SITES

16.*	PT Hutchins	4901 E. 12th	*1,900 feet south*
17.	*Tony's Auto Express Service*	*3609 E. 14th St.*	*2,300 feet nw*
18.	*Shell Station*	*3750 E. 14th St.*	*2,100 feet nw*
*19.**	*Continental Volvo*	*4030 E. 14th St.*	*900 feet nw*
20.	*Grand Auto/Super Tire*	*4240/4256 E. 14th St.*	*Subject Site*
21.	*Unocal*	*4251 E. 14th St.*	*300 feet sw*
22.	*Motor Partners*	*1234 40th Ave.*	*1,000 feet west*
*23.**	*Motor Partners 1*	*1236 & 1238 41st Ave.*	*800 feet west*
24.	*Everett Stern Property*	*1033 44th Ave.*	*800 feet south*
*25.**	*Pacific Galvanizing*	*715 46th Ave.*	*2,600 feet south*
*26.**	*Learner*	*768 46th Ave.*	*2,500 feet sw*
27.	*Peterson Property*	*1066 47th Ave.*	*1,700 feet south*
28.	*Cohn Warehouse*	*1212 47th Ave.*	*1,400 feet se*
29.	*Norcal*	*1234 47th Ave.*	*1,400 feet se*
30.	*F&K Investment*	*1259 48th Ave.*	*1,900 feet east*
31.	*Bayview Federal Bank*	*1437 48th Ave.*	*2,300 feet east*
32.	*Mepaco*	*1226 49th Ave.*	*1,800 feet se*
33.	*Stop "n Go*	*4100 Foothill Blvd.*	*1,400 feet ne*
*34.**	*BP Oil*	*4250 Foothill Blvd.*	*1,100 feet ne*
35.	*Chevron*	*4265 Foothill Blvd.*	*1,000 feet ne*
36.	*BP Oil*	*4280 Foothill Blvd.*	*1,050 feet ne*
37.	*Shell*	*4411 Foothill Blvd.*	*1,400 feet ne*
38.	*Shell*	*630 High St.*	*2,600 feet ne*
39.	*Exxon*	*720 High St.*	*2,300 feet sw*
40.	*Southern Pacific Trans Co.*	*744 High St.*	*2,100 feet sw*
*41.**	*Ed's Auto Wreckers*	*752 High St.*	*1,800 feet sw*
42.	*Oakland Unified School District*	*900 High St.*	*1,500 feet sw*
43.	*Chevron*	*3616 San Leandro St.*	*2,500 feet nw*
*44.**	*Chevron Asphalt Terminal*	*4525 San Leandro St.*	*1,200 feet south*
45.#	*Childrens Hospital*	*4509 Foothill Blvd.*	*1,600 feet ne*
46.#	Southern Pacific	1421 High St.	50 feet ne (adjacent to subject site on the northeast

* Denotes sites that are referenced on both lists.
\# Denotes sites that are on the Cortese List only.

All of the above sites, with the exception of *Sites 20, 21, 46*, because of hydraulic gradient considerations and the distance from the subject property, are considered to have a negligible potential to impact the subject site. Please refer to Figure 3 in Appendix A for a graphical representation of the site locations.

Site 20 is the subject site and is discussed in detail in Section G, Part 2.

Site 21, the Unocal Station, at 4251 E. 14th Street is approximately 300 to 400 feet south-southwest of the subject property. *Unocal* had a waste oil underground storage tank removed in January 1990 and a gasoline UST removed in April 1992. Contamination as total petroleum hydrocarbons as gasoline (TPH-G) and the gasoline constituent benzene were detected in the soils samples and groundwater. Four groundwater monitoring wells well installed between September and November 1992. TPH-G did not exceed 480 parts per million (ppm), nor did benzene surpass 12 parts per billion (ppb) in the groundwater samples.

The measured depth to groundwater averages 33 to 35 feet bgs. The groundwater flow direction has been measured to fluctuate between the southwest, and east-northeast and northeast, upgradient of the subject site. *No halogenated volatile organic compounds (HVOCs) have been detected in the groundwater on this site.*

Site 46, the *Southern Pacific* facility at 1421 High Street is listed on the Cortese database as a recorded fuel leak site. This site is not found on any of the other databases reviewed by AllWest in preparation of this report. This site is not listed on the Regional Water Quality Control Board's (RWQCB) Leaking Underground Storage Tank list, nor, is it listed with the Alameda County Health Care Services Agency-Hazardous Materials Division as a recorded fuel leak site. No information at the above-referenced agencies was available regarding this site. In addition, a review of historic building permit records at the City of Oakland Building Department did not reveal any reference to *Southern Pacific* having ever occupied this site. The Alameda County Health Care Services Agency is further reviewing their historic records and will forward any information they uncover regarding this site at a future date.

V. INFORMATION SOURCES

A. AERIAL PHOTOGRAPHS

Pacific Aerial Surveys, 8407 Edgewater Drive, Oakland, California

AV-4625-12-31, 11/94
AV-4230-112-33, 4/92
AV-3845-11-35, 6/90
AV-3268-7-30, 3/88
AV-2717-7-4, 10/85
AV-2300-7-26, 6/83
AV-2040-7-27, 6/81
AV-1750-7-28, 9/79
AV-1377-6-28, 7/77
AV-1193-7-22, 5/75
AV-1100-7-31, 4/73
AV-995-5-25, 5/71
AV-902-7-25, 5/69
AV-858-3-31, 7/68
AV-710-9-27, 4/66
AV-550-8-22, 7/63
AV-337-7-34, 7/59
AV-253-11-33, 5/57
AV-119-13-25, 8/53
AV-28-18-16, 4/50
AV-11-5-19, 3/47

B. REGULATORY AGENCY LISTS

- U.S. Environmental Protection Agency: *National Priorities List (NPL)* - April 1995
- U.S. Environmental Protection Agency: *Comprehensive Environmental Response, Compensation and Liability Act (CERCLIS) List* - June 1995
- U.S. Environmental Protection Agency: *Resource Conservation and Recovery Act (RCRA) Database* - July 1995
- California Environmental Protection Agency, Department of Toxic Substances Control (DTSC): *Annual Work Plan* (formerly *Expenditure Plan for the Hazardous Clean-up Bond Act (BEP) of 1984 and 1990*) - June 1994
- California Environmental Protection Agency, Department of Toxic Substances Control (DTSC): *CALSITES* (formerly *Abandoned Sites Program Information List*) - March 1995
- California Integrated Management Board: *Active and Inactive/Closed Landfills List* - December 1994
- California Office of Planning and Research: *Hazardous Waste and Substances Site (Cortese) List* - September 1994

California Regional Water Quality Control Board, San Francisco Bay Region, *Leaking Underground Fuel Tanks (LUFT) Cases* - July 1995

G.

VIRONMENTAL STUDIES

California Division of Mines and Geology, 1972, Geologic Atlas of California (Olaf P. Jenkins Edition), Oakland Sheet. Prepared by the California Division of Mines and Geology; Oakland Sheet; Geology compiled by Thomas H. Rogers, 1965

H.

U.S. Geological Survey, Oakland East Quadrangle, 7-1/2-Minute Quadrangle Topographic Map, 1959 base map, photo-revised in 1980 (1:24,000)

I.

State of California Hydrologic Unit Map, 198, United States Geological Survey, 1983

Studies for the Zonation of the San Francisco Bay Region, Paper 941-A, R.D., 1975, United States Geological Survey

SESSOR'S INFORMATION

Alameda County Assessor's Office, 1221 Oak Street, Oakland, California (510) 272-3787

ANNING AND ZONING

95181-21.MHS12

Oakland Planning Department, Building Records Division, 1330 Broadway Street, 2nd Floor, Oakland, California

Oakland Planning Department, Zoning Information, 1330 Broadway Street, 2nd Floor, Oakland, California

UBLIC WORKS

Oakland Public Works Department, Oakland, California

ATER QUALITY

California Regional Water Quality Control Board-Bay Area Division, Webster Street, Oakland, California

G. PUBLIC HEALTH

- Alameda County Health Care Services Agency - Hazardous Materials Division, 1131 Harbor Bay Parkway, Room 250, Oakland, California (510) 567-6700

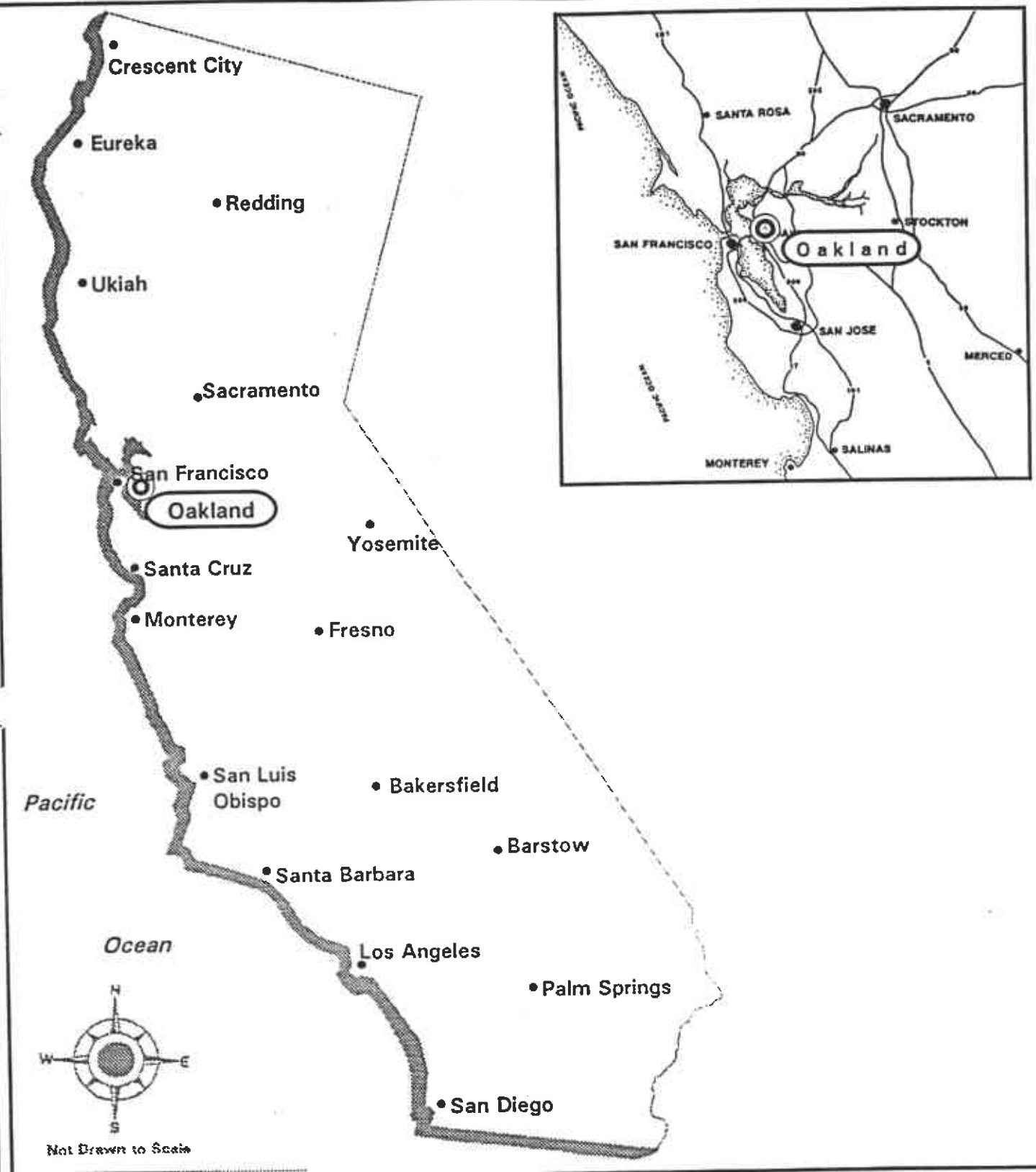
H. AIR QUALITY

- San Francisco Bay Area Air Quality Management District,939 Ellis Street, San Francisco, California

I. OTHER SOURCES

- Sanborn Fire Insurance Maps, 1903, U.C. Berkeley Bancroft Library, Berkeley, California
- Haines Cross Street Directories, 1994, 1990, 1985, 1975, and 1973. Oakland Public Library, 125 14th Street, Oakland, California
- R.J. Polk's City Directories, 1969, 1967 and 1963. Oakland Public Library, 125 14th Street, Oakland, California

95181-21.MHS12



AllWest Environmental, Inc.	July 1995	Site Regional Map	Project 95181.21	Figure 1
	4240 E. 14th Street, Oakland, California			Source *AllWest*

CERCLIS Sites

1. Clorox Co., Oakland Plant — 850 42nd Avenue
2. National Lead Co. — 47th Ave. & E. 10th St.

RCRA TSD Facility

3. American National Can Inc. — 3801 E. 8th Street

Cal Sites

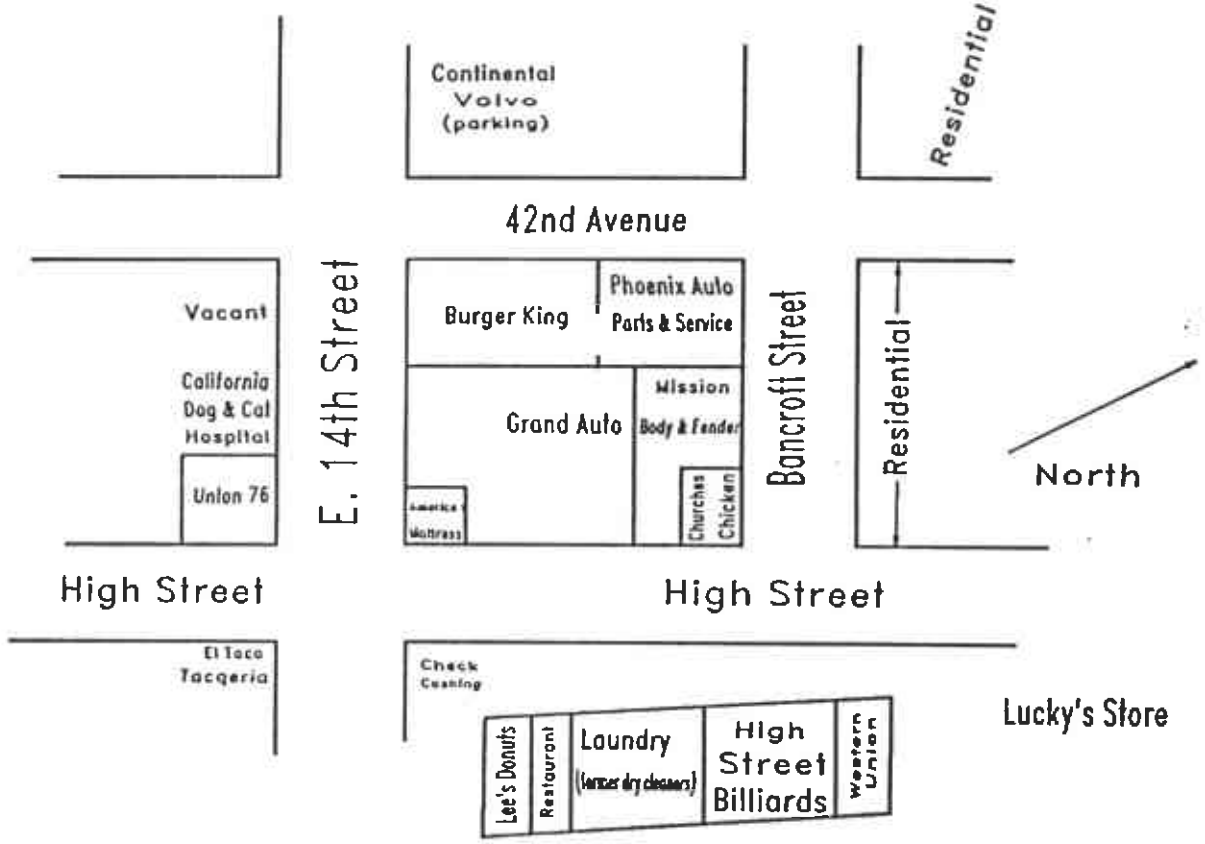
3. American National Can Inc., 3801 E. 14th Street
4. Armor Equipment, 1137 57th Avenue
5. Clorox Co., High & Wattling Street
6. General Electric Co. 5441 E. 14th Street
7. Arrow Sign Co., 1046 45th Avenue
8. Owens-Illinois, Inc. 1100 57th Street
9. L&M Plating, 920 54th Avenue
10. Ferro Enameling Co., 1100 57th Street
11. Quaker Oats Co., 5625 E.14th Street
12. Veiss-Zaken Scrap Metal & Iron, 1249 49th Avenue
13. The Learner Co., 768 46th Avenue
14. August Manufacturing Co., 1466 36th Avenue
15. Volvo GM Heavy Truck Corp., 750 50th Avenue

LUST & CORTESE SITES

16. PT Hutchins, 4901 E. 12th St.
17. Tony's Auto Express, 3609 E. 14th St.
18. Shell Station, 3750 E. 14th St.
19. Continental Volvo, 4030 E. 14th St.
20. Grand Auto/Super Tire, 4240/4256 E. 14th St.
21. Unocal 4251 E. 14th St.
22. Motor Partners 1234 40th Ave.
23. Motor Partners 1, 1236 & 1238 41st Ave.
24. Everett Stern, 1033 44th Ave.
25. Pacific Galvanizing, 715 46th Ave.
26. Learner Co., 768 46th Ave.
27. Pererson Prop., 1066th 47th Ave.
28. Cohn Warehouse, 1212 47th Ave.
29. Norcal, 1234 47th Ave.
30. F&K Investment, 1259 48th Ave.
31. Bayview Bank, 1437 48th Ave.
32. Mepaco, 1226 49th Ave.
33. Stop n' Go, 4100 Foothill Blvd.
34. BP Oil, 4250 Foothill Blvd.
35. Chevron, 4265 Foothill Blvd.
36. BP Oil, 4280 Foothill Blvd.
37. Shell, 4411 Foothill Blvd.
38. Shell, 630 High St.
39. Exxon, 720 High St.
40. Southern Pacific Trans. Co., 744 High St.
41. Ed's Auto Wreckers, 752 High St.
42. Oakland Unified School District, 900 High St.
43. Chevron, 3616 San Leandro St.
44. Chevron Asphalt Terminal, 4525 San Leandro St.
45. Childrens Hospital, 4509 Foothill Blvd.

AllWest
AllWest Environmental, Inc.

July 1995	Off - Site Concerns	Project 95181.21	Figure 3(continued)
4240 East 14th Street Oakland, California			Source *CA DOT*



AllWest Environmental, Inc	August 1995	Adjacent and Local Site Plan	Project No. 95181.21	Figure 4
	4240 East 14th Street Oakland, California			Source *AllWest*

HARTCROWSER

Earth and Environmental Technologies

Hart Crowser, Inc.
353 Sacramento, Suite 1140
San Francisco, California 94111
FAX 415.391.2216
415.391.1885

Letter of Transmittal

To: PACCAR Automotive, Inc.
1400 N. 4th Street
Renton, WA 98055

Attn: Mr. Raymond Elliott
Environmental Manager

Attn: _____

Date: 3/18/96

Job No. 6077

Re: Oakland Report, Revised Appendix B

We are sending the following items:

Date	Copies	Description
3/18/96	6 punched 1 annotated	> Revised Appendix B

These are transmitted:

☐ For your information ☐ For action specified below ☐ For review and comment ☒ For your use ☐ As requested

Remarks

By: Jay A. Ach
Sr. Project Geologist

Copies to: _____

Title: _____

APPENDIX B

Estimating Equilibrium Concentrations of Chlorinated VOCs in Soil and Groundwater Using Distribution Coefficients

In the saturated part of an aquifer, chemical interactions of chlorinated VOCs can be modeled by assuming a simplified, three-phase chemical system that consists of soil, water, and the chlorinated VOC of interest.

The overall ratio of the concentration of a VOC in the soil relative to the concentration of the VOC in the water is indicated by the equation

$$K_d = C_s/C_w \qquad (1)$$

where: K_d is the overall ratio (or distribution coefficient), in L/kg,
C_s is the concentration of VOC in the soil (ug/kg), and
C_w is the concentration of VOC in the water (ug/L).

The components of soil are highly variable, and differ in their individual affinities for organic compounds such as chlorinated VOCs. Therefore K_d's for soil vary widely. However, for chlorinated VOCs, the soil components having the greatest affinities for VOCs are organic materials contained in the soil. Due to this effect, the amount of organic material in the soil, quantified as total organic carbon (TOC), is generally the most important indicator of potential affinity of the soil for VOCs. The distribution coefficient that describes the TOC/water concentration ratio is indicated by the equation

$$K_{oc} = C_{oc}/C_w \qquad (2)$$

where: K_{oc} is the organic carbon/water ratio (or distribution coefficient), in L/kg,
C_{oc} is the concentration of VOC in the organic carbon (ug/kg), and
C_w is the concentration of VOC in the water (ug/L).

The K_{oc} for many VOCs and other organic compounds have been experimentally determined and are generally available (Table 4). Equation (2) above indicates that if $K_{oc} > 1$ (or $\log K_{oc} > 0$), then the VOC will be preferentially adsorbed onto the organic carbon. Conversely, if $K_{oc} < 1$ (or $\log K_{oc} < 0$), the VOC will preferentially be released to the water.

By assuming that the total concentration of a VOC in soil is due solely to the adsorption by organic material, the overall distribution coefficient can be expressed as

$$K_d = (\%TOC) \times K_{oc}. \quad (3)$$

Thus, by using an analyzed or estimated value for %TOC and a published value for K_{oc}, K_d can be estimated. Once K_d has been estimated, the corresponding equilibrium concentration in groundwater for a given soil concentration (or vice versa) can be estimated, as indicated by the following rearrangement of equation (1):

$$C_w = C_s/K_d . \quad (4)$$

As an example, for PCE in soil sample S2C-8, the concentration of PCE was determined to be 104 ug/mg. TOC in Bay mud typically ranges from 1.0% to 0.1%. Using a log K_{oc} of 2.56 for PCE (Table 4), the K_d for this sample is estimated (Equation 3) to range from

$$K_{d(max)} = (\%TOC) \times K_{oc} = 1.0\% \times \log 2.56 = 3.63$$

to

$$K_{d(min)} = (\%TOC) \times K_{oc} = 0.1\% \times \log 2.56 = 0.363.$$

The corresponding range of equilibrium water concentrations for the soil concentration of 104 ug/mg is therefore estimated (Equation 4) to be

$$C_{w(min)} = 104/3.63 = 28.6 \text{ ug/L} \quad (5)$$

to

$$C_{w(max)} = 104/0.363 = 286 \text{ ug/L}. \quad (6)$$

The estimated range equilibrium concentration for PCE in water (28.6 to 286 ug/L) is less than the maximum concentration of 340 ug/L of PCE measured in groundwater from nearby well MW-1. A similar calculation suggests that a soil TOC of 0.14% will produce an equilibrium water concentration of 200 ug/L PCE, the historical minimum measured in MW-1 (with the exception of the apparently anomalous 1/31/95 data).

Note that sample S2C-8 was collected from well above the water table (8 ft bgs). It is used as an example because this PCE concentration was the highest detected in site soil. The above calculations thus represent a conservative analysis. The second highest concentration of PCE detected in soil (30 ug/kg) was detected in boring B-8, drilled in the sump area. This sample was collected near the water table at 25 ft bgs; three samples collected from B-3 at shallower depths did not contain detectable PCE,

strongly suggesting that the PCE detected did not migrate from above. Calculations using equations 5 and 6 above and a PCE concentration of 30 ug/kg indicate an equilibrium concentration of 8 to 82 ug/L in water, well below historical concentrations.

Thus, soil containing greater than a minimum percentage of TOC and containing PCE at the detected concentrations, if in direct contact with water, is unlikely to produce PCE concentrations in groundwater as high as those historically observed in MW-1.

It should be noted that these calculations do not take into account adsorption of PCE by clay minerals in the Site soil (silty clay, i.e. "Bay Mud"). When the percentage of clay in soil greatly exceeds the percentage of TOC, as is the case at the Site, adsorption of VOCs by clay may greatly exceed adsorption by organic carbon (e.g. Mackay et al., 1985). The aqueous PCE concentrations calculated above therefore represent a maximum range, exclusive of additional adsorption of PCE by clay. The extent of adsorption by clays of VOCs has not been adequately quantified, however, so that it is not possible to estimate the magnitude of clay adsorption effects.

REFERENCE

Mackay, D.M., Roberts, P.V., and Cherry, J.A., 1985, Transport of organic contaminants in groundwater; Envir. Science & Technology, v. 19, no. 5, 384-392.

Agency Letter
for
Former Super Tire Facility
4256 E. 14th Street
Oakland, California

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

RAFAT A. SHAHID, Assistant Agency Director

DEPARTMENT OF ENVIRONMENTAL HEALTH
Hazardous Materials Division
80 Swan Way, Rm. 200
Oakland, CA 94621
(510) 271-4320

December 27, 1993

Raymond Elliot
PACCAR Automotive, Inc.
7200 Edgewater Drive
Oakland, CA 94621

Re: Super Tire Facility, 4256 E. 14th Street, Oakland, CA 94601

Dear Mr. Elliot:

Alameda County Environmental Health Department, Hazardous Materials Division (ACEHD) has received and reviewed the Request for Case Closure, dated November 15, 1993, prepared by your Consultant HartCrowser (H/C). The report documents the previous subsurface investigation work which has occurred at the site. This includes the installation of several soil borings and the installation of a monitoring well at the above location.

Initial soil sampling indicated the presence of Total Oil and Grease (TOG) at 430 parts per million (ppm) at an eleven foot depth beneath the location of the former waste oil tank. A boring, later converted to a groundwater monitoring well, placed approximately ten feet east of this area did not indicate the presence of any pollutants in soil. However, in groundwater, the reports indicate the presence of a petroleum hydrocarbon material which did not match the typical gasoline pattern at 100 parts per billion (ppb), cis 1,2-dichloroethene (DCE) at 15 ppb, trichloroethene (TCE) at 27 ppb and tetrachloroethene (Perc) at 83 ppb.

The initial soil sampling also indicated levels of chromium and lead each exceeding ten times the allowable soluble threshold limit concentrations. Further sampling in the respective areas indicated that similar elevated levels were not to be found.

Based upon review of the support documentation and at this time no further soil investigation or remediation is required. The report alludes to the regional presence of the chlorinated materials mentioned above which has not yet been defined. As you are aware PACCAR is also currently undertaking an investigation of the source of these pollutants at the adjacent Grand Auto facility. You are requested to continue to quarterly sample monitoring well HC-1, on the Super Tire property, in conjunction with the quarterly sampling performed at Grand Auto. You are requested to continue to monitor for chromium, lead, TOG, the petroleum hydrocarbon previously identified in ground water and

for all chlorinated solvents detected in any of the Grand Auto or Super Tire monitoring wells.

Please feel free to contact me if you have any questions regarding the above at (510) 271-4320.

Sincerely,

Paul M. Smith
Senior Hazardous Materials Specialist

c:
Mr. Patrick Lynch, Hart Crowser, Inc. 353 Sacramento St., Suite 1140, San Francisco, CA 94111
Ms. Florence Ginsburg, 2690 Hillsdale Dr., San Leandro, CA 94577
Mr. Richard Goodman Esq., 1 Kaiser Plaza, Suite 701, Oakland, CA 94612
Mr. Joseph I. Hess, P.O. Box 1049, Tiburon, CA 94920-0980
Mr. Rich Hiett, SFRWQCB, 2101 Webster St., Suite 500, Oakland, CA 94612

Hart Crowser 1993 Request for Site Closure
for
Former Super Tire Facility
4256 E. 14th Street
Oakland, California

Re: PAI High St. #60

cc PEG

Not reviewed prior to submittal.
CCR ✓ Bat ✓

HARTCROWSER

353 Sacramento Street, Suite 1140
San Francisco, California 94111
FAX 415.391.2216
415.391.1885

Earth and Environmental Technologies

J-6077

November 15, 1993

Mr. Paul Smith
Senior Hazardous Material Specialist
Alameda County Health Agency
Department of Environmental Health
Division of Hazardous Materials
80 Swan Way, Room 200
Oakland, CA 94621

Ref: Request for Case Closure
Super Tire Facility
4256 East 14th Street, Oakland, California

Dear Mr. Smith:

Hart Crowser, Inc., on behalf of Paccar Automotive, Inc. (PAI), has prepared this case closure request for the Super Tire Facility located at 4256 East 14th Street, Oakland, California. The site is located at the intersection of East 14th Street and High Street as shown on the Site Location Map (Figure 1).

This letter discusses the results of our investigation of potential onsite hazardous material source areas. These results indicate that the soils and groundwater beneath the Super Tire Facility have not been impacted by previous site operations.

Groundwater beneath the site contains detectable levels of chlorinated solvents due the suspected regional presence of these compounds in groundwater. These compounds were not detected in any of the soil samples from the site and no onsite source of these compounds is known or suspected to exist. The groundwater impacts are not believed to be associated with the activities at the Super Tire property.

This letter has been prepared according to the "Recommended Format for Case Closure Referrals to RWQCB for Site Cleanup Certification (Draft 6/19/89)". It includes a discussion of the nature of the suspected problem areas at the site (Section 1.0), the investigative methods used to assess these suspected areas (Section 2.0), and the results of the investigation (Section 3.0). Sections 4.0 and 5.0 contain background information on the regional hydrogeology and beneficial uses, respectively. The remedial activities that were performed and their effectiveness are discussed in section 6.0 and 7.0. Finally, the conclusion section (Section 8.0) discusses the rationale supporting no further action and closure of the site.

1.0 NATURE OF THE PROBLEM

Based on a review of historical aerial photographs, the Super Tire Store at 4256 East 14th Street in Oakland, California, was used for retail gasoline sales and automobile servicing as early as 1947. While PAI never operated the site as a gasoline filling station, they did remove two existing underground gasoline storage tanks and a waste oil tank in July 1976, immediately after leasing the property. No environmental sampling was required at the time of the tank removal, and no records on the condition of tanks at the time of removal have been maintained.

In 1992, PAI performed soil borings in the location of the former tanks to evaluate potential environmental impacts which may have occurred during the tanks operating life. The results of this investigation were reported in "Preliminary Site Investigation Report Grand Auto/Super Tire Facilities," November 20, 1992.

During sampling detectable concentrations of oil and grease (O&G), chromium, lead, nickel, zinc and diesel range petroleum hydrocarbons (TPH-D) were measured in site soils. As described in the following paragraphs, the concentrations were generally low, and the extent of the chemical residues appeared limited in both vertical and horizontal extent.

In a January 7, 1993 letter ACHCS requested additional sampling of the waste oil tank location where a soil sample had a reported lead concentration of 60 parts-per-million (ppm). The additional sampling work included the performance of a soil boring in the former tank location. (This boring was converted to a permanent groundwater monitoring well as part of PAI's investigation of the neighboring Grand Auto Supply site). The results of the additional sampling were reported in: "Groundwater Monitoring Well Installation, Super Tire Facility," July 9, 1993.

In 1993, PAI completed the removal of hydraulic hoists from within the service area of the Super Tire facility. The aforementioned report included the results of confirmation sampling of the hydraulic hoist excavations. In a September 28, 1993 letter, ACHCS requested additional sampling of the hydraulic hoist excavation because an elevated level of chromium was reported in a confirmation sample. In this letter ACHCS also requested the removal of fuel piping that remained buried at the site after the tanks were removed in 1976. Section 3.0 of this letter reports the results of the re-sampling of the hoist excavation on October 20, 1993 and the results of the confirmation sample obtained from the fuel piping excavation trench.

A summary of the soil analytical results is presented in Table 1. Figure 2 shows the sample locations and the location of the site that have been investigated as potential source areas. Based on the results of the sampling, the only sample results that presented concerns were the lead concentration of 60 ppm measured in B-1 at 11 feet BGS in the location of the former waste oil tank, and the chromium level of 75 ppm in sample H-2 from the hoist excavation. Each metal was measured at greater than ten times the Soluble Threshold Limit Concentration (STLC) listed in 22 CCR 66261.24. Subsequent sampling of each of the two locations did not confirm these levels of chromium and lead, reducing the concern that these metals could potentially leach to groundwater.

Samples obtained from the onsite groundwater monitoring well, Well HC-1, indicate that none of the compounds detected in onsite soils were present in the groundwater beneath the site. Groundwater samples did contain detectable concentrations of freon, tetrachloroethylene, trichloroethylene, and 1,2-dichloroethylene. The presence of these chlorinated hydrocarbons in onsite groundwater is believed to be a result of the regional presence of these compounds in area groundwater. Results of previous groundwater analysis are shown in Table 2.

The removal of the remaining fuel conveyance piping from the site, has brought the site into compliance with existing underground storage tank ordinance. The sampling activities have investigated potential onsite source areas, and the results of the investigation do not show an impact to soil and groundwater due to the former business activities at the site. The results of previous investigative and remediation activities are fully reported in the plans and reports listed in Appendix A.

2.0 INVESTIGATIVE METHODS

The investigative activities at the site followed the: "Tri-regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites (August 1990)." Field sampling procedures for soils, groundwater, and groundwater elevation measurement were outlined in the "Sampling and Analysis Plan, Grand Auto/Super Tire Facilities, Oakland, California," Hart Crowser, July 6, 1992. The portion of this document that discusses soil sampling methodology, groundwater monitoring well design, well installation, well development, groundwater sampling methodology, and groundwater elevation measurements has been reproduced in Appendix B.

Certified lab reports for all analytical work at the site are found in Appendix C. Sample analysis was performed according to the Tri-Regional Board's recommended minimum verification analyses for underground tank leaks. The soil samples obtained from borings in the location of the former fuel tanks were analyzed by methods recommended for an unknown fuel leak. The soil samples obtained from borings in the location of the former waste oil tank were analyzed by methods recommended for a waste oil leak. The hydraulic hoist verification samples were analyzed by the methods recommended for a used oil or unknown leak.

3.0 EXTENT OF SOIL AND GROUNDWATER CONTAMINATION

The following is a discussion of the significance of results of previous soil sampling at the site. Results indicate that no onsite sources impacted underlying groundwater. The chemicals found in groundwater beneath the site are apparently associated with the regional presence of these compounds which is being investigated by the neighboring Grand Auto Facility.

Boring (B-2) was drilled in the area of the former underground fuel storage tanks. Samples obtained from B-2 had a detectable concentration of 40 ppm TPH-diesel at 6 feet BGS, underlain by a soil sample with non-detectable (less than 10 ppm) TPH-diesel at 14 feet BGS. Based on the low concentration of detectable TPH-diesel in the sample from 6 feet BGS, and the lack of detection in the subsequent sample at 14 feet BGS, the presence of TPH-diesel in this area was determined to be insignificant.

Boring B-1 and HC-1 were both drilled in the area of the former waste oil tank. Boring HC-1 was converted to a groundwater monitoring well. A soil sample obtained from B-1 at 11 feet BGS contained 430 ppm of oil and grease and 60

ppm of total lead. Boring HC-1, located within 10 feet of B-1, contained non-detectable concentrations (less than 50 ppm) of oil and grease, and 6 ppm of total lead at the corresponding depth. Subsequent samples from B-1 and HC-1 at 16 feet BGS and 16 feet BGS, respectively, did not have detectable levels of oil and grease or lead. Based on the low concentration of these compounds that were detected, and the lack of detection in the subsequent samples from each boring, the presence of oil and grease and lead in soils in this area was determined to be very limited in extent, and therefore, insignificant.

The two confirmation samples from the hoist excavation (Samples H-1 and H-2) showed the presence of total chromium at 47 and 75 ppm. Because the total chromium level in one of the samples exceeded ten times the STLC, it was desirable to perform a waste extraction test (WET) to measure the soluble chromium concentration. Re-sampling of the hoist excavation (H-2A) showed total chromium levels below ten times the STLC, and as a result the WET test was not performed on the sample.

Four confirmation samples (P-1 through P-4) were obtained from the fuel piping excavation. Each of these samples had non-detectable levels of TPH-gasoline by EPA Method 8015.

4.0 LOCAL AND REGIONAL HYDROGEOLOGY

The site is located in an area underlain by Quaternary alluvial deposits which consists primarily of unconsolidated clays, silts, sands, and gravels. These deposits are underlain by the Franciscan formation at an undetermined depth.

The subsurface stratigraphy of the site was based on materials encountered from drilling three soil borings onsite and from incorporating data from borings conducted on the adjacent Grand Auto Supply site. Descriptions of the subsurface materials encountered are provided on the boring logs included in Appendix D.

The site is underlain by an irregularly layered sequence of silty to gravely sands and clayey silt beds to the maximum depth explored, 46 feet BGS. Approximately the upper 20 feet of material appears to be artificial fill.

Unconfined groundwater was encountered at depths of approximately 35 feet BGS. Measured groundwater elevations indicate a relatively flat groundwater gradient. Data indicates a slight southwestern gradient. A groundwater gradient map prepared by incorporating data from the adjacent Grand Auto Supply wells is shown in Figure 3.

5.0 BENEFICIAL USES

The site is located in an area were groundwater is considered to have beneficial uses. Alameda Public Works department indicated the presence of industrial and irrigation supply wells within one mile of the site. In general these wells were completed to depths of several hundred feet BGS. The results of our investigation indicate that no impacts to beneficial uses of groundwater has occurred as a result the operations at the site or from the existing site conditions.

6.0 REMEDIATION ACTIVITIES

During completion of the hoist removal approximately 20 cubic yards of soil was excavated and disposed of offsite at the Vasco Road Sanitary Landfill in Livermore, California. Laboratory reports from the characterization sampling of the excavated soil are found in Appendix E.

Remedial activities also included the removal of buried fuel conveyance piping that had remained at the site following the removal of the underground fuel tanks. Confirmation sampling was performed in the excavated piping trench at approximately 20 foot intervals. A total of four soil samples were collected with a slide hammer in stainless steel tubes, sealed, placed in a cool ice chest and transported under chain of custody documentation to Superior Analytical Laboratory for analysis for Total Petroleum Hydrocarbons by EPA Method 8015.

7.0 REMEDIATION EFFECTIVENESS

Results of the confirmation samples from the hoist and piping excavations indicate that the soil excavation activities have been effective in reducing the levels of petroleum hydrocarbons in soils to non-detectable levels.

8.0 CONCLUSION

PAI investigated areas of a former gasoline filling and automotive service station. The investigation included borings in the locations of former underground tanks. Fuel conveyance piping and hydraulic hoists were excavated and confirmation samples were collected. The results of soil sample analysis do not indicate significant chemical residues in site soils which could potentially impact underlying groundwater. Based on the results of the investigation and the completion of the remedial activities no further action is required at this site.

If you would like to discuss this closure request, please call me at (415) 391-1885.

Sincerely,

HART CROWSER, INC.

Patrick G. Lynch, P.E.
Senior Project Engineer

PGL/pr

Attachments:

Figures 1 - Location Map
2 - Site Plan
3 - Groundwater Elevations

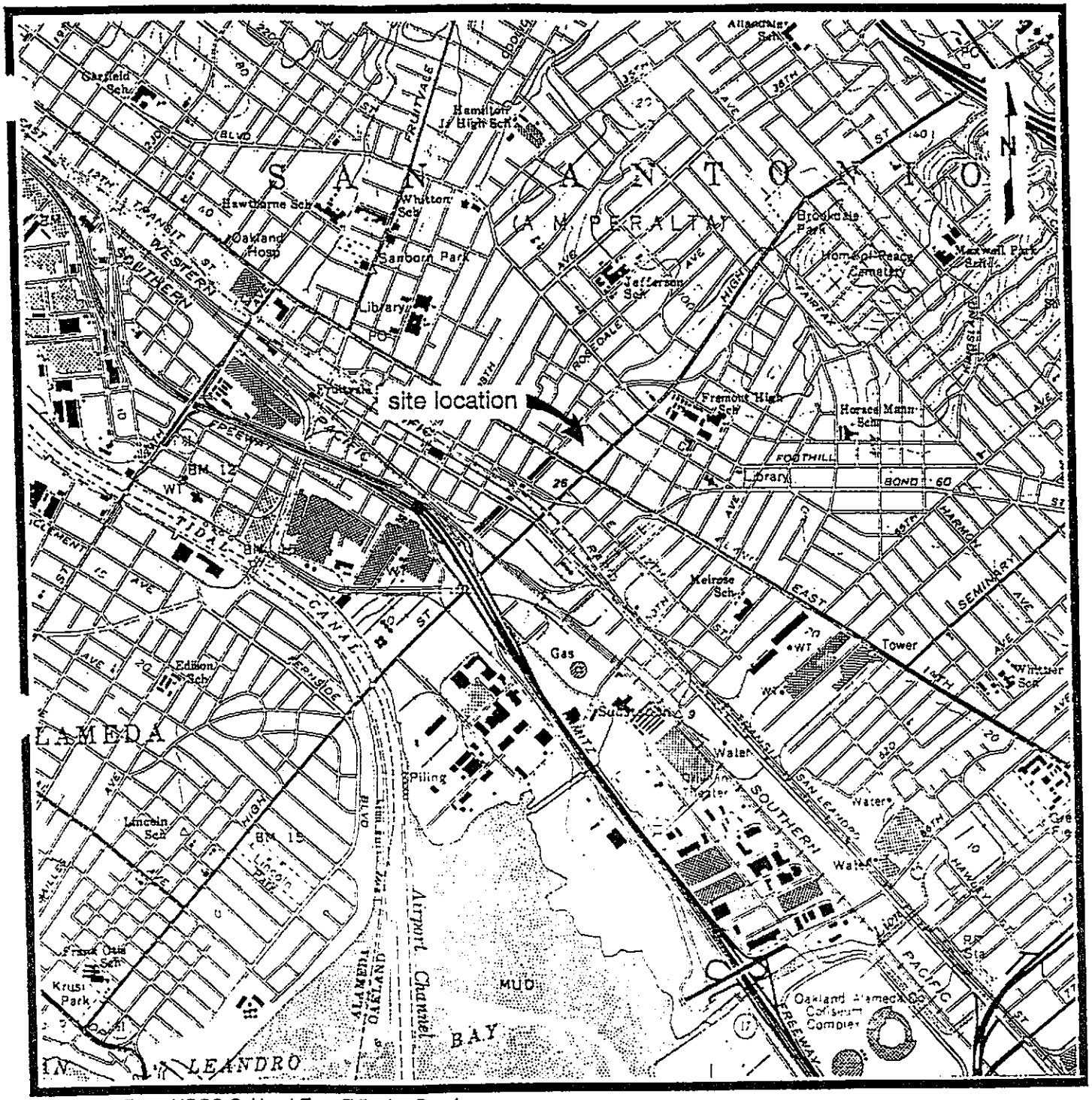
Tables 1 - Soil Sample Analysis Results Summary
2 - Groundwater Chemical Analysis Results

Appendices A - References
B - Field Sampling Plan
C - Certified Analytical Reports
D - Boring Logs
E - Soil Disposal Characterization Analysis

cc: Mr. Raymond Elliott, Paccar Automotive, Inc.

FIGURES

Location Map
Site Plan
Groundwater Elevations



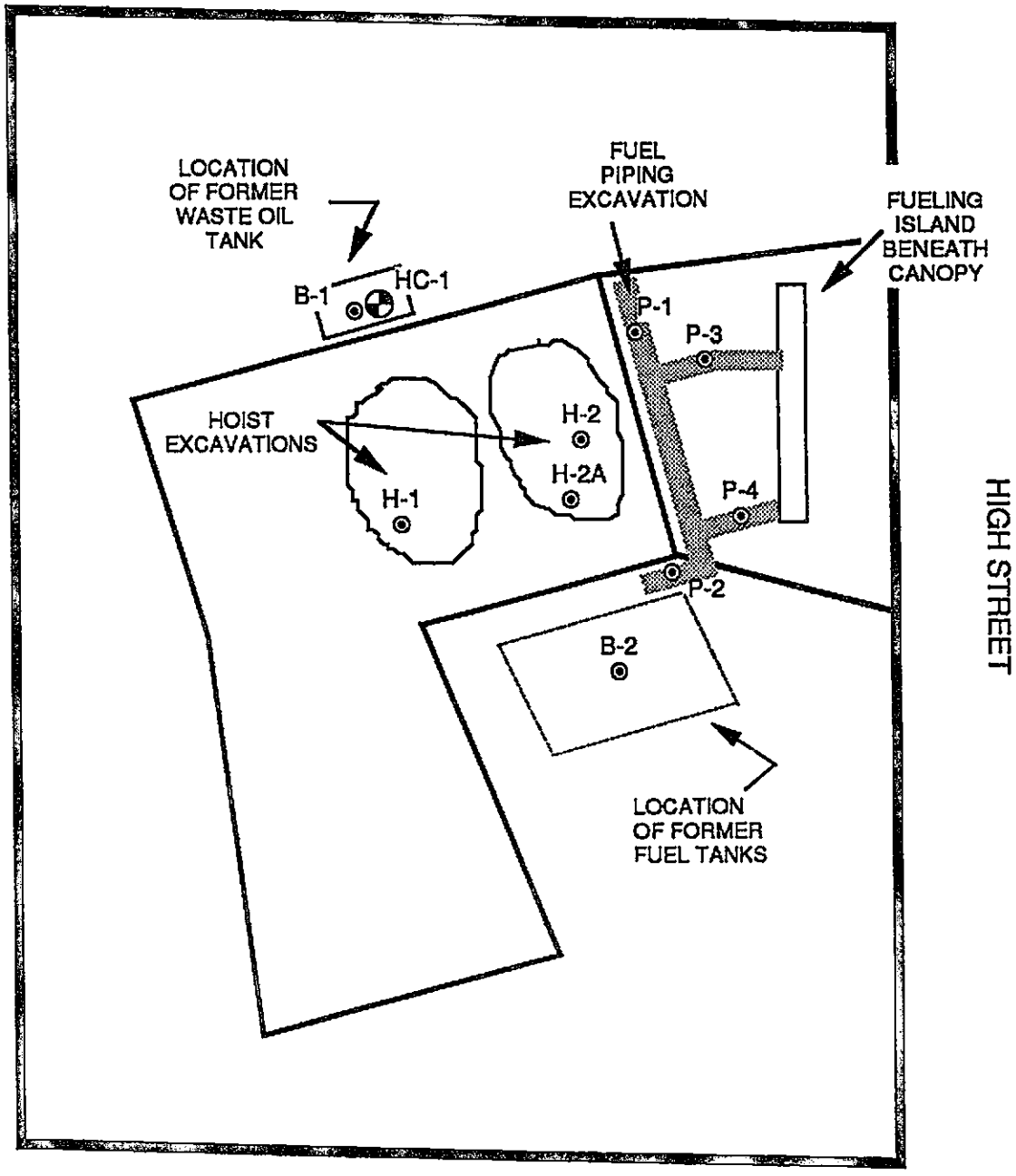
Base Map From USGS Oakland East 7.5 min. Quad

LOCATION MAP
Grand Auto/Former Super Tire Site
Oakland, California

HARTCROWSER

J-6077 7/92

Figure 1



LEGEND:

B-1 ⊙ Boring or sample location

MW-1 ⊕ Monitoring Well location

SITE PLAN

SUPER TIRE STORE

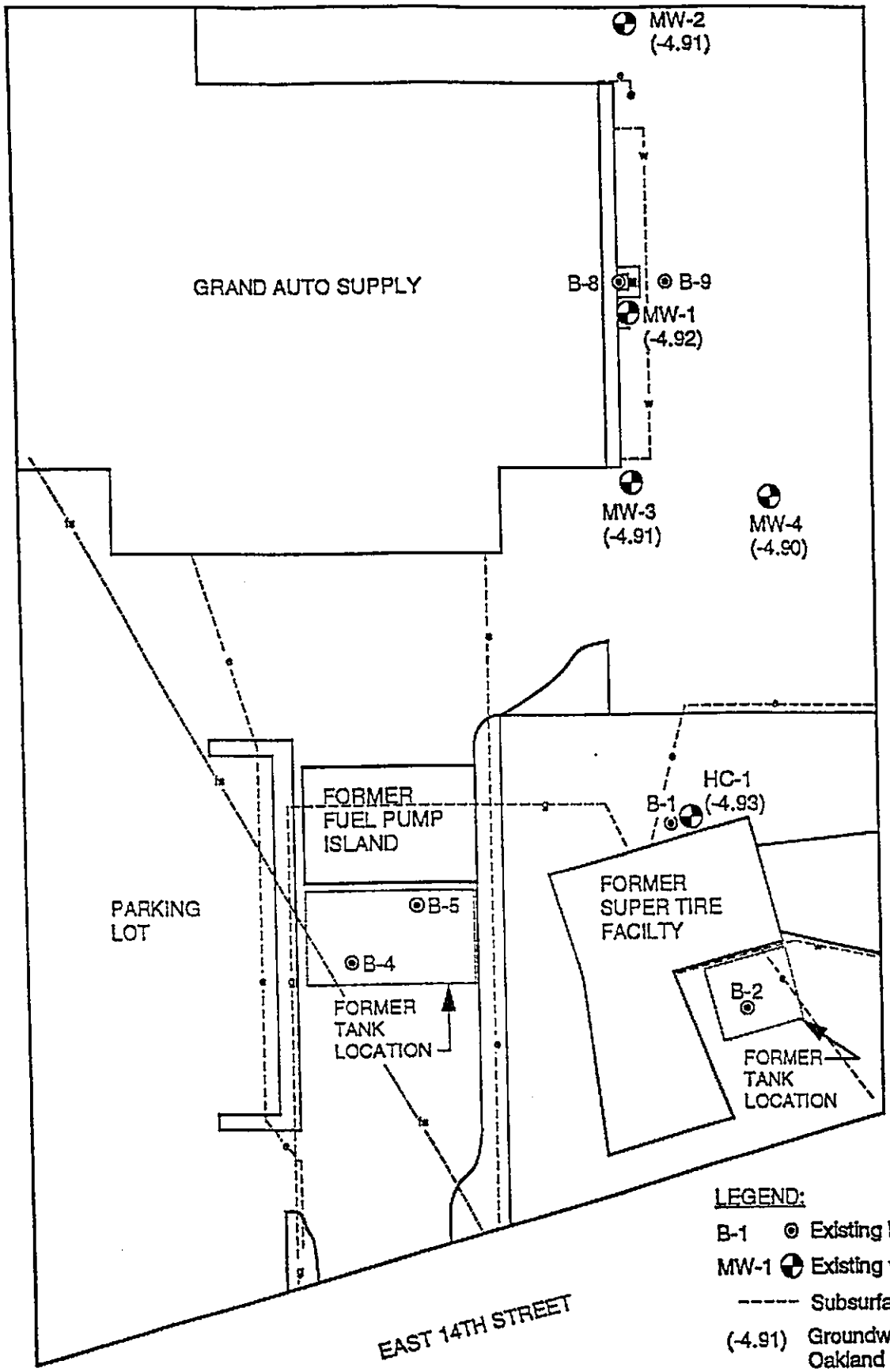
4256 East 14th Street
Oakland, California

HARTCROWSER

J-6077 *10/93*

Figure 2

MISSION AUTOMOTIVE



LEGEND:

B-1 ⊙ Existing boring location

MW-1 ⊕ Existing well location

----- Subsurface utility lines

(-4.91) Groundwater elevation in feet Oakland City Datum, on May 5, 1993.

0 20 40 80

Scale, in Feet

GROUNDWATER ELEVATIONS

GRAND AUTO RETAIL FACILITY
EAST 14TH & HIGH STREETS
OAKLAND, CALIFORNIA

HARTCROWSER

J-6077 5/93

Figure 3

pad/pacmr oakland site v.1

TABLES
Soil Sample Analysis Results Summary
Groundwater Chemical Analysis Results

TABLE 1

SOIL SAMPLE ANALYSIS RESULTS SUMMARY

SUPER TIRE STORE

OAKLAND, CALIFORNIA

J-6077

(all values in mg/kg)

	Fuel Tank Location		Waste Oil Tank Location							
Boring	B-2		B-1		HC-1					
Depth	6	14	11	16	11	16	20	26	31	36
Oil and Grease	NT	NT	430	ND 50	ND 50	ND 50	ND 50	ND 50	ND 50	ND 50
TPH-Diesel	40	ND 10	ND 10	ND 10	NT	NT	NT	NT	NT	NT
TPH-Gasoline	ND 1.0	ND 1.0	ND 1.0	ND 1.0	NT	NT	NT	NT	NT	NT
Organic Lead	NT	ND 2.0	ND 2.0	ND 2.0	NT	NT	NT	NT	NT	NT
Benzene	ND 0.003	ND 0.003	NT	NT	NT	NT	NT	NT	NT	NT
Ethyl Benzene	0.004	ND 0.003	NT	NT	NT	NT	NT	NT	NT	NT
Toluene	0.003	ND 0.003	NT	NT	NT	NT	NT	NT	NT	NT
Xylene	0.007	ND 0.003	NT	NT	NT	NT	NT	NT	NT	NT
Clorinated VOCs	NT	NT	ND 0.005	NT	NT	NT	NT	NT	NT	NT
Cadmium	NT	NT	ND 1.0	NT	NT	NT	NT	NT	NT	NT
Chromium	NT	NT	35	NT	NT	NT	NT	NT	NT	NT
Lead	NT	NT	60	NT	6	ND 5	ND 5	ND 5	ND 5	ND 5
Nickel	NT	NT	40	NT	NT	NT	NT	NT	NT	NT
Zinc	NT	NT	190	NT	NT	NT	NT	NT	NT	NT

NOTES: 1) ND X denotes chemical not detected in sample at a level of X.

2) NT denotes analysis not performed on sample.

TABLE 1

SOIL SAMPLE ANALYSIS RESULTS SUMMARY

SUPER TIRE STORE

OAKLAND, CALIFORNIA

J-6077

(all values in mg/kg)

	Hoist Excavations			Fuel Conveyance Piping Excavation			
Sample	H-1	H-2	H-2A	P-1	P-2	P-3	P-4
Depth	8	8	8	2.5	2.5	2.5	2.5
Oil and Grease	ND 50	ND 50	NT	NT	NT	NT	NT
TPH-Diesel	ND 10	ND 10	NT	NT	NT	NT	NT
TPH-Gasoline	ND 1.0	ND 1.0	NT	ND 1.0	ND 1.0	ND 1.0	ND 1.0
Organic Lead	ND 2.0	ND 2.0	NT	NT	NT	NT	NT
Benzene	ND 0.003	ND 0.003	NT	ND 0.003	ND 0.003	ND 0.003	ND 0.003
Ethyl Benzene	ND 0.003	ND 0.003	NT	ND 0.003	ND 0.003	ND 0.003	ND 0.003
Toluene	ND 0.003	ND 0.003	NT	ND 0.003	ND 0.003	ND 0.003	ND 0.003
Xylene	ND 0.009	ND 0.009	NT	ND 0.009	ND 0.009	ND 0.009	ND 0.009
Clorinated VOCs	ND 0.005	ND 0.005	NT	NT	NT	NT	NT
PCBs	ND 0.003	ND 0.003					
Cadmium	ND 1.0	ND 1.0	NT	NT	NT	NT	NT
Chromium	47	75	41	NT	NT	NT	NT
Lead	19	97	NT	NT	NT	NT	NT
Nickel	67	82	NT	NT	NT	NT	NT
Zinc	97	55	NT	NT	NT	NT	NT

NOTES: 1) ND X denotes chemical not detected in sample at a level of X.
2) NT denotes analysis not performed on sample.

TABLE 2

GROUNDWATER CHEMICAL ANALYSIS RESULTS

SUPER TIRE STORE
OAKLAND, CALIFORNIA
J-6077
(all values in µg/L)

WELL	HC-1	
DATE	4/26/93	8/4/93
Oil and Grease	ND 5,000	NT
TPH-Gasoline	ND 50	100*
Benzene	ND 0.3	ND 0.3
Ethyl Benzene	ND 0.3	ND 0.3
Toluene	ND 0.3	ND 0.3
Xylenes	ND 0.9	ND 0.9
Freon	47	NT
cis-1,2-Dichloroethene	13	15
Trichloroethene	22	27
Tetrachloroethene	46	83
Cadmium	ND 50	NT
Chromium	ND 50	ND 50
Lead	ND 100	NT
Nickel	ND 100	NT
Zinc	ND 50	NT

NOTES:
1) ND X denotes chemical not detected in sample at a level of X.
2) NT denotes analysis not performed on sample.
3) * denotes sample chromatogram did not match diesel standard.

APPENDIX A
References

ATTACHMENT A

REFERENCES

1. Hart Crowser, Inc., "Health and Safety Plan, Grand Auto/Super Tire Stores, Oakland, California," July 7, 1992.

2. Hart Crowser, Inc., "Sampling and Analysis Plan, Grand Auto/Super Tire Facilities, Oakland, California," July 13, 1992.

3. Hart Crowser, Inc., "Preliminary Site Investigation Report, Grand Auto/Super Tire Facilities, Oakland, California," November 20, 1992.

4. Hart Crowser, Inc., "Groundwater Monitoring Well Installation, Super Tire Facility, Oakland, California," July 8, 1993.

5. Alameda County Health Care Services, "Comments on Preliminary Site Investigation Report," letter to PACCAR Automotive, dated January 7, 1993.

6. Alameda County Health Care Services, "Comments on Groundwater Monitoring Well Installation Report," letter to PACCAR Automotive, dated September 28, 1993.

APPENDIX B
Field Sampling Plan

ATTACHMENT B

FIELD SAMPLING PLAN
GRAND AUTO/SUPER FACILITIES
4240/4256 E. 14th STREET, OAKLAND, CA.

This field sampling plan (FSP) describes the type, location, quantity and rationale for all samples to be collected and measurements to be made during this investigation. This FSP includes the following information:

- The objectives of the investigation;
- A description of the types of samples (soil, groundwater) which will be taken, and the chemical parameters which will be analyzed or tested for in the samples;
- A description of the depth and frequency of sampling at each location;
- Specifications for drilling of soil borings and construction of groundwater monitoring wells.
- A map showing all locations which will be sampled;

1. *Soil Boring and Monitoring Well Installation*

Soil Boring and Monitoring Well Placement Objectives

The objectives of the subsurface soil sampling effort are to characterize the nature and extent of potential subsurface contamination borings locations were determined based on the examination of historical aerial photos and maps, as well as the current site configuration. The objective of the groundwater monitoring well installations is to determine potential impacts groundwater from a previous release of petroleum fuel.

The groundwater investigation at this site will involve the installation of ground water monitoring wells in the shallow groundwater aquifer. According to regional information, depth to groundwater ranges from approximately 6 to 15 feet BGS, and the regional groundwater flow direction is to the southwest.

Types, Locations, and Numbers of Soil Borings and Wells

A maximum of six subsurface borings will be drilled on the site during this Preliminary Site Investigation. Of these six borings, three

may be converted to groundwater monitoring wells. The proposed locations of the borings and wells are shown on Figure 3. The locations of these borings are approximate and may change due to unforeseen conditions such as site access, drilling refusal and the presence of utilities.

The initial boring will be continuously sampled to more clearly define stratigraphic details and local depth to groundwater. A minimum of three soil samples will be collected from each boring. Should extremely shallow groundwater depths exist at the site (less than 5 feet), the remaining borings will similarly be continuously sampled to the depth of static water. If the depth to groundwater is greater than 5 feet, one soil sample will be obtained from within the first three feet of the subsurface, and then at five foot intervals to the total depth of the boring. Soil samples may also be collected at depths of known or anticipated changes in lithology. Each boring will be logged by a Hart Crowser geologist, and all samples will be screened using a field PID.

A minimum of one sample per boring will be submitted for analysis of chemical concentrations. The remaining samples will be retained by Hart Crowser for future analytical or geotechnical analysis if required. Samples will be selected for analysis based on visual indications of contamination or PID measurements.

determined by the geologist in the field, but will not provide for breaching of a lower isolated aquifer.

Soil Boring Procedures

Drilling Procedures site construction drawings provided by PAI and markings provided by West Coast Locators will be used to locate underground utilities at the Site prior to drilling operations. Borings will be drilled using a truck-mounted Hollow-Stem Auger (HSA) technique. This drilling method is effective for shallow borings and monitoring well installations in fine grained soils such as those expected beneath the site.

Borings not intended for monitoring well installation will be backfilled to the surface with cement/bentonite slurry grout. In the event that groundwater is present in the boring, the grout will be pumped to the bottom of the boring by way of a tremie pipe to minimize the tendency for bridging. Drill cuttings will be stored in DOT-approved 55-gallon drums and kept in a secure location onsite pending analytical results. Subsequently, the analytical results will be used to determine the appropriate disposal method.

Borehole Logging In order to characterize the subsurface materials, a complete log of all conditions encountered during drilling will be maintained. This includes lithologic and hydrogeologic descriptions along with notations on drilling speed, and drill-bit behavior as different materials are encountered.

Borings will be logged by a Hart Crowser geologist in accordance with the Unified Soil Classification System and standard geologic practice. The geologist will be responsible for including the following information on the boring log.

- Soil Type;
- Color of cuttings;
- Size of cuttings, e.g. cobbles, sand, silt, and clay;
- Descriptive comments; e.g. degree of cementation;
- Moisture content;
- Moisture of all the cuttings will be noted along with the depth at which ground water is first encountered; and

- Drilling speed and rig behavior will be noted to help verify the nature of the material encountered by the drill bit;

When obtaining samples with a split-spoon sampler, blow counts counted by the driller will be recorded for every 6-inch penetration of a 140-pound weight free-falling 30 inches.

Subsurface Soil Sampling Procedures Samples will be obtained using a modified California split-spoon sampler. Stainless steel liners will be placed in the sampler barrel to retrieve and store the sample. Sample depths of all soil samples will be noted on the borehole log form.

The soil sample liners will be removed from the sampler and the liners will be sealed with Teflon tape, covered with tight fitting plastic caps, labeled, and placed in refrigerated storage for analysis. The samples intended for analysis will be delivered via courier to a State-certified chemical testing laboratory. Strict chain of custody procedures will be observed as detailed in the QA/QC Plan.

A portion of each cutting sample will be retained in a small sample bag for future reference. This sample will be tagged with the location and exploratory boring number, the cutting depth, and the date and time the cuttings were obtained.

Subsurface Soil Analyses Samples will be stored in coolers and transported to the analytical laboratory using strict chain-of-custody procedures. Selected subsurface soil samples will be analyzed for the following parameters, which are constituents that are commonly associated with the previous fueling/waste oil storage activities at the Site. Samples from soil boring B-1 (former waste oil tank location) will be analyzed by the following methods in accordance with LUFT requirements:

- TPH-diesel (EPA 8015)
- TPH-gasoline/BTEX (EPA 8015/8020)
- Oil & grease (EPA 5520)
- Chlorinated hydrocarbons (EPA 8020)
- Metals (Cd, Cr, Pb, Ni, Zn) (EPA 6010)
- Organic lead (DHS/LUFT)

Samples from the remaining soil borings will be analyzed by the following methods:

- TPH-diesel (EPA 8015)
- TPH-gasoline/BTEX (EPA 8015/8020)
- Organic lead (DHS/LUFT)

Well Installation Procedures

Permits Well construction permits will be obtained from the Alameda County Zone 7 Water Resources Management District prior to commencement of drilling operations. The ACDEH will also be notified of planned activities at the site and a permit will be obtained if required.

Monitoring Well Installation Monitoring well installation and sampling procedures will follow guidelines and procedures contained in the California Department of Health Services Draft Site Characterization guidelines, dated August 1990. The monitoring wells will be installed using the procedures and equipment described in the following paragraphs. A schematic drawing of a typical monitoring well is presented in Figure 3. During well installation, construction specifications will be recorded on a Monitoring Well Installation Report, shown in Appendix A.

The following paragraphs list the monitoring well construction specifications for each proposed well.

Monitoring Well Casing The monitoring wells will be constructed of new 4-inch diameter, flush joint threaded Schedule 40 polyvinyl chloride (PVC) casing and factory-constructed well screen. The slot width of the well screen will be 0.020 inches. All PVC casing will include the National Sanitation Foundation (NSF) and/or American Society for Testing and Materials (ASTM) designation.

The well screen will extend through the entire thickness of the uppermost aquifer or to a depth of 25 feet BGS, whichever is less. The upper portion of the screened section will extend approximately 3 to 5 feet into the unsaturated material above the first encountered water-bearing zone. The bottom of the screened section will be fitted with a flush joint threaded bottom cap. The solid section of the well casing will extend from the top

of the screened section to approximately 4 inches below the ground surface.

Filter Pack Material After placement of the casing, an appropriate filter pack will be placed in the annulus between the exploratory boring and the casing. The filter pack will be sized appropriate for the formations encountered and the screen size installed. The filter pack should extend from the bottom of the well screen to a minimum height of 2 feet above the top of the well screen. This height may vary for the anticipated shallow groundwater conditions.

The well will be sealed by the placement of at least 6 inches of water-charged bentonite pellets above the filter pack and concrete or cement grout to the ground surface. An Emco-Wheaton sealed traffic box will be placed over the well head to protect the well while providing easy access.

Well Development Prior to groundwater sampling and development, each well will be checked for the presence of a free-floating petroleum product phase with an electronic interface probe and a transparent bailer. Both items will be decontaminated in a non-phosphate detergent solution and rinsed in distilled water prior to each use.

Each well will be developed by removing a minimum of eight well volumes of groundwater and until discharged water is reasonably free of sediment. A well volume is calculated using the following equation:

$$V_b = Pi \times [R_c^2 (1-n) + nR_b^2] \times H$$

Where:

V_b - volume of standing water in borehole, cubic feet (ft^3)
Pi - 3.14
R_c^2 - radius of casing, feet
R_b^2 - radius of soil boring, feet
n - porosity of filter pack, decimal fraction
H - height of standing water in well, feet.

The variable H is determined by subtracting the depth to water from the total well depth. The porosity, n, for this investigation is assumed to be 0.3. To convert the borehole volume to gallons multiply by 7.48 gallons per ft^3. Water levels and well depths will be obtained using an electric sounding device.

Wells will be developed by use of a surge block and bailer, or a surge block and 2 or 4-inch submersible pump combination. Monitoring wells that are slow to recharge groundwater will be developed by bailing dry at least twice. Groundwater parameters will be collected, if possible, for each borehole volume removed. Information collected during well development will be recorded on a Well Development Data Form.

Water discharged from the monitoring wells will be stored in DOT-approved sealed head 55-gallon drums. Groundwater analytical results will be used to determine the appropriate disposal method.

2. *Groundwater Sampling*

Groundwater Sampling Objectives

Objectives of the groundwater sampling and analysis effort are:

- Determine the presence of chemicals of potential concern in areas of the site that are likely to have been impacted by previous fuel storage activities.
- Determine the concentrations of contaminants (if present) in groundwater at specific locations of the Site.

Types, Locations, and Numbers of Samples

A groundwater sample will be obtained from the three onsite monitoring wells (if installed) and analyzed for TPH as gasoline with BTEX distinction by EPA Method 8015/8020. A duplicate sample will be obtained at one well and analyzed for these same parameters. If floating product is present in a well, that well will not be sampled. The tentative locations of the wells are shown on Figure 3.

Well Purging Procedure

Prior to sampling the monitoring wells, each well will be purged of a minimum of three and a maximum of five casing volumes of water using a Teflon bailer or a 2 or 4-inch submersible pump constructed of Teflon and stainless steel materials. A casing volume is calculated using the following equation:

$$V_c = Pi \times R_c^2 \times H$$

Where:

V_c - volume of standing water in well casing, cubic feet (ft^3)
Pi - 3.14
R_c^2 - radius of casing, feet
H - height of standing water in well, feet.

All purging equipment will be properly decontaminated prior to use at each well. Water discharged during purging operations will be stored as previously described.

Measurement of Field Parameters

Field parameters (pH, conductivity, and temperature) will be measured at the start of purge water pumping and at each consecutive well volume until sequential measurements differ by no more than 10 percent. Field measurements will be compared with data from previous sampling rounds, if available, and examined for significant discrepancies. Specific procedures for operation, maintenance and calibration of the field instruments are presented in the Quality Assurance/Quality Control Plan.

An oil-water interface probe will be used to measure the thickness of floating product, if present. Product thickness will be measured to the nearest 0.01 foot.

The following equipment will be used for measurements of ground water parameters in the field:

- pH/Temperature — Orion 230 A or equivalent
- Conductivity — Orion 120 or equivalent

Groundwater Sampling Procedures

Water samples will be collected using a decontaminated Teflon or pre-cleaned single-use disposable bailer. Water samples will be placed in 40 milliliter borosilicate glass VOA containers and preserved with HCl. Details of the water sampling procedures will recorded on the Groundwater Sampling Data report form, as shown in Appendix A. A laboratory prepared trip blank will accompany all groundwater samples, and will be analyzed for similar chemical constituents.

All samples and blanks will be placed in a cooler with ice packs to cool the samples to a maximum temperature of 4°C and transported via courier to a State-certified hazardous materials testing laboratory. Chain of custody procedures will be observed.

Sample Handling, Packaging and Shipping Procedures for Groundwater Samples

Outlined in this section are the sample handling, packaging and shipping procedures for groundwater samples collected during the investigation at this site. These procedures are to be followed to yield samples representative of field conditions.

Only laboratory prepared bottles are to be used for sample collection. Bottles will be received from the laboratory cleaned and if necessary, with preservative added. A label will be affixed to the bottle by the laboratory indicating the presence and type of preservative used.

Unpreserved sample bottles will be rinsed with the water to be sampled prior to sample collection. Sample bottles containing preservative are not to be rinsed. Sample bottles requiring zero head space will be checked for air bubbles after the cap and septum have been securely fastened. If air bubbles are detected, the sample will be recollected.

A sample tag will be filled out for each sample bottle. The sample tag will contain the following information:

- Project number
- Project name
- Sample location
- Date of sample collection
- Time of sample collection
- Type of preservative
- Sampler's initials

The samples will be properly packed in ice chests containing an appropriate amount of "blue ice". Blue ice will be properly decontaminated using a phosphate-free detergent and rinsed with deionized water prior to use. Bagged ice or dry ice may be used only if sealed in a clean water-tight container.

3. *Sump and Hydraulic Hoist Removal*

Sump and Hydraulic Hoist Removal Objectives

The existing sump and the two existing hydraulic hoist will be removed from within the Super Tire service area. An additional sump will be removed adjacent to the former car wash within the Grand Auto facility.

Oil remaining in the hydraulic lift system and the sump will be collected in drums to the maximum extent possible. The floor sump will then be rinsed with a high pressure steam washer. The rinsate will be collected and stored in drums onsite. The drums will be sampled and profiled at a local oil recycler. A maximum liquid volume (oil and rinsate) requiring disposal has been assumed to be 150 gallons.

The concrete floor will be sawcut to the assumed excavation dimensions. The concrete will be broken up with a hydraulic breaker and disposed of at a recycler.

Do to the access limitations within a building, a mini-excavator will be used to expose and remove the two hoist systems and associated reservoirs and lines. The lift will be cleaned onsite and disposed of at a permitted facility. Additional soil will excavated if visually contaminated. The maximum depth of

excavation in the building is assumed to be eight feet. The estimated maximum volume of soil to be excavated is 100 yards. No shoring is assumed to be required.

Soil samples will be collected from areas beneath and/or surrounding the present locations of specified sumps and hydraulic hoists located on the Grand Auto and former Super Tire facilities. These samples will aid in characterization of potential hydrocarbon residues remaining within the shallow soils beneath the site.

Types, Locations, and Numbers of Samples

One soil sample will be collected beneath each removed sump and hoist location at the maximum depth of the excavation. If groundwater is present within the excavation, sidewall samples will be obtained at a location slightly above the current static water elevation. A grab sample of groundwater will also be obtained.

Should overexcavation be required, a soil sample will be collected every 20 feet (on center) across the floor of the excavation, or every 20 feet along the excavation sidewall should groundwater enter the pit.

Excavated soil will be sampled to determine disposal requirements as appropriate. One composite sample (consisting of four individual samples which will be composited by the analytical laboratory) will be obtained for each 50 cubic yards of excavated soil.

Excavation Soil Sampling Procedures

In order to minimize risk to the safety of the sampler and subcontracting crew surrounding an unshored excavation, samples will be collected from soil collected within the excavator bucket. The sampler shall endeavor to obtain a sample which appears representative of the soil conditions at the point of collection and has been minimally disturbed by the excavation process. The sample will be collected in a pre-cleaned stainless steel sampling tube by manual penetration into the soil or with an appropriate slide hammer tool, depending on the bulk density of the soils encountered. All

sampling equipment will be thoroughly decontaminated prior to sample acquisition. Disposable nitrile surgical-type gloves will be worn during sample collection to minimize the potential for cross-contamination.

Excavation Soil Sample Analyses

Samples will be stored in coolers and transported to the analytical laboratory using strict chain-of-custody procedures. Selected subsurface soil samples will be analyzed for the following parameters, which are constituents that are commonly associated with the previous automotive service activities at the Site:

- TPH-diesel (EPA 8015)
- TPH-gasoline/BTEX (EPA 8015/8020)
- Oil & grease (EPA 5520)
- Chlorinated hydrobons (EPA 8020)
- Metals (Cd, Cr, Pb, Ni, Zn) (EPA 6010)
- Organic lead (DHS/LUFT)

4. *Decontamination Procedures*

All equipment that may come in contact with potentially contaminated soil or water is decontaminated prior to and after use. Decontamination consists of steam cleaning (high pressure, hot water rinse) or phosphate-free detergent wash, and deionized (DI) or tap water rinse as appropriate.

Drilling, sampling, and monitoring well installation equipment is decontaminated as follows:

1. The drill rods and augers (and casings, if soiled) will be steam-cleaned prior to use to prevent cross-contamination between exploratory borings. Cleaning shall be accomplished by scraping loose soil off the equipment, followed by the removal of all soil with an electric or fuel powered pressure steam cleaner. All soils and fluids generated from the cleaning shall be contained and transferred to DOT-approved 55 gallon drums for disposal.

2. Soil sampling equipment (e.g., split-barrel or standard penetration samplers, sampling tubes) are cleaned prior to use in each boring and between sampling. The sampler may be steam cleaned or washed in a phosphate-free detergent solution and rinsed in tap water. Visible soil is removed at this time. Wash solutions and rinse water are renewed prior to each boring.

3. Geophysical probes and cables are steam-cleaned or washed in a phosphate-free detergent solution and rinsed in tap water and wiped clean prior to each use.

4. Casing, screen, couplings, and caps used in monitoring well installation are steam-cleaned prior to installation. Visible foreign matter is removed at this time.

5. The exterior surfaces and accessible interior portions of submersible, centrifugal, and positive-displacement pumps are steam-cleaned prior to each use or prior to each sampling round.

6. Non-dedicated bailers are steam-cleaned or washed in phosphate-free detergent solution and rinsed twice in tap water and additionally in de-ionized water prior to each use. Rope or string (used with bailers or disposable sampling bottles) that has been in contact with the water in the well or boring will be replaced after collection of each sample.

7. Steel tapes, well sounders, transducers, and field instruments will be rinsed in distilled, deionized water or wiped clean after each use. Generally, only the wetted end of these devices require cleaning.

APPENDIX C
Certified Analytical Reports

Superior Precision Analytical, Inc.
835 Arnold Drive, Suite 106 • Martinez, California 94553 • (510) 229-0166 / fax (510) 229-0916

HARTCROWSER Inc.
Attn: PAT LYNCH

Project 6077
Reported 25-July-1992

EPA METHOD 8010

Sample preparation by Purge and Trap (EPA SW-846 Method 5030) and Chromatographic analysis using an electrolytic conductivity detector (EPA SW-846 Method 8010).

Chronology

Laboratory Number 86260

Identification	Sampled	Received	Extracted	Analyzed	Run #	Lab #
B1-11	07/16/92	07/17/92	/ /	07/22/92		1

Superior Precision Analytical, Inc.
835 Arnold Drive, Suite 106 • Martinez, California 94553 • (510) 229-0166 / fax (510) 229-0916

HARTCROWSER Inc.
Attn: PAT LYNCH

Project 6077
Reported 25-July-1992

EPA METHOD 8010

Laboratory Number	Sample Identification	Matrix
86260- 1	B1-11	Soil

RESULTS OF ANALYSIS

Laboratory Number: 86260- 1

Chloromethane:	ND<5
Vinyl Chloride:	ND<5
Bromomethane:	ND<5
Chloroethane:	ND<5
Trichlorofluoromethane:	ND<5
1,1-Dichloroethene:	ND<5
Dichloromethane:	ND<5
c-1,2-Dichloroethene:	ND<5
1,1-Dichloroethane:	ND<5
t-1,2-Dichloroethene:	ND<5
Chloroform:	ND<5
1,1,1-Trichloroethane:	ND<5
Carbon tetrachloride:	ND<5
1,2-Dichloroethane:	ND<5
Trichloroethene:	ND<5
1,2-Dichloropropane:	ND<5
Bromodichloromethane:	ND<5
c-1,3-Dichloropropene:	ND<5
t-1,3-Dichloropropene:	ND<5
1,1,2-Trichloroethane:	ND<5
Tetrachloroethene:	ND<5
Dibromochloromethane:	ND<5
Chlorobenzene:	ND<5
Bromoform:	ND<5
1,1,2,2-Tetracl-ethane:	ND<5
1,3-Dichlorobenzene:	ND<5
1,4-Dichlorobenzene:	ND<5
1,2-Dichlorobenzene:	ND<5

Concentration: ug/kg

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HARTCROWSER Inc.
Attn: PAT LYNCH

Project 6077
Reported 25-July-1992

EPA METHOD 8010

Laboratory Number	Sample Identification	Matrix
86260- 1	B1-11	Soil

RESULTS OF ANALYSIS

Laboratory Number: 86260- 1

4-Chlorotoluene:	70%

Superior Precision Analytical, Inc.
835 Arnold Drive, Suite 106 • Martinez, California 94553 • (510) 229-0166 / fax (510) 229-0916

EPA METHOD 8010
Quality Assurance and Control Data - Soil
Laboratory Number 86260

Compound	Method Blank (ug/kg)	PQL (ug/kg)	Average Spike Recovery (%)	Limits (%)	RPD (%)	Spike Level (ug/kg)
Chloromethane:	ND<5	5				
Vinyl Chloride:	ND<5	5				
Bromomethane:	ND<5	5				
Chloroethane:	ND<5	5				
Trichlorofluoromethane:	ND<5	5				
1,1-Dichloroethene:	ND<5	5				
Dichloromethane:	ND<5	5				
c-1,2-Dichloroethene:	ND<5	5				
1,1-Dichloroethane:	ND<5	5	82%	60-140	9%	100
t-1,2-Dichloroethene:	ND<5	5				
Chloroform:	ND<5	5				
1,1,1-Trichloroethane:	ND<5	5				
Carbon tetrachloride:	ND<5	5				
1,2-Dichloroethane:	ND<5	5				
Trichloroethene:	ND<5	5	90%	60-140	9%	100
1,2-Dichloropropane:	ND<5	5				
Bromodichloromethane:	ND<5	5				
c-1,3-Dichloropropene:	ND<5	5				
t-1,3-Dichloropropene:	ND<5	5				
1,1,2-Trichloroethane:	ND<5	5				
Tetrachloroethene:	ND<5	5				
Dibromochloromethane:	ND<5	5				
Chlorobenzene:	ND<5	5	107%	60-140	13%	100
Bromoform:	ND<5	5				
1,1,2,2-Tetracl-ethane:	ND<5	5				
1,3-Dichlorobenzene:	ND<5	5				
1,4-Dichlorobenzene:	ND<5	5				
1,2-Dichlorobenzene:	ND<5	5				
4-Chlorotoluene:			82%		0%	

Definitions:

ND = Not Detected
PQL = Practical Quantitation Limit

RPD = Relative Percent Difference

QC File No. 86260

Nancy A. Nelson
Senior Analyst

Certified Laboratories

Superior Precision Analytical, Inc.
835 Arnold Drive, Suite 106 • Martinez, California 94553 • (510) 229-0166 / fax (510) 229-0916

C E R T I F I C A T E O F A N A L Y S I S

LABORATORY NO.: 86260
CLIENT: HARTCROWSER Inc.
CLIENT JOB NO.: 6077

DATE RECEIVED: 07/17/92
DATE REPORTED: 07/25/92

ANALYSIS FOR TOTAL ORGANIC LEAD
by DHS METHOD (LUFT MANUAL)

LAB #	Sample Identification	Concentration (mg/kg)
1	B1-11	ND<2
2	B1-16	ND<2
4	B2-14	ND<2
6	B4-21	ND<2
8	B5-26	ND<2

mg/kg - parts per million (ppm)

Method Detection Limit for Organic Lead in Soil: 2 mg/kg

QAQC Summary: MS/MSD Average Recovery : 104 %
Duplicate RPD : 3

Richard Srna, Ph.D.
Nancy A. Nilsen for
Laboratory Director

Superior Precision Analytical, Inc.
835 Arnold Drive, Suite 106 • Martinez, California 94553 • (510) 229-0166 / fax (510) 229-0916

C E R T I F I C A T E O F A N A L Y S I S

LABORATORY NO.: 86260
CLIENT: HARTCROWSER Inc.
CLIENT JOB NO.: 6077

DATE RECEIVED:07/17/92
DATE REPORTED:07/25/92

ANALYSIS FOR CADMIUM, CHROMIUM, LEAD & ZINC
by EPA SW-846 Method 6010

LAB #	Sample Identification	Concentration(mg/kg) Cadmium	Chromium	Lead	Zinc
1	B1-11	ND<1	35	60	190

mg/kg - parts per million (ppm)

Method Detection Limit for Cadmium in Soil: 1 mg/kg
Method Detection Limit for Chromium in Soil: 5 mg/kg
Method Detection Limit for Lead in Soil: 5 mg/kg
Method Detection Limit for Zinc in Soil: 20 mg/kg

QAQC Summary: MS/MSD Average Recovery : 101/104%
Duplicate RPD : 3%

Richard Srna, Ph.D.
Nancy H. Nelson for
Laboratory Manager

Superior Precision Analytical, Inc.
835 Arnold Drive, Suite 106 ▪ Martinez, California 94553 ▪ (510) 229-0166 / fax (510) 229-0916

C E R T I F I C A T E O F A N A L Y S I S

LABORATORY NO.: 86260
CLIENT: HARTCROWSER Inc.
CLIENT JOB NO.: 6077

DATE RECEIVED:07/17/92
DATE REPORTED: 07/25/92

ANALYSIS FOR TOTAL NICKEL
by SW-846 METHOD 6010

LAB #	Sample Identification	Concentration(mg/kg) Total Nickel
1	B1-11	40

mg/kg - parts per million (ppm)

Method Detection Limit for Nickel in Soil: 10 mg/kg

QAQC Summary: MS/MSD Average Recovery : 104/104%
Duplicate RPD : 0%

Richard Srna, Ph.D.
Laboratory Manager

Superior Precision Analytical, Inc.
835 Arnold Drive, Suite 106 • Martinez, California 94553 • (510) 229-0166 / fax (510) 229-0916

HARTCROWSER Inc.
Attn: PAT LYNCH

Project 6077
Reported 07/25/92

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
86260- 1	B1-11	07/16/92	07/21/92	Soil
86260- 2	B1-16	07/16/92	07/21/92	Soil
86260- 3	B2-6	07/16/92	07/24/92	Soil
86260- 4	B2-14	07/16/92	07/24/92	Soil
86260- 6	B4-21	07/16/92	07/24/92	Soil
86260- 7	B5-19	07/16/92	07/24/92	Soil
86260- 8	B5-26	07/16/92	07/24/92	Soil

RESULTS OF ANALYSIS

Laboratory Number:	86260- 1	86260- 2	86260- 3	86260- 4	86260- 6
Oil and Grease:	430	ND<50	NA	NA	NA
Diesel:	ND<10	ND<10	40 *	ND<10	ND<10
Gasoline:	ND<1	ND<1	ND<1	ND<1	ND<1
Benzene:	ND<.003	ND<.003	ND<.003	ND<.003	ND<.003
Toluene:	ND<.003	ND<.003	0.004	ND<.003	ND<.003
Ethyl Benzene:	ND<.003	ND<.003	0.003	ND<.003	ND<.003
Xylenes:	ND<.003	ND<.003	0.007	ND<.003	ND<.003
Concentration:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg

Laboratory Number:	86260- 7	86260- 8
Oil and Grease:	NA	NA
Diesel:	ND<10	ND<10
Gasoline:	ND<1	ND<1
Benzene:	0.011	ND<.003
Toluene:	ND<.003	ND<.003
Ethyl Benzene:	ND<.003	ND<.003
Xylenes:	0.003	ND<.003
Concentration:	mg/kg	mg/kg

Superior Precision Analytical, Inc.
835 Arnold Drive, Suite 106 ▪ Martinez, California 94553 ▪ (510) 229-0166 / fax (510) 229-0916

C E R T I F I C A T E O F A N A L Y S I S

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

QA/QC INFORMATION
SET: 86260

* A non-standard diesel pattern was observed in the chromatogram.

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
mg/kg = parts per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:
Minimum Detection Limit in Soil: 50mg/kg

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Soil: 1mg/kg

PA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg

EPA SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Soil: 0.005mg/kg

ANALYTE	SPIKE LEVEL	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Oil and Grease:	30 mg	78/71	9%	56-106
Diesel:	200 ng	102/100	2%	70-130
Gasoline:	200 ng	86/100	15%	70-130
Benzene:	200 ng	99/99	0%	70-130
Toluene:	200 ng	98/98	0%	70-130
Ethyl Benzene:	200 ng	99/98	1%	70-130
Xylenes:	600 ng	103/104	1%	70-130

Richard Srna, Ph.D.
Laboratory Director

86260

Sample Custody Record

DATE 7-17-92 PAGE 1 OF 1

HARTCROWSER

Hart Crowser, Inc.
353 Sacramento Street, Suite 1140
San Francisco, California 94111

JOB NUMBER 6077 LAB NUMBER SUPERIOR

PROJECT MANAGER PATRICK LYNCH

PROJECT NAME PACCAR / OAKLAND

SAMPLED BY: B. BJORKLUND

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TPH-D (8015 m)	TPH-G (8015 m)	BTEX (8020)	OIL + GREASE (SM 5520)	HAL. V. O/G (8010)	METALS: Cd, Cr, Pb, Ni, Zn (6010)	ORGANIC LEAD (DHS/LUFT)	NO. OF CONTAINERS	OBSERVATIONS / COMMENTS / COMPOSITING INSTRUCTIONS
1	B1-11	7-16-92		SOIL	✓	✓	✓	✓	✓	✓	✓	1	
2	B1-16				✓	✓	✓	✓	?		✓	1	PERFORM 8010 ONLY IF SAMPLE B1-11 TESTS POSITIVE IN 8010
3	B2-6				✓	✓	✓					1	EXPECT ND
4	B2-14				✓	✓	✓				✓	1	
5	B4-16											→	HOLD
6	B4-21				✓	✓	✓				✓	1	
7	B5-19				✓	✓	✓					1	
9	B5-26				✓	✓	✓				✓	1	EXPECT ND

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: Alicia Haynes		SIGNATURE: Dave Crawford	7/17
PRINTED NAME: Alicia Haynes	TIME	PRINTED NAME: DAVE CRAWFORD	TIME
COMPANY: HART CROWSER	2:11	COMPANY: EXPRESS-IT	14:10
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: Dave Crawford	7/17	SIGNATURE: Marcia A. Nelson	7/17/92
PRINTED NAME: DAVE CRAWFORD	TIME	PRINTED NAME: MARCIA NELSON	TIME
COMPANY: EXPRESS-IT	17:00	COMPANY: SUPERIOR	5:00 pm

TOTAL NUMBER OF CONTAINERS 8 SOIL

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS

PLEASE RETURN COOLER

5 DAY TAT

METHOD OF SHIPMENT

Please initial:

Samples Stored in ice COOLER

Appropriate containers

Samples preserved

VOA's without headspace

Comments: ASAP

DISTRIBUTION:

1. PROVIDE WHITE AND YELLOW COPIES TO LABORATORY
2. RETURN PINK COPY TO PROJECT MANAGER
3. LABORATORY TO FILL IN SAMPLE NUMBER AND SIGN FOR RECEIPT
4. LABORATORY TO RETURN WHITE COPY TO HART CROWSER

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HARTCROWSER Inc
Attn: Patrick Lynch

Project PACCAR/OAKLAND
Reported 08-April-1993

ANALYSIS FOR POLYCHLORINATED BIPHENYLS

Chronology

Laboratory Number 56249

Identification	Sampled	Received	Extracted	Analyzed	Run #	Lab #
H-1	04/01/93	04/01/93	04/06/93	04/07/93		1
H-2	04/01/93	04/01/93	04/06/93	04/07/93		2

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HARTCROWSER Inc
Attn: Patrick Lynch

Project PACCAR/OAKLAND
Reported 08-April-1993

ANALYSIS FOR POLYCHLORINATED BIPHENYLS

Laboratory Number	Sample Identification	Matrix
56249- 1	H-1	Soil
56249- 2	H-2	Soil

RESULTS OF ANALYSIS

Laboratory Number:	56249- 1	56249- 2
AROCLOR 1016:	ND<3	ND<3
AROCLOR 1221:	ND<3	ND<3
AROCLOR 1232:	ND<3	ND<3
AROCLOR 1242:	ND<3	ND<3
AROCLOR 1248:	ND<3	ND<3
AROCLOR 1254:	ND<3	ND<3
AROCLOR 1260:	ND<3	ND<3
Concentration:	ug/kg	ug/kg
SURROGATE RECOVERY:	93%	83%

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ANALYSIS FOR POLYCHLORINATED BIPHENYLS
Quality Assurance and Control Data - Soil
Laboratory Number 56249

Compound	Method Blank (ug/kg)	PQL (ug/kg)	Average Spike Recovery (%)	Limits (%)	RPD (%)
AROCLOR 1016:	ND<3	ND<3			
AROCLOR 1221:	ND<3	ND<3			
AROCLOR 1232:	ND<3	ND<3			
AROCLOR 1242:	ND<3	ND<3			
AROCLOR 1248:	ND<3	ND<3			
AROCLOR 1254:	ND<3	ND<3	112%	60-140	0%
AROCLOR 1260:	ND<3	ND<3			

Definitions:

ND = Not Detected
PQL = Practical Quantitation Limit

RPD = Relative Percent Difference

QC File No. 56249

4/9/93
Senior Analyst

Certified Laboratories

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

HARTCROWSER Inc
Attn: Patrick Lynch

Project PACCAR/OAKLAND
Reported 04/07/93

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
56249- 1	H-1	04/01/93	04/06/93	Soil
56249- 2	H-2	04/01/93	04/06/93	Soil

RESULTS OF ANALYSIS

Laboratory Number: 56249- 1 56249- 2

Diesel:	ND<10	ND<10
Oil and Grease:	ND<50	ND<50
Gasoline:	ND<1	ND<1
Benzene:	ND<.003	ND<.003
Toluene:	ND<.003	ND<.003
Ethyl Benzene:	ND<.003	ND<.003
Xylenes:	ND<.009	ND<.009
Concentration:	mg/kg	mg/kg

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C E R T I F I C A T E O F A N A L Y S I S

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

QA/QC INFORMATION
SET: 56249

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
mg/kg = parts per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:
Minimum Detection Limit in Soil: 50mg/kg

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Soil: 10mg/kg

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg

EPA SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Soil: 0.003mg/kg

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Diesel:	88/84	5%	69-127
Oil and Grease:	72/74	3%	63-100
Gasoline:	93/90	3%	75-111
Benzene:	100/95	5%	75-114
Toluene:	103/99	4%	78-114
Ethyl Benzene:	106/102	4%	76-120
Xylenes:	96/92	4%	71-117

Richard Srna, Ph.D.
Laboratory Director

4/8/93

Superior Precision Analytical, Inc.
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C E R T I F I C A T E O F A N A L Y S I S

LABORATORY NO.: 56249-1
CLIENT: HARTCROWSER INC.
JOB NO.: PACCAR/OAKLAND

DATE SAMPLED: 04/01/93
DATE RECEIVED: 04/01/93
DATE ANALYZED: 04/06/93

EPA SW-846 METHOD 8010
HALOGENATED VOLATILE ORGANICS
SAMPLE: H-1

Compound	MDL (ug/kg)	RESULTS (ug/kg)
Chloromethane/Vinyl Chloride	10	ND
Bromomethane/Chloroethane	10	ND
Trichlorofluoromethane	5	ND
1,1-Dichloroethene	5	ND
Methylene Chloride	50	ND
trans-1,2-Dichloroethene	5	ND
1,1-Dichloroethane	5	ND
cis-1,2-Dichloroethene	5	ND
Chloroform	5	ND
1,1,1-Trichloroethane	5	ND
Carbon tetrachloride	5	ND
1,2-Dichloroethane	5	ND
Trichloroethylene	5	ND
1,2-Dichloropropane	5	ND
Bromodichloromethane	5	ND
Cis-1,3-Dichloropropene	5	ND
trans-1,3-Dichloropropene	5	ND
1,1,2-Trichloroethane	5	ND
Tetrachloroethene	5	ND
Dibromochloromethane	5	ND
Chlorobenzene	5	ND
Bromoform	5	ND
1,1,2,2-Tetrachloroethane	5	ND
1,3-Dichlorobenzene	5	ND
1,2-Dichlorobenzene	5	ND
1,4-Dichlorobenzene	5	ND

MDL = Method Detection Limit
ug/kg = parts per billion (ppb)
QA/QC Summary: Daily Standard RPD =<15%
MS/MSD average recovery = 99 % :MS/MSD RPD = 4 %

Richard Srna, Ph.D.

(for) 4/8/93
Laboratory Director

RECEIVED 1993

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C E R T I F I C A T E O F A N A L Y S I S

LABORATORY NO.: 56249-2
CLIENT: HARTCROWSER INC.
JOB NO.: PACCAR/OAKLAND

DATE SAMPLED: 04/01/93
DATE RECEIVED: 04/01/93
DATE ANALYZED: 04/06/93

EPA SW-846 METHOD 8010
HALOGENATED VOLATILE ORGANICS
SAMPLE: H-2

Compound	MDL (ug/kg)	RESULTS (ug/kg)
Chloromethane/Vinyl Chloride	10	ND
Bromomethane/Chloroethane	10	ND
Trichlorofluoromethane	5	ND
1,1-Dichloroethene	5	ND
Methylene Chloride	50	ND
trans-1,2-Dichloroethene	5	ND
1,1-Dichloroethane	5	ND
cis-1,2-Dichloroethene	5	ND
Chloroform	5	ND
1,1,1-Trichloroethane	5	ND
Carbon tetrachloride	5	ND
1,2-Dichloroethane	5	ND
Trichloroethylene	5	ND
1,2-Dichloropropane	5	ND
Bromodichloromethane	5	ND
Cis-1,3-Dichloropropene	5	ND
trans-1,3-Dichloropropene	5	ND
1,1,2-Trichloroethane	5	ND
Tetrachloroethene	5	ND
Dibromochloromethane	5	ND
Chlorobenzene	5	ND
Bromoform	5	ND
1,1,2,2-Tetrachloroethane	5	ND
1,3-Dichlorobenzene	5	ND
1,2-Dichlorobenzene	5	ND
1,4-Dichlorobenzene	5	ND

MDL = Method Detection Limit
ug/kg = parts per billion (ppb)
QA/QC Summary: Daily Standard RPD =<15%
MS/MSD average recovery = 99 % :MS/MSD RPD = 4 %

Richard Srna, Ph.D.

(for) 4/8/93
Laboratory Director

Superior Precision Analytical, Inc.
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C E R T I F I C A T E O F A N A L Y S I S

LABORATORY NO.: 88233
CLIENT: HARTCROWSER Inc.
CLIENT JOB NO.: J6077

DATE RECEIVED: 04/01/93
DATE REPORTED: 04/07/93
DATE SAMPLED: 04/01/93

ANALYSIS FOR CADMIUM, CHROMIUM, LEAD, ZINC & NICKEL
by EPA SW-846 Method 6010

LAB #	Sample Identification	Concentration(mg/kg) Cadmium	Chromium	Lead	Zinc	Nickel
1	H-1	ND	47	19	97	67
2	H-2	ND	75	8	55	82

mg/kg - parts per million (ppm)

Method Detection Limit for Cadmium in Soil: 1 mg/kg
Method Detection Limit for Chromium in Soil: 5 mg/kg
Method Detection Limit for Lead in Soil: 5 mg/kg
Method Detection Limit for Zinc in Soil: 20 mg/kg
Method Detection Limit for Nickel in Soil: 10 mg/kg

QAQC Summary: Spike Averge Recovery : 98% - 104%
Duplicate RPD : < 2%

Richard Srna, Ph.D.

Laboratory Manager

Superior Precision Analytical, Inc.
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C E R T I F I C A T E O F A N A L Y S I S

LABORATORY NO.: 88233
CLIENT: HARTCROWSER Inc.
CLIENT JOB NO.: J6077

DATE RECEIVED: 04/01/93
DATE REPORTED: 04/07/93
DATE SAMPLED : 04/01/93

ANALYSIS FOR TOTAL ORGANIC LEAD
by DHS METHOD (LUFT MANUAL)

LAB #	Sample Identification	Concentration (mg/Kg)
1	H-1	ND
2	H-2	ND

mg/kg - parts per million (ppm)
Method Detection Limit for Organic Lead in Soil: 2 mg/kg

QAQC Summary: MS/MSD Average Recovery : 105%
Duplicate RPD : 0

Richard Srna, Ph.D.

Laboratory Director

56249 RECEIVED ... 1993

HARTCROWSER

Hart Crowser, Inc.
353 Sacramento Street, Suite 1140
San Francisco, California 94111

Sample Custody Record

DATE 4/1/93 PAGE 1 OF 1

JOB NUMBER J5077 LAB NUMBER

PROJECT MANAGER PAT LYNCH

PROJECT NAME PACCAR / OAKLAND

SAMPLED BY:

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TPH-GAS + BTEX	TPH-DIESEL	TOG 5520EF	8010	PCB 8080	METALS (Cd, Cr, Pb, Ni, Zn)	Organic Pb				NO. OF CONTAINERS	OBSERVATIONS / COMMENTS / COMPOSITING INSTRUCTIONS
	H-1	PM	NORTH LIFT	SOIL	X	X	X	X	X	X	X				1	
	H-2	PM	SOUTH LIFT	SOIL	X	X	X	X	X	X	X				1	

Please Initial: RB SAMPLES HAND-DELIVERED
Samples Stored in Ice ✓
Appropriate containers
Samples preserved NO
VOA's without headspace NA
Comments:

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: [signature]	4/1/93	SIGNATURE:	
PRINTED NAME: ERIC SCHWIENIND	TIME	PRINTED NAME:	TIME
COMPANY: HART CROWSER	1336	COMPANY:	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE:		SIGNATURE: [signature]	4/1/93
PRINTED NAME:	TIME	PRINTED NAME: KUHLE	TIME
COMPANY:		COMPANY: SPA SF	13 16

TOTAL NUMBER OF CONTAINERS 2

METHOD OF SHIPMENT DIRECT DELIVERY

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS 5 Day

DISTRIBUTION:
1. PROVIDE WHITE AND YELLOW COPIES TO LABORATORY
2. RETURN PINK COPY TO PROJECT MANAGER
3. LABORATORY TO FILL IN SAMPLE NUMBER AND SIGN FOR RECEIPT
4. LABORATORY TO RETURN WHITE COPY TO HART CROWSER

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CERTIFICATE OF ANALYSIS

LABORATORY NO.: 88364
CLIENT: HARTCROWSER Inc.
CLIENT JOB NO.: 6077

DATE RECEIVED: 04/19/93
DATE REPORTED: 04/26/93
DATE SAMPLED: 04/14/93

ANALYSIS FOR TOTAL LEAD
by SW-846 Method 6010

LAB #	Sample Identification	Concentration(mg/Kg) Total Lead
1	HC-1 11'	6
2	HC-1 16'	ND
3	HC-1 20'	ND
4	HC-1 26'	ND
5	HC-1 31'	ND
6	HC-1 36'	ND

mg/kg - parts per million (ppm)
Method Detection Limit for Lead in Soil: 5 mg/kg

QAQC Summary: MS/MSD Average Recovery : 98%
Duplicate RPD : 1%

Richard Srna, Ph.D.

For Sayed Syed
Laboratory Manager

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

HARTCROWSER Inc.
Attn: Eric Schniewind

Project 6077
Reported 04/26/93

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
88364- 1	HC-1 11'	04/14/93	04/23/93	Soil
88364- 2	HC-1 16'	04/14/93	04/23/93	Soil
88364- 3	HC-1 20'	04/14/93	04/23/93	Soil
88364- 4	HC-1 26'	04/14/93	04/23/93	Soil
88364- 5	HC-1 31'	04/14/93	04/23/93	Soil
88364- 6	HC-1 36'	04/14/93	04/23/93	Soil

RESULTS OF ANALYSIS

Laboratory Number:	88364- 1	88364- 2	88364- 3	88364- 4	88364- 5
Gasoline:	NA	NA	NA	NA	NA
Benzene:	NA	NA	NA	NA	NA
Toluene:	NA	NA	NA	NA	NA
Ethyl Benzene:	NA	NA	NA	NA	NA
Xylenes:	NA	NA	NA	NA	NA
Oil and Grease:	ND<50	ND<50	ND<50	ND<50	ND<50
Diesel:	NA	NA	NA	NA	NA
Concentration:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg

Laboratory Number:	88364-6
Gasoline:	NA
Benzene:	NA
Toluene:	NA
Ethyl Benzene:	NA
Xylenes:	NA
Oil and Grease:	ND<50
Diesel:	NA
Concentration:	mg/kg

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HARTCROWSER Inc.
Attn: Eric Schniewind

Project 6077
Reported 05/04/93

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
88430- 1	MW-1	04/26/93	04/28/93	Water
88430- 2	MW-2	04/26/93	04/29/93	Water
88430- 3	MW-3	04/26/93	04/28/93	Water
88430- 4	MW-4	04/26/93	04/29/93	Water
88430- 5	HC-1	04/26/93	04/29/93	Water
88430- 6	MW-1A	04/26/93	04/29/93	Water
88430- 7	TRIP BLANK	04/26/93	04/29/93	Water

RESULTS OF ANALYSIS

Laboratory Number:	88430- 1	88430- 2	88430- 3	88430- 4	88430- 5
Gasoline:	57*	70	ND<50	ND<50	ND<50
Benzene:	ND<0.3	0.8	ND<0.3	ND<0.3	ND<0.3
Toluene:	ND<0.3	1.1	ND<0.3	ND<0.3	ND<0.3
Ethyl Benzene:	ND<0.3	ND<0.3	ND<0.3	ND<0.3	ND<0.3
Xylenes:	ND<0.9	1.0	ND<0.9	ND<0.9	ND<0.9
Oil and Grease:	NA	ND<5000	NA	NA	ND<5000
Concentration:	ug/L	ug/L	ug/L	ug/L	ug/L

Laboratory Number:	88430- 6	88430- 7
Gasoline:	74*	ND<50
Benzene:	ND<0.3	ND<0.3
Toluene:	ND<0.3	ND<0.3
Ethyl Benzene:	ND<0.3	ND<0.3
Xylenes:	ND<0.9	ND<0.9
Oil and Grease:	NA	NA
Concentration:	ug/L	ug/L

* Gasoline range concentration reported. The chromatogram shows only single peak in the gasoline range.

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CERTIFICATE OF ANALYSIS

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

QA/QC INFORMATION
SET: 88430

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
ug/L = parts per billion (ppb)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:
Minimum Detection Limit in Water: 5000ug/L

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Water: 50ug/L

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Water: 50ug/L

EPA SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Water: 0.3ug/L

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Gasoline:	77/73	5%	70-130
Benzene:	109/107	2%	70-130
Toluene:	91/91	0%	70-130
Ethyl Benzene:	99/100	1%	70-130
Xylenes:	99/100	1%	70-130
Oil and Grease:	92/93	1%	56-106

Richard Srna, Ph.D.
For Boyd S. Yeu
Laboratory Director

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 ▪ Martinez, California 94553 ▪ (510) 229-1512 / fax (510) 229-1526

HARTCROWSER Inc.
Attn: Eric Schniewind

Project 6077
Reported 04-May-1993

HALGONATED VOLATILE ORGANICS

Sample preparation by Purge and Trap (EPA SW-846 Method 5030) and Chromatographic analysis using an electrolytic conductivity detector (EPA SW-846 Method 8010).

Chronology

Laboratory Number 88430

Identification	Sampled	Received	Extracted	Analyzed	Run #	Lab #
MW-1	04/26/93	04/27/93	/ /	04/28/93		1
MW-2	04/26/93	04/27/93	/ /	04/28/93		2
MW-3	04/26/93	04/27/93	/ /	04/28/93		3
MW-4	04/26/93	04/27/93	/ /	04/28/93		4
HC-1	04/26/93	04/27/93	/ /	04/28/93		5
MW-1A	04/26/93	04/27/93	/ /	04/28/93		6

RECEIVED MAY 1993

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HARTCROWSER Inc.
Attn: Eric Schniewind

Project 6077
Reported 04-May-1993

HALGONATED VOLATILE ORGANICS

Laboratory Number	Sample Identification	Matrix
88430- 1	MW-1	Water
88430- 2	MW-2	Water
88430- 3	MW-3	Water
88430- 4	MW-4	Water
88430- 5	HC-1	Water

RESULTS OF ANALYSIS

Laboratory Number:	88430- 1	88430- 2	88430- 3	88430- 4	88430- 5
Freon 1,2 :	37	31	35	28	47
Chloromethane/Vinyl Ch:	ND<1	ND<1	ND<1	ND<1	ND<1
Bromomethane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Chloroethane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Trichlorofluoromethane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,1-Dichloroethene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Dichloromethane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
t-1,2-Dichloroethene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,1-Dichloroethane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
c-1,2-Dichloroethene:	8.7	8.5	9.7	3.9	13
Chloroform:	1.0	0.9	ND<0.5	0.6	ND<0.5
1,1,1-Trichloroethane:	ND<0.5	0.6	0.8	ND<0.5	ND<0.5
Carbon tetrachloride:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,2-Dichloroethane:	ND<0.5	0.6	ND<0.5	ND<0.5	ND<0.5
Trichloroethene:	22	32	21	17	22
c-1,3-Dichloropropene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,2-Dichloropropane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
t-1,3-Dichloropropene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Bromodichloromethane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,1,2-Trichloroethane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Tetrachloroethene:	300	7.5	79	98	46
Dibromochloromethane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Chlorobenzene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Bromoform:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,1,2,2-Tetrachloroeth:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,3-Dichlorobenzene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,2-Dichlorobenzene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,4-Dichlorobenzene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Concentration:	ug/L	ug/L	ug/L	ug/L	ug/L

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

HARTCROWSER Inc.
Attn: Eric Schniewind

Project 6077
Reported 04-May-1993

HALGONATED VOLATILE ORGANICS

Laboratory Number	Sample Identification	Matrix
88430- 6	MW-1A	Water

RESULTS OF ANALYSIS

Laboratory Number: 88430- 6

Freon 1,2 :	110
Chloromethane/Vinyl Ch:	ND<1
Bromomethane:	ND<0.5
Chloroethane:	ND<0.5
Trichlorofluoromethane:	ND<0.5
1,1-Dichloroethene:	ND<0.5
Dichloromethane:	ND<0.5
t-1,2-Dichloroethene:	ND<0.5
1,1-Dichloroethane:	ND<0.5
c-1,2-Dichloroethene:	9.6
Chloroform:	1.1
1,1,1-Trichloroethane:	0.6
Carbon tetrachloride:	ND<0.5
1,2-Dichloroethane:	ND<0.5
Trichloroethene:	25
c-1,3-Dichloropropene:	ND<0.5
1,2-Dichloropropane:	ND<0.5
t-1,3-Dichloropropene:	ND<0.5
Bromodichloromethane:	ND<0.5
1,1,2-Trichloroethane:	ND<0.5
Tetrachloroethene:	290
Dibromochloromethane:	ND<0.5
Chlorobenzene:	ND<0.5
Bromoform:	ND<0.5
1,1,2,2-Tetrachloroeth:	ND<0.5
1,3-Dichlorobenzene:	ND<0.5
1,2-Dichlorobenzene:	ND<0.5
1,4-Dichlorobenzene:	ND<0.5
Concentration:	ug/L

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HALGONATED VOLATILE ORGANICS
Quality Assurance and Control Data - Water

Laboratory Number 88430

Compound	Method Blank (ug/L)	PQL (ug/L)	Average Spike Recovery (%)	Limits (%)	RPD (%)
Chloromethane/Vinyl Ch:	ND<1	1			
Bromomethane:	ND<0.5	0.5			
Chloroethane:	ND<0.5	0.5			
Trichlorofluoromethane:	ND<0.5	0.5			
1,1-Dichloroethene:	ND<0.5	0.5	89%	75-125	0%
Dichloromethane:	ND<0.5	0.5			
t-1,2-Dichloroethene:	ND<0.5	0.5			
1,1-Dichloroethane:	ND<0.5	0.5			
c-1,2-Dichloroethene:	ND<0.5	0.5			
Chloroform:	ND<0.5	0.5			
1,1,1-Trichloroethane:	ND<0.5	0.5			
Carbon tetrachloride:	ND<0.5	0.5			
1,2-Dichloroethane:	ND<0.5	0.5			
Trichloroethene:	ND<0.5	0.5	100%	75-125	2%
c-1,3-Dichloropropene:	ND<0.5	0.5			
1,2-Dichloropropane:	ND<0.5	0.5			
t-1,3-Dichloropropene:	ND<0.5	0.5			
Bromodichloromethane:	ND<0.5	0.5			
1,1,2-Trichloroethane:	ND<0.5	0.5			
Tetrachloroethene:	ND<0.5	0.5			
Dibromochloromethane:	ND<0.5	0.5			
Chlorobenzene:	ND<0.5	0.5	106%	75-125	3%
Bromoform:	ND<0.5	0.5			
1,1,2,2-Tetrachloroeth:	ND<0.5	0.5			
1,3-Dichlorobenzene:	ND<0.5	0.5			
1,2-Dichlorobenzene:	ND<0.5	0.5			
1,4-Dichlorobenzene:	ND<0.5	0.5			

Definitions:

ND = Not Detected
PQL = Practical Quantitation Limit

RPD = Relative Percent Difference

QC File No. 88430

Sajid Syed
Senior Analyst

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 88430
CLIENT: HARTCROWSER Inc.
CLIENT JOB NO.: 6077

DATE RECEIVED: 04/27/93
DATE REPORTED: 05/04/93
DATE SAMPLED: 04/26/93

ANALYSIS FOR CADMIUM, CHROMIUM, LEAD, ZINC & NICKEL
by EPA SW-846 Method 6010

LAB #	Sample Identification	Concentration (mg/L) Cadmium	Chromium	Lead	Zinc	Nickel
1	MW-1	ND	ND	ND	ND	ND
2	MW-2	ND	ND	ND	ND	ND
3	MW-3	ND	0.17	ND	0.21	0.2
4	MW-4	ND	0.06	ND	0.08	ND
5	HC-1	ND	ND	ND	ND	ND

mg/L - parts per million (ppm)
Method Detection Limit for Cadmium in Water : 0.05 mg/L
Method Detection Limit for Chromium in Water : 0.05 mg/L
Method Detection Limit for Lead in Water : 0.1 mg/L
Method Detection Limit for Zinc in Water : 0.05 mg/kg
Method Detection Limit for Nickel in Water : 0.1 mg/kg

QAQC Summary: MS/MSD Recovery Range : 100%-101%
Duplicate RPD : < 4%

Richard Srna, Ph.D.
For Sajid S. Syed
Laboratory Manager

8430

HARTCROWSER

Hart Crowser, Inc.
353 Sacramento Street, Suite 1140
San Francisco, California 94111

Sample Custody Record

DATE 4-27-93 PAGE 1 OF 1

JOB NUMBER 6077 LAB NUMBER

PROJECT MANAGER ERIC SCHNIEWIND

PROJECT NAME PACCAR OAKLAND J 6077

SAMPLED BY: BJORKLUND / SCHNIEWIND

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TPH6/BTEX	8010	O+G	CAM Pb	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
1	MW-1	4-26-93		WATER	✓	✓		✓	5	
2	MW-2				✓	✓	✓	✓	6	
3	MW-3				✓	✓		✓	5	
4	MW-4				✓	✓		✓	5	
5	HC-1				✓	✓	✓	✓	6	
6	MW-1A	↓		↓	✓	✓		HOLD	5	
7	TRIP BLANK	4-26-93		WATER	✓				2	

Please Initial:
Sample Storage in ice. KAS ✓ 4°C
Appropriate containers ✓
Sample preservation ✓
VOA's without headspace ✓
Comments:

TOTAL NUMBER OF CONTAINERS 33

METHOD OF SHIPMENT SELF

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS

5 DAY ~~TAT~~

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE Brian Bjorklund	4/27/93	SIGNATURE	
PRINTED NAME BRIAN BJORKLUND	TIME	PRINTED NAME	TIME
COMPANY HART CROWSER	8:35	COMPANY	
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE		SIGNATURE Hsaneh Sabounchi	
PRINTED NAME	TIME	PRINTED NAME Hsaneh Sabounchi	TIME
COMPANY		COMPANY Superior	4/27/93 8:35

DISTRIBUTION:

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RECEIVED OCT 2 7 1993

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HARTCROWSER Inc.
Attn: PAT LYNCH

Project J6077
Reported 10/25/93

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
90336- 1	P-1	10/18/93	10/25/93	Soil
90336- 2	P-2	10/18/93	10/25/93	Soil
90336- 3	P-3	10/18/93	10/25/93	Soil
90336- 4	P-4	10/18/93	10/25/93	Soil

RESULTS OF ANALYSIS

Laboratory Number:	90336- 1	90336- 2	90336- 3	90336- 4
Gasoline:	ND<1	ND<1	ND<1	ND<1
Benzene:	ND<.003	ND<.003	ND<.003	ND<.003
Toluene:	ND<.003	ND<.003	ND<.003	ND<.003
Ethyl Benzene:	ND<.003	ND<.003	ND<.003	ND<.003
Total Xylenes:	ND<.009	ND<.009	ND<.009	ND<.009
Concentration:	mg/kg	mg/kg	mg/kg	mg/kg

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 ▪ Martinez, California 94553 ▪ (510) 229-1512 / fax (510) 229-1526

CERTIFICATE OF ANALYSIS

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

QA/QC INFORMATION
SET: 90336

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
mg/kg = parts per million (ppm)

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg

EPA SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Soil: 0.003mg/kg

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Gasoline:	87/85	2%	70-130
Benzene:	97/105	8%	70-130
Toluene:	97/102	5%	70-130
Ethyl Benzene:	95/100	5%	70-130
Total Xylenes:	99/104	5%	70-130

10/25/93

Senior Chemist

RECEIVED OCT 2 7 1993

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HARTCROWSER Inc.
Attn: PAT LYNCH

Project J6077
Reported 25-October-1993

ANALYSIS FOR TOTAL LEAD
by EPA Method SW-846 6010

Chronology

Laboratory Number 90336

Identification	Sampled	Received	Extracted	Analyzed	Run #	Lab #
P-1	10/18/93	10/18/93	10/25/93	10/25/93		1
P-2	10/18/93	10/18/93	10/25/93	10/25/93		2
P-3	10/18/93	10/18/93	10/25/93	10/25/93		3
P-4	10/18/93	10/18/93	10/25/93	10/25/93		4

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HARTCROWSER Inc.
Attn: PAT LYNCH

Project J6077
Reported 25-October-1993

ANALYSIS FOR TOTAL LEAD

Laboratory Number	Sample Identification	Matrix
90336- 1	P-1	Soil
90336- 2	P-2	Soil
90336- 3	P-3	Soil
90336- 4	P-4	Soil

RESULTS OF ANALYSIS

Laboratory Number:	90336- 1	90336- 2	90336- 3	90336- 4
TOTAL LEAD:	9	10	7	6
Concentration:	mg/Kg	mg/Kg	mg/Kg	mg/Kg

RECEIVED OCT 2 7 1993

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ANALYSIS FOR TOTAL LEAD
Quality Assurance and Control Data - Soil

Laboratory Number 90336

Compound	Method Blank (mg/Kg)	RL (mg/Kg)	Spike Recovery (%)	Limits (%)	RPD (%)
TOTAL LEAD:	ND<5	5	97/95	75-125	2%

Definitions:
ND = Not Detected
RPD = Relative Percent Difference
RL = Reporting Limit
mg/Kg = Parts per million (ppm)
QC File No. 90336

10/25/93
Senior Chemist
Account Manager

90336

Sample Custody Record

DATE 10/18/93 PAGE 1 OF 1

HARTCROWSER

Hart Crowser, Inc.
353 Sacramento Street, Suite 1140
San Francisco, California 94111

JOB NUMBER J6077 LAB NUMBER

PROJECT MANAGER PAT LYNCH

PROJECT NAME PACCAR - OAKLAND (SUPERTIRE)

SAMPLED BY: ERIC SCHNIEWIND

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: TPH-Gas/BTEX	TESTING: Total Pb	TESTING: (If total Pb over 50 ppm run STLC Pb)	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	P-1	AM		SOIL	X	X		1	
	P-2	↓		↓	X	X		1	
	P-3				X	X		1	
	P-4				X	X		1	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: [signature]	10/18/93	SIGNATURE: 790# Hunjo	10/18/93
PRINTED NAME: ERIC SCHNIEWIND	TIME	PRINTED NAME:	TIME
COMPANY: HART CROWSER	4:50	COMPANY: AERO	4:50

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: 790# Hunjo	10/19	SIGNATURE: Onyi A Nwogu	
PRINTED NAME:	TIME	PRINTED NAME: ONYI A NWOGU	TIME
COMPANY:		COMPANY: SUPERIOR SF	

TOTAL NUMBER OF CONTAINERS: 4

METHOD OF SHIPMENT: COURIER

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS: NORMAL TAT

DISTRIBUTION:

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10/19/93

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HARTCROWSER Inc.
Attn: PAT LYNCH

Project PACCAR OAKLAND
Reported 28-October-1993

ANALYSIS FOR TOTAL CHROMIUM
by EPA Method SW-846 6010

Chronology

Laboratory Number 90347

Identification	Sampled	Received	Extracted	Analyzed	Run #	Lab #
H2A	10/20/93	10/20/93	10/25/93	10/26/93		1

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

HARTCROWSER Inc.
Attn: PAT LYNCH

Project PACCAR OAKLAND
Reported 28-October-1993

ANALYSIS FOR TOTAL CHROMIUM

Laboratory Number	Sample Identification	Matrix
90347- 1	H2A	Soil

RESULTS OF ANALYSIS

Laboratory Number: 90347- 1

Chromium	(Cr):	41
Concentration:		mg/Kg

Superior Precision Analytical, Inc.
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ANALYSIS FOR TOTAL CHROMIUM
Quality Assurance and Control Data - Soil

Laboratory Number 90347

Compound		Method Blank (mg/Kg)	RL (mg/Kg)	Spike Recovery (%)	Limits (%)	RPD (%)
Chromium	(Cr):	ND<5	5	101/102	75-125	1%

Definitions:
ND = Not Detected
RPD = Relative Percent Difference
RL = Reporting Limit
mg/Kg = Parts per million (ppm)
QC File No. 90347

10/28/93
Senior Chemist
Account Manager

1-34+

Sample Custody Record

DATE 10/20/93 PAGE 1 OF 1

HARTCROWSER

Hart Crowser, Inc.
353 Sacramento Street, Suite 1140
San Francisco, California 94111

JOB NUMBER J6077 LAB NUMBER

PROJECT MANAGER PAT LYNCH

PROJECT NAME PACCAR OAKLAND (SUPERTIRE)

SAMPLED BY: ERIC SCHNIEWIND

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: TOTAL CR	NO. OF CONTAINERS	OBSERVATIONS / COMMENTS / COMPOSITING INSTRUCTIONS
	HZA	AM		SOIL	X	1	IF CR IS 10X STLC (IR >50 ppm) THEN RUN WET ANALYSIS

Please initial:
Samples Stored in ice: ✓ 4°
Appropriate containers: ✓
Samples preserved: no
VOA's without headspace: no
Comments:

TOTAL NUMBER OF CONTAINERS 1

METHOD OF SHIPMENT

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS NORMAL TAT

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: E. Schniewind	10/20/93	SIGNATURE: Pettit	10/20/93
PRINTED NAME: ERIC SCHNIEWIND	TIME	PRINTED NAME: PETTIT	TIME
COMPANY: HART CROWSER	9:18	COMPANY: Superior	920
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: Cecilia G. Joaquin	10/20/93	SIGNATURE: Vanegas	10/21
PRINTED NAME: Cecilia G. Joaquin	TIME	PRINTED NAME: Superior	TIME
COMPANY: Superior	5:20 pm	COMPANY:	1200

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1. PROVIDE WHITE AND YELLOW COPIES TO LABORATORY
2. RETURN PINK COPY TO PROJECT MANAGER
3. LABORATORY TO FILL IN SAMPLE NUMBER AND SIGN FOR RECEIPT
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APPENDIX D
Boring Logs

Key to Exploration Logs

Sample Descriptions

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates, and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:
MAJOR CONSTITUENTS, minor constituents, color, density, moisture, additional remarks.

Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance. Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SAND and GRAVEL Density	Standard Penetration Resistance in Blows/Foot
Very loose	0 - 4
Loose	4 - 10
Medium dense	10 - 30
Dense	30 - 50
Very Dense	>50

SILT or CLAY Density	Standard Penetration Resistance in Blows/Foot	Approximate Sheer Strength in TSF
Very soft	0 - 2	<0.125
Soft	2 - 4	0.125 - 0.25
Medium stiff	4 - 8	0.25 - 0.5
Stiff	8 - 15	0.5 - 1.0
Very Stiff	15 - 30	1.0 - 2.0
Hard	>30	>2.0

Moisture

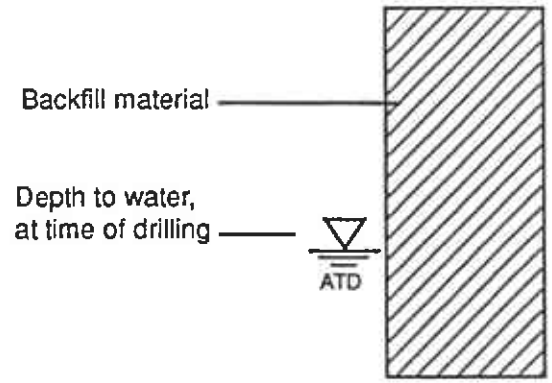
Dry	Little perceptible moisture.
Damp	Some perceptible moisture, probably below optimum.
Moist	Probably near optimum moisture content.
Wet	Much perceptible moisture, probably above optimum.

Minor Constituents

Minor Constituents	Estimated Percentage
Not identified in description	0 - 5
Slightly (clayey, silty, etc.)	5 - 12
Clayey, silty, sandy, gravelly	12 - 30
Very (clayey, silty, etc.)	30 - 50

Legends

Groundwater Observations



Sampling

BORING SYMBOLS

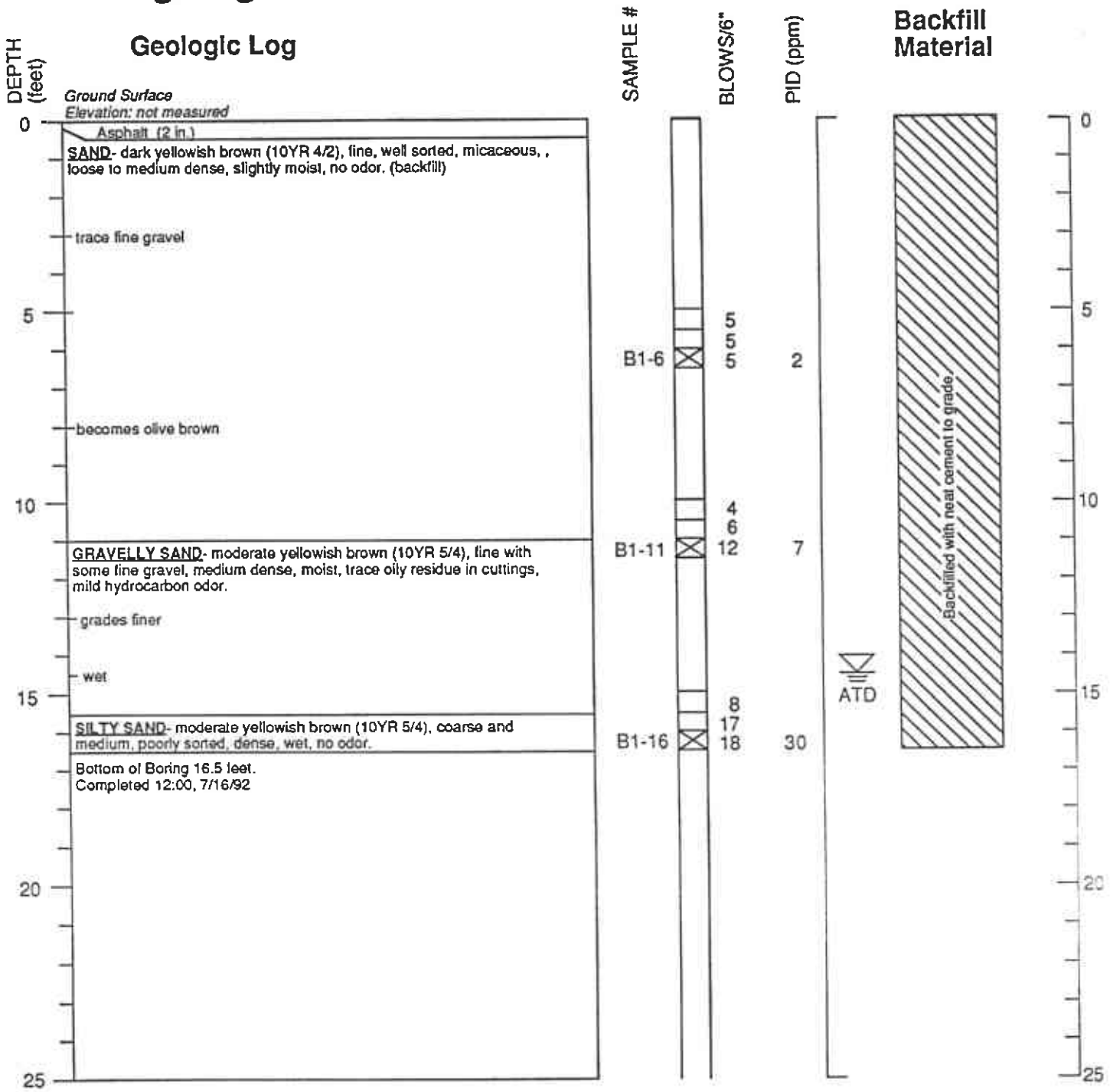
	2" Diameter Tubes, Pushed
	Shelby Tube
	Cuttings
	Core Run
*	No Sample Recovery
P	Tube Pushed, Not Driven

HARTCROWSER

J-6077 5/92

Figure D-1

Boring Log B1



1. *Refer to Figure D-1 for explanation of descriptions and symbols.*
2. *Soil descriptions and stratum lines are interpretive and actual changes may be gradual.*
3. *Groundwater level is at time of drilling (ATD) for date specified. Level may vary with time.*

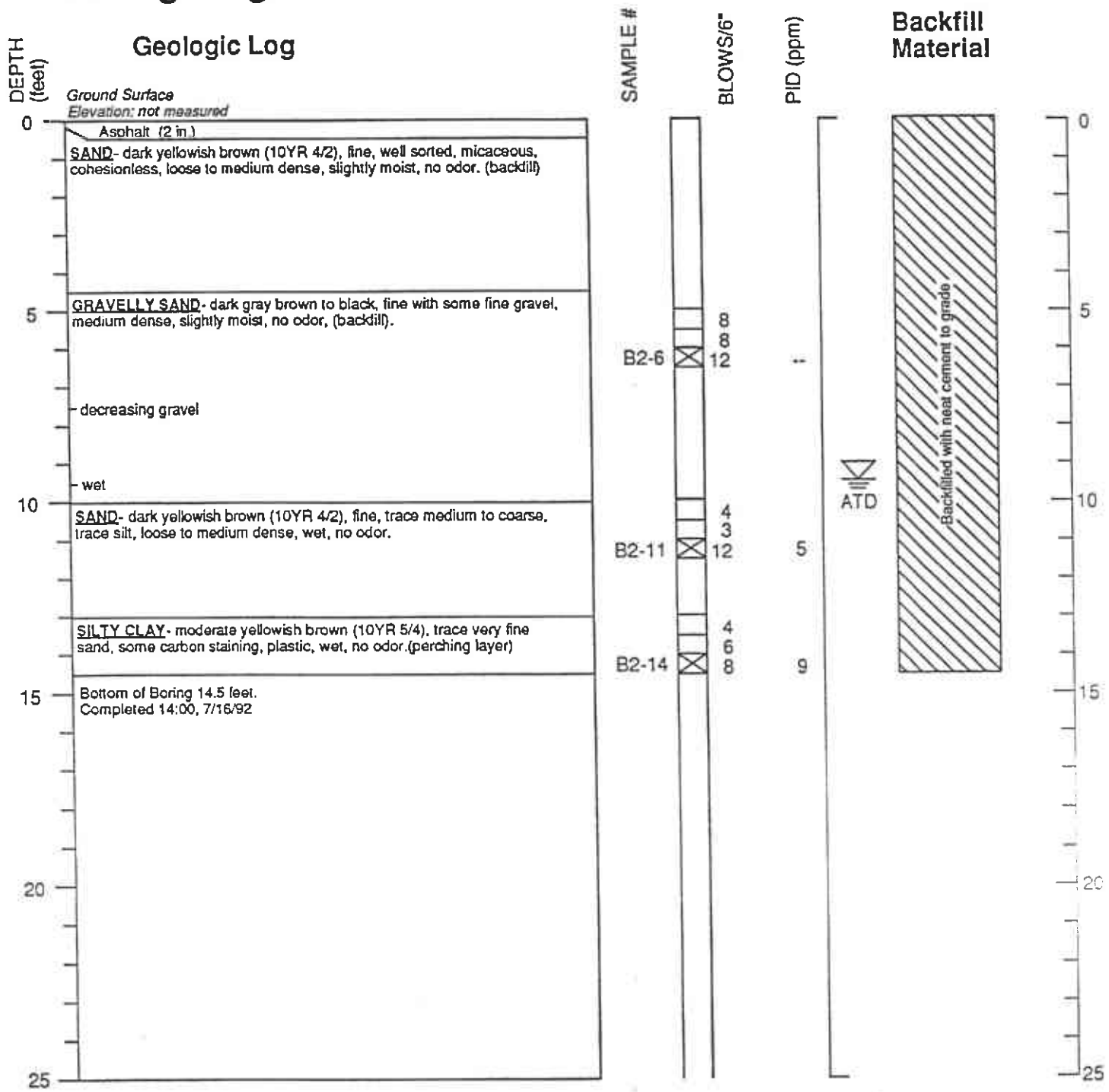
HARTCROWSER

J-6077 *7/92*

Figure D-2

Page 1 of 1

Boring Log B2



1. *Refer to Figure D-1 for explanation of descriptions and symbols.*
2. *Soil descriptions and stratum lines are interpretive and actual changes may be gradual.*
3. *Groundwater level is at time of drilling (ATD) for date specified. Level may vary with time.*

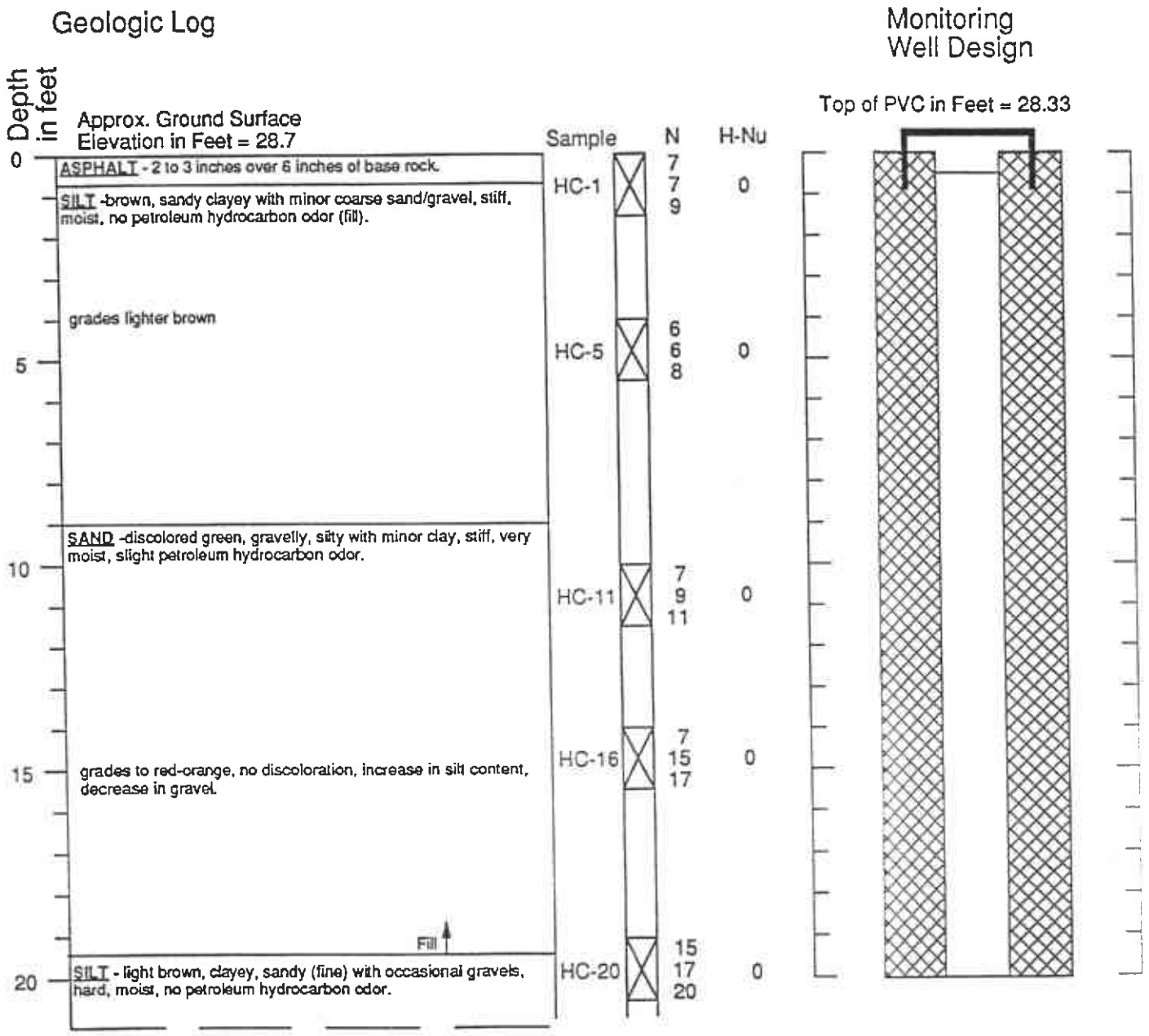
HARTCROWSER

J-6077 *7/92*

Figure D-3

Page 1 of 1

Boring Log and Construction Data for Monitoring Well HC-1



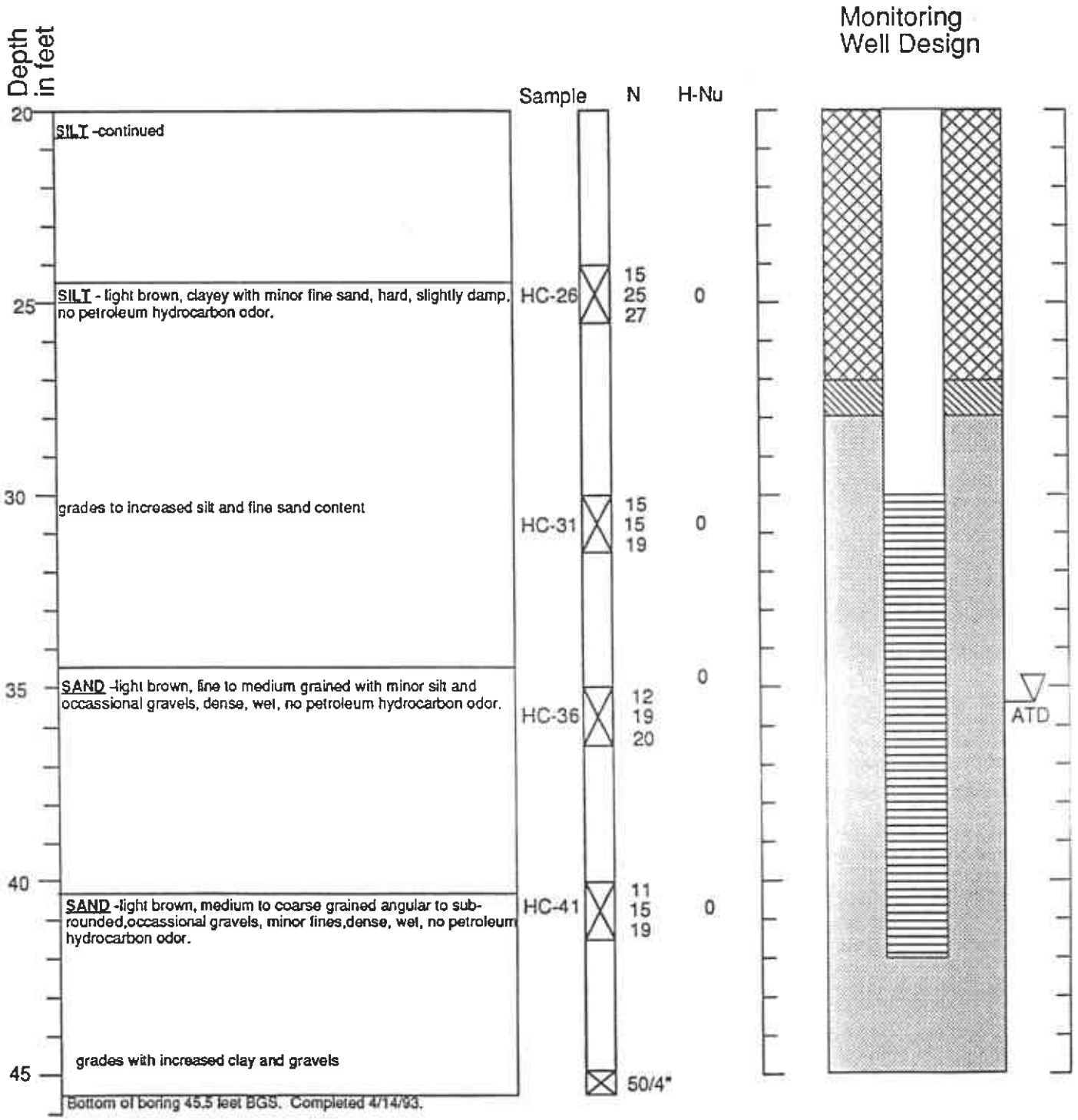
1. Refer to Figure D-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
4. Elevations referenced to the City of Oakland Datum.

HARTCROWSER

J-6077 6/93

Figure D-4

Boring Log and Construction Data for Monitoring Well HC-1



1. Refer to Figure D-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
4. Elevations referenced to the City of Oakland Datum.

HARTCROWSER

J-6077 *6/93*

Figure D-4

APPENDIX E
Soil Disposal Characterization Analysis

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 88009-1
CLIENT: HARTCROWSER Inc.
CLIENT JOB NO.: J6077
CLIENT SAMPLE ID: SP1-4

DATE RECEIVED:03/09/93
DATE REPORTED:03/16/93
DATE SAMPLED: 03/09/93

CAM 17 METALS
Methods: EPA SW 846 6000 & 7000 Series
California Administrative Code Title 22

Element		Results (mg/Kg)	Detection Limit (mg/Kg)
Silver	(Ag)	ND	5
Arsenic	(As)	2	1
Barium	(Ba)	170	5
Beryllium	(Be)	ND	0.5
Cadmium	(Cd)	ND	1
Cobalt	(Co)	14	10
Chromium	(Cr)	56	5
Copper	(Cu)	22	10
Mercury	(Hg)	0.17	0.05
Molybdenum	(Mo)	ND	10
Nickel	(Ni)	84	10
Lead	(Pb)	13	5
Antimony	(Sb)	ND	5
Selenium	(Se)	ND	1
Thallium	(Tl)	ND	5
Vanadium	(V)	40	10
Zinc	(Zn)	74	20

mg/kg - parts per million (ppm)

QAQC Summary: Spike Recovery Range: 91-108%
Duplicate RPD <= 4%

For Richard Srna, Ph.D.

Laboratory Manager

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

CERTIFICATE OF ANALYSIS

LABORATORY NO. 56141-1
CLIENT: HARTCROWSER INC
DATE SAMPLED : 03/09/93
DATE ANALYZED: 03/12/93

DATE RECEIVED: 03/09/93
DATE REPORTED: 03/15/93
PROJECT NO. J6077

EPA SW-846 METHOD 8240 - VOLATILE ORGANICS
by Gas Chromatography/ Mass Spectrometry

SAMPLE: SP1,SP2,SP3,SP4 COMP

Compound	MDL	ug/kg	Compound	MDL	ug/kg
Chloromethane	50	ND	Cis-1,3-Dichloropropene	15	ND
Bromomethane	50	ND	Trichloroethene	15	ND
Vinyl Chloride	50	ND	Dibromochloromethane	15	ND
Chloroethane	50	ND	1,1,2-Trichloroethane	15	ND
Methylene Chloride	50	ND	Benzene	5	ND
Acetone	50	ND	Trans-1,3-Dichloropropene	15	ND
Carbon Disulfide	15	ND	2-Chloroethyl vinyl ether	15	ND
Trichlorofluoromethane	15	ND	Bromoform	15	ND
,1-Dichloroethene	15	ND	4-Methyl-2-Pentanone	50	ND
,1-Dichloroethane	15	ND	2-Hexanone	50	ND
trans-1,2-Dichloroethene	15	ND	Tetrachloroethene	15	ND
Chloroform	15	ND	1,1,2,2-Tetrachloroethane	15	ND
1,2-Dichloroethane	5	ND	Toluene	15	ND
2-Butanone	100	ND	Chlorobenzene	15	ND
1,1,1-Trichloroethane	15	ND	Ethylbenzene	15	ND
Carbon Tetrachloride	15	ND	Styrene	15	ND
Vinyl Acetate	50	ND	Total Xylenes	15	ND
Bromodichloromethane	15	ND	1,3-Dichlorobenzene	15	ND
1,2-Dichloropropane	15	ND	1,4-Dichlorobenzene	15	ND
cis-1,2-Dichloroethene	15	ND	1,2-Dichlorobenzene	15	ND

ug/kg = parts per billion (ppb)
ND = ANALYTE NOT DETECTED ABOVE QUANTITATION LIMIT
QC DATA:

Surrogate Recoveries		QC LIMITS soil
1,2-DCA-d4.....	104%	70-121 %
Toluene-d8.....	108%	81-117 %
Bromofluorobenzene.....	96%	74-121 %

comments:

Richard Srna, Ph.D.

Laboratory Director

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

HARTCROWSER Inc
Attn: Patrick Lynch

Project J6077
Reported 03/15/93

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
56141- 1	SP1,SP2,SP3,SP4 COMP	03/09/93	03/12/93	Soil
56141- 2	D1,D2,D3 COMP	03/09/93	03/12/93	Soil

RESULTS OF ANALYSIS

Laboratory Number: 56141- 1 56141- 2

Oil and Grease:	ND<50	10000
Concentration:	mg/kg	mg/kg

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

C E R T I F I C A T E O F A N A L Y S I S

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

QA/QC INFORMATION
SET: 56141

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
mg/kg = parts per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:
Minimum Detection Limit in Soil: 50mg/kg

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Soil: 10mg/kg

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg

EPA SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Soil: 0.003mg/kg

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Oil and Grease:	72/66	9%	63-100

Richard Srna, Ph.D.
Laboratory Director

Sample Custody Record

DATE 3/9/93 PAGE ____ OF ____

J6141

HARTCROWSER

Hart Crowser, Inc.
353 Sacramento Street, Suite 1140
San Francisco, California 94111

JOB NUMBER J6077 LAB NUMBER ____

PROJECT MANAGER PAT LYNCH

PROJECT NAME PACCAR OAKLAND

SAMPLED BY: ERIC SCHWIENIND

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: OIL & GREASE 5520EF	TESTING: 8240	TESTING: CAM 17 METALS	TESTING: PCB'S	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/COMPOSITING INSTRUCTIONS
	SP 1	AM	SOIL PILE	SOIL	X	X	X	X	1	COMPOSITE
	SP 2	↓	SUPERTIRE	↓					1	
	SP 3								1	
	SP 4								1	
	D1	AM	SUMP #2	SOIL	X	X				COMPOSITE
	D2	↓	↓	↓						
	D3									

Please initial: ____

Samples Stored in ice: yes 6°C

Appropriate containers: yes

Samples preserved: NA

VOAs without headspace: NA

Comments: ____

TOTAL NUMBER OF CONTAINERS: 7

METHOD OF SHIPMENT: COURIER

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS: NORMAL TAT T=4°C

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	3/9/93	SIGNATURE	3/9
PRINTED NAME: ERIC SCHWIENIND	TIME	PRINTED NAME: Danny White	TIME
COMPANY: HART CROWSER	2:35	COMPANY: AERO	2:35
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	3/9	SIGNATURE	3/9/93
PRINTED NAME: Danny White	TIME	PRINTED NAME: Cecilia Joaquin	TIME
COMPANY: AERO	3:25	COMPANY: Superior Lab	3:45 pm

DISTRIBUTION:

1. PROVIDE WHITE AND YELLOW COPIES TO LABORATORY
2. RETURN PINK COPY TO PROJECT MANAGER
3. LABORATORY TO FILL IN SAMPLE NUMBER AND SIGN FOR RECEIPT
4. LABORATORY TO RETURN WHITE COPY TO HART CROWSER

Chain of Custody an Analysis Request

page 1

Section I

From: Superior Precision Analytical, Inc.
1555 Burke St. Unit I
San Francisco, CA 92124
Phone No. (415) 647-2081 Fax No. (415) 821-7123
Contact: Nancy Pettitt
P.O. No. 50141

Turn Around Time (circle one)
Same Day 72 Hrs
24 Hrs 5 Day
48 Hrs 10 Day 4day

Superior Precision Analytical, Inc.
P.O. Box 1545
Martinez, California 94553

Work Subcontracted to: M+E.

Section II: Analysis Request

	Laboratory Sample Identification	S = Soil A = Air W = Water Matrix	CAM17	Metals:	418.1	8270	8080 (pest. and PCB's)	PCB's				Client Sample Identification	Number of Containers	Preservative (yes or no)			Sampling Remarks
1	50141-1	S	X					X				SPI-4 Comp	1	N			☐ Chevron ☒ Non-Chevron **Please Fax Results**
2	-2	↓	X									D1-B Comp	1	N			
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	

Relinquished by Nancy Pettitt	Date/Time 3/9/93 2030	Received by	Date/Time	Lab please initial the following:
Organization Superior		Organization		Samples Stored in Ice
Relinquished by	Date/Time	Received by	Date/Time	Appropriate Containers
Organization		Organization		Samples Preserved
Relinquished by	Date/Time	Received by	Date/Time	VOAs without Headspace
Organization		Organization		Comments

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

HARTCROWSER Inc.
Attn: PAT LYNCH

Project J6077
Reported 16-March-1993

ANALYSIS FOR POLYCHLORINATED BIPHENYLS

Sample preparation by microextraction into hexane, and by gas chromatography using an electron capture detector. (EPA Method 8080).

Chronology

Laboratory Number 88009

Identification	Sampled	Received	Extracted	Analyzed	Run #	Lab #
SP1-4	03/09/93	03/09/93	/ /	03/11/93		1

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 ▪ Martinez, California 94553 ▪ (510) 229-1512 / fax (510) 229-1526

HARTCROWSER Inc.
Attn: PAT LYNCH

Project J6077
Reported 16-March-1993

ANALYSIS FOR POLYCHLORINATED BIPHENYLS

Laboratory Number	Sample Identification	Matrix
88009- 1	SP1-4	Soil

RESULTS OF ANALYSIS

Laboratory Number: 88009- 1

AROCLOR 1016:	ND<3
AROCLOR 1221:	ND<3
AROCLOR 1232:	ND<3
AROCLOR 1242:	ND<3
AROCLOR 1248:	ND<3
AROCLOR 1254:	ND<3
AROCLOR 1260:	8
Concentration:	ug/kg

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

ANALYSIS FOR POLYCHLORINATED BIPHENYLS
Quality Assurance and Control Data - Soil

Laboratory Number 88009

ompound	Method Blank (ug/kg)	PQL (ug/kg)	Average Spike Recovery (%)	Limits (%)	RPD (%)
AROCLOR 1016:	ND<3	3			
AROCLOR 1221:	ND<3	3			
ROCLOR 1232:	ND<3	3			
ROCLOR 1242:	ND<3	3			
AROCLOR 1248:	ND<3	3			
ROCLOR 1254:	ND<3	3	95%	60-140	1%
ROCLOR 1260:	ND<3	3			

Definitions:

ND = Not Detected
PQL = Practical Quantitation Limit

RPD = Relative Percent Difference

QC File No. 88009

Senior Analyst

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

RECEIVED

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 88385
CLIENT: HARTCROWSER
CLIENT JOB NO.: J6077

DATE RECEIVED: 04/21/93
DATE SAMPLED: 04/26/93
DATE REPORTED: 04/27/93
DATE REVISED: 05/04/93

ANALYSIS FOR SOLUBLE METALS
by Calif. Admin. Code Title 22, Paragraph 66700
& EPA Method SW-846 6000 & 7000 series
CLIENT ID: SP1,SP2,SP3,SP4

Element		Results (mg/L)	Detection Limit (mg/L)
Antimony	(Sb)	ND	0.35
Chromium	(Cr)	ND	0.5
Mercury	(Hg)	ND	0.005
Molybdenum	(Mo)	ND	0.7
Nickel	(Ni)	2	1
Thallium	(Tl)	ND	0.1
Vanadium	(V)	ND	1

mg/L = parts per million in extract (ppm)

QAQC Summary: Spike Recovery Range: 91-113%
Duplicate RPD = < 4%

Richard Srna, Ph.D.

Jelomina V. Sanguila (for)
Laboratory Manager

Superior Precision Analytical, Inc.
1555 Burke, Unit I ▪ San Francisco, California 94124 ▪ (415) 647-2081 / fax (415) 821-7123

C E R T I F I C A T E O F A N A L Y S I S

LABORATORY NO.: 56214
CLIENT: HARTCROWSER INC
CLIENT JOB NO.: J6077

DATE RECEIVED: 03/25/93
DATE REPORTED: 03/31/93

ANALYSIS FOR FLASHPOINT
by EPA Method 1010 SW-846

LAB #	Sample Identification	FLASHPOINT
56214-1	SP-1,2,3,4	>100°C

Richard Srna, Ph.D.

Laboratory Director

Superior Precision Analytical, Inc.
1555 Burke, Unit I ▪ San Francisco, California 94124 ▪ (415) 647-2081 / fax (415) 821-7123

C E R T I F I C A T E O F A N A L Y S I S

LABORATORY NO.: 56214
CLIENT: HARTCROWSER INC
JOB NO: J6077

DATE RECEIVED: 03/25/93
DATE REPORTED: 03/31/93

ANALYSIS FOR pH
by EPA Method 9041

LAB #	Sample Identification	pH
1	SP-1,2,3,4	7.8

Richard Srna, Ph.D.

Laboratory Director

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 88319
CLIENT: HARTCROWSER Inc.
CLIENT JOB NO.: J6077

DATE RECEIVED: 04/12/93
DATE REPORTED: 04/19/93
DATE SAMPLED: 03/09/93

ANALYSIS FOR SOLUBLE LEAD
by SW-846 Method 6010

LAB #	Sample Identification	Concentration(mg/L) Soluble Lead
1	COMP SP 1-4	ND

mg/L - parts per million (ppm)
Method Detection Limit for Soluble Lead: 0.5 mg/L

QAQC Summary: MS/MSD Average Recovery : 90%
Duplicate RPD : 3%

Richard Srna, Ph.D.

Sajid Syed For.
Laboratory Manager

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

C E R T I F I C A T E O F A N A L Y S I S

LABORATORY NO.: 56214
CLIENT: HART CROWSER
CLIENT PROJECT NO.: J6077

DATE RECEIVED: 03/25/93
DATE REPORTED: 04/07/93

Following is a list of Cross referenced Lab Numbers and Sample I.D.'s for referring to the following reports.

Superior Lab Number	Subbed Lab Number	Customer Sample Identification
56214-1	93032.88-01A	SP-1,2,3,4

Subbed to: CLAYTON ENVIRONMENTAL CONSULTANTS DOHS#1196.

Western Operations

1252 Quarry Lane
P.O. Box 9019
Pleasanton, CA 94566
(510) 426-2600
Fax (510) 426-0106

Clayton
ENVIRONMENTAL
CONSULTANTS

April 6, 1993

Mr. Rick Kiehle
SUPERIOR ANALYTICAL LABORATORY
1555 Burke Street, Unit 1
San Francisco, CA 94124

Client Ref. 56214
Clayton Project No. 93032.88

Dear Mr. Kiehle:

Attached is our analytical laboratory report for the samples received on March 29, 1993. A copy of the Chain-of-Custody form acknowledging receipt of these samples is attached.

Please note that any unused portion of the samples will be disposed of 30 days after the date of this report, unless you have requested otherwise.

We appreciate the opportunity to be of assistance to you. If you have any questions, please contact Suzanne Silvera, Client Services Supervisor, at (510) 426-2657.

Sincerely,

Ronald H. Peters, CIH
Director, Laboratory Services
Western Operations

RHP/tb
Attachments

Results of Analysis
for
Superior Analytical Laboratory

Client Reference: 56214
Clayton Project No. 93032.88

Sample Matrix/Media: SOIL
Analysis Method: EPA 9010

Date Received: 03/29/93
Date Analyzed: 04/05/93

Lab Number	Sample Identification	Date Sampled	Reactive Cyanide (mg/kg)	Detection Limit (mg/kg)
01A	56214-1	03/09/93	<1	1
02A	METHOD BLANK	--	<1	1

ND Not detected at or above limit of detection
< Not detected at or above limit of detection
-- Information not available or not applicable

Results are reported on a wet weight basis, as received

Results of Analysis
for
Superior Analytical Laboratory

Client Reference: 56214
Clayton Project No. 93032.88

Sample Matrix/Media: SOIL
Analysis Method: SW 7.3.4.2

Date Received: 03/29/93
Date Analyzed: 04/01/93

Lab Number	Sample Identification	Date Sampled	Reactive Sulfide (mg/kg)	Detection Limit (mg/kg)
01A	56214-1	03/09/93	<10	10
02A	METHOD BLANK	--	<10	10

ND Not detected at or above limit of detection
< Not detected at or above limit of detection
-- Information not available or not applicable

Results are reported on a wet weight basis, as received

Quality Assurance Results Summary
for
Clayton Project No. 93032.88

Clayton Lab Number: 9303288-01A
Ext./Prep. Method: EPA9010
Date: 04/02/93
Analyst: HYW
Std. Source: MALL 6881
Sample Matrix/Media: SOIL

Analytical Method: EPA9010
Instrument ID: 07487
Date: 04/05/93
Time: 1 :
Analyst: HYW
Units: MG/KG

Analyte	Sample Result	Spike Level	Matrix Spike Result	MS Recovery (%)	Matrix Spike Duplicate Result	MSD Recovery (%)	Average Recovery (% R)	LCL (% R)	UCL (% R)	RPD (%)	UCL (%RPD)
CYANIDE	ND	10.0	8.95	90	9.11	91	90	58	135	1.8	25

LCS = Laboratory Control Sample
ND = Not detected at or above limit of detection
LCL = Lower Control Limit
UCL = Upper Control Limit
SOR = Spike out of range due to high sample concentration.

Quality Assurance Results Summary
for
Clayton Project No. 93032.88

Clayton Lab Number: 9303288-01A
Ext./Prep. Method: EPA7_3_4_2
Date: 04/01/93
Analyst: MCN
Std. Source: BAKER 611700
Sample Matrix/Media: SOIL

Analytical Method: EPA7_3_4_2
Instrument ID: 00008
Date: 04/01/93
Time: 01:00
Analyst: MCN
Units: MG/KG

Analyte	Sample Result	Spike Level	Matrix Spike Result	MS Recovery (%)	Matrix Spike Duplicate Result	MSD Recovery (%)	Average Recovery (% R)	LCL (% R)	UCL (% R)	RPD (%)	UCL (%RPD)
REACTIVE SULFIDE	ND	272	240	88	230	85	86	61	111	4.3	25

LCS = Laboratory Control Sample
ND = Not detected at or above limit of detection

LCL = Lower Control Limit

UCL = Upper Control Limit
SOR = Spike out of range due to high sample concentration.

Chain of Custody and Analysis Request

page ___ of ___

Section I

From: Superior Precision Analytical, Inc.
1555 Burke St. Unit I
San Francisco, CA 92124
Phone No. (415) 647-2081 Fax No. (415) 821-7123
Contact: Rick Kiehle
P.O. No. 56214

Turn Around Time (circle one)
Same Day 72 Hrs
24 Hrs 5 Day
48 Hrs 10 Day

Superior Precision Analytical, Inc.
P.O. Box 1545
Martinez, California 94553

Work Subcontracted to: Clayton

Section II: Analysis Request

Laboratory Sample Identification	S = Soil A = Air W = Water	BAM17	Metals:	418.1	8270	8080 (pest. and PCB's)	Rec'd Cold				Client Sample Identification	Number of Containers	Preservative (yes or no)			Sampling Remarks
9303288																☒ Chevron ☒ Non-Chevron non chevron **Please Fax Results**
1 56214-1	Soil						X				SP 1,2,3,4	1	N			
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																

Relinquished by: Claudia Joaquin	Date/Time: 3/11/13 1000	Received by:	Date/Time: 3/12/13 1:30	Lab please initial the following:
Organization: Superior Lab		Organization:		Samples Stored in Ice:
Relinquished by:	Date/Time:	Received by:	Date/Time:	Appropriate Containers:
Organization:		Organization:		Samples Preserved:
Relinquished by:	Date/Time:	Received by:	Date/Time:	VOAs without Headspace:
Organization:		Organization:		Comments: