FLUOR DANIEL GTI

REMEDIATION FEASIBILITY STUDY
GENERAL MOTORS CORPORATION TRUCK CENTER
8099 SOUTH COLISEUM WAY
OAKLAND, CALIFORNIA

1/7/97

Fluor Daniel GTI Project 05260487

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1.0 INTRODUCTION

This Remediation Feasibility Study for the General Motors Corporation (GMC) Truck Center at 8099 South Coliseum Way in Oakland, California, includes an assessment of environmental impacts with four proposed alternatives for corrective action at the site. This feasibility study evaluates the extent of impacted material related to hydrocarbon releases at the site and its potential for compromising water quality in the immediate vicinity of the site. Proposed corrective action alternatives summarize the site-specific effectiveness of each alternative and a cost-benefit analysis of each proposed action. This report follows guidelines for Corrective Action Requirements and Feasibility Study outlined in Section 2725 of Title 23 in the California Code of Regulations.

Issues at this site related to its investigation and remediation include impacts from former underground storage tanks (USTs) on California Department of Transportation (CalTrans) property located to the east of the site and CalTrans' refusal to allow installation of monitoring wells on their property as a matter of policy. Alameda County Health Care Services Agency (ACHCSA) has agreed that installing wells on CalTrans property would not be required.

An overview of current site conditions and a summary of previous environmental investigations conducted at the site are presented in the following documents:

- *Phase I, Level II Environmental Site Assessment*, DRAFT, Clayton Environmental Consultants. August 9, 1993 (CECI, 1993);
- *Work Plan For Further Site Assessment Report,* Groundwater Technology, Inc. January 26, 1995 (GTI, 1995a);
- *Summary of Work Completed,* Groundwater Technology, Inc. May 9, 1995 (GTI, 1995b);
- *Sampling and Analysis Report for June 26, 1995,* Groundwater Technology, Inc. DRAFT February 2, 1996 (GTI, 1996a);
- *Sampling and Analysis Report for February and March, 1996.* DRAFT April 12, 1996 (GTI, 1996b); and
- *Aquifer Characterization Report.* DRAFT. May 1, 1996 (GTI, 1996c).

As of May 13, 1996, Groundwater Technology, Inc. and Fluor Daniel Environmental Services merged and became Fluor Daniel GTI, Inc.

2.0 BACKGROUND

2.1 Site Information

The GMC Truck Center is located on a 6.6 acre lot at 8099 Coliseum Way in Oakland, California (figure 1). The subject site is surrounded by CalTrans property and Highway 880 to the south, Coliseum Way to north, Hegenberger Road and CalTrans property to the east, and vacant land to the west. The primary land use in the area is commercial (figure 1).

The facility is comprised of one permanent structure and two trailers. The permanent structure is currently used to house the showroom, parts, sales, and service departments. One of the trailers is used as a sales office for used trucks.

The site is located approximately 1 mile east of the San Francisco Bay at an elevation of 10 feet above mean sea level (MSL). The surrounding topography slopes gently down to the northwest towards the bay.

The local geology and hydrogeology have been described in previous reports listed in section 6.0, References (Clayton Environmental Consultants 1993; Groundwater Technology 1995, 1996). In summary, the lithology is heterogeneous and reported to consist of unconsolidated sediment, primarily clay (Bay mud) with some interbedded sand and gravel, and fill material. The fill material primarily consists of gravelly clay from just below the paved ground surface down to 2 to 15 feet below ground surface (bgs). Near the area of the hydrocarbon plume, fill was reported to 6 feet bgs which is underlain by clay to 14 feet bgs. The clay bed is underlain by gravel and sand to 18 feet, followed by clay to the bottom of the borings at 20 feet bgs. Groundwater is reported between approximately 3 and 10 feet bgs. Groundwater elevations in the site monitoring wells recorded on April 3, 1996, ranged from 0.10 feet to 6.04 feet above MSL.

The waterbearing zone is comprised of a 4-foot-thick sand and gravel bed between approximately 12 to 18 feet bgs in the area of MW-2 and PZ-1 through PZ-3. These materials are likely stream channel deposits that are discontinuous and were not found in monitoring wells MW-1 and MW-3 through MW-8. The deposits in the shallow water-bearing zone in the area of wells MW-1 and MW-3 through MW-8 were reported as primarily sandy clay and gravelly clay. The monitoring well locations and borehole locations are shown on figures 3 and 4.

Groundwater flow beneath the site is reported to the north under a vertical gradient of approximately 0.01 foot per foot. Groundwater appears under confined conditions in the area of MW-2 as described in the Aquifer Characterization Report.

2.2 Soil and Groundwater Assessments

Clayton Environmental Consultants (Clayton) conducted work at the site during the period of July through September 1993. Subsurface work consisted of drilling soil borings with subsequent collection of soil and groundwater samples near the property boundary of GMC and CalTrans, the area of the former site USTs, and near the garbage collection area.

In July 1993, Clayton drilled five soil borings at the site: four adjacent to existing CalTrans USTs located along the eastern property boundary, and one in the west corner of the site behind the garbage collection area (figure 2). The assessment was documented in the assessment report, *Phase I, Level II Environment Site Assessment*, dated August 6, 1993, by Clayton (Clayton 1993). Results of laboratory analyses from soil and groundwater samples collected in both areas are provided in the *Work Plan for Further Site Assessment* dated January 26, 1995, by Groundwater Technology. Soil and groundwater samples were obtained from four soil borings (BH-1 through BH-4) along the GMC property boundary adjacent to the former CalTrans USTs. These borings were performed following the observation by a GM representative of UST removals occurring on the CALTRANS property and the apparent detection of a significant hydrocarbon release. The analytical results from these samples indicated the presence of relatively high levels of TPH-d and TPH-g on the edge of the GMC property.

On August 5, 1993, GMC removed the four USTs south of the main building. The tanks included: a 2,000-gallon diesel fuel tank, a 2,000-gallon gasoline tank, a 1,000-gallon oil storage tank, and a 1,000-gallon used oil tank. Soil samples were collected from beneath the tanks after removal, analyzed as required by the ACHCSA, and the tanks were manifested and disposed at a licensed disposal facility. Laboratory results were reported in the January 26, 1995, *Work Plan for Further Site Assessment* (Groundwater Technology 1995).

Following closure of the former USTs on site, additional soil borings were advanced in the area adjacent to the former tank locations on September 9, 10, and 15, 1993 by Clayton. Selected soil and groundwater samples were collected from the bore holes and submitted for laboratory analysis. The results of the analyses from this work was reported to the ACHCSA in a November 2, 1993, letter from Mr. G. Keith West of GMC to Mr. Barney M. Chan, Hazardous Materials Specialist, ACHCSA (GMC, 1993).

Groundwater Technology conducted several environmental investigations and has prepared several brief letter reports summarizing the activities performed and data gathered during the subsurface investigations at the facility. Field activities were conducted on March 23 and 24, 1995, and June 26, 1995. The March and June 1995 investigations included drilling 27 soil cores, with collection and laboratory analysis of soil and groundwater samples (Groundwater Technology, 1996a).

The field activities and analytical results were reported to GMC on October 20, 1995. Groundwater concentration maps for total petroleum hydrocarbons (TPH) as motor oil and a soil concentration map for TPH as diesel (TPH-d) and oil and grease are included in the October 20, 1995, report, Summary of Subsurface Investigations (figures 5 through 7).

Groundwater Technology completed additional field work between February 20 and March 1, 1996, at the GMC facility. The purpose of the work completed during this phase was to collect data to determine the extent of soil and groundwater impacted by hydrocarbons at the site. The field work included the advancement of eight borings, the collection of soil samples from those borings, the installation of eight 20-foot-deep 4-inch-diameter monitoring wells (MW-1 through MW-8), and the collection of eight groundwater samples from the new wells. The procedures and results of the 1996 investigations were reported in the *Report Sampling and Analysis Activities of February 20 to March 1, 1996, for Work Plan Addendum #2*, dated April 12, 1996. The results of the 1996 investigations are summarized in tables 1 through 4.

2.3 Summary of Risk Assessment

A risk assessment was performed for this site concurrently with this feasibility study. The methods and conclusions of the risk assessment are contained in the document *Risk-Based Corrective Action of Soil and Groundwater, General Motors Corporation, White Truck Center, 8099 Coliseum Way, Oakland, CA, January 9, 1997, Fluor Daniel GTI, Inc.*

The risk assessment followed the approach recommended by the American Society for Testing Materials (ASTM) in the *Standard Guide for Risk-Based Corrective Action (RBCA) Applied at Petroleum Release Sites, E 173-95 (ASTM, 1995).* RBCA is a three-tiered approach for evaluating a site in order that the appropriate risk management decision can be implemented. Each tier increases in complexity and site-specificity. For the GMC White Truck Center site, a tier 2 evaluation was warranted based on a comparison of the maximum concentration of benzene detected in the soil to the risk-based screening levels (RBSLs). Since the most restrictive RBSL for benzene in soil is for exposure to vapors within a building, a site-specific target level (SSTL) for this exposure was developed. This SSTL was developed using the Heuristic Model of Johnson and Ettinger (1991) which is referenced in ASTM E173-95 and described in the risk assessment in detail.

One sample (MW-3 10') exceeds the SSTL for benzene in soil. The closest samples to this point (SB-2, 20, and 22) have nondetectable concentrations of benzene, thus limiting the area of soil which exceeds acceptable concentrations. The area defined by the closest sample locations to this well is approximately 6,500 square feet. This represents the upper-bound estimate of soil area which exceeds the SSTL.

Since the SSTL is derived based on volatilization of benzene from soil beneath a building, and the area of soil which exceeds the SSTL does not extend beneath the existing building, no current health risk is predicted for this site. However, construction of a building on top of this soil could, theoretically, result in an unacceptable risk via inhalation.

Based on the last round of quarterly groundwater monitoring and sampling and historical analytical data for groundwater, the immediate threat posed to currently potable water supplies by impacted groundwater at the site is negligible. Groundwater in the immediate area is unsuitable for potable water. The City of Oakland obtains potable water from Pardee and Comanche reservoirs in the Sierra Nevada foothills. Surface water bodies are at no risk of being impacted with dissolved hydrocarbons, based on their position relative to the hydraulic gradient at the site and their distance from the boundaries of the dissolved hydrocarbon plume. The closest surface water body is a drainage ditch approximately 0.3 miles northwest of the subject property. The drainage ditch runs southwest directly into the San Leandro Bay, which is connected to the San Francisco Bay.

3.0 CORRECTIVE ACTION ALTERNATIVES

3.1 Overview

Based on the results of previous site assessments, four alternatives for soil and groundwater corrective action at the site were evaluated as follows:

- groundwater monitoring and sampling, combined with Intrinsic Bioremediation
- in situ bioremediation
- ex situ treatment (soil excavation and groundwater pumping with offsite removal or onsite treatment)
- institutional control

3.2 Groundwater Monitoring and Sampling and Intrinsic Bioremediation

The objectives of this alternative are to remove the active sources of soil and groundwater contamination, delineate all hydrocarbon-impacted soil and groundwater, and establish an effective groundwater monitoring program that demonstrates natural attenuation of the contaminant plume. Implementation of this alternative began with the removal of the former USTs, associated piping, and hydrocarbon-impacted soil in 1993.

Groundwater monitoring and sampling would continue at the site for a period of four quarters. Additional periods of groundwater monitoring would be added if necessary as determined from analysis of the contaminant plume trends. All monitoring wells would be gauged for depth to water to determine the magnitude and direction of groundwater flow beneath the site. The groundwater would be periodically sampled to determine the concentration of dissolved benzene, toluene, ethylbenzene, and total xylenes (BTEX) and TPH. The objectives of the monitoring and sampling program would be to monitor the effects of natural attenuation of hydrocarbons in groundwater and assure that the dissolved phase plume does not migrate beyond the isolated area.

need to Add analysis for bio remed. parameters

3.3 In Situ Bioremediation

Chemicals present in the unsaturated and saturated zones can be treated by aerobic biodegradation. Oxygen is most economically supplied to the vadose zone by applying a vacuum and inducing air flow through the soil. Oxygen can also be introduced to the saturated zone through air sparging or hydrogen peroxide addition. Inorganic nutrients in the form of ammonia and phosphate are then added to the subsurface to further stimulate naturally occurring bacteria. Biodegradation of volatile hydrocarbons and heavier hydrocarbons occurs. Certain hydrocarbons can also be removed by volatilization through venting and/or air sparging. The extent of biodegradation can be estimated by monitoring source reduction and the formation of byproduct such as carbon dioxide.

Bioventing involves the carefully metered delivery of oxygen to contaminated soils by forced air movement (either extraction or injection of air) to increase soil oxygen concentrations and stimulate biodegradation without creating ex situ hydrocarbon levels requiring treatment. The system also may include the injection of contaminated gases using the soil system for remediation. Bioventing eliminates the requirement for expensive vapor treatment systems.

Biosparging involves the introduction of air into the saturated zone through a short section of well screen, generally at a point 5 feet to 20 feet below the water table. Biosparging provides oxygen at a low rate to an oxygen deficient environment. The increased levels of oxygen then enhance the natural biodegradation of hydrocarbons. The low injection rate of oxygen is adjusted to sufficiently promote bacterial proliferation in the saturated and unsaturated zones and consequent oxidation of hydrocarbons to water and carbon dioxide. Hydrocarbon vapors are not emitted and, as a result, the process does not require vapor capture equipment or off-gas treatment. Lithologic data collected during preliminary investigations indicate that carefully monitored biosparging is a technically feasible alternative for hydrocarbon remediation at the site. Because hydrocarbon-utilizing bacteria are present throughout the subsurface, biosparging may remediate hydrocarbons in both the saturated and unsaturated zones.

To implement this corrective action alternative, further assessment and continuation of the groundwater monitoring and sampling program would be required. Assessment would include installation of a bioventing test well and a biosparge test well, and pilot testing. A biovent test well and a biosparge test well would be installed in the vicinity of the former UST pit where the highest dissolved hydrocarbon concentrations have been observed. A biosparge and biovent test would be conducted by injecting air or extracting air at low flow rates and monitoring induced pressure, depth to water, carbon dioxide, oxygen and hydrocarbon vapor concentrations at the surrounding monitoring wells. Measurements obtained during testing would provide information regarding optimum injection or extraction rates and pressures for biosparging or bioventing.

Upon analysis of the pilot test results, a work plan detailing the steps required to install and implement a bioremediation system would be submitted to ACHCSA for approval.

3.4 Soil and Groundwater Removal And Treatment

The in situ technologies previously described offer advantages of being relatively inexpensive and versatile, and can usually achieve site closure within a desired time period. In situ technology may require long-term monitoring to demonstrate effectiveness and is conducive to certain sites. For example, very tight soil or soil containing nonvolatile and low biodegradable contaminants may not be highly amenable to the in situ technologies described previously. In such cases, soil excavation with disposal or on-site treatment may be the only alternative to remove sorbed-phase contamination from saturated soil within a relatively short time period. Although expensive, excavation does provide a permanent solution by rapidly removing the contaminant source. Once removed, contaminated soil can be transported to an off-site disposal facility or treated on-site. Treatment technologies for excavated soil include the following methods:

- beneficial reuse (asphalt incorporation and construction reuse)
- solidification/stabilization (chemical or biological stabilization processes)

- chemical extraction (heap leaching and liquid/solid contactors)
- volatilization (surface spreading, soil pile aeration, soil shredding)
- chemical treatment (peroxide spraying)
- bioremediation (biopiles, slurry reactors)
- low-temperature thermal treatment (low-temperature thermal stripping or soil roasting)

High temperature thermal treatment such a incineration, pyrolysis, and vitrification technologies are generally not considered for treating petroleum hydrocarbon-contaminated soil because of the high costs. These would include high energy requirements, permitting time and effort (test burns) and local or site impacts related to siting and operating equipment.

Groundwater treatment consists of the following measures:

- groundwater withdrawal from the subsurface
- aboveground treatment and discharge of recovered groundwater

Additionally, groundwater containment technologies may be used to gain hydraulic control of contaminant plumes. Groundwater pumping is primarily used as a containment strategy. It has been shown to enhance remediation, but is effective as a sole remediation technique only for very soluble contaminants. A drawback of groundwater pumping and treatment is the slow rate of contaminant mass removal and the possibility for drawing contaminants onto the site from off-site sources.

Recovery wells are used where the soil is fairly permeable, especially with depth as in clean sands or coarser granular soils, and where the saturated thickness is sufficient to submerge the well screen and pump as the water table is lowered under pumping conditions. Recovery wells with individual submersible pumps can be installed within or on the perimeter of the zone to be contained.

Groundwater treatment technologies for recovered groundwater containing petroleum-hydrocarbon contamination generally consist of either separation technologies such as (1) liquid-phase carbon adsorption and (2) air stripping, or destructive technologies such as (3) advanced oxidation and (4) bioreactors. Separation technologies are generally the most cost-effective approach for treating recovered groundwater containing petroleum-hydrocarbon contamination, although off-gas treatment requirements for air strippers and carbon disposal costs may add significantly to total treatment costs. Advanced oxidation and bioreactors must be considered for treating recovered groundwater that is contaminated with organics that are not amenable to air stripping and carbon-adsorption treatment. Advanced oxidation is effective for treating aromatic compounds such as BTEX, as well as water-soluble contaminants (such as phenols) that cannot be removed efficiently by air stripping or activated carbon. Bioreactors can also effectively treat BTEX and soluble compounds such as phenols, alcohols, and ketones.

3.5 Institutional Controls

Institutional controls are an additional mechanism to provide protection of beneficial uses and a guarantee of public health and safety. Guidance from the U.S. Environmental Protection Agency and California State Department of Toxic Substances Control is considered in setting institutional controls. This type of approach would also require periodic soil and groundwater monitoring to assure limited plume migration over time so there are no future potential impacts to receptors. This technology can provide a long-term means of preventing future use of the land which may not be conducive to the contaminants left at the site. There is also limited access to the areas of contamination and therefore reduced exposure through direct contact with the contaminated materials. Access controls do provide a restrictive means of reducing exposure but are only successful if the controls are maintained. Land use restrictions are successful only if enforced.

Institutional control is a potential alternative to no action or expensive soil and groundwater extraction/treatment systems. Institutional control of the GMC impacted area would include deed restrictions. Workers performing subsurface work in the impacted area would be safeguarded with protective clothing and informed regarding the potential health effects of contact with the site soils and groundwater. Potential property leasers/purchasers would be informed regarding the soil and groundwater impacts. The area around MW-3 would be restricted from future construction of enclosed structures unless the potential for benzene to migrate into the buildings from the subsurface is assessed, and addressed as necessary. No restrictions on current operations would be required.

4.0 COST BENEFIT ANALYSIS OF CORRECTIVE ACTION ALTERNATIVES

4.1 Overview

Total costs of each alternative are based on the sum of capital and operating costs. Capital costs are one-time fees for equipment and/or services. Operational costs are fees incurred on a regular basis over the lifetime of the project. Operational costs are highly variable and sensitive to the estimated lifetime of the project. In addition to the cost analysis, the benefits of each corrective action alternative are briefly discussed below.

4.2 Groundwater Monitoring and Sampling and Intrinsic Bioremediation

Costs associated with the groundwater monitoring and sampling alternative include the following:

Capital Costs

- subcontractor, consulting, and laboratory fees for delineation borings and possible additional groundwater monitoring wells

- consulting fees for computer modeling to determine the fate and transport of the hydrocarbon plume.

Operational Costs

- consulting and laboratory fees for periodic groundwater monitoring and sampling of the site-related groundwater monitoring wells

Soil borings and monitoring wells have already delineated the majority of the lateral and vertical extent of hydrocarbon-impacted soil and groundwater. Capital costs are low in comparison to the capital costs of hydrocarbon mass removal or bioremediation technologies. The operating costs of this option could be high depending on the lifetime of the groundwater monitoring and sampling program.

The benefits of this alternative include the ability to avoid higher cost remedial technologies and the relatively low impact caused to the existing business.

4.3 Bioremediation

Costs associated with the implementation of bioremediation include the following:

Capital Costs

- subcontractor, consulting, permitting and laboratory fees for the installation of an oxygen delivery system (bioventing or biosparge wells)

- consulting and laboratory fees for a pilot test to analyze the site-specific feasibility of this remediation alternative

- subcontractor, consulting, permitting, laboratory, equipment, and materials fees for the installation and startup of a bioremediation system

- subcontractor, consulting, and laboratory fees for confirmation borings and additional assessment to analyze the effectiveness of remediation

Operational Costs

- labor, consulting, utility, consumables and laboratory fees for system operation
- labor, consulting, and laboratory fees for soil monitoring and sampling to monitor the effectiveness of the system
- labor, consulting, and laboratory fees for groundwater monitoring and sampling until closure of the project

Capital costs of in situ bioremediation are moderate and are less expensive than those required for the soil excavation/groundwater pumping alternatives, but are greater than the capital costs for the monitoring/no further action alternative. Biosparging/bioventing avoids high capital costs by eliminating the need for vapor extraction/destruction equipment. Operational costs are somewhat lower than soil vapor extraction and/or air sparging due to lower permit fees, equipment capital and maintenance costs, and laboratory fees.

The benefits associated with the bioremediation alternative are the removal of hydrocarbons from soil and groundwater beneath the site which reduces any long term liability associated with leaving hydrocarbon-impacted material in place. In addition, bioremediation represents the lowest total cost of the hydrocarbon mass removal alternatives.

4.4 Soil Excavation/Groundwater Pumping

Costs associated with the implementation of soil and groundwater extraction/treatment include the following:

Capital Costs

- consulting and permit fees for the design of an extraction and treatment system
- subcontractor, consulting, permit, equipment and materials fees for the installation, testing and start-up of a soil and groundwater treatment system.
- subcontractor, consulting and laboratory fees for confirmation borings and additional assessment to analyze the effectiveness of remediation
- land filling costs if soils are disposed of offsite

Operational Costs

- labor, consulting and laboratory fees for soil and groundwater monitoring and sampling to monitor the effectiveness of the system
- operation, maintenance, permitting fees, and utility fees for the soil and groundwater treatment system
- labor, consulting and laboratory fees for groundwater monitoring and sampling until closure of the project

Capital and operational costs associated with this alternative are the highest of the four alternatives. Capital costs would be high due to the fees associated with purchase and installation of the soil and groundwater extraction and abatement system. Operational costs would be higher than those associated with the previous alternatives due to higher system utility fees and maintenance expenses, in addition to groundwater and soil monitoring.

Additional costs that must be considered are those incurred as a result of loss of business. The extent of lost business is dependent on the interruption caused during installation of the soil extraction and groundwater pumping system.

A benefit associated with the extraction alternative is the removal of soil hydrocarbon mass, which reduces the long-term liability that may be associated with leaving the untreated material in place.

4.5 Institutional Control

Costs associated with implementing institutional control include the following:

Capital Costs

- legal fees for preparing and implementing deed restrictions
- consulting and permit fees for the design of on-site access controls and a health/safety plan to work at the impacted area
- subcontractor, consulting, equipment, and materials fees for the installation, and maintenance of a controlled access system for the impacted area

Operational Costs

- labor, consulting and laboratory fees for site health and safety monitoring and periodic sampling to monitor the ambient vapors at the impacted zone
- operation and maintenance costs for the site access control system and legal documentation
- labor, consulting and laboratory fees for groundwater and soil monitoring and sampling over a long-term period or until closure of the project

Capital costs for the set up and operation of institutional controls are among the least costly of the four proposed corrective action alternatives. Long-term operational costs could be the highest of the four alternatives. Operational costs could be minimized by shortening the lifetime of the project.

Additional costs that must be considered are those incurred as a result of loss of business or loss of efficiency of doing business due to the additional site access controls. An additional consideration is the potential loss of property values. The extent of lost business is dependent on the interruption caused by institutional controls.

A benefit associated with this alternative includes less disruption of business and less capital expense.

5.0 CONCLUSION

The results of environmental assessment at the GMC Truck Center located at 8099 Coliseum Way in Oakland, California, indicate that soil and groundwater have been impacted by high molecular weight petroleum hydrocarbons released from the oil water separator, garbage collection area, and former UST complex located in the east and southwest portions of the site. Evaluation of data collected in past environmental investigations has defined the lateral boundaries and vertical extent of hydrocarbon-impacted soil and groundwater related to the GMC site, excluding the Interstate 880 right of way where access was refused. The eastern extent of hydrocarbon-impacted material is undefined due to the presence of material impacted from past releases from former USTs located on the CalTrans property. Based on the boundaries of impacted soil and groundwater, the delineated levels of BTEX and TPH contaminants and the results of the site-specific risk assessment, no immediate risk is apparent to local potable water supplies or to beneficial waters. The local groundwater is generally unsuitable for potable water due to high dissolved solids. Four alternatives for corrective action have been proposed and include groundwater monitoring and sampling with intrinsic bioremediation, bioremediation (augmented), soil and groundwater extraction with ex situ treatment, and institutional control. Based on the technical and economic evaluation presented in this report the following relative ranking matrix has been developed to summarize the analysis of each alternative.

Corrective Action Alternative Comparison

Corrective Action Alternative	Implementation 1 = easiest 4 = most difficult	Hydrocarbon Removal Rate 1 = fastest 4 = slowest	Capital Costs 1 = lowest 4 = highest	Operating Cost 1 = lowest 4 = highest	Total
Monitoring/Intrinsic Bioremediation	1	4	2	1	8
Soil Removal and Groundwater Pumping	4	3	4	4	15
In-Situ Bioremediation	3	2	3	3	11
Institutional Controls	2	4	2	1	9

It appears that the highest percentage of hydrocarbon mass is limited to the former UST locations, oil/water separator, and garbage collection area. Therefore, remediation or control efforts would be most effective if targeted at the hydrocarbon-impacted soils in these areas both above and beneath the water table. A Tier 2 evaluation was reported in the Fluor Daniel GTI *Risk-Based Corrective Action of Soil and Groundwater Report*, dated January 9, 1997. This report evaluated risk based levels of chemicals on the GMC site that will pose unacceptable health risks to human health and environmental receptors. The level of benzene in MW-3 exceeded the site specific target levels for benzene in soil for the inhalation pathway only. This area is generally bound by the locations of SB-1, SB-2, SB-20, and SB-22. It is assumed that low or nondetectable levels of benzene and TPH exist beneath the GMC building southwest of MW-3 because MW-3 is downgradient from the building and a soil boring sample along the edge of the building (SB-22) was analyzed and with nondetectable levels of benzene and TPH.

The monitoring/Intrinsic Bioremediation combined with Institutional Controls (deed restriction) approach is recommended for this site. Because of the high molecular weight and low mobility of the hydrocarbon, and because of potential natural biodegradation and attenuation, it is not expected that the plume will migrate to intercept potable water supplies or sensitive receptors. In fact, as discussed in the risk assessment there are no sensitive receptors on or off-site and human exposure via inhalation is only predicted in the event that a structure be built over an area near MW-3. The levels of contaminants are low to moderate and only very low levels of carcinogenic toxins (benzene) are present in the subsurface. **Benzene levels are nondetectable or near nondetectable in soils except from soils at MW-3 about 140 feet upgradient from the downgradient property boundary.** Benzene levels in groundwater are nondetectable except in MW-8 which has levels near the laboratory detection limit. The existing concrete/asphalt paving will serve as a cap to prevent access to the impacted soils and restrict fugitive vapors from escaping. This option will not appreciably interrupt the present business activities and the expense will be moderate to low. The area around MW-3 will be restricted to no future building construction activities without further assessment and due consideration to the benzene detected in the soils at this location.

6.0 REFERENCES

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General Motors Corporation, West, G. Keith. November 2, 1993 Letter to Mr. Barney M. Chan, Hazardous Materials Specialist, ACHCSA.

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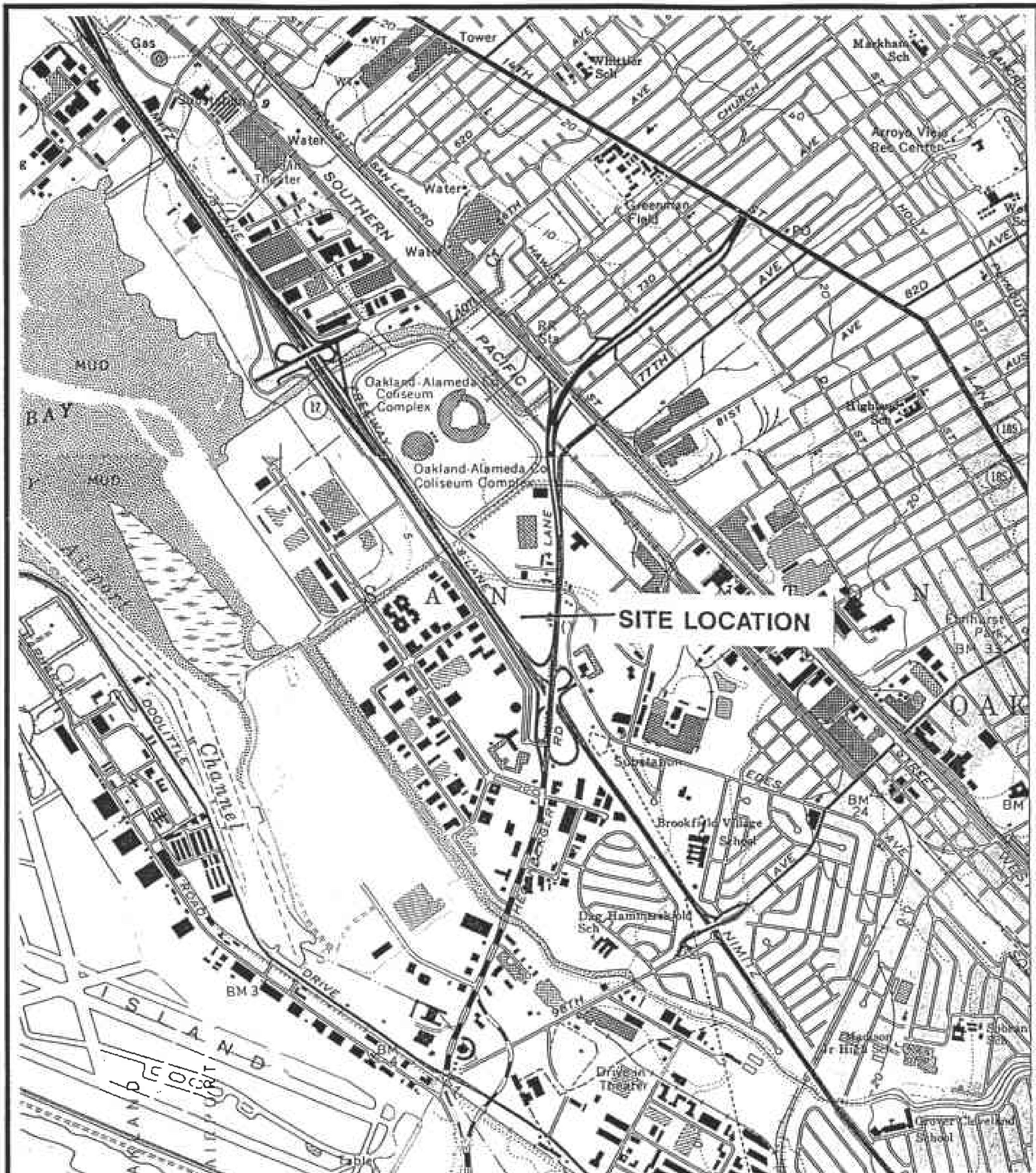
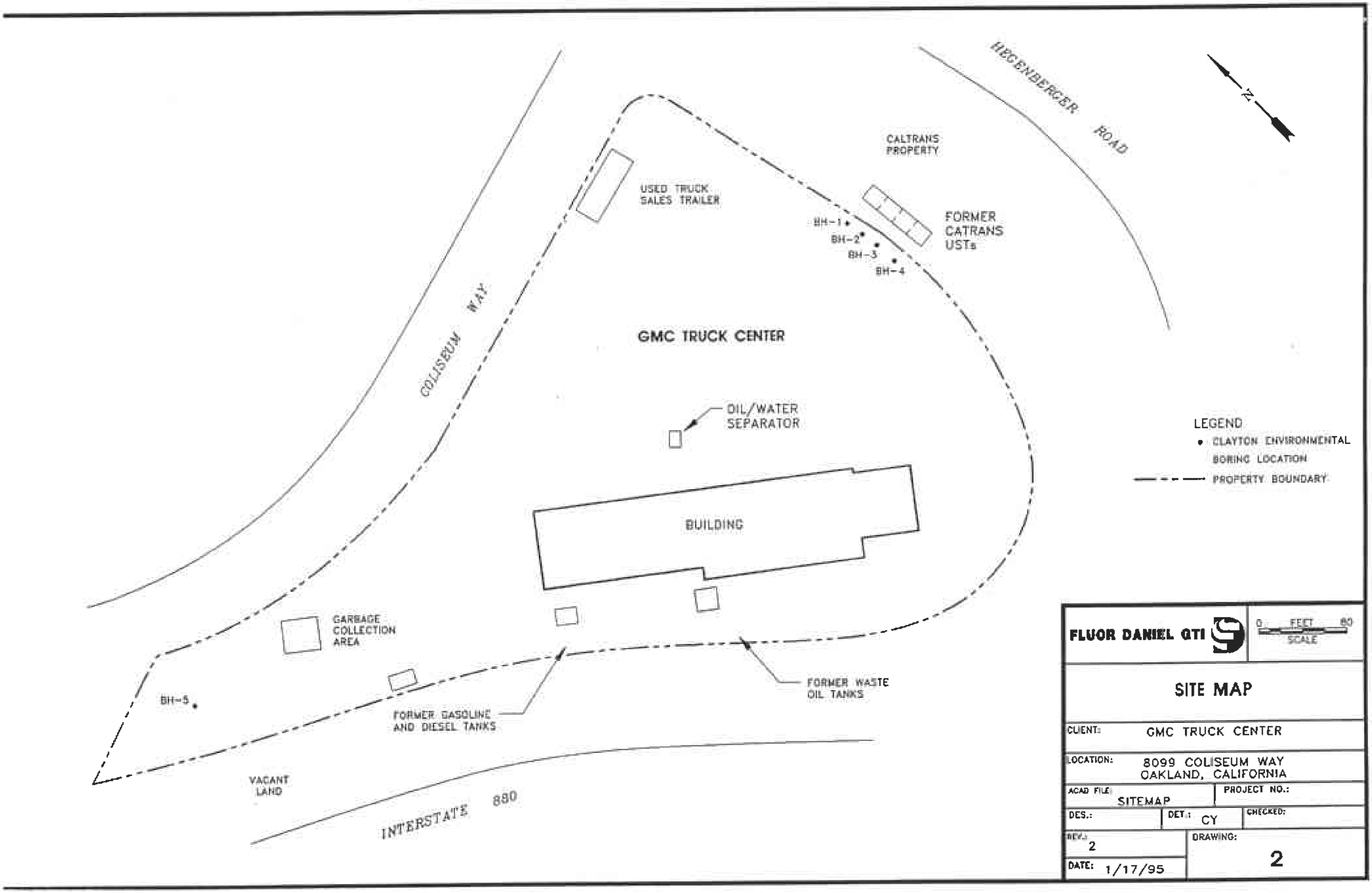
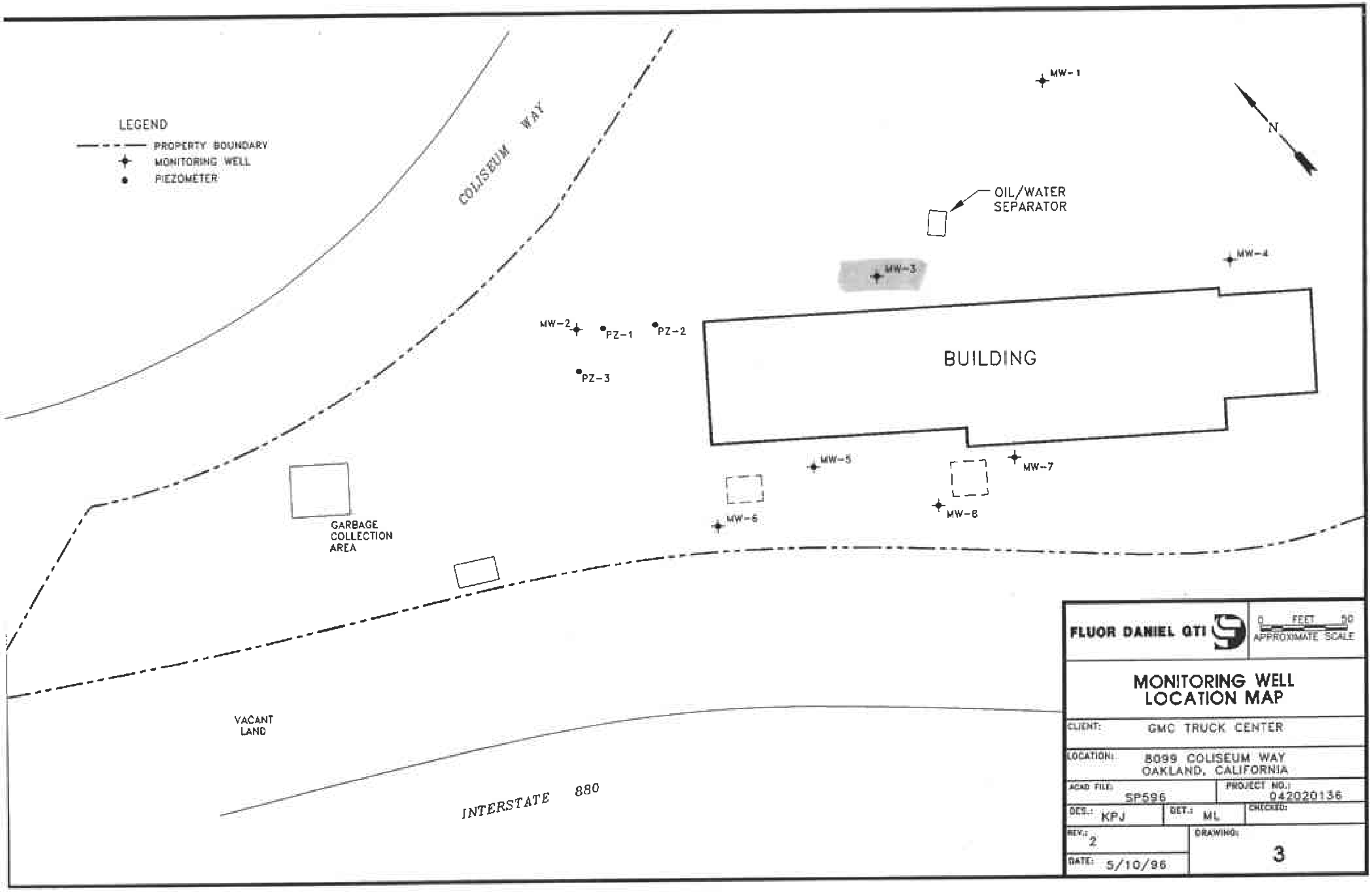
Groundwater Technology, Inc. April 12, 1996d. *Report of Sampling and Analysis Activities of February 20 to March 1, 1996 for Work Plan Addendum #2.* GMC Truck Center, 8099 South Coliseum Way, Oakland, California.

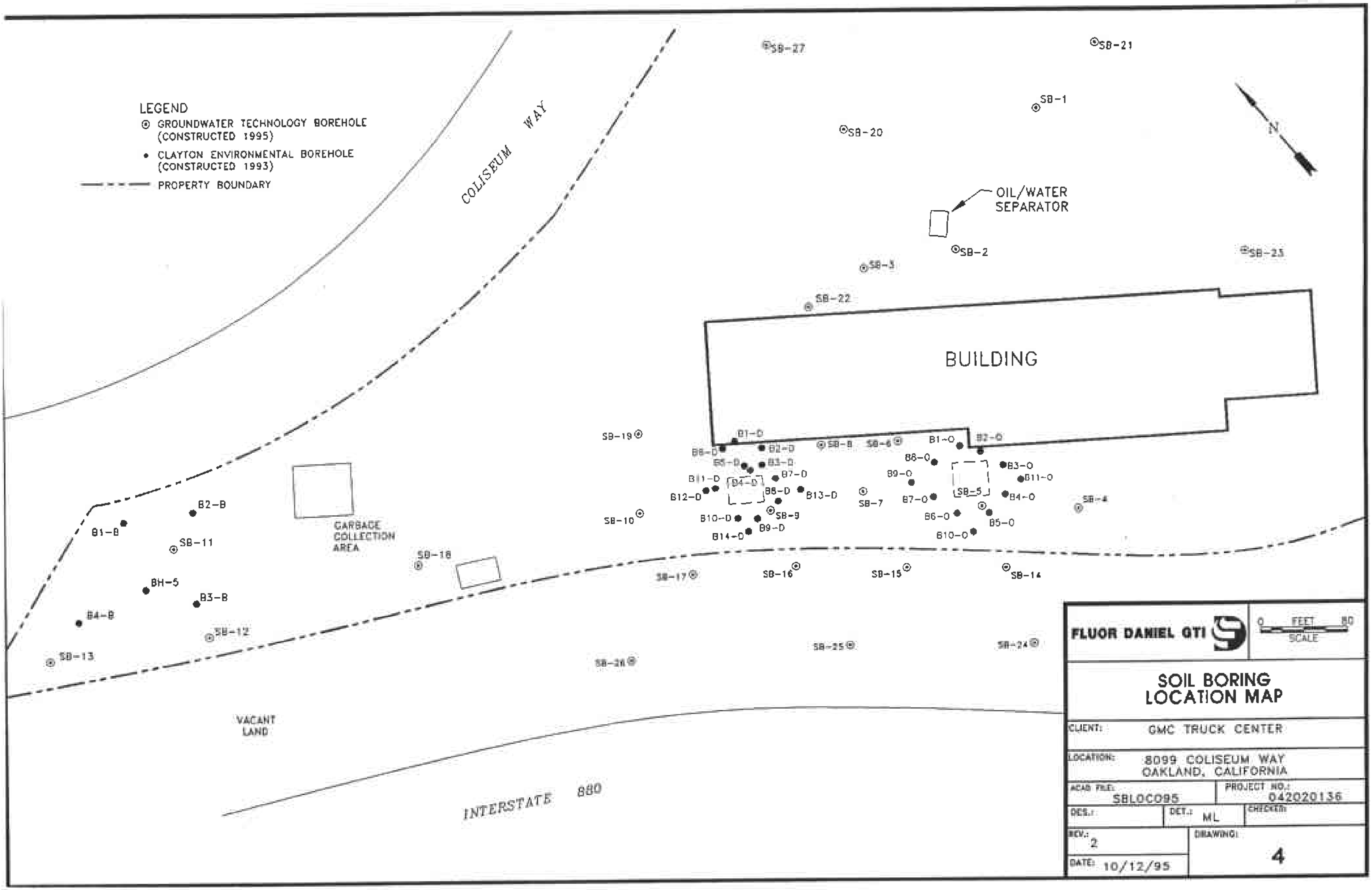
FIGURES

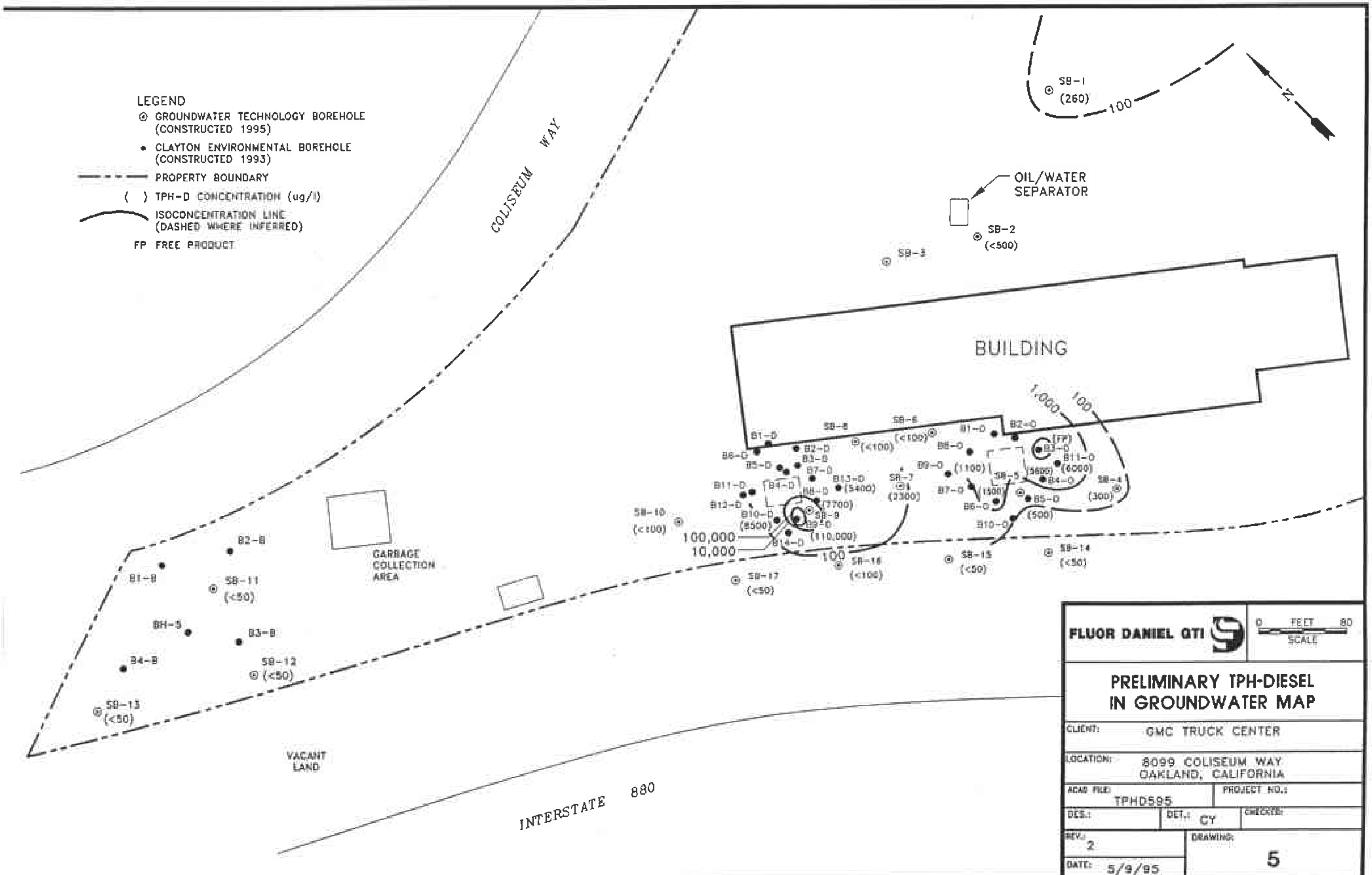


FLUOR DANIEL GTI	N	SCALE: 0 FEET 2000	**SITE LOCATION MAP**
		CLIENT: GMC TRUCK CENTER	DATE: 5/14/96
SOURCE: U.S.G.S. 7.5' QUAD SHEET SAN LEANDRO, CALIFORNIA PHOTOREVISED 1980		LOCATION: 8099 COLISEUM WAY OAKLAND, CALIFORNIA	FIGURE: 1


HEGENBERGER ROAD
CALTRANS PROPERTY
USED TRUCK SALES TRAILER
FORMER CATRANS USTs
BH-1
BH-2
BH-3
BH-4
COLISEUM WAY
GMC TRUCK CENTER
OIL/WATER SEPARATOR
LEGEND
CLAYTON ENVIRONMENTAL BORING LOCATION
PROPERTY BOUNDARY
BUILDING
GARBAGE COLLECTION AREA
BH-5
FORMER GASOLINE AND DIESEL TANKS
FORMER WASTE OIL TANKS
VACANT LAND
INTERSTATE 880
N
FLUOR DANIEL GTI
0 FEET 80
SCALE
SITE MAP
CLIENT: GMC TRUCK CENTER
LOCATION: 8099 COLISEUM WAY OAKLAND, CALIFORNIA
ACAD FILE: SITEMAP
PROJECT NO.:
DES.:
DET.: CY
CHECKED:
REV.: 2
DRAWING: 2
DATE: 1/17/95


LEGEND
PROPERTY BOUNDARY
MONITORING WELL
PIEZOMETER
COLISEUM WAY
N
OIL/WATER SEPARATOR
MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
MW-7
MW-8
PZ-1
PZ-2
PZ-3
BUILDING
GARBAGE COLLECTION AREA
VACANT LAND
INTERSTATE 880
FLUOR DANIEL GTI
0 FEET 50
APPROXIMATE SCALE
MONITORING WELL LOCATION MAP
CLIENT: GMC TRUCK CENTER
LOCATION: 8099 COLISEUM WAY OAKLAND, CALIFORNIA
ACAD FILE: SP596
PROJECT NO.: 042020136
DES.: KPJ
DET.: ML
CHECKED:
REV.: 2
DRAWING: 3
DATE: 5/10/96


LEGEND
GROUNDWATER TECHNOLOGY BOREHOLE (CONSTRUCTED 1995)
CLAYTON ENVIRONMENTAL BOREHOLE (CONSTRUCTED 1993)
PROPERTY BOUNDARY
COLISEUM WAY
N
OIL/WATER SEPARATOR
BUILDING
GARBAGE COLLECTION AREA
VACANT LAND
INTERSTATE 880
SB-1
SB-2
SB-3
SB-4
SB-5
SB-6
SB-7
SB-8
SB-9
SB-10
SB-11
SB-12
SB-13
SB-14
SB-15
SB-16
SB-17
SB-18
SB-19
SB-20
SB-21
SB-22
SB-23
SB-24
SB-25
SB-26
SB-27
B1-B
B2-B
B3-B
B4-B
BH-5
B1-D
B2-D
B3-D
B4-D
B5-D
B6-D
B7-D
B8-D
B9-D
B10-D
B11-D
B12-D
B13-D
B14-D
B1-O
B2-O
B3-O
B4-O
B5-O
B6-O
B7-O
B8-O
B9-O
B10-O
B11-O
FLUOR DANIEL GTI
0 FEET 80
SCALE
SOIL BORING LOCATION MAP
CLIENT: GMC TRUCK CENTER
LOCATION: 8099 COLISEUM WAY OAKLAND, CALIFORNIA
ACAD FILE: SBLOC095
PROJECT NO.: 042020136
DES.:
DET.: ML
CHECKED:
REV.: 2
DRAWING: 4
DATE: 10/12/95

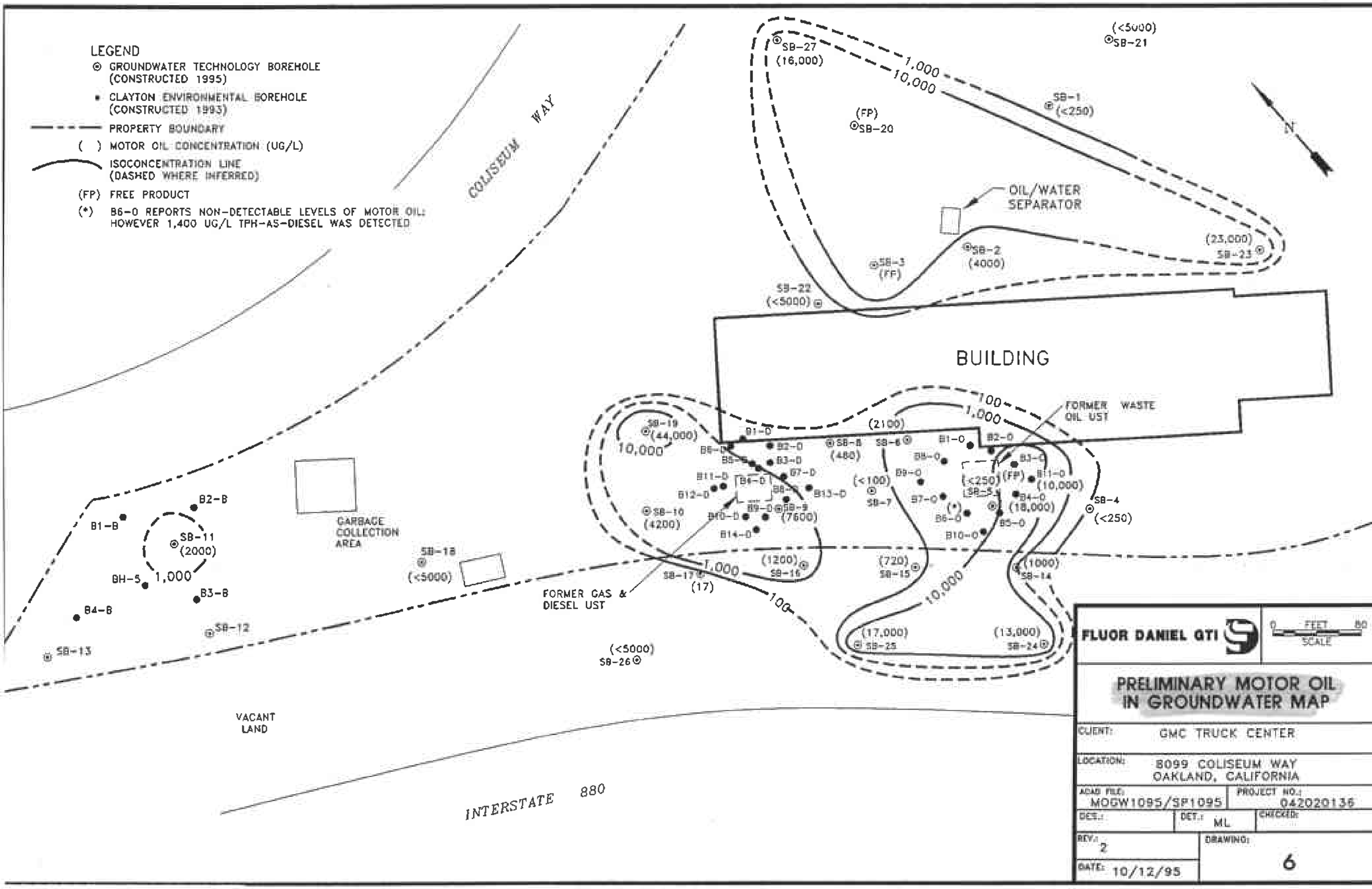


FLUOR DANIEL GTI

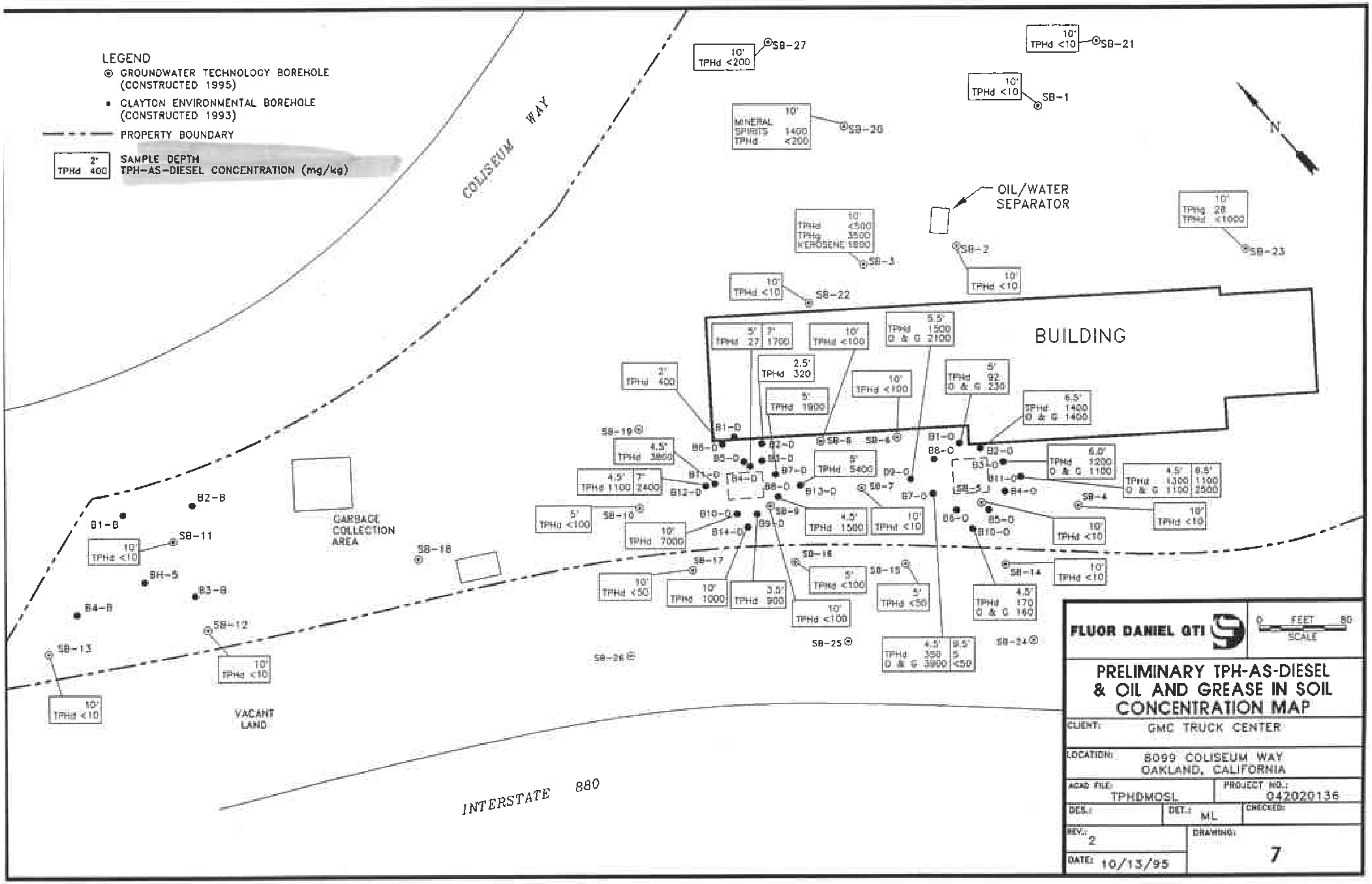
0 FEET 80 SCALE

PRELIMINARY TPH-DIESEL IN GROUNDWATER MAP

CLIENT:	GMC TRUCK CENTER
LOCATION:	8099 COLISEUM WAY OAKLAND, CALIFORNIA
ACAD FILE: TPHD595	PROJECT NO.:
DES.:	DET.: CY
CHECKED:	
REV.: 2	DRAWING: 5
DATE: 5/9/95	



LEGEND
GROUNDWATER TECHNOLOGY BOREHOLE (CONSTRUCTED 1995)
CLAYTON ENVIRONMENTAL BOREHOLE (CONSTRUCTED 1993)
PROPERTY BOUNDARY
( ) MOTOR OIL CONCENTRATION (UG/L)
ISOCONCENTRATION LINE (DASHED WHERE INFERRED)
(FP) FREE PRODUCT
(*) B6-O REPORTS NON-DETECTABLE LEVELS OF MOTOR OIL; HOWEVER 1,400 UG/L TPH-AS-DIESEL WAS DETECTED
COLISEUM WAY
INTERSTATE 880
N
BUILDING
OIL/WATER SEPARATOR
FORMER WASTE OIL UST
FORMER GAS & DIESEL UST
GARBAGE COLLECTION AREA
VACANT LAND
SB-27 (16,000)
(<5000) SB-21
SB-1 (<250)
(FP) SB-20
SB-3 (FP)
SB-2 (4000)
(23,000) SB-23
SB-22 (<5000)
SB-19 (44,000)
(2100)
SB-8 (480)
SB-6
(<100) SB-7
SB-5 (<250) (FP)
(10,000)
(18,000)
SB-4 (<250)
SB-10 (4200)
SB-9 (7600)
(1200) SB-16
SB-17 (17)
(720) SB-15
(1000) SB-14
(17,000) SB-25
(13,000) SB-24
(<5000) SB-26
SB-18 (<5000)
SB-11 (2000)
SB-12
SB-13
B1-B
B2-B
B3-B
B4-B
BH-5
B1-D B2-D B3-D B4-D B5-D B6-D B7-D B8-D B9-D B10-D B11-D B12-D B13-D B14-D
B1-O B2-O B3-O B4-O B5-O B6-O B7-O B8-O B9-O B10-O B11-O
100
1,000
10,000
FLUOR DANIEL GTI
0 FEET 80 SCALE
PRELIMINARY MOTOR OIL IN GROUNDWATER MAP
CLIENT: GMC TRUCK CENTER
LOCATION: 8099 COLISEUM WAY OAKLAND, CALIFORNIA
ACAD FILE: MOGW1095/SP1095
PROJECT NO.: 042020136
DES.:
DET.: ML
CHECKED:
REV.: 2
DRAWING: 6
DATE: 10/12/95


LEGEND
GROUNDWATER TECHNOLOGY BOREHOLE (CONSTRUCTED 1995)
CLAYTON ENVIRONMENTAL BOREHOLE (CONSTRUCTED 1993)
PROPERTY BOUNDARY
2' TPHd 400 SAMPLE DEPTH TPH-AS-DIESEL CONCENTRATION (mg/kg)
COLISEUM WAY
INTERSTATE 880
BUILDING
OIL/WATER SEPARATOR
GARBAGE COLLECTION AREA
VACANT LAND
N
SB-27 10' TPHd <200
SB-21 10' TPHd <10
SB-1 10' TPHd <10
SB-20 10' MINERAL SPIRITS 1400 TPHd <200
SB-3 10' TPHd <500 TPHg 3500 KEROSENE 1800
SB-2 10' TPHd <10
SB-23 10' TPHg 28 TPHd <1000
SB-22 10' TPHd <10
SB-11 10' TPHd <10
SB-12 10' TPHd <10
SB-13 10' TPHd <10
SB-18
SB-26
SB-25
SB-24
B1-B B2-B B3-B B4-B BH-5
FLUOR DANIEL GTI
0 FEET 80 SCALE
PRELIMINARY TPH-AS-DIESEL & OIL AND GREASE IN SOIL CONCENTRATION MAP
CLIENT: GMC TRUCK CENTER
LOCATION: 8099 COLISEUM WAY OAKLAND, CALIFORNIA
ACAD FILE: TPHDMOSL
PROJECT NO.: 042020136
DES.:
DET.: ML
CHECKED:
REV.: 2
DRAWING: 7
DATE: 10/13/95

TABLES

TABLE 1
SOIL SAMPLE ANALYTICAL RESULTS
GENRERAL MOTORS TRUCKING FACILITY
OAKLAND, CALIFORNIA

Sample I.D.-Depth	Date Collected	Benzene	Toluene	Ethly-Benzene	Xylenes	TPH-as-gasoline mg/kg	TPH-as-diesel fuel mg/kg	Hydrocar-bons (c) mg/kg
BH-1-6*	07/23/93	--	--	--	--	340	280	480
BH-1-10.5*	07/23/93	--	--	--	--	20	8	<50
BH-1-15.5*	07/23/93	--	--	--	--	0.5	10	140
BH-3-5.5*	07/23/93	--	--	--	--	6.3	44	180
BH-4-5.5*	07/23/93	--	--	--	--	51	17	70
BH-5-5.5*	07/23/93	--	--	--	--	0.5	700	820
BH-5-10.5*	07/23/93	--	--	--	--	<0.3	3	<50
B4D-7*	09/09/93	--	--	--	--	<0.3	27	--
B4D-5*	09/09/93	--	--	--	--	1.4(a)	1,700	<5
B8D-4.5*	09/09/93	--	--	--	--	<0.3	1,500	<5
B9D-5.5*	09/09/93	--	--	--	--	<0.3	900	--
B7D-5*	09/09/93	--	--	--	--	<0.3	1,900	--
B10D-10*	09/09/93	--	--	--	--	1.1(a,b)	7,000	--
B11-4.5D*	09/09/93	--	--	--	--	<0.3	3,800	--
BH4-B-5*	09/10/93	--	--	--	--	--	570	580
BH1-B-4.5*	09/10/93	--	--	--	--	--	6	<50
BH2-B-5*	09/10/93	--	--	--	--	--	490	540
BH3-B-5.5*	09/10/93	--	--	--	--	--	470	440

FLUOR DANIEL GTI

TABLE 1
SOIL SAMPLE ANALYTICAL RESULTS
GENRERAL MOTORS TRUCKING FACILITY
OAKLAND, CALIFORNIA

Sample I.D.-Depth	Date Collected	Benzene	Toluene	Ethyl-Benzene	Xylenes	TPH-as-gasoline mg/kg	TPH-as-diesel fuel mg/kg	Hydrocar-bons (c) mg/kg
B2-D-2.5*	09/15/93	<0.005	<0.005	<0.005	<0.005	<0.3	320	--
B6-D-2*	09/15/93	<0.005	<0.005	0.005	<0.005	<30	400	--
B13-D-3.5*	09/15/93	<0.005	<0.005	<0.005	<0.005	<0.3	5,400	--
B12-D-4.5*	09/15/93	--	--	--	--	--	1,100	--
B12-D-7.0*	09/15/93	--	--	--	--	--	2,400	--
B14-D-10.0*	09/15/93	<0.005	<0.005	0.005	<0.005	0.9	1,000	--
B1-0-5.5*	09/15/93	--	--	--	--	--	92	230
B2-0-6.5*	09/15/93	--	--	--	--	--	1,400	1,400
B3-0-6.0*	09/15/93	--	--	--	--	--	1,200	1,100
B7-0-4.5*	09/15/93	--	--	--	--	--	350	3,900
B7-0-9.5*	09/15/93	--	--	--	--	--	5	<50
B9-0-5.5*	09/15/93	--	--	--	--	--	1,500	2,100
B10-0-4.5*	09/15/93	--	--	--	--	--	170	160
B11-0-4.5*	09/15/93	--	--	--	--	--	1,300	1,100
B11-0-6.5*	09/15/93	--	--	--	--	--	1,100	2,500
SB1-10**	03/23/95	<0.005	<0.005	<0.005	<0.015	<1.0	<10	<100
SB2-10**	03/23/95	<0.005	<0.005	<0.005	<0.015	<0.1	<10	<100
SB3-10**	03/23/95	<0.25	<0.25	5.4	87	3,500	<500	1,800(d)

FLUOR DANIEL GTI

TABLE 1
SOIL SAMPLE ANALYTICAL RESULTS
GENRERAL MOTORS TRUCKING FACILITY
OAKLAND, CALIFORNIA

Sample I.D.-Depth	Date Collected	Benzene	Toluene	Ethly-Benzene	Xylenes	TPH-as-gasoline mg/kg	TPH-as-diesel fuel mg/kg	Hydrocar-bons (c) mg/kg
SB4-10**	03/23/95	<0.005	<0.005	<0.005	<0.015	<1.0	<10	<100
SB5-10**	03/23/95	<0.005	<0.005	<0.005	<0.015	<1.0	<10	<100
SB6-10**	03/23/95	<0.005	<0.005	<0.005	<0.015	<1.0	<100	<1000
SB7-10**	03/23/95	<0.005	<0.005	<0.005	<0.015	<1.0	<10	<100
SB8-10**	03/23/95	<0.005	<0.005	<0.005	<0.015	<1.0	<100	<1000
SB9-10**	03/23/95	<0.005	<0.005	<0.005	<0.015	<1.0	<100	<1000
SB10-5**	03/24/95	<0.005	<0.005	<0.005	<0.015	<1.0	<100	<1000
SB11-10**	03/24/95	<0.005	<0.005	<0.005	<0.015	<1.0	<10	<100
SB12-10**	03/24/95	<0.005	<0.005	<0.005	<0.015	<1.0	<10	<100
SB13-10**	03/24/95	<0.005	<0.005	<0.005	<0.015	<1.0	<10	<100
SB14-10**	03/25/95	<0.005	<0.005	<0.005	<0.015	<1.0	<10	<100
SB15-5**	03/24/95	<0.005	<0.005	<0.005	<0.015	<1.0	<50	<500
SB16-5**	03/24/95	<0.005	<0.005	<0.005	<0.015	<1.0	<100	<1000
SB17-10**	03/24/95	<0.005	<0.005	<0.005	<0.015	<1.0	<50	<500

Note:
See laboratory reports for Environmental Protection Agency (EPA) analytical methods

TPH = Total Petroleum Hydrocarbons

* = Samples collected by Clayton Environmental Consultants.

FLUOR DANIEL GTI

** = Samples collected by Groundwater Technology, Inc.

a = According to lab report "Purgeable hydrocarbons quantitated as gasoline may be due to heavier petroleum product.

b = According to lab report Purgeable hydrocarbons quantitated as gasoline do not match typical gasoline pattern.

c = Hydrocarbons reported as oil and grease.

d = Reported by laboratory as uncategorized compound TPH Kerosene.

FLUOR DANIEL GTI

GROUNDWATER TECHNOLOGY, INC.
GMC WHITE TRUCK CENTER

TABLE 1
SOIL ANALYTICAL RESULTS
MARCH 20-22, 1996

11-Apr

SAMPLE LOCATION	Sample Depth (feet)	Benzene (ug/Kg)	Toluene (ug/Kg)	Ethyl-benzene (ug/Kg)	Total Xylenes (ug/Kg)	TPH Gasoline (mg/Kg)	TPH Mineral Spirits (mg/Kg)	TPH Diesel (mg/Kg)	TPH Lube Oil (mg/Kg)
MW-1	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-2	10	BDL	BDL	BDL	BDL	BDL	BDL	BDL	22
MW-3	10	310,000	BDL	BDL	260,000	8,400	1,900	BDL	1,300
MW-4	10	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1,100
MW-5	16	BDL	BDL	BDL	5.5	6.4	BDL	BDL	800
MW-6	15	BDL	BDL	BDL	BDL	0.49	BDL	BDL	370
MW-7	10	1.4	BDL	BDL	BDL	0.27	BDL	BDL	460
MW-8	10	2.2	BDL	BDL	BDL	0.14	BDL	BDL	2,200

TABLE 2
WATER SAMPLE ANALYTICAL RESULTS
GENRERAL MOTORS TRUCKING FACILITY
OAKLAND, CALIFORNIA

Sample I.D.-Depth	Date Collected	Benzene	Toluene	Ethly-Benzene	Xylenes	TPH-as-gasoline ug/l	TPH-as-diesel fuel ug/l	Hydrocar-bons (a) ug/l
BH-1*	07/23/93	--	--	--	--	780	1,300	--
BH-3*	07/23/93	--	--	--	--	--	47,000	--
1-WD (under fuel tank)	08/05/93	<0.4	0.4	<0.3	0.5	--	--	--
B4-O*	09/10/93	<0.4	<0.3	<0.3	<0.4	<50	5,600	18,000
B6-O*	09/10/93	<0.4	<0.3	<0.3	<0.4	<50	1,400	<5
B11-O*	09/15/93	<0.4	<0.3	<0.3	<0.4	<50	6,000	10,000
B14-O*	09/15/93	<0.4	<0.3	<0.3	<0.4	<50	10,000	--
B3-0* (FREE PRODUCT)	09/15/93	--	--	--	--	--	--	150,000
BH9-D*	09/09/93	--	--	--	--	--	110,000	--
BH10-D*	09/09/93	--	--	--	--	--	8,500	--
BH-8D*	09/09/93	--	--	--	--	--	7,700	--
B14-D*	09/15/93	<0.4	<0.3	<0.3	<0.4	<50	10,000	--
SB1-WATER**	03/23/95	0.4	<0.3	<0.3	0.6	<503	260	<250
SB2-WATER***	03/23/95	<0.3	<0.3	<0.3	<0.5	<50	<500	4,000
SB3-(FREE PROJECT)**	03/23/95	--	--	--	--	--	--	--
SB4-WATER**	03/23/95	<0.3	<0.3	<0.3	<0.4	<50	300	<250

FLUOR DANIEL GTI

TABLE 2
WATER SAMPLE ANALYTICAL RESULTS
GENRERAL MOTORS TRUCKING FACILITY
OAKLAND, CALIFORNIA

Sample I.D.-Depth	Date Collected	Benzene	Toluene	Ethly-Benzene	Xylenes	TPH-as-gasoline ug/l	TPH-as-diesel fuel ug/l	Hydrocar-bons (a) ug/l
SB5-WATER**	03/23/95	<0.3	<0.3	<0.3	<0.4	<50	500	<250
SB6-WATER**	03/24/95	1.3	<0.3	<0.3	<0.4	<50	<250	2,100
SB7-WATER **	03/23/95	<0.3	<0.3	<0.3	<0.4	<50	2,300	<250
SB8-WATER**	03/23/95	<0.3	<0.3	<0.3	<0.4	<50	<50	480
SB9-WATER **	03/23/95	<0.3	<0.3	<0.3	<0.4	<50	<1,000	7,600
SB10-WATER**	03/24/95	<0.3	<0.3	<0.3	<0.4	<50	<500	4,200
SB11-WATER**	03/24/95	<0.3	<0.3	<0.3	<0.4	<50	<250	2,000
SB12-WATER**	03/24/95	<0.3	<0.3	<0.3	<0.4	<50	<500	<2,500
SB13-WATER**	03/24/95	<0.3	<0.3	<0.3	<0.4	<50	<250	<1,250
SB14-WATER**	03/24/95	<0.3	<0.3	<0.3	<0.4	<50	<50	1,000
SB15-WATER**	03/24/95	<0.3	<0.3	<0.3	<0.4	<50	<50	720
SB16-WATER**	03/24/95	0.4	<0.3	<0.3	<0.4	<50	<50	1200
SB17-WATER**	03/24/95	<0.3	<0.3	<0.3	<0.4	<50	<250	<1,250

Note:

FLUOR DANIEL GTI

See laboratory reports for Environmental Protection Agency (EPA) analytical methods

TPH	=	Total Petroleum Hydrocarbons
*	=	Samples collected by Clayton Environmental Consultants
**	=	Samples collected by Groundwater Technology, Inc.
--	=	Not analyzed
a	=	Hydrocarbons reported as oil.

FLUOR DANIEL GTI

GROUNDWATER TECHNOLOGY, INC.
GMC WHITE TRUCK CENTER

TABLE 2
GROUNDWATER ANALYTICAL RESULTS
MARCH 1, 1996

SAMPLE LOCATION	Benzene (ug/L)	Toluene (ug/L)	Ethyl-benzene (ug/L)	Total Xylenes (ug/L)	TPH Gasoline (ug/L)	TPH Diesel (mg/L)	TPH Lube Oil (mg/L)
MW-1	BDL	BDL	BDL	BDL	BDL	BDL	0.86
MW-2	BDL	BDL	BDL	BDL	BDL	BDL	1.6
MW-3	BDL	BDL	BDL	BDL	BDL	BDL	0.68
MW-4	BDL	BDL	BDL	BDL	BDL	BDL	1.4
MW-5	BDL	BDL	BDL	BDL	BDL	BDL	8
MW-6	BDL	BDL	BDL	BDL	BDL	BDL	11
MW-7	BDL	BDL	BDL	BDL	BDL	BDL	2.9
MW-8	4.6	BDL	BDL	BDL	0.16	BDL	3.6

GROUNDWATER TECHNOLOGY, INC.

TABLE 3
ADDENDUM 1 SOIL AND GROUNDWATER SAMPLING
SOIL SAMPLE ANALYTICAL RESULTS
GENERAL MOTORS CORPORATION WHITE TRUCK CENTER
OAKLAND, CALIFORNIA

Sample I.D.	Date	Benzene Collected mg/kg	Toluene mg/kg	Ethyl-benzene mg/kg	Total Xylenes mg/kg	TPH as gasoline mg/kg	TPH as diesel mg/kg	TPH as mineral spirits mg/kg	TPH as kerosene mg/kg	TPH as motor oil mg/kg
SB-20 *	06/26/95	<0.10	<0.10	**1.6**	**17**	<20	<200	**1400**	<200	<2000
SB-21	06/26/95	<0.005	<0.005	<0.005	<0.015	<1.0	<10	<10	<10	<100
SB-22	06/26/95	<0.005	<0.005	<0.005	<0.015	<1.0	<10	<10	<10	<100
SB-23 **	06/26/95	<0.025	**0.042**	**0.061**	**0.32**	**28**	<10000	<1000	<1000	<10000
SB-27	06/26/95	<0.005	<0.005	<0.005	<0.015	<1.0	<200	<200	<200	<2000

* Indicates that the detection limit was raised due to high concentration of target analyte.
** Indicates that the detection limit was raised due to matrix interference.

FLUOR DANIEL GTI

GROUNDWATER TECHNOLOGY, INC.

TABLE 4
ADDENDUM 1 SOIL AND GROUNDWATER SAMPLING
GROUNDWATER SAMPLE ANALYTICAL RESULTS
GENERAL MOTORS CORPORATION WHITE TRUCK CENTER
OAKLAND, CALIFORNIA

Sample I.D.	Date	Benzene Collected ug/L	Toluene ug/L	Ethyl-benzene ug/L	Total Xylenes ug/L	TPH as gasoline ug/L	TPH as diesel ug/L	TPH as mineral spirits ug/L	TPH as kerosene ug/L	TPH as motor oil ug/L
SB-18	06/26/95	<0.3	**8.1**	<0.3	<0.5	<50	<1,000	<1,000	<1,000	<5,000
SB-19	06/26/95	<0.3	**0.3**	<0.3	<0.5	<50	<2,500	<2,500	<2,500	**44,000**
SB-20	06/26/95	<0.3	<0.3	**60**	**150**	<500	<2,500	**520,000**	<2,500	**170,000**
SB-21	06/26/95	<0.3	**0.5**	**0.7**	<0.5	<50	<1,000	<1,000	<1,000	<5,000
SB-22	06/26/95	<0.3	**0.6**	<0.3	<0.5	<50	<1,000	<1,000	<1,000	<5,000
SB-23	06/26/95	0.5	<0.3	**1.0**	**2.8**	**150**	<2,500	<2,500	**3,900**	**23,000**
SB-24	06/26/95	<0.3	**0.4**	<0.3	<0.5	<50	<1,000	<1,000	<1,000	**13,000**
SB-25	06/26/95	<0.3	<0.3	<0.3	<0.5	<50	<1,000	<1,000	<1,000	**17,000**
SB-26	06/26/95	<0.6	<0.6	<0.6	<1.0	<100	<1,000	<1,000	<1,000	<5,000
SB-27	06/26/95	<0.3	<0.3	<0.3	<0.5	<50	<1,000	<1,000	<1,000	**16,000**

FLUOR DANIEL GTI