Part of the June 1993
Woodward Clyde Consultant Report

T9=

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1.0
INTRODUCTION

1.1 AUTHORIZATION AND SCOPE

This report presents the results of studies performed by Woodward-Clyde Consultants (WCC) to characterize soil conditions at City Center Parcels T5 and T6. These parcels are located on the western half of the block bounded by 11th Street, 12th Street, Clay Street and Broadway. This study was performed in accordance with the Contract for Professional Services between WCC and the Redevelopment Agency of the City of Oakland (Agency), dated January 19, 1990, and amended June 25, 1990, November 15, 1990, January 18, 1991 and January 18, 1992.

The purpose of this study is to chemically characterize the surficial fill material occurring on Parcels T5 and T6 to evaluate appropriate treatment and/or off-site disposal options for the fill. The work completed for this study included the following:

- Drilling and logging 21 soil borings ranging in depth from 1 to 13 feet;
- Laboratory analysis of 52 soil samples for total petroleum hydrocarbons (TPH) quantified as gasoline, diesel, and motor oil, oil and grease, total lead, polychlorinated biphenyls (PCBs), CAM 17 metals, and semi-volatile organic compounds; and
- Evaluation of the chemical analytical data and preparation of this report. This report includes discussions of the work performed, the chemical analytical results and disposal alternatives and costs for portions of the fill.

1.2 LIMITATIONS

This report was prepared in general accordance with the accepted standard of practice which exists in the San Francisco Bay Area at the time this investigation was performed. No other warranties are expressed or implied. The scope of this investigation is limited by time

constraints, expense, and practicality. A limited number of samples were taken at locations at the site and a limited number of laboratory chemical analyses were performed for those samples. Professional opinions concerning the presence of hazardous substances were developed based on the resulting data. It would be prohibitively expensive and time consuming to sample all locations at the site and analyze the samples for all substances which are now, or in the future might be, considered hazardous. Therefore, WCC cannot be held responsible should the investigation fail to detect the presence or quantity of all hazardous substances at all locations of the site. Also, additional analytical data may result in revisions to cost estimates and may require changes in the project plans, particularly with respect to the available options for off-site disposal.

2.0
FILL CHARACTERIZATION

2.1 SOIL BORINGS

The soil borings were drilled on Parcels T5 and T6 under Groundwater Protection Ordinance Permit Number 90469 issued by the Alameda County Flood Control and Water Conservation District (Zone 7) to WCC on August 2, 1990.

WCC drilled soil borings at 21 locations on the site on August 16 and 17, 1990 using a truck-mounted hydraulic drill rig and a hand-held, gasoline-powered auger, both using 6-inch diameter solid-stem augers. Locations of these soil borings are shown on Figure 1. Borings were placed at various locations across the site for the purpose of evaluating the depth and physical and chemical nature of the surficial fill material. No borings were installed in the driveways or other areas covered by asphalt or concrete. ← does this compromise invest.?

The depth of the borings varied from approximately 1 foot to approximately 13 feet. Drilling was generally stopped at or just below the base of the fill layer, although several of the shallower borings were terminated above the base of the fill because the hand-held auger could not be advanced through dense gravelly material.

Soil samples were collected in each boring at approximately 2-foot intervals. The depth of sample collection alternated from even-numbered depths to odd-numbered depths so that all levels of the fill would be relatively equally sampled. The number of samples per boring varied depending on the thickness of the fill at that location. Logs of the borings describing the materials encountered and the depth of soil samples are included in Appendix A.

The soil samples were obtained using a 2-inch inside-diameter drive sampler. The samples were retained in 2-inch-diameter by 4-inch-long brass tubes with plastic end caps. The soil sampler was cleaned between each sample and between borings by washing in an Alconox detergent and tap water solution, followed by water rinses. Following drilling, the borings were backfilled to the ground surface using the entire volume of drill cuttings such that no drill cuttings remained. Soil samples were immediately placed in an ice chest cooled with

"blue ice" for transport under chain-of-custody control to Eureka Laboratories, Inc., a State-certified analytical laboratory in Sacramento, California.

2.2 CHEMICAL ANALYTICAL RESULTS

Fifty-two soil samples of the surficial fill and native soil beneath the fill were analyzed for total lead using EPA Method 6010, total oil and grease using EPA Method 413.2 and the petroleum fraction of the total oil and grease using EPA Method 418.1. Five soil samples were analyzed for TPH as gasoline, diesel and motor oil using EPA Method 8015, modified. Nine discrete fill samples and one composite fill sample were analyzed for PCBs using EPA Method 8080. One composite fill sample and one discrete fill sample were analyzed for CAM 17 metals using EPA Method 6010, and semi-volatile organic compounds using EPA Method 8270.

The results of the laboratory analyses of the samples, shown in Tables 1 and 2 and Appendix B, are summarized as follows:

- The reported concentrations of total lead in the fill samples [redacted] This average assumes a concentration of 1.5 mg/kg (one-half of the detection limit) for all samples in which the reported concentration of lead was below the detection limit;

- The concentrations of the petroleum fraction of the total oil and grease in the fill samples [redacted] This average assumes a concentration of 2 mg/kg (one-half of the detection limit) for all samples in which the concentration of oil and grease was reported below the detection limit;

- Five samples were analyzed for gasoline, diesel, and motor oil. The concentrations of gasoline and diesel in the samples were reported below the detection limits of 5 mg/kg and 10 mg/kg, respectively. Motor oil was reported to exceed the detection limit of 25 mg/kg in three of the five samples at concentrations of 57 mg/kg, 71 mg/kg, and [redacted] mg/kg;

- No PCBs were reported exceeding the detection limit of 0.1 mg/kg in the composite sample or in the nine discrete samples;

- The reported concentration of total lead exceeds the detection limit of 3.0 mg/kg in three of 11 native soil samples. In these three samples, the reported concentrations of lead are 3.1 mg/kg, 5.5 mg/kg, and 6.3 mg/kg;

- The reported total metal concentrations do not exceed the Total Threshold Limit Concentrations (TTLC) of the respective metals; and

- No semi-volatile organic compounds analyzed by EPA Method 8270 were reported exceeding their respective detection limits in the analyzed composite sample. In the discrete samples the following polynuclear aromatic hydrocarbons (PAH) and their respective concentrations were reported: phenanthrene, 153 µg/kg (equivalent to parts per billion); fluoranthene, 293 µg/kg; pyrene, 271 µg/kg; and chrysene, 176 µg/kg. The detection limits for these PAH compounds is 130 µg/kg.

There is currently no State of California regulatory limit for these specific compounds. However, limiting acceptance criteria for disposal of soil containing PAH compounds do exist but vary between landfills. Forward landfill in Stockton will accept soil with a total PAH concentration of 10 mg/kg to 15 mg/kg depending on the particular compounds present. Vasco Road/BFI landfill does not have a specific limit for these individual compounds or for a total PAH concentration but considers the entire analytical data package on a case-by-case basis. This sample contains a total PAH concentration of about 0.9 mg/kg.

2.3 DISCUSSION

The thickness of the fill material was estimated in each boring based on visual examination of the drill cuttings and recovered soil samples and the results of the laboratory analyses of the soil samples. The estimated fill thickness at each boring location is shown on Figure 1. Fill is generally present as a layer varying from 3 to 6 feet thick. The fill layer appears to attain a maximum thickness of 10 feet on Parcel T5 at the southeast corner near boring F1 and a minimum thickness in the central area of Parcel T6 near borings F7 and F11. Based on the average thickness of the fill on each parcel as evaluated in the soil borings, the total

volum[redacted] about 4,7[redacted]6.

The fill has been subdivided into two classifications based on the concentrations of oil and grease and total lead. Coincidentally, the subdivision boundaries appear to approximately correspond with the parcel boundaries. In[redacted]y clea[redacted] ele[redacted]

The samples taken in the fill on Parcel T5 do not contain concentrations of TPH or oil and grease which exceed their respective detection limits. Also, the T5 samples do not contain reported concentrations of total lead exceeding expected background concentrations for native soil, except for sample F1-4 taken in the southeast corner of the parcel with a reported total lead concentration of 29.8 mg/kg. The average concentration of total lead in samples of fill from Parcel T5 is 5.2 mg/kg, within the range expected for native soil in the downtown Oakland area.

On [redacted]y. The average concentration of oil and grease in the six samples analyzed from Parcel T6 is 154 mg/kg. The average concentration of motor oil in the three samples analyzed from this area is 166 mg/kg. The[redacted]

3.0
FILL DISPOSAL ALTERNATIVES

WCC expects that the development of Parcels T5 and T6 will require the removal and off-site disposal of large quantities of both fill and native soil in order to create space for high-rise building foundations and underground parking. Based on the results of this study, WCC estimates that, of the estimated 6,200 bank cubic yards of fill on both parcels, approximately [redacted] Several conceptual disposal alternatives for this fill are discussed below along with order-of-magnitude estimated costs for implementation.

WCC has developed these alternatives based on previous experience with cleanup projects on nearby sites in the City Center area. These projects, performed on behalf of the Redevelopment Agency of the City of Oakland, include the Oakland Federal Building, City Center Garage II, and 1155 Clay Street. Cleanup of these sites involved the off-site treatment and/or disposal of surficial fill material containing elevated concentrations of lead and petroleum hydrocarbons.

The removal of the fill from those sites was accomplished by a process of excavation, segregation, and stockpiling of the fill. The segregation operations were based on chemical characteristics of the fill which are pertinent to the selection of disposal alternatives. Experience has shown that it is generally possible to successfully segregate the fill based on a visual manifestation of the chemical characteristics. perhaps TPH$_{MO}$, not metals

All the cleanup alternatives for the T5/T6 parcel fundamentally consist of a process of excavation, segregation and stockpiling of the fill from the T6 parcel. The T6 fill would be segregated on the basis of relative petroleum hydrocarbon concentrations with the intent of developing a stockpile containing low concentrations of petroleum hydrocarbons, possibly suitable for direct disposal in a landfill, and one or more stockpiles with higher petroleum hydrocarbon concentrations. The stockpiles, as well as the in-situ fill on the T5 parcel, would be tested further to characterize the fill for more detailed assessment of off-site disposal alternatives and to comply with application requirements of potential disposal sites.

The cost estimates presented in this section are necessarily based on a number of assumptions: 1) the fill on the T5 parcel is not contaminated and may be disposed off-site without environmental restrictions; 2) the volume of fill to be treated and/or disposed from the T6 parcel is about 2,500 bank cubic yards, 4,000 bulk cubic yards or 6,000 tons; 3) Class III landfill disposal of the T6 fill without segregation is not feasible due to the elevated concentration of total lead; and 4) no additional contaminants are encountered. Additional assumptions used in developing these cost estimates are shown on Table 3.

Contractor, engineering and consulting costs, including fill characterization and project oversight, are estimated to be in the range of $150,000 to $250,000 for each alternative. A more detailed breakdown of the estimated costs, along with estimated excavation and disposal costs, is presented in Table 3.

3.1 ALTERNATIVE 1 - DIRECT CLASS II DISPOSAL

The quickest, simplest, and least expensive alternative for disposal of the T6 fill would probably involve disposal in a Class II or Class III landfill. Utilization of one, relatively low-cost disposal site would minimize the need for classification, sorting and hauling to multiple sites resulting in lower cost and faster completion of the site cleanup. The successful performance of this alternative depends on acceptable extractable lead concentrations for the soil considered for disposal as discussed below.

For this soil, the concentration of extractable lead, as measured by the Waste Extraction Test (WET), may be a limiting factor in the selection of a disposal site. Class III landfills generally have a limiting disposal criteria of 0.5 ppm extractable lead as analyzed by the WET method using a weak acetic acid extracting solution. Based on [redacted] extractable lead may be equivalent to about 5 ppm, or greater, total-lead in soil. Therefore, on the basis of the limited total-lead testing completed in this study, it appears unlikely the T6 fill could be disposed in a Class III landfill without segregation or other treatment.

Not necessarily as low as 5ppm (which is max Pb)

Class II landfills, such as Forward, Inc. or the BFI, Inc. landfill, now under construction in Pittsburg, California, generally have a less stringent disposal criteria for extractable lead. Forward, Inc. has a disposal criteria for extractable lead of 0.5 ppm as analyzed by the WET method using deionized water as the extracting solution. Based upon our experience with this

method, 0.5 ppm extractable lead may correlate to total lead concentrations of about 50 ppm or greater in soil. Also, we understand that the extractable lead disposal criteria may be raised to 5.0 ppm at Forward during Spring 1992. Therefore, the T6 fill, with an average total lead concentration of 88 ppm, may be acceptable for Class II disposal, depending upon the results of more extensive WET method testing using deionized water.

If extractable lead concentrations within the fill are acceptable for Class II disposal, the landfill may still not accept the fill under current oil and grease disposal criteria. However, Forward, Inc. expects the Class II disposal criteria for petroleum hydrocarbons will be raised to within the range of about 700 ppm to 1000 ppm during the Spring of 1992. If that happens, and Forward's extractable lead criteria can be met, direct Class II disposal of the fill may become a feasible option.

Direct Class II disposal would require the excavation and stockpiling of all fill on the T6 parcel. The stockpiled fill would be sampled and analyzed in accordance with disposal application requirements of the prospective landfill. If the concentrations of contaminants are below the limiting disposal criteria of a landfill, the stockpiled fill would be directly disposed in that landfill. This alternative appears to be the least expensive alternative and may be feasible if the following conditions apply:

- The average concentration of oil and grease in the stockpiled fill is below 100 ppm (or the current Class II disposal criteria at the time of fill removal);
- The concentration of extractable lead is below the disposal criteria for extractable lead. Based on the available data, the concentration of total lead in the fill appears to be well below the limiting disposal criteria for total lead; and
- The fill is otherwise suitable for disposal in a Class II landfill (e. g., not ignitable, corrosive or reactive).

The excavation, hauling and disposal costs are estimated to be approximately $204,000 or about $51/cubic yard, assuming disposal at the Forward, Inc. landfill. The total project cost for this alternative, including a 50% contingency, is estimated to be about $610,000.

Disposal costs and acceptance criteria for the BFI, Inc. landfill now under construction in Pittsburg are not available at this time.

If, at the time of fill removal, the chemical characteristics of the T6 fill do not meet the acceptance criteria for disposal at Class II or III landfills, Alternative 2 should be considered.

3.2 ALTERNATIVE 2 - SEGREGATION, BIOREMEDIATION, AND CLASS II DISPOSAL

If it is found that portions of the stockpiled fill contain petroleum concentrations which are too high for direct Class II disposal, bioremedial treatment of that portion of the fill to reduce petroleum hydrocarbon concentrations may be the next least expensive alternative. The bioremediation process is a treatment in which the soil is irrigated and fertilized to enhance the activity of naturally-occurring soil bacteria. The bacteria break down the petroleum hydrocarbons through digestive processes into innocuous material. This process may be performed in various ways, including landfarming, biologic reactors or in-situ bioremediation.

Based on our previous experience working in the City Center area, and the relatively shallow depth of the fill, we believe that the most efficient way to perform this alternative would be to excavate and segregate the fill on the T6 parcel prior to undertaking bioremediation of the fill. The fill would be segregated into at least two stockpiles on the basis of relative oil and grease concentrations. If the segregation technique is successful, one of the stockpiles would be directly disposed in a Class II landfill and one stockpile would be treated prior to disposal by a method such as bioremediation to reduce the oil and grease to a concentration acceptable for Class II disposal.

This alternative would be feasible if the following conditions apply:

- The average concentration of petroleum hydrocarbons in a portion of the stockpiled fill exceeds the Class II limiting disposal criteria for oil and grease (or other petroleum hydrocarbons);

- Bioremediation is a feasible process for reducing the petroleum hydrocarbon concentrations in the material;

- The concentration of extractable lead in the fill does not exceed the Class II disposal criteria for extractable lead; and

- The remaining portion of the stockpiled fill, and the bioremediated fill, is suitable for direct disposal in a Class II landfill.

The excavation, hauling, bioremedial treatment and disposal costs are estimated to be approximately $303,000 or about $76/cubic yard. The total project cost for this alternative, including a 50% contingency, is estimated to be about $760,000. This estimate assumes that one half of the contaminated fill would require bioremediation, and that the bioremediation would be performed as a landfarming-type operation.

3.3 ALTERNATIVE 3 - INCINERATION

If it is found that the stockpiled fill contains extractable lead which exceeds Class II landfill disposal criteria, incineration of all or a portion of the fill at a facility such as Port Costa Materials, Inc. (PCM) may be the next least expensive alternative. PCM's current acceptance criteria for WET-method lead is 5.0 ppm, ten times that of Forward, Inc.

As before, this alternative involves the excavation and segregation of the fill into at least two stockpiles based on the relative concentrations of oil and grease. This process may also result in the creation of stockpiles of relatively higher and lower concentrations of lead because, in the past on nearby sites, elevated concentrations of oil and grease have been associated with elevated concentrations of total lead.

Therefore, although the average concentration of extractable lead throughout the T6 fill may exceed the disposal criteria for a Class II landfill, it is possible that one of the stockpiles may qualify for direct Class II disposal. The "high lead" stockpile would be incinerated at PCM's facility in Port Costa, California or an equivalent facility if others are operating at the time the work is performed. This alternative would be feasible if the fill meets the acceptance criteria of PCM as suggested by the analytical results of this study.

The excavation, hauling and disposal costs for Alternative 3 are estimated to be approximately $432,000 or about $108/cubic yard. The total project cost for this alternative,

including a 50% contingency, is estimated to be about $960,000. This estimated cost assumes that all of the contaminated T6 fill would require incineration.

3.4 ALTERNATIVE 4 - ON-SITE LEAD FIXING AND CLASS II DISPOSAL

If it is found that the stockpiled fill contains extractable lead concentrations which exceed the acceptance criteria of nonhazardous incinerator facilities, treatment involving chemical fixation of lead within all, or a portion, of the fill may be the next least expensive alternative. Lead fixation is a treatment of the soil which uses a chemical process to reduce the solubility of the lead. The goal of the treatment would be to render the fill acceptable for disposal in a Class II landfill.

As before, this alternative involves the excavation of all fill on the T6 parcel and segregation of the fill into at least two stockpiles based on the relative concentrations of oil and grease. If additional analyses indicate total and/or extractable lead concentrations exceed the disposal criteria at Class II/III landfills and incinerators such that lead fixation appears to be a cost-effective disposal option, WCC would recommend that this option be pursued.

In order to perform on-site chemical treatment of the soil to reduce the solubility of lead, permits are required from various state and local agencies. At least several months would be required to apply for the relevant permits, selection of a treatment contractor, and preparation of the site. A significant uncertainty of this alternative is that permits for the on-site treatment of waste may not be granted by the State of California, Alameda County, and/or the Regional Water Quality Control Board. Also, Class II/III landfills may not accept the treated soil for disposal.

If the necessary permits are acquired, the stockpiles containing higher lead concentrations would be treated on-site by the lead fixation process. Following treatment, the fill would be disposed in a Class II or III landfill.

This alternative would be feasible if the following conditions apply:

- The concentration of extractable lead exceeds the disposal criteria for extractable lead at both a Class II landfill and an incineration facility;

- A chemical lead fixation process will reduce the concentration of soluble lead to a concentration below the disposal criteria for extractable lead at a Class II landfill; and

- The treated fill is otherwise suitable for direct disposal at a Class II landfill.

The excavation, hauling and disposal costs for this alternative are estimated to be approximately $516,000 or about $129/cubic yard. The total project cost for this alternative, including a 50% contingency, is estimated to be about $1,080,000.

3.5 ALTERNATIVE 5 - DIRECT CLASS I DISPOSAL

Direct Class I landfill disposal may be the only available option if it is found that the stockpiled fill contains extractable lead which exceeds the acceptance criteria at incineration facilities, and treatment involving lead fixation is insufficient to achieve Class II/III landfill disposal, or is not permitted by regulatory agencies.

This alternative is the most expensive alternative and may be necessary if the following conditions apply:

- The concentration of extractable lead exceeds the acceptance criteria for extractable lead at incineration facilities; and

- A chemical lead fixation process is either not cost-effective or will not reduce the concentration of soluble lead to a concentration below the acceptance criteria for extractable lead at incineration facilities; or

- The treated fill is not suitable for direct disposal at an incineration facility or a Class II landfill due to the concentration of some other contaminant unknown at this time.

The excavation, hauling and disposal costs are estimated to be approximately $720,000 or about $180/cubic yard. The total project cost for this alternative, including a 50% contingency, is estimated to be about $1,380,000.

3.6 UNCERTAINTY IN COST ESTIMATES

The cost estimates provided for each of the soil removal and disposal alternatives have been developed using the information available, the limited analytical results of this study, and assumptions which are believed to be reasonable and conservative. Although the estimated costs must be considered approximate, we believe they correctly show the relative cost ranking for each alternative. The actual remedial cost will depend on a host of variables, including: 1) the quantity of soil moved, 2) the chemical characteristics of the soil encountered, 3) contracting and disposal market conditions at the time the excavation is performed, 4) the need, if any, to accelerate the work schedule; and 5) various contingencies which may arise during the course of the project.

4.0
CONCLUSIONS AND RECOMMENDATIONS

The development of Parcels T5 and T6 may require the excavation, removal and off-site disposal of large quantities of surficial fill and native soil. Based on the chemical analytical results of this study, the surficial fill on the T5 parcel appears to be free of significant contamination and probably may be disposed off-site without restriction. However, during excavation for construction on the parcel, localized areas of contaminated fill may become apparent which may require special handling or restricted disposal.

The analytical results of this study suggest that disposal options for the fill on Parcel T6 may be limited due to elevated concentrations of oil and grease and lead in the fill. In the opinion of WCC, the lowest cost alternative for disposal of the fill available at this time may involve bioremedial treatment of some or all of the fill and disposal at a Class II landfill (Alternative 2 discussed above). However, if the disposal criteria are raised for oil and grease at the Forward, Inc. landfill or another Class II disposal facility prior to commencement of the remediation project, Alternative 1, direct disposal at a Class II landfill, may become the lowest cost alternative.

Table 1. Summary of Selected Chemical Analytical Results of Fill Material*, City Center Parcels T5 and T6, Oakland, California.

SAMPLE NUMBER	DEPTH (feet)	TOTAL LEAD	OIL AND GREASE	PETROLEUM HYDROCARBONS			PCB	SEMI-VOLATILE COMPOUNDS
				GASOLINE	DIESEL	MOTOR OIL		
PARCEL T5								
F1-1	2	3.2	ND	ND	ND	ND	--	--
F1-2	4	3.5	--	--	--	--	--	--
F1-3	6	9.2	--	--	--	--	--	--
F1-4	9	29.8	--	--	--	--	--	--
F1-1,2,3,4	comp.	--	--	--	--	--	ND	ND
F2-1	1	3.9	ND	--	--	--	--	--
F2-2	3	5.3	--	--	--	--	--	--
F2-3	5	ND	ND	--	--	--	--	--
F3-1	1	ND	--	--	--	--	--	--
F3-2	3	3.2	--	--	--	--	--	--
F4-1	2	ND	--	--	--	--	--	--
F4-2	4	ND	--	--	--	--	--	--
F5-1	2	ND	ND	ND	ND	ND	ND	--
F5-2	4	ND	--	--	--	--	--	--
F13-1	2	ND	ND	--	--	--	ND	--
F14-1	1	4.4	--	--	--	--	ND	--
F14-2	3	6.5	--	--	--	--	--	--
F14-3	5	11.0	--	--	--	--	--	--
F15-1	1	4.1	--	--	--	--	--	--
F15-2	3	5.7	--	--	--	--	--	--
F15-3	4	4.2	--	--	--	--	--	--
F16-1	1	5.8	--	--	--	--	--	--
F16-2	3	4.5	--	--	--	--	--	--
F16-3	6	3.9	--	--	--	--	--	--
Average **		5.2	ND	ND	ND	ND	ND	ND
PARCEL T6								
F7-1	1	177.0	143	--	--	--	--	--
F7-2	3	11.9	--	--	--	--	--	--
F8-1	2	391.0	14	ND	ND	57	ND	note 1
F8-2	4	ND	--	--	--	--	--	--
F9-1	2	3.0	ND	--	--	--	ND	--
F10-1	2	4.0	ND	--	--	--	ND	--
F12-1A	1.5	172.0	126	ND	ND	71	ND	--
F12-1B	2	9.3	--	--	--	--	--	--
F12-2	5	4.3	--	--	--	--	--	--
F17-1	1	263.0	--	--	--	--	--	--
F17-2	3	15.8	--	--	--	--	--	--
F18-1	1	83.9	--	--	--	--	--	--
F18-2	5	21.7	--	--	--	--	--	--
F19-1	1	69.1	--	ND	ND	371	ND	--
F20-1	1	105.0	634	--	--	--	--	--
F21-1	4	80.6	--	--	--	--	ND	--
Average **		88.3	153.5	ND	ND	166.3	ND	--
Detection Limit		3.0	4	5	10	25	0.1	varies
Analytical Method:								
EPA Method		6010	418.1		8015 (Modified)		8080	8270

* all results reported as mg/kg (parts per million), ND = not detected, dashed where no analysis performed

** averages computed assuming ND values = 1/2 detection limit values

note 1. phenanthrene = 0.153 pppm, fluoranthene = 0.293 ppm, pyrene = 0.271 ppm, chrysene = 0.175 ppm

Table 2. Summary of Chemical Analytical Results for Metals in Fill Material
City Center Parcels T5 and T6, Oakland, California.

METAL	DETECTION LIMIT	SAMPLE F8-1	T5 SAMPLE F1-1,2,3,4 (composite)	TTLC
Silver	0.5	ND	ND	500
Arsenic	1.0	14.7	17.6	500
Barium	0.1	70.5	42.0	10,000
Beryllium	0.5	ND	ND	75
Cadmium	1.0	ND	ND	100
Cobalt	1.0	4.0	5.7	8,000
Chromium	0.5	36.6	33.3	2,500
Copper	0.5	24.9	8.2	2,500
Mercury	1.0	2.6	1.9	20
Molybdenum	1.0	ND	ND	3,500
Nickel	1.0	16.7	27.7	2,000
Lead	3.0	386.0	27.5	1,000
Antimony	3.0	3.3	3.6	500
Selenium	3.0	4.2	5.1	100
Thallium	1.0	36.4	44.7	700
Vanadium	0.5	17.4	22.3	2,400
Zinc	0.5	113.0	36.5	5,000

* all results reported as mg/kg (parts per million), ND = not detected,
TTLC = Total Threshold Limit Concentration

Table 3. Summary of Selected Chemical Analytical Results of Native Soil*, City Center Parcels T5 and T6, Oakland, California.

SAMPLE NUMBER	DEPTH (feet)	TOTAL LEAD	OIL AND GREASE
F1-5	13	5.5	ND
F3-3	5	ND	--
F5-3	6	ND	--
F6-1	2	ND	--
F7-3	5	3.1	--
F8-3	6	ND	--
F9-3	6	ND	--
F10-3	6	6.3	--
F11-1	2	ND	--
F13-2	4	ND	--
F15-4	6	ND	--
AVERAGE **		2.4	
Detection Limit		3.0	4
Analytical Method: EPA Method		6010	418.1

* all results reported as mg/kg (parts per million), ND = not detected, dashed where no analysis performed

** averages computed assuming ND values = 1/2 detection limit values

Table 4. Cost Estimate for Remedial Alternatives, City Center Parcels T5 and T6

Alternative	1	2	3	4	5
	Class II Direct Disp.	Bioremediate Class II Disp.	Incinerate	Lead Fixation Class II Disp.	Class I Direct Disp.
Excavation and Disposal					
Excavate	62,000	62,000	47,000	62,000	145,000
Haul	46,000	46,000	25,000	46,000	95,000
Bioremediation (3000 c.y.)		45,000			
Bioremediation Space Rental		54,000			
Lead Fixing Process				312,000	
Disposal	96,000	96,000	360,000	96,000	480,000
EXC. AND DISP. SUBTOTAL	$204,000	$303,000	$432,000	$516,000	$720,000
Contractor					
Mobe/Demobe	6,000	6,000	6,000	6,000	6,000
Site Preparation	40,000	40,000	40,000	40,000	40,000
Traffic Control	9,000	9,000	9,000	9,000	9,000
Health and Safety	2,200	2,200	2,200	2,200	2,200
CONTRACTOR SUBTOTAL	$57,200	$57,200	$57,200	$57,200	$57,200
WCC - Engineering and Consulting					
Contractor Selection	16,000	16,000	16,000	16,000	16,000
Soil Characterization	25,000	25,000	30,000	25,000	25,000
Project Management	30,000	30,000	30,000	30,000	30,000
Field Monitoring	20,000	20,000	20,000	20,000	20,000
Landfill and Reg. Corresp.	25,000	25,000	25,000	25,000	25,000
Closure	10,000	10,000	10,000	10,000	10,000
Reporting	20,000	20,000	20,000	20,000	20,000
WCC SUBTOTAL	$146,000	$146,000	$151,000	$146,000	$146,000
50% Contingency	$203,600	$253,100	$320,100	$359,600	$461,600
ESTIMATED PROJECT TOTAL COST	$610,800	$759,300	$960,300	$1,078,800	$1,384,800

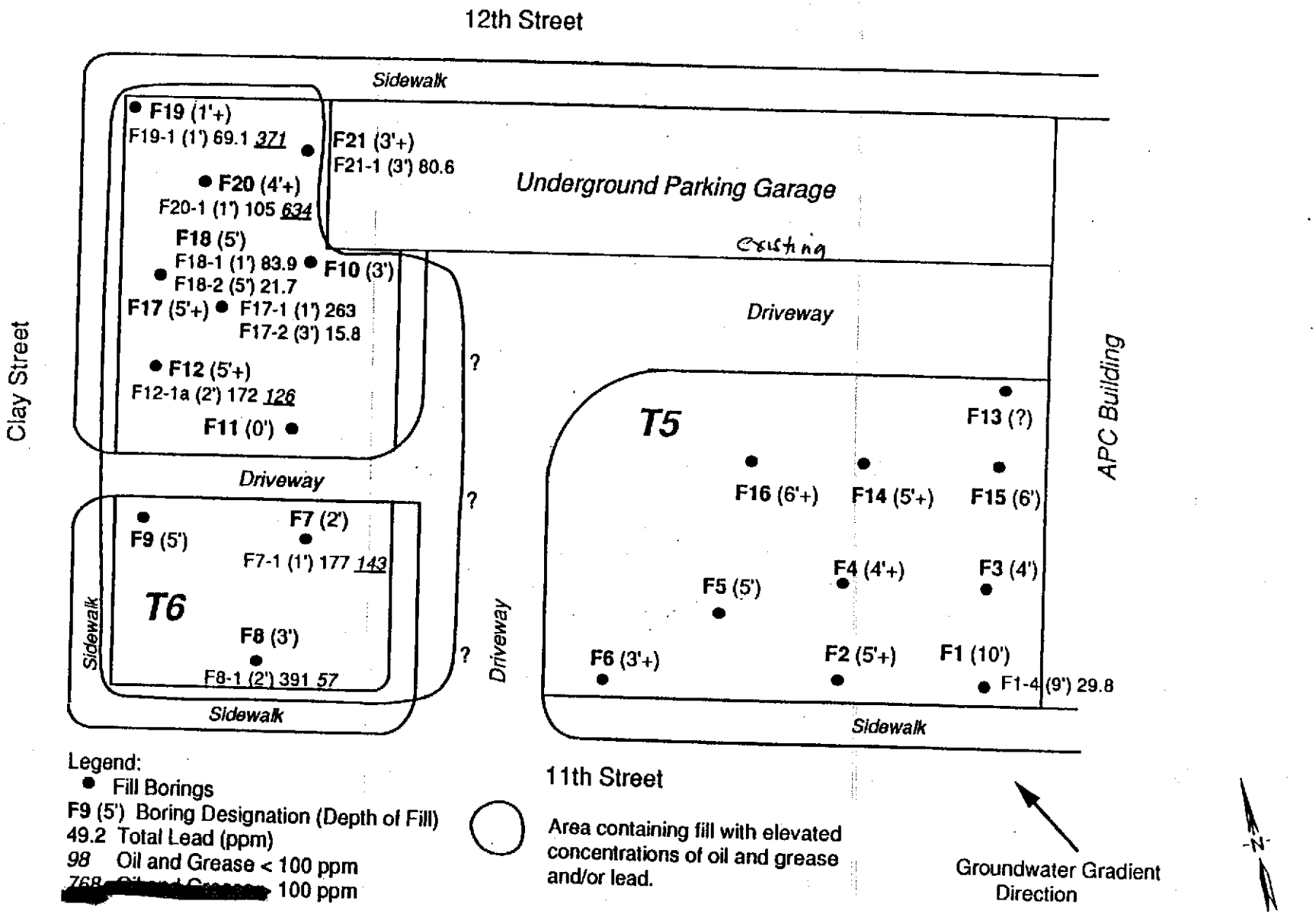
ASSUMPTIONS:

1) No additional contamination is encountered.
2) The landfill acceptance criteria do not change substantially from those currently in effect.
3) On-site segregation of soil can be accomplished effectively.
4) Estimated 2500 cubic yard volume of in-place contaminated fill is expected to yield 4000 bulk yards of material to be disposed weighing approximately 6000 tons.
5) The disposal and haul rates are based on 1991 rates and are not adjusted for inflation.

NOTES:

1) Zanker Landfill, San Jose no longer accepts materials from outside Santa Clara County.

Sample ID, depth, lead, TOG



Legend:
- ● Fill Borings
- F9 (5') Boring Designation (Depth of Fill)
- 49.2 Total Lead (ppm)
- 98 Oil and Grease < 100 ppm
- [redacted] 100 ppm

Area containing fill with elevated concentrations of oil and grease and/or lead.

Groundwater Gradient Direction

N

SCALE
0 50 FEET

Project No. 90C0039C	City Center ESA	T5/T6 Site Map	Figure 1
Woodward-Clyde Consultants			

APPENDIX A

SOIL BORING LOGS

Woodward-Clyde Consultants

PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F1	DATE STARTED / DATE FINISHED AUGUST 16, 1990
DRILLING AGENCY HEW Drilling / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT	COMPLETION DEPTH 13 Ft. / SAMPLER 2" Modified Calif. Type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 5 / DIST. 0 / UNDIST. 5
SIZE AND TYPE OF CASING NA	
TYPE OF PERFORATION NA / FROM TO Ft.	
SIZE AND TYPE OF PACK NA / FROM TO Ft.	WATER LEVEL NA / FIRST COMPL. 24 HRS.
TYPE OF SEAL NO. 1 NA / FROM TO Ft.	LOGGED BY W. Copeland / CHECKED BY
NO. 2 NA / FROM TO Ft.	

DEPTH (feet)	DESCRIPTION
	grass
	SAND (SP)
	medium brown, moist, no debris
	becomes siltier, slightly mottled brown and gray
5	contains fragments of brick, mortar, and gravel (fill)
	contains wood chips, mortar, and few gravels to 3/4" dia. (fill)
10	SILTY SAND (SM)
	mottled reddish brown and gray, moist (native soil)
	Bottom of Boring at 13 ft.
15	
20	
25	
30	
35	

DEPTH (feet)	SAMPLES: drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
5	1	F1-1		7 8	no visual evidence of contamination
	2	F1-2		3 3	
	3	F1-3		7 12	
10	4	F1-4		5 14	
	5	F1-5		23 26	
15					
20					
25					
30					
35					

Woodward-Clyde Consultants

PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F2	DATE STARTED / DATE FINISHED AUGUST 16, 1990
DRILLING AGENCY HEW Drilling / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT	COMPLETION DEPTH 5 Ft. / SAMPLER 2" Modified Calif. Type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 3 / DIST. 0 / UNDIST. 3
SIZE AND TYPE OF CASING NA	
TYPE OF PERFORATION NA / FROM / TO / Ft.	WATER LEVEL NA / FIRST / COMPL. / 24 HRS.
SIZE AND TYPE OF PACK NA / FROM / TO / Ft.	LOGGED BY W. Copeland / CHECKED BY
TYPE OF SEAL NO. 1 NA / FROM / TO / Ft.	
NO. 2 NA / FROM / TO / Ft.	

DEPTH (feet)	DESCRIPTION
	grass
	SAND (SP)
	mottled gray and brown, moist, little silt
	becomes wet, contains a very small brick fragment (fill)
5	Bottom of Boring at 5 ft.

DEPTH (feet)	SAMPLES: drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
5	1	F2-1		3 4	no visual evidence of contamination
	2	F2-2		4 4	
	3	F2-3		4 14	

Woodward-Clyde Consultants

PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F3	DATE STARTED / DATE FINISHED AUGUST 16, 1990
DRILLING AGENCY HEW Drilling / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT	COMPLETION DEPTH 5 Ft. / SAMPLER 2" Modified Calif. Type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 3 DIST. 0 UNDIST. 3
SIZE AND TYPE OF CASING NA	
TYPE OF PERFORATION NA / FROM TO Ft.	
SIZE AND TYPE OF PACK NA / FROM TO Ft.	WATER LEVEL NA FIRST COMPL. 24 HRS.
TYPE OF SEAL NO. 1 NA / FROM TO Ft.	LOGGED BY W. Copeland / CHECKED BY
NO. 2 NA / FROM TO Ft.	

DEPTH (feet)	DESCRIPTION
	grass
	SAND (SP) brown, moist, contains gravel up to 1/4" dia., small fragments of mortar (fill)
5	SILTY SAND (SM) mottled red brown and gray, moist (native soil)
	Bottom of Boring at 5 ft.

DEPTH (feet)	SAMPLES drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
5	1	F3-1			
	2	F3-2		8 14	
	3	F3-3		8 10	

10 15 20 25 30 35

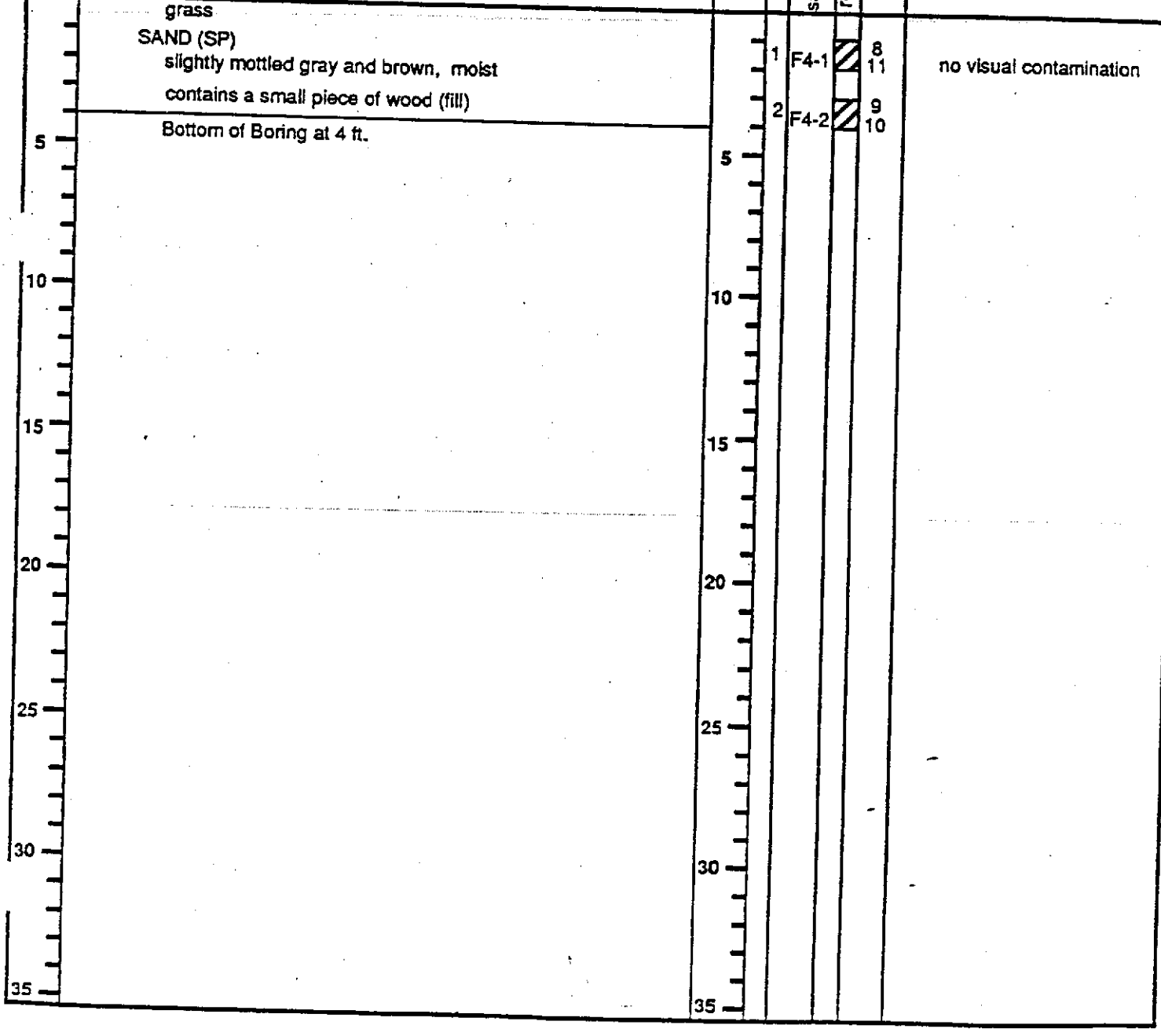
Woodward-Clyde Consultants

PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F4	DATE STARTED / DATE FINISHED AUGUST 16, 1990
DRILLING AGENCY HEW Drilling / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT	COMPLETION DEPTH 4 Ft. / SAMPLER 2" Modified Calif. Type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 2 / DIST. 0 / UNDIST. 2
SIZE AND TYPE OF CASING NA	WATER LEVEL NA / FIRST / COMPL. / 24 HRS.
TYPE OF PERFORATION NA / FROM / TO / Ft.	LOGGED BY W. Copeland / CHECKED BY
SIZE AND TYPE OF PACK NA / FROM / TO / Ft.	
TYPE OF SEAL NO. 1 NA / FROM / TO / Ft.	
NO. 2 NA / FROM / TO / Ft.	

DEPTH (feet)	DESCRIPTION
	grass
	SAND (SP)
	slightly mottled gray and brown, moist
	contains a small piece of wood (fill)
	Bottom of Boring at 4 ft.

DEPTH (feet)	SAMPLES drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
5	1	F4-1		8 11	no visual contamination
	2	F4-2		9 10	



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PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F5	DATE STARTED / DATE FINISHED AUGUST 16, 1990
DRILLING AGENCY HEW Drilling / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT	COMPLETION DEPTH 6 Ft / SAMPLER 2" Modified Calif. Type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 3 / DIST. 0 / UNDIST. 3
SIZE AND TYPE OF CASING NA	
TYPE OF PERFORATION NA / FROM / TO / Ft.	WATER LEVEL NA / FIRST / COMPL. / 24 HRS.
SIZE AND TYPE OF PACK NA / FROM / TO / Ft.	LOGGED BY W. Copeland / CHECKED BY
TYPE OF SEAL NO. 1 NA / FROM / TO / Ft.	
NO. 2 NA / FROM / TO / Ft.	

DEPTH (feet)	DESCRIPTION	DEPTH (feet)	SAMPLES drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
	grass						
	SAND (SP) brown, moist, trace of silt		1	F5-1		7 10	
			2	F5-2		6 5	
5	SILTY SAND (SM) mottled gray, brown, and red brown, wet (native)	5	3	F5-3		3 9	
	Bottom of Boring at 6 ft.						
10		10					
15		15					
20		20					
25		25					
30		30					
35		35					

Woodward-Clyde Consultants

PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F6	DATE STARTED / DATE FINISHED AUGUST 16, 1990
DRILLING AGENCY HEW Drilling / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT	COMPLETION DEPTH 3 Ft. / SAMPLER 2" Modified Calif. Type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 1 DIST. 0 UNDIST. 1
SIZE AND TYPE OF CASING NA	
TYPE OF PERFORATION NA / FROM TO Ft.	
SIZE AND TYPE OF PACK NA / FROM TO Ft.	WATER LEVEL NA FIRST COMPL. 24 HRS.
TYPE OF SEAL NO. 1 NA / FROM TO Ft.	LOGGED BY W. Copeland / CHECKED BY
NO. 2 NA / FROM TO Ft.	

DEPTH (feet)	DESCRIPTION	DEPTH (feet)	SAMPLES: drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
	grass						
	SAND (SP)						
	mottled gray and reddish brown, moist (native soil)		1	F6-1		10 13	
	encountered pipe (?), stopped drilling						
5	Bottom of Boring at 3 ft.	5					
10		10					
15		15					
20		20					
25		25					
30		30					
35		35					

Woodward-Clyde Consultants

PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F7	DATE STARTED / DATE FINISHED AUGUST 16, 1990
DRILLING AGENCY HEW Drilling / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT	COMPLETION DEPTH 5 Ft. / SAMPLER 2" Modified Calif. Type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 3 / DIST. 0 / UNDIST. 3
SIZE AND TYPE OF CASING NA	WATER LEVEL NA / FIRST / COMPL. / 24 HRS.
TYPE OF PERFORATION NA / FROM / TO / Ft.	LOGGED BY W. Copeland / CHECKED BY
SIZE AND TYPE OF PACK NA / FROM / TO / Ft.	
TYPE OF SEAL NO. 1 NA / FROM / TO / Ft.	
TYPE OF SEAL NO. 2 NA / FROM / TO / Ft.	

DEPTH (feet)	DESCRIPTION	DEPTH (feet)	SAMPLES drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
	grass						
	GRAVELLY SAND (SP) dark brown, moist, gravel up to 3/4" dia. (fill)		1	F7-1		*	* pushed sampler
	SAND (SP) dry		2	F7-2		5 5	
5	becomes light brown, damp, no gravel (native soil)	5	3	F7-3		9 11	
	Bottom of Boring at 5 ft.						
10		10					
15		15					
20		20					
25		25					
30		30					
35		35					

Woodward-Clyde Consultants

PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F8		DATE STARTED / DATE FINISHED	AUGUST 16, 1990
DRILLING AGENCY HEW Drilling	DRILLER	ELEVATION AND DATUM	NA
DRILLING EQUIPMENT			
DRILLING METHOD 6" Solid Auger	DRILL BIT NA	COMPLETION DEPTH 6 Ft.	SAMPLER 2" Modified Calif. Type
SIZE AND TYPE OF CASING NA		NO. OF SAMPLES 3 DIST. 0 UNDIST. 3	
TYPE OF PERFORATION NA	FROM TO Ft.		
SIZE AND TYPE OF PACK NA	FROM TO Ft.	WATER LEVEL NA FIRST COMPL. 24 HRS.	
TYPE OF SEAL NO. 1 NA	FROM TO Ft.	LOGGED BY W. Copeland	CHECKED BY
NO. 2 NA	FROM TO Ft.		

DEPTH (feet)	DESCRIPTION
	grass
	SAND (SP) dark brown, damp, trace of fine gravel and brick fragments (fill)
5	SAND (SP) light brown, dry, fine grained, black spots with orange rinds (native soil)
	Bottom of Boring at 6 ft.
10	
15	
20	
25	
30	
35	

DEPTH (feet)	SAMPLES drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
	1	F8-1		20 14	
	2	F8-2		11 7	
5	3	F8-3		10 17	
10					
15					
20					
25					
30					
35					

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PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F9	DATE STARTED / DATE FINISHED AUGUST 16, 1990
DRILLING AGENCY HEW Drilling / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT	COMPLETION DEPTH 6 Ft. / SAMPLER 2" Modified Calif. Type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 3 / DIST. 0 / UNDIST. 3
SIZE AND TYPE OF CASING NA	
TYPE OF PERFORATION NA / FROM TO Ft.	
SIZE AND TYPE OF PACK NA / FROM TO Ft.	WATER LEVEL NA / FIRST / COMPL. / 24 HRS.
TYPE OF SEAL NO. 1 NA / FROM TO Ft.	LOGGED BY W. Copeland / CHECKED BY
NO. 2 NA / FROM TO Ft.	

DEPTH (feet)	DESCRIPTION	SAMPLES: drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
	grass					
	SILTY SAND (SM) dark brown, wet, pieces of mortar and gravel up to 3/4" dia. (fill)	1	F9-1		3 3	
	becomes moist, lighter brown	2	F9-2		2 1	
5	becomes mottled red brown and gray tan, saturated (native soil)	3	F9-3		2 1	
	Bottom of Boring at 6 ft.					

10 15 20 25 30 35

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PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F10	DATE STARTED / DATE FINISHED AUGUST 16, 1990
DRILLING AGENCY HEW Drilling / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT	COMPLETION DEPTH 10 Ft. / SAMPLER 2" Modified Calif. Type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 3 DIST. 0 UNDIST. 3
SIZE AND TYPE OF CASING NA	
TYPE OF PERFORATION NA FROM TO Ft.	WATER LEVEL NA FIRST COMPL. 24 HRS.
SIZE AND TYPE OF PACK NA FROM TO Ft.	
TYPE OF SEAL NO. 1 NA FROM TO Ft.	LOGGED BY W. Copeland / CHECKED BY
NO. 2 NA FROM TO Ft.	

DEPTH (feet)	DESCRIPTION	DEPTH (feet)	SAMPLES drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
	SILTY SAND (SM) mottled gray and red brown, damp, contains brick fragments and trace of fine gravel (fill)		1	F10-1		3 3	
5	SILTY SAND (SM) mottled gray and red brown, damp (native soil)	5	2	F10-2		2 1	
			3	F10-3		2 1	
10	Bottom of Boring at 10 ft.	10					
15		15					
20		20					
25		25					
30		30					
35		35					

Woodward-Clyde Consultants

PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F11	DATE STARTED / DATE FINISHED AUGUST 16, 1990
DRILLING AGENCY HEW Drilling / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT	COMPLETION DEPTH 4 Ft. / SAMPLER 2" Modified Calif. Type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 1 DIST. 0 UNDIST. 1
SIZE AND TYPE OF CASING NA	
TYPE OF PERFORATION NA / FROM TO Ft.	
SIZE AND TYPE OF PACK NA / FROM TO Ft.	WATER LEVEL NA FIRST COMPL. 24 HRS.
TYPE OF SEAL NO. 1 NA / FROM TO Ft.	LOGGED BY W. Copeland / CHECKED BY
NO. 2 NA / FROM TO Ft.	

DEPTH (feet)	DESCRIPTION	DEPTH (feet)	SAMPLES: drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
	grass SILTY SAND (SM) light brown with black spots with orange rinds, damp, (native soil)		1	F11-1			
			2			17 22	
5	Bottom of Boring at 4 ft.	5					
10		10					
15		15					
20		20					
25		25					
30		30					
35		35					

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PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F12		DATE STARTED / DATE FINISHED	AUGUST 16, 1990
DRILLING AGENCY HEW Drilling	DRILLER	ELEVATION AND DATUM	NA
DRILLING EQUIPMENT		COMPLETION DEPTH 5 Ft	SAMPLER 2" Modified Calif. Type
DRILLING METHOD 6" Solid Auger	DRILL BIT NA	NO. OF SAMPLES 3	DIST. 0 / UNDIST. 3
SIZE AND TYPE OF CASING NA		WATER LEVEL NA	FIRST / COMPL. / 24 HRS.
TYPE OF PERFORATION NA	FROM TO Ft.	LOGGED BY W. Copeland	CHECKED BY
SIZE AND TYPE OF PACK NA	FROM TO Ft.		
TYPE OF SEAL NO. 1 NA	FROM TO Ft.		
NO. 2 NA	FROM TO Ft.		

DEPTH (feet)	DESCRIPTION	DEPTH (feet)	SAMPLES: drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
	grass						
	SILTY SAND (SM)						
	F12-1A: dark brown, damp, contains bricks, solid bricks up to 4 ft. (fill)		1	F12 -1A		6	moved 2 ft. east and redrilled
	F12-1B: mottled brown and red brown, (fill)			-1B		6	
5		5	2	F12 -2			moved 10 ft. east and redrilled
	Bottom of Boring at 5 ft.						
10		10					
15		15					
20		20					
25		25					
30		30					
35		35					

Woodward-Clyde Consultants

PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F13		DATE STARTED / DATE FINISHED	AUGUST 16, 1990
DRILLING AGENCY HEW Drilling	DRILLER	ELEVATION AND DATUM	NA
DRILLING EQUIPMENT		COMPLETION DEPTH 4 Ft.	SAMPLER 2" Modified Calif. Type
DRILLING METHOD 6" Solid Auger	DRILL BIT NA	NO. OF SAMPLES 2	DIST. 0 / UNDIST. 2
SIZE AND TYPE OF CASING NA		WATER LEVEL NA	FIRST / COMPL. / 24 HRS.
TYPE OF PERFORATION NA	FROM TO Ft.	LOGGED BY W. Copeland	CHECKED BY
SIZE AND TYPE OF PACK NA	FROM TO Ft.		
TYPE OF SEAL NO. 1 NA	FROM TO Ft.		
NO. 2 NA	FROM TO Ft.		

DEPTH (feet)	DESCRIPTION	DEPTH (feet)	SAMPLES: drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
	grass						
	SAND (SP)						
	light to medium brown, moist, trace of gravel to 1/4" dia. (fill?)		1	F13 -1		7 15	no evidence of contamination
	becomes slightly mottled brown and red brown (native soil)		2	F13 -2		18 23	
5	Bottom of Boring at 4 ft.	5					
10		10					
15		15					
20		20					
25		25					
30		30					
35		35					

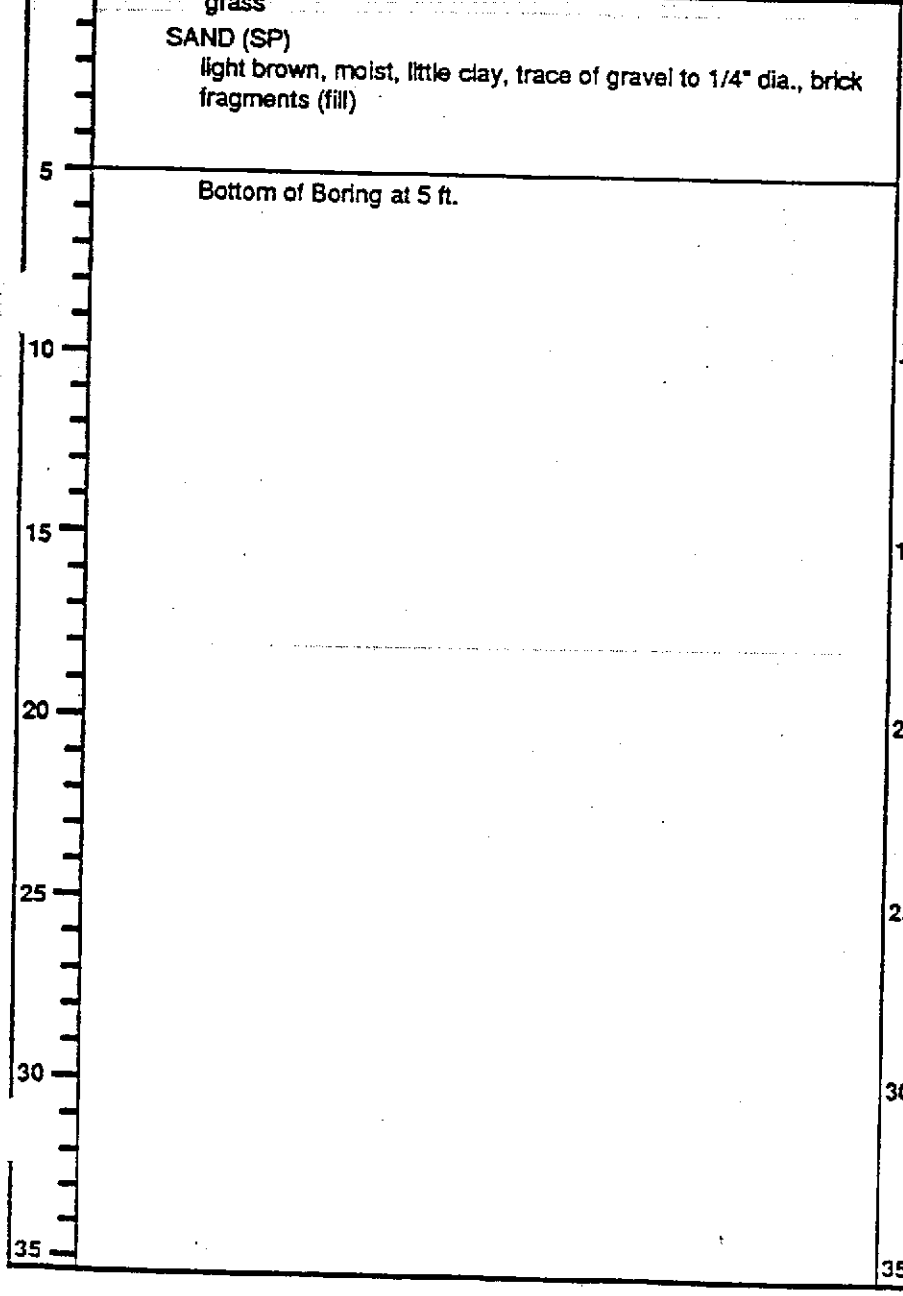
Woodward-Clyde Consultants

PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F14	DATE STARTED / DATE FINISHED AUGUST 17, 1990
DRILLING AGENCY / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT small hand-held rotary auger	COMPLETION DEPTH 5 Ft / SAMPLER 2" hand driven type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 3 / DIST. 0 / UNDIST. 3
SIZE AND TYPE OF CASING NA	
TYPE OF PERFORATION NA FROM TO Ft.	
SIZE AND TYPE OF PACK NA FROM TO Ft.	WATER LEVEL NA FIRST COMPL. 24 HRS.
TYPE OF SEAL NO. 1 NA FROM TO Ft.	LOGGED BY W. Copeland / CHECKED BY
NO. 2 NA FROM TO Ft.	

DEPTH (feet)	DESCRIPTION
	grass
	SAND (SP) light brown, moist, little clay, trace of gravel to 1/4" dia., brick fragments (fill)
5	Bottom of Boring at 5 ft.

DEPTH (feet)	SAMPLES: drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
1	1	F14 -1			sampler hand-driven 6 inches for each sample
2	2	F14 -2			
3	3	F14 -3			
5					



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PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F15	DATE STARTED / DATE FINISHED AUGUST 17, 1990
DRILLING AGENCY / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT small hand-held rotary auger	COMPLETION DEPTH 6 Ft. / SAMPLER 2" hand driven type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 4 (DIST. 0, UNDIST. 4)
SIZE AND TYPE OF CASING NA	
TYPE OF PERFORATION NA / FROM / TO / Ft.	WATER LEVEL NA FIRST / COMPL. / 24 HRS.
SIZE AND TYPE OF PACK NA / FROM / TO / Ft.	
TYPE OF SEAL NO. 1 NA / FROM / TO / Ft.	LOGGED BY D. Simpson / CHECKED BY
NO. 2 NA / FROM / TO / Ft.	

DEPTH (feet)	DESCRIPTION
	grass
	SAND (SP) light brown, little clay, gravel, concrete and brick fragments to 1-1/2" dia. (fill)
5	SILTY SAND (SM) mottled gray brown and red brown (native soil)
	Bottom of Boring at 6 ft.
10	
15	
20	
25	
30	
35	

DEPTH (feet)	SAMPLES: drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
5	1	F15-1			sampler hand-driven 6 inches for each sample
	2	F15-2			
	3	F15-3			
	4	F15-4			
10					
15					
20					
25					
30					
35					

Woodward-Clyde Consultants

PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F16	DATE STARTED / DATE FINISHED AUGUST 17, 1990
DRILLING AGENCY / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT small hand-held rotary auger	COMPLETION DEPTH 6 Ft. / SAMPLER 2" hand driven type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 3 / DIST. 0 / UNDIST. 3
SIZE AND TYPE OF CASING NA	
TYPE OF PERFORATION NA / FROM / TO / Ft.	
SIZE AND TYPE OF PACK NA / FROM / TO / Ft.	WATER LEVEL NA / FIRST / COMPL. / 24 HRS.
TYPE OF SEAL NO. 1 NA / FROM / TO / Ft.	LOGGED BY D. Simpson / CHECKED BY
NO. 2 NA / FROM / TO / Ft.	

DEPTH (feet)	DESCRIPTION
	grass
	CLAYEY SAND (SC) light brown, contains brick and asphaltic concrete fragments to 1-1/2" dia. (fill)
5	
	Bottom of Boring at 6 ft.
10	
15	
20	
25	
30	
35	

DEPTH (feet)	SAMPLES: drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
	1	F16-1			sampler hand-driven 6 inches for each sample
	2	F16-2			
5	3	F16-3			
10					
15					
20					
25					
30					
35					

Woodward-Clyde Consultants

PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F17	DATE STARTED / DATE FINISHED AUGUST 17, 1990
DRILLING AGENCY / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT small hand-held rotary auger	COMPLETION DEPTH 5-1/2 Ft. / SAMPLER 2" hand driven type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 2 DIST. 0 UNDIST. 2
SIZE AND TYPE OF CASING NA	
TYPE OF PERFORATION NA FROM TO Ft.	WATER LEVEL NA FIRST COMPL. 24 HRS.
SIZE AND TYPE OF PACK NA FROM TO Ft.	LOGGED BY D. Simpson / CHECKED BY
TYPE OF SEAL NO. 1 NA FROM TO Ft.	
NO. 2 NA FROM TO Ft.	

DEPTH (feet)	DESCRIPTION
	grass
	GRAVELLY SILTY SAND (SP-SM) dark brown, very slightly moist, contains brick fragments (fill)
	SAND with CLAY (SP-SC) light brown and gray, very slightly moist, contains brick fragments and plastic (fill)
5	Bottom of Boring at 5-1/2 ft.
10	
15	
20	
25	
30	
35	

DEPTH (feet)	SAMPLES drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
	1	F17-1			sampler hand-driven 6 inches for each sample
	2	F17-2			50% recovery from F17-1
5	3				
10					
15					
20					
25					
30					
35					

Woodward-Clyde Consultants

PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F18	DATE STARTED / DATE FINISHED AUGUST 17, 1990
DRILLING AGENCY / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT small hand-held rotary auger	COMPLETION DEPTH 5-1/2 Ft. / SAMPLER 2" hand driven type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 2 DIST. 0 UNDIST. 2
SIZE AND TYPE OF CASING NA	WATER LEVEL NA FIRST COMPL. 24 HRS.
TYPE OF PERFORATION NA FROM TO Ft.	LOGGED BY D. Simpson / CHECKED BY
SIZE AND TYPE OF PACK NA FROM TO Ft.	
TYPE OF SEAL NO. 1 NA FROM TO Ft.	
NO. 2 NA FROM TO Ft.	

DEPTH (feet)	DESCRIPTION	DEPTH (feet)	SAMPLES: drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
0	GRAVELLY SILTY SAND (SP-SM) dark brown, moist, contains brick fragments and cobbles (fill)	0	1	F18-1			sampler hand-driven 6 inches for each sample 0% recovery from F18-1, sample was hand-packed
5	SAND with CLAY (SP-SC) red brown, moist (native soil) Bottom of Boring at 5-1/2 ft.	5	2	F18-2			
10		10					
15		15					
20		20					
25		25					
30		30					
35		35					

Woodward-Clyde Consultants

PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F19	DATE STARTED / DATE FINISHED AUGUST 17, 1990
DRILLING AGENCY / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT small hand-held rotatary auger	COMPLETION DEPTH 1 Ft. / SAMPLER 2" hand driven type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 1 / DIST. 0 / UNDIST. 1
SIZE AND TYPE OF CASING NA	
TYPE OF PERFORATION NA / FROM / TO / Ft.	WATER LEVEL NA / FIRST / COMPL. / 24 HRS.
SIZE AND TYPE OF PACK NA / FROM / TO / Ft.	LOGGED BY D. Simpson / CHECKED BY
TYPE OF SEAL NO. 1 NA / FROM / TO / Ft.	
NO. 2 NA / FROM / TO / Ft.	

DEPTH (feet)	DESCRIPTION	DEPTH (feet)	SAMPLES: drive no.	SAMPLES: sample no.	SAMPLES: recov. (ft)	SAMPLES: blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
0	GRAVEL with CLAY and SAND (GW-GC) light and dark brown, dry, very hard drilling (fill)	0	1	F19 -1			0% recovery from F19-1, sample was hand-packed drill refusal at 1 ft. depth
1	Bottom of Boring at 1 ft.	1					
5		5					
10		10					
15		15					
20		20					
25		25					
30		30					
35		35					

Woodward-Clyde Consultants

PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F20	DATE STARTED / DATE FINISHED AUGUST 17, 1990
DRILLING AGENCY / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT small hand-held rotary auger	COMPLETION DEPTH 4 Ft. / SAMPLER 2" hand driven type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 1 DIST. 0 UNDIST. 1
SIZE AND TYPE OF CASING NA	
TYPE OF PERFORATION NA FROM TO Ft.	WATER LEVEL NA FIRST COMPL. 24 HRS.
SIZE AND TYPE OF PACK NA FROM TO Ft.	
TYPE OF SEAL NO. 1 NA FROM TO Ft.	LOGGED BY D. Simpson / CHECKED BY
NO. 2 NA FROM TO Ft.	

DEPTH (feet)	DESCRIPTION	DEPTH (feet)	SAMPLES: drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
	GRAVEL with SILT and SAND (GP-GM) dark brown and gray, very slightly moist, contains large cobbles (fill)		1	F20 -1			0% recovery from F20-1, sample was hand-packed
5	Bottom of Boring at 4 ft.	5					
10		10					
15		15					
20		20					
25		25					
30		30					
35		35					

Woodward-Clyde Consultants

PROJECT NAME CITY CENTER T5 No. 90C0039C

BORING NUMBER F21	DATE STARTED / DATE FINISHED AUGUST 17, 1990
DRILLING AGENCY / DRILLER	ELEVATION AND DATUM NA
DRILLING EQUIPMENT small hand-held rotary auger	COMPLETION DEPTH 3 Ft. / SAMPLER 2" hand driven type
DRILLING METHOD 6" Solid Auger / DRILL BIT NA	NO. OF SAMPLES 1 / DIST. 0 / UNDIST. 1
SIZE AND TYPE OF CASING NA	WATER LEVEL NA / FIRST / COMPL. / 24 HRS.
TYPE OF PERFORATION NA FROM TO Ft.	LOGGED BY D. Simpson / CHECKED BY
SIZE AND TYPE OF PACK NA FROM TO Ft.	
TYPE OF SEAL NO. 1 NA FROM TO Ft.	
NO. 2 NA FROM TO Ft.	

DEPTH (feet)	DESCRIPTION	DEPTH (feet)	SAMPLES: drive no.	sample no.	recov. (ft)	blow counts	REMARKS (Drill rate, Fluid Loss, Odor, etc.)
	GRAVEL with CLAY and SAND (GP-GC) medium brown, moist, contains some large cobbles, brick, concrete, and asphaltic concrete fragments, very hard drilling (fill)		1	F21 -1			0% recovery from F21-1, sample was hand-packed
5	Bottom of Boring at 3 ft.	5					
10		10					
15		15					
20		20					
25		25					
30		30					
35		35					

APPENDIX B

CHEMICAL ANALYTICAL RESULTS

EUREKA LABORATORIES, INC.

Corporate Office:
6790 FLORIN PERKINS ROAD
SACRAMENTO, CA 95828
TEL: (916) 381-7953
FAX: (916) 381-4013

Branch Office:
12121 NORTHUP WAY, SUITE 212
BELLEVUE, WA 98005
TEL: (206) 885-0284
FAX: (206) 885-6162

Air Pollution
Chemical Analysis,
Research & Testing
Environmental Studies
Robotics
Toxicology

September 6, 1990

Bill Copeland
WOODWARD-CLYDE CONSULTANTS
500 12th Street, Suite 100
Oakland, CA 94607

Reference: ELI No: 90-08-215
Project #: 90C0039C

Dear Mr. Copeland:

Eureka Laboratories, Inc. is pleased to submit a laboratory report for the subject project. This report presents analytical results for fifty-three (53) soil samples for the following analyses:

ANALYSIS	METHOD	SAMPLE ID.
TTLC/CAM Metals	EPA 6010	F1-1,2,3,4 COMPOSITE, F8-1
Semi-Volatile Compound	EPA 8270	same as above
Polychlorinated Biphenyls (PCB)	EPA 8080	F1-1,2,3,4 COMPOSITE, F5-1, F8-1, F9-1, F10-1, F12-1A, F13-1, F14-1, F19-1, F21-1
Oil & Grease	EPA 413.2 (Gravimetric)	F1-1, F1-5, F2-1, F2-3, F5-1, F7-1, F8-1, F9-1, F10-1, F12-1A, F13-1, F20-1
Total Recoverable Hydrocarbons	EPA 418.1	same as above
Lead	EPA 6010	F1-1, F1-2, F1-3, F1-4, F1-5, F2-1, F2-2, F2-3, F3-3, F4-1, F4-2, F5-1, F5-2, F5-3, F6-1, F7-1, F7-2, F7-3, F8-1, F8-2, F8-3, F9-1, F9-2, F9-3, F10-1, F10-2 *, F10-3, F11-1, F12-1A, F12-1B, F12-2, F13-2, F14-1, F14-2, F14-3, F15-1, F15-2, F15-3, F15-4, F16-1, F16-2, F16-3, F17-1, F17-2, F18-1, F18-2, F19-1, F20-1, F21-1, F3-1, F3-2, F13-1

ANALYSIS	METHOD	SAMPLE ID.
Total Petroleum Hydrocarbons	EPA 8015 (Modified)	F1-1, F5-1, F8-1, F12-1A, F19-1

Sincerely,
EUREKA LABORATORIES, INC.

By: Shao-Pin Yo, Ph.D. for
Laboratory Director

SPY/jj

Attachment

TTLC/CAM Metals, EPA Method 6010

EUREKA LABORATORIES, INC.
6790 Florin-Perkins Road
Sacramento, CA 95828
(916) 381-7953

Order No: 90-08-215
Hazardous Waste Testing
Certification: E765

CLIENT: WOODWARD-CLYDE
PROJECT #: 90C0039D
SAMPLE ID: BLANK

DATE RECEIVED: 08/22/1990
DATE EXTRACTED: 09/04/1990
DATE COMPLETED: 09/05/1990

	CONCENTRATION [mg/Kg (ppm)]	DETECTION LIMIT [mg/Kg (ppm)]
Silver	<0.5	0.5
Arsenic	<1.0	1.0
Barium	<0.1	0.1
Beryllium	<0.5	0.5
Cadmium	<1.0	1.0
Cobalt	<1.0	1.0
Chromium	<0.5	0.5
Copper	<0.5	0.5
Mercury	<1.0	1.0
Molybdenum	<1.0	1.0
Nickel	<1.0	1.0
Lead	<3.0	3.0
Antimony	<3.0	3.0
Selenium	<3.0	3.0
Thallium	<1.0	1.0
Vanadium	<0.5	0.5
Zinc	<0.5	0.5

This detection limit for soil is based on the dilution factor of 50.

The determinations of Mercury, Arsenic, and Selenium by methods 6010 or 200.7 are subjected to many interferences. For more accurate determinations for the above three metals, Atomic Absorption Spectrometric methods are recommended. ICP may be used for scanning or for reference purposes for the three metals only.

Josie Quiambao — September 6, 1990
Josie Quiambao, Chemist — Date

TTLC/CAM Metals, EPA Method 6010

EUREKA LABORATORIES, INC.
6790 Florin-Perkins Road
Sacramento, CA 95828
(916) 381-7953

Order No: 90-08-215
Hazardous Waste Testing
Certification: E765

CLIENT: WOODWARD-CLYDE
PROJECT #: 90C0039D
SAMPLE ID: F1-1,F1-2,F1-3,F1-4 COMPOSITE

DATE RECEIVED: 08/22/1990
DATE EXTRACTED: 09/04/1990
DATE COMPLETED: 09/05/1990
DATE SAMPLED: 08/16/1990

	CONCENTRATION [mg/Kg (ppm)]	DETECTION LIMIT [mg/Kg (ppm)]
Silver	<0.5	0.5
Arsenic	17.6	1.0
Barium	42.0	0.1
Beryllium	<0.5	0.5
Cadmium	<1.0	1.0
Cobalt	5.7	1.0
Chromium	33.3	0.5
Copper	8.2	0.5
Mercury	1.9	1.0
Molybdenum	<1.0	1.0
Nickel	27.7	1.0
Lead	27.5	3.0
Antimony	3.6	3.0
Selenium	5.1	3.0
Thallium	44.7	1.0
Vanadium	22.3	0.5
Zinc	36.5	0.5

This detection limit for soil is based on the dilution factor of 50.

The determinations of Mercury, Arsenic, and Selenium by methods 6010 or 200.7 are subjected to many interferences. For more accurate determinations for the above three metals, Atomic Absorption Spectrometric methods are recommended. ICP may be used for scanning or for reference purposes for the three metals only.

Josie Quiambao — September 6, 1990
Josie Quiambao, Chemist — Date

TTLC/CAM Metals, EPA Method 6010

EUREKA LABORATORIES, INC.
6790 Florin-Perkins Road
Sacramento, CA 95828
(916) 381-7953

Order No: 90-08-215
Hazardous Waste Testing
Certification: E765

CLIENT: WOODWARD-CLYDE
PROJECT #: 90C0039D
SAMPLE ID: F8-1

DATE RECEIVED: 08/22/1990
DATE EXTRACTED: 09/04/1990
DATE COMPLETED: 09/05/1990
DATE SAMPLED: 08/16/1990

	CONCENTRATION [mg/Kg (ppm)]	DETECTION LIMIT [mg/Kg (ppm)]
Silver	<0.5	0.5
Arsenic	14.7	1.0
Barium	70.5	0.1
Beryllium	<0.5	0.5
Cadmium	<1.0	1.0
Cobalt	4.0	1.0
Chromium	36.6	0.5
Copper	24.9	0.5
Mercury	2.6	1.0
Molybdenum	<1.0	1.0
Nickel	16.7	1.0
Lead	386	3.0
Antimony	3.3	3.0
Selenium	4.2	3.0
Thallium	36.4	1.0
Vanadium	17.4	0.5
Zinc	113	0.5

This detection limit for soil is based on the dilution factor of 50.

The determinations of Mercury, Arsenic, and Selenium by methods 6010 or 200.7 are subjected to many interferences. For more accurate determinations for the above three metals, Atomic Absorption Spectrometric methods are recommended. ICP may be used for scanning or for reference purposes for the three metals only.

Josie Quiambao — September 6, 1990
Josie Quiambao, Chemist — Date

TTLC/CAM Metals, EPA Method 6010

EUREKA LABORATORIES, INC.
6790 Florin-Perkins Road
Sacramento, CA 95828
(916) 381-7953

Order No: 90-08-215
Hazardous Waste Testing
Certification: E765

CLIENT: WOODWARD-CLYDE
PROJECT #: 90C0039D
SAMPLE ID: MATRIX SPIKE RECOVERY

DATE RECEIVED: 08/22/1990
DATE EXTRACTED: 09/04/1990
DATE COMPLETED: 09/05/1990

	SPIKE RECOVERY
Silver	72%
Arsenic	81%
Barium	75%
Beryllium	85%
Cadmium	77%
Cobalt	71%
Chromium	74%
Copper	90%
Mercury	75%
Molybdenum	78%
Nickel	74%
Lead	77%
Antimony	72%
Selenium	84%
Thallium	72%
Vanadium	75%
Zinc	75%

Josie Quiambao
Josie Quiambao
Chemist

September 6, 1990
Date

TTLC/CAM Metals, EPA Method 6010

EUREKA LABORATORIES, INC.
6790 Florin-Perkins Road
Sacramento, CA 95828
(916) 381-7953

Order No: 90-08-215
Hazardous Waste Testing
Certification: E765

CLIENT: WOODWARD-CLYDE
PROJECT #: 90C0039D
SAMPLE ID: MATRIX SPIKE RECOVERY DUPLICATE

DATE RECEIVED: 08/22/1990
DATE EXTRACTED: 09/04/1990
DATE COMPLETED: 09/05/1990

SPIKE RECOVERY

Silver	72%
Arsenic	77%
Barium	74%
Beryllium	84%
Cadmium	75%
Cobalt	70%
Chromium	73%
Copper	88%
Mercury	73%
Molybdenum	74%
Nickel	74%
Lead	76%
Antimony	71%
Selenium	82%
Thallium	69%
Vanadium	72%
Zinc	75%

Josie Quiambao — September 6, 1990
Josie Quiambao, Chemist — Date

ORGANIC ANALYSIS REPORT
Semi-Volatile Compound, EPA Method 8270

EUREKA LABORATORIES, INC.
6790 Florin Perkins Road
Sacramento, CA 95828
(916)381-7953

Order No.: 90-08-215
Hazardous Waste Testing
Certification No.: E765

CLIENT: WOODWARD-CLYDE CONSULTANTS
SAMPLE ID: F1-1,F1-2,F1-3,F1-4 COMP
REPORT UNIT: ppb (ug/Kg)
SAMPLE LOCATION:

DATE SAMPLED: 08/16/90
DATE RECEIVED: 08/22/90
DATE EXTRACTED: 08/28/90
DATE COMPLETED: 08/29/90
DILUTION FACTOR: 1.00

CAS#	COMPOUND	RESULT	DET.LIMIT
I. PRIORITY POLLUTANT ACID COMPOUNDS			
108-95-2	Phenol	ND	150
95-57-8	2-Chlorophenol	ND	150
88-75-5	2-Nitrophenol	ND	150
105-67-9	2,4-Dimethylphenol	ND	150
120-83-2	2,4-Dichlorophenol	ND	150
59-50-7	4-Choro-3-methylphenol	ND	150
88-06-2	2,4,6-Trichlorophenol	ND	150
51-28-5	2,4-Dinitrophenol	ND	800
100-02-7	4-Nitrophenol	ND	800
534-52-1	2-Methyl-4,6-Dinitrophenol	ND	800
87-86-5	Pentachlorophenol	ND	150
II. PRIORITY POLLUTANT BASE/NEUTRAL COMPOUNDS			
62-75-9	N-Nitrosodimethylamine	ND	150
111-44-4	Bis(2-Chloroethyl)ether	ND	150
541-73-1	1,3-Dichlorobenzene	ND	150
95-50-1	1,2-Dichlorobenzene	ND	150
106-46-7	1,4-Dichlorobenzene	ND	150
118-74-1	Hexachlorobenzene	ND	150
67-72-1	Hexachloroethane	ND	150
621-64-7	N-Nitrosodi-n-propylamine	ND	150
98-95-3	Nitrobenzene	ND	150
117-84-0	Di-n-octyl phthalate	ND	150
120-82-1	1,2,4-Trichlorobenzene	ND	150
91-20-3	Naphthalene	ND	150
87-68-3	Hexachlorobutadiene	ND	150
91-57-6	2-Methylnaphthalene	ND	150
77-47-4	Hexachlorocyclopentadiene	ND	150
91-58-7	2-Chloronaphthalene	ND	150
131-11-3	Dimethyl phthalate	ND	150
208-96-8	Acenaphthylene	ND	150
83-32-9	Acenaphthene	ND	150
121-14-2	2,4-Dinitrotoluene	ND	300
606-20-2	2,6-Dinitrotoluene	ND	300
86-73-7	Fluorene	ND	150
84-66-2	Diethyl phthalate	ND	150
7005-72-3	4-Chlorophenyl phenyl ether	ND	150
86-30-6	N-Nitrosodiphenylamine	ND	300
101-55-3	4-Bromophenyl phenyl ether	ND	150

ORGANIC ANALYSIS REPORT
Semi-Volatile Compound, EPA Method 8270

CLIENT: WOODWARD-CLYDE CONSULTANTS Order No.: 90-08-215
SAMPLE ID: F1-1,F1-2,F1-3,F1-4 COMP

39638-32-9	Bis(2-Chloroisopropyl)ether	ND	150
85-01-8	Phenanthrene	ND	150
120-12-7	Anthracene	ND	150
84-74-2	Di-n-butyl phthalate	ND	150
206-44-0	Fluoranthene	ND	150
92-87-5	Benzidine	ND	1200
111-91-1	Bis(2-Chloroethoxy)methane	ND	300
129-00-0	Pyrene	ND	150
85-68-7	Butyl benzyl phthalate	ND	150
91-94-1	3,3-Dichlorobenzidine	ND	300
218-01-9	Chrysene	ND	150
56-55-3	Benzo(a)anthracene	ND	150
117-81-7	Bis(2-Ethylhexyl)phthalate	ND	1000
207-08-9	Benzo(k)fluoranthene	ND	150
205-99-2	Benzo(b)fluoranthene	ND	150
50-32-8	Benzo(a)pyrene	ND	150
193-39-5	Indeno(1,2,3-cd)pyrene	ND	150
53-70-3	Dibenzo(a,h)anthracene	ND	150
191-24-2	Benzo(g,h,i)perylene	ND	150
78-59-1	Isophorone	ND	150

III. PESTICIDES

319-84-6	a-BHC	ND	500
58-89-9	g-BHC	ND	500
319-85-7	b-BHC	ND	500
319-86-8	d-BHC	ND	500
76-44-8	Heptachlor	ND	500
309-00-2	Aldrin	ND	500
1024-57-3	Heptachlor epoxide	ND	500
60-57-1	Dieldrin	ND	500
72-55-9	4,4'-DDE	ND	500
959-98-8	Endosulfan I	ND	1000
33213-65-9	Endosulfan II	ND	1000
72-20-8	Endrin	ND	1000
72-54-8	4,4'-DDD	ND	500
50-29-3	4,4'-DDT	ND	500
1031-07-8	Endosulfan sulfate	ND	1000
57-74-9	Chlorodane	ND	5000
8001-35-2	Toxaphene	ND	10000
	PCB	ND	10000

IV. HAZARDOUS SUBSTANCES LIST

62-53-3	Aniline	ND	150
100-51-6	Benzyl alcohol	ND	150
95-48-7	o-Cresol	ND	150
106-44-5	p-Cresol	ND	150
65-85-0	Benzoic acid	ND	800
106-47-8	4-Chloroaniline	ND	150

ORGANIC ANALYSIS REPORT
Semi-Volatile Compound, EPA Method 8270

CLIENT: WOODWARD-CLYDE CONSULTANTS Order No.: 90-08-215
SAMPLE ID: F1-1,F1-2,F1-3,F1-4 COMP

95-95-4	2,4,5-Trichlorophenol	ND	800
88-74-4	2-Nitroaniline	ND	800
99-09-2	3-Nitroaniline	ND	800
132-64-9	Dibenzofuran	ND	150
100-01-6	4-Nitroaniline	ND	800

Chemist Chung P Li
Chung P. Li, Ph.D.

09/01/90
Date

ND=NOT DETECTED AT OR BELOW DETECTION LIMIT
NA=NOT AVAILABLE

ORGANIC ANALYSIS REPORT
Semi-Volatile Compound, EPA Method 8270

EUREKA LABORATORIES, INC.
6790 Florin Perkins Road
Sacramento, CA 95828
(916)381-7953

Order No.: 90-08-215
Hazardous Waste Testing
Certification No.: E765

CLIENT: WOODWARD-CLYDE CONSULTANTS
SAMPLE ID: F8-1
REPORT UNIT: ppb (ug/Kg)
SAMPLE LOCATION:

DATE SAMPLED: 08/16/90
DATE RECEIVED: 08/22/90
DATE EXTRACTED: 08/28/90
DATE COMPLETED: 08/29/90
DILUTION FACTOR: 1.00

CAS#	COMPOUND	RESULT	DET.LIMIT
I. PRIORITY POLLUTANT ACID COMPOUNDS			
108-95-2	Phenol	ND	150
95-57-8	2-Chlorophenol	ND	150
88-75-5	2-Nitrophenol	ND	150
105-67-9	2,4-Dimethylphenol	ND	150
120-83-2	2,4-Dichlorophenol	ND	150
59-50-7	4-Choro-3-methylphenol	ND	150
88-06-2	2,4,6-Trichlorophenol	ND	150
51-28-5	2,4-Dinitrophenol	ND	800
100-02-7	4-Nitrophenol	ND	800
534-52-1	2-Methyl-4,6-Dinitrophenol	ND	800
87-86-5	Pentachlorophenol	ND	150
II. PRIORITY POLLUTANT BASE/NEUTRAL COMPOUNDS			
62-75-9	N-Nitrosodimethylamine	ND	150
111-44-4	Bis(2-Chloroethyl)ether	ND	150
541-73-1	1,3-Dichlorobenzene	ND	150
95-50-1	1,2-Dichlorobenzene	ND	150
106-46-7	1,4-Dichlorobenzene	ND	150
118-74-1	Hexachlorobenzene	ND	150
67-72-1	Hexachloroethane	ND	150
621-64-7	N-Nitrosodi-n-propylamine	ND	150
98-95-3	Nitrobenzene	ND	150
117-84-0	Di-n-octyl phthalate	ND	150
120-82-1	1,2,4-Trichlorobenzene	ND	150
91-20-3	Naphthalene	ND	150
87-68-3	Hexachlorobutadiene	ND	150
91-57-6	2-Methylnaphthalene	ND	150
77-47-4	Hexachlorocyclopentadiene	ND	150
91-58-7	2-Chloronaphthalene	ND	150
131-11-3	Dimethyl phthalate	ND	150
208-96-8	Acenaphthylene	ND	150
83-32-9	Acenaphthene	ND	150
121-14-2	2,4-Dinitrotoluene	ND	300
606-20-2	2,6-Dinitrotoluene	ND	300
86-73-7	Fluorene	ND	150
84-66-2	Diethyl phthalate	ND	150
7005-72-3	4-Chlorophenyl phenyl ether	ND	150
86-30-6	N-Nitrosodiphenylamine	ND	300
101-55-3	4-Bromophenyl phenyl ether	ND	150

ORGANIC ANALYSIS REPORT
Semi-Volatile Compound, EPA Method 8270

CLIENT: WOODWARD-CLYDE CONSULTANTS Order No.: 90-08-215
SAMPLE ID: F8-1

39638-32-9	Bis(2-Chloroisopropyl)ether	ND	150
85-01-8	Phenanthrene	153	150
120-12-7	Anthracene	ND	150
84-74-2	Di-n-butyl phthalate	ND	150
206-44-0	Fluoranthene	293	150
92-87-5	Benzidine	ND	1200
111-91-1	Bis(2-Chloroethoxy)methane	ND	300
129-00-0	Pyrene	271	150
85-68-7	Butyl benzyl phthalate	ND	150
91-94-1	3,3-Dichlorobenzidine	ND	300
218-01-9	Chrysene	175	150
56-55-3	Benzo(a)anthracene	ND	150
117-81-7	Bis(2-Ethylhexyl)phthalate	ND	1000
207-08-9	Benzo(k)fluoranthene	ND	150
205-99-2	Benzo(b)fluoranthene	ND	150
50-32-8	Benzo(a)pyrene	ND	150
193-39-5	Indeno(1,2,3-cd)pyrene	ND	150
53-70-3	Dibenzo(a,h)anthracene	ND	150
191-24-2	Benzo(g,h,i)perylene	ND	150
78-59-1	Isophorone	ND	150

III. PESTICIDES

319-84-6	a-BHC	ND	500
58-89-9	g-BHC	ND	500
319-85-7	b-BHC	ND	500
319-86-8	d-BHC	ND	500
76-44-8	Heptachlor	ND	500
309-00-2	Aldrin	ND	500
1024-57-3	Heptachlor epoxide	ND	500
60-57-1	Dieldrin	ND	500
72-55-9	4,4'-DDE	ND	500
959-98-8	Endosulfan I	ND	1000
33213-65-9	Endosulfan II	ND	1000
72-20-8	Endrin	ND	1000
72-54-8	4,4'-DDD	ND	500
50-29-3	4,4'-DDT	ND	500
1031-07-8	Endosulfan sulfate	ND	1000
57-74-9	Chlorodane	ND	5000
8001-35-2	Toxaphene	ND	10000
	PCB	ND	10000

IV. HAZARDOUS SUBSTANCES LIST

62-53-3	Aniline	ND	150
100-51-6	Benzyl alcohol	ND	150
95-48-7	o-Cresol	ND	150
106-44-5	p-Cresol	ND	150
65-85-0	Benzoic acid	ND	800
106-47-8	4-Chloroaniline	ND	150

ORGANIC ANALYSIS REPORT
Semi-Volatile Compound, EPA Method 8270

CLIENT: WOODWARD-CLYDE CONSULTANTS Order No.: 90-08-215
SAMPLE ID: F8-1

95-95-4	2,4,5-Trichlorophenol	ND	800
88-74-4	2-Nitroaniline	ND	800
99-09-2	3-Nitroaniline	ND	800
132-64-9	Dibenzofuran	ND	150
100-01-6	4-Nitroaniline	ND	800

Chemist Chung P. Li

Chung P. Li, Ph.D.

09/01/90
Date

ND=NOT DETECTED AT OR BELOW DETECTION LIMIT
NA=NOT AVAILABLE

ORGANIC ANALYSIS REPORT
Semi-Volatile Compound, EPA Method 8270

EUREKA LABORATORIES, INC.
6790 Florin Perkins Road
Sacramento, CA 95828
(916)381-7953

Order No.: 90-08-215
Hazardous Waste Testing
Certification No.: E765

CLIENT: WOODWARD-CLYDE CONSULTANTS
SAMPLE ID: METHOD BLANK
REPORT UNIT: ppb (ug/Kg)
SAMPLE LOCATION:

DATE SAMPLED:
DATE RECEIVED: 08/22/90
DATE EXTRACTED: 08/28/90
DATE COMPLETED: 08/29/90
DILUTION FACTOR: 1.00

CAS#	COMPOUND	RESULT	DET.LIMIT
I. PRIORITY POLLUTANT ACID COMPOUNDS			
108-95-2	Phenol	ND	150
95-57-8	2-Chlorophenol	ND	150
88-75-5	2-Nitrophenol	ND	150
105-67-9	2,4-Dimethylphenol	ND	150
120-83-2	2,4-Dichlorophenol	ND	150
59-50-7	4-Choro-3-methylphenol	ND	150
88-06-2	2,4,6-Trichlorophenol	ND	150
51-28-5	2,4-Dinitrophenol	ND	800
100-02-7	4-Nitrophenol	ND	800
534-52-1	2-Methyl-4,6-Dinitrophenol	ND	800
87-86-5	Pentachlorophenol	ND	150
II. PRIORITY POLLUTANT BASE/NEUTRAL COMPOUNDS			
62-75-9	N-Nitrosodimethylamine	ND	150
111-44-4	Bis(2-Chloroethyl)ether	ND	150
541-73-1	1,3-Dichlorobenzene	ND	150
95-50-1	1,2-Dichlorobenzene	ND	150
106-46-7	1,4-Dichlorobenzene	ND	150
118-74-1	Hexachlorobenzene	ND	150
67-72-1	Hexachloroethane	ND	150
621-64-7	N-Nitrosodi-n-propylamine	ND	150
98-95-3	Nitrobenzene	ND	150
117-84-0	Di-n-octyl phthalate	ND	150
120-82-1	1,2,4-Trichlorobenzene	ND	150
91-20-3	Naphthalene	ND	150
87-68-3	Hexachlorobutadiene	ND	150
91-57-6	2-Methylnaphthalene	ND	150
77-47-4	Hexachlorocyclopentadiene	ND	150
91-58-7	2-Chloronaphthalene	ND	150
131-11-3	Dimethyl phthalate	ND	150
208-96-8	Acenaphthylene	ND	150
83-32-9	Acenaphthene	ND	150
121-14-2	2,4-Dinitrotoluene	ND	300
606-20-2	2,6-Dinitrotoluene	ND	300
86-73-7	Fluorene	ND	150
84-66-2	Diethyl phthalate	ND	150
7005-72-3	4-Chlorophenyl phenyl ether	ND	150
86-30-6	N-Nitrosodiphenylamine	ND	300
101-55-3	4-Bromophenyl phenyl ether	ND	150

ORGANIC ANALYSIS REPORT
Semi-Volatile Compound, EPA Method 8270

CLIENT: WOODWARD-CLYDE CONSULTANTS Order No.: 90-08-215
SAMPLE ID: METHOD BLANK

39638-32-9	Bis(2-Chloroisopropyl)ether	ND	150
85-01-8	Phenanthrene	ND	150
120-12-7	Anthracene	ND	150
84-74-2	Di-n-butyl phthalate	ND	150
206-44-0	Fluoranthene	ND	150
92-87-5	Benzidine	ND	1200
111-91-1	Bis(2-Chloroethoxy)methane	ND	300
129-00-0	Pyrene	ND	150
85-68-7	Butyl benzyl phthalate	ND	150
91-94-1	3,3-Dichlorobenzidine	ND	300
218-01-9	Chrysene	ND	150
56-55-3	Benzo(a)anthracene	ND	150
117-81-7	Bis(2-Ethylhexyl)phthalate	ND	1000
207-08-9	Benzo(k)fluoranthene	ND	150
205-99-2	Benzo(b)fluoranthene	ND	150
50-32-8	Benzo(a)pyrene	ND	150
193-39-5	Indeno(1,2,3-cd)pyrene	ND	150
53-70-3	Dibenzo(a,h)anthracene	ND	150
191-24-2	Benzo(g,h,i)perylene	ND	150
78-59-1	Isophorone	ND	150

III. PESTICIDES

319-84-6	a-BHC	ND	500
58-89-9	g-BHC	ND	500
319-85-7	b-BHC	ND	500
319-86-8	d-BHC	ND	500
76-44-8	Heptachlor	ND	500
309-00-2	Aldrin	ND	500
1024-57-3	Heptachlor epoxide	ND	500
60-57-1	Dieldrin	ND	500
72-55-9	4,4'-DDE	ND	500
959-98-8	Endosulfan I	ND	1000
33213-65-9	Endosulfan II	ND	1000
72-20-8	Endrin	ND	1000
72-54-8	4,4'-DDD	ND	500
50-29-3	4,4'-DDT	ND	500
1031-07-8	Endosulfan sulfate	ND	1000
57-74-9	Chlorodane	ND	5000
8001-35-2	Toxaphene	ND	10000
	PCB	ND	10000

IV. HAZARDOUS SUBSTANCES LIST

62-53-3	Aniline	ND	150
100-51-6	Benzyl alcohol	ND	150
95-48-7	o-Cresol	ND	150
106-44-5	p-Cresol	ND	150
65-85-0	Benzoic acid	ND	800
106-47-8	4-Chloroaniline	ND	150

ORGANIC ANALYSIS REPORT
Semi-Volatile Compound, EPA Method 8270

CLIENT: WOODWARD-CLYDE CONSULTANTS Order No.: 90-08-215
SAMPLE ID: METHOD BLANK

95-95-4	2,4,5-Trichlorophenol	ND	800
88-74-4	2-Nitroaniline	ND	800
99-09-2	3-Nitroaniline	ND	800
132-64-9	Dibenzofuran	ND	150
100-01-6	4-Nitroaniline	ND	800

Chemist Chung P. Li

Chung P. Li, Ph.D.

09/01/90

Date

ND=NOT DETECTED AT OR BELOW DETECTION LIMIT
NA=NOT AVAILABLE

ORGANIC ANALYSIS REPORT
Semi-Volatile Compound, EPA Method 8270

EUREKA LABORATORIES, INC.
6790 Florin Perkins Road
Sacramento, CA 95828
(916)381-7953

Order No.: 90-08-215
Hazardous Waste Testing
Certification No.: E765

CLIENT: WOODWARD-CLYDE CONSULTANTS
SAMPLE ID: SPIKE RECOVERY
REPORT UNIT: %
SAMPLE LOCATION:

DATE SAMPLED:
DATE RECEIVED: 08/22/90
DATE EXTRACTED: 08/28/90
DATE COMPLETED: 08/29/90

CAS#	COMPOUND	RESULT
I. PRIORITY POLLUTANT ACID COMPOUNDS		
108-95-2	Phenol	82%
95-57-8	2-Chlorophenol	95%
88-75-5	2-Nitrophenol	NA
105-67-9	2,4-Dimethylphenol	NA
120-83-2	2,4-Dichlorophenol	NA
59-50-7	4-Choro-3-methylphenol	97%
88-06-2	2,4,6-Trichlorophenol	NA
51-28-5	2,4-Dinitrophenol	NA
100-02-7	4-Nitrophenol	81%
534-52-1	2-Methyl-4,6-Dinitrophenol	NA
87-86-5	Pentachlorophenol	102%
II. PRIORITY POLLUTANT BASE/NEUTRAL COMPOUNDS		
62-75-9	N-Nitrosodimethylamine	NA
111-44-4	Bis(2-Chloroethyl)ether	NA
541-73-1	1,3-Dichlorobenzene	NA
95-50-1	1,2-Dichlorobenzene	NA
106-46-7	1,4-Dichlorobenzene	87%
118-74-1	Hexachlorobenzene	NA
67-72-1	Hexachloroethane	NA
621-64-7	N-Nitrosodi-n-propylamine	93%
98-95-3	Nitrobenzene	NA
117-84-0	Di-n-octyl phthalate	NA
120-82-1	1,2,4-Trichlorobenzene	76%
91-20-3	Naphthalene	NA
87-68-3	Hexachlorobutadiene	NA
91-57-6	2-Methylnaphthalene	NA
77-47-4	Hexachlorocyclopentadiene	NA
91-58-7	2-Chloronaphthalene	NA
131-11-3	Dimethyl phthalate	NA
208-96-8	Acenaphthylene	NA
83-32-9	Acenaphthene	85%
121-14-2	2,4-Dinitrotoluene	67%
606-20-2	2,6-Dinitrotoluene	NA
86-73-7	Fluorene	NA
84-66-2	Diethyl phthalate	NA
7005-72-3	4-Chlorophenyl phenyl ether	NA
86-30-6	N-Nitrosodiphenylamine	NA
101-55-3	4-Bromophenyl phenyl ether	NA

ORGANIC ANALYSIS REPORT
Semi-Volatile Compound, EPA Method 8270

CLIENT: WOODWARD-CLYDE CONSULTANTS Order No.: 90-08-215
SAMPLE ID: SPIKE RECOVERY

39638-32-9	Bis(2-Chloroisopropyl)ether	NA
85-01-8	Phenanthrene	NA
120-12-7	Anthracene	NA
84-74-2	Di-n-butyl phthalate	NA
206-44-0	Fluoranthene	NA
92-87-5	Benzidine	NA
111-91-1	Bis(2-Chloroethoxy)methane	NA
129-00-0	Pyrene	85%
85-68-7	Butyl benzyl phthalate	NA
91-94-1	3,3-Dichlorobenzidine	NA
218-01-9	Chrysene	NA
56-55-3	Benzo(a)anthracene	NA
117-81-7	Bis(2-Ethylhexyl)phthalate	NA
207-08-9	Benzo(k)fluoranthene	NA
205-99-2	Benzo(b)fluoranthene	NA
50-32-8	Benzo(a)pyrene	NA
193-39-5	Indeno(1,2,3-cd)pyrene	NA
53-70-3	Dibenzo(a,h)anthracene	NA
191-24-2	Benzo(g,h,i)perylene	NA
78-59-1	Isophorone	NA

III. PESTICIDES

319-84-6	a-BHC	NA
58-89-9	g-BHC	NA
319-85-7	b-BHC	NA
319-86-8	d-BHC	NA
76-44-8	Heptachlor	NA
309-00-2	Aldrin	NA
1024-57-3	Heptachlor epoxide	NA
60-57-1	Dieldrin	NA
72-55-9	4,4'-DDE	NA
959-98-8	Endosulfan I	NA
33213-65-9	Endosulfan II	NA
72-20-8	Endrin	NA
72-54-8	4,4'-DDD	NA
50-29-3	4,4'-DDT	NA
1031-07-8	Endosulfan sulfate	NA
57-74-9	Chlorodane	NA
8001-35-2	Toxaphene	NA
	PCB	NA

IV. HAZARDOUS SUBSTANCES LIST

62-53-3	Aniline	NA
100-51-6	Benzyl alcohol	NA
95-48-7	o-Cresol	NA
106-44-5	p-Cresol	NA
65-85-0	Benzoic acid	NA
106-47-8	4-Chloroaniline	NA

ORGANIC ANALYSIS REPORT
Semi-Volatile Compound, EPA Method 8270

CLIENT: WOODWARD-CLYDE CONSULTANTS Order No.: 90-08-215
SAMPLE ID: SPIKE RECOVERY

95-95-4	2,4,5-Trichlorophenol	NA
88-74-4	2-Nitroaniline	NA
99-09-2	3-Nitroaniline	NA
132-64-9	Dibenzofuran	NA
100-01-6	4-Nitroaniline	NA

Chemist Chung P Li
Chung P. Li, Ph.D.

09/01/90
Date

ND=NOT DETECTED AT OR BELOW DETECTION LIMIT
NA=NOT AVAILABLE

ORGANIC ANALYSIS REPORT
Semi-Volatile Compound, EPA Method 8270

EUREKA LABORATORIES, INC.
6790 Florin Perkins Road
Sacramento, CA 95828
(916)381-7953

Order No.: 90-08-215
Hazardous Waste Testing
Certification No.: E765

CLIENT: WOODWARD-CLYDE CONSULTANTS
SAMPLE ID: SPIKE RECOVERY DUPLICATE
REPORT UNIT: %
SAMPLE LOCATION:

DATE SAMPLED:
DATE RECEIVED: 08/22/90
DATE EXTRACTED: 08/28/90
DATE COMPLETED: 08/29/90

CAS#	COMPOUND	RESULT
I. PRIORITY POLLUTANT ACID COMPOUNDS		
108-95-2	Phenol	89%
95-57-8	2-Chlorophenol	102%
88-75-5	2-Nitrophenol	NA
105-67-9	2,4-Dimethylphenol	NA
120-83-2	2,4-Dichlorophenol	NA
59-50-7	4-Choro-3-methylphenol	98%
88-06-2	2,4,6-Trichlorophenol	NA
51-28-5	2,4-Dinitrophenol	NA
100-02-7	4-Nitrophenol	90%
534-52-1	2-Methyl-4,6-Dinitrophenol	NA
87-86-5	Pentachlorophenol	110%
II. PRIORITY POLLUTANT BASE/NEUTRAL COMPOUNDS		
62-75-9	N-Nitrosodimethylamine	NA
111-44-4	Bis(2-Chloroethyl)ether	NA
541-73-1	1,3-Dichlorobenzene	NA
95-50-1	1,2-Dichlorobenzene	NA
106-46-7	1,4-Dichlorobenzene	89%
118-74-1	Hexachlorobenzene	NA
67-72-1	Hexachloroethane	NA
621-64-7	N-Nitrosodi-n-propylamine	101%
98-95-3	Nitrobenzene	NA
117-84-0	Di-n-octyl phthalate	NA
120-82-1	1,2,4-Trichlorobenzene	77%
91-20-3	Naphthalene	NA
87-68-3	Hexachlorobutadiene	NA
91-57-6	2-Methylnaphthalene	NA
77-47-4	Hexachlorocyclopentadiene	NA
91-58-7	2-Chloronaphthalene	NA
131-11-3	Dimethyl phthalate	NA
208-96-8	Acenaphthylene	NA
83-32-9	Acenaphthene	85%
121-14-2	2,4-Dinitrotoluene	67%
606-20-2	2,6-Dinitrotoluene	NA
86-73-7	Fluorene	NA
84-66-2	Diethyl phthalate	NA
7005-72-3	4-Chlorophenyl phenyl ether	NA
86-30-6	N-Nitrosodiphenylamine	NA
101-55-3	4-Bromophenyl phenyl ether	NA

ORGANIC ANALYSIS REPORT
Semi-Volatile Compound, EPA Method 8270

CLIENT: WOODWARD-CLYDE CONSULTANTS Order No.: 90-08-215
SAMPLE ID: SPIKE RECOVERY DUPLICATE

39638-32-9	Bis(2-Chloroisopropyl)ether	NA
85-01-8	Phenanthrene	NA
120-12-7	Anthracene	NA
84-74-2	Di-n-butyl phthalate	NA
206-44-0	Fluoranthene	NA
92-87-5	Benzidine	NA
111-91-1	Bis(2-Chloroethoxy)methane	NA
129-00-0	Pyrene	NA
85-68-7	Butyl benzyl phthalate	84%
91-94-1	3,3-Dichlorobenzidine	NA
218-01-9	Chrysene	NA
56-55-3	Benzo(a)anthracene	NA
117-81-7	Bis(2-Ethylhexyl)phthalate	NA
207-08-9	Benzo(k)fluoranthene	NA
205-99-2	Benzo(b)fluoranthene	NA
50-32-8	Benzo(a)pyrene	NA
193-39-5	Indeno(1,2,3-cd)pyrene	NA
53-70-3	Dibenzo(a,h)anthracene	NA
191-24-2	Benzo(g,h,i)perylene	NA
78-59-1	Isophorone	NA

III. PESTICIDES

319-84-6	a-BHC	NA
58-89-9	g-BHC	NA
319-85-7	b-BHC	NA
319-86-8	d-BHC	NA
76-44-8	Heptachlor	NA
309-00-2	Aldrin	NA
1024-57-3	Heptachlor epoxide	NA
60-57-1	Dieldrin	NA
72-55-9	4,4'-DDE	NA
959-98-8	Endosulfan I	NA
33213-65-9	Endosulfan II	NA
72-20-8	Endrin	NA
72-54-8	4,4'-DDD	NA
50-29-3	4,4'-DDT	NA
1031-07-8	Endosulfan sulfate	NA
57-74-9	Chlorodane	NA
8001-35-2	Toxaphene	NA
	PCB	NA

IV. HAZARDOUS SUBSTANCES LIST

62-53-3	Aniline	NA
100-51-6	Benzyl alcohol	NA
95-48-7	o-Cresol	NA
106-44-5	p-Cresol	NA
65-85-0	Benzoic acid	NA
106-47-8	4-Chloroaniline	NA

ORGANIC ANALYSIS REPORT
Semi-Volatile Compound, EPA Method 8270

CLIENT: WOODWARD-CLYDE CONSULTANTS Order No.: 90-08-215
SAMPLE ID: SPIKE RECOVERY DUPLICATE

95-95-4	2,4,5-Trichlorophenol	NA
88-74-4	2-Nitroaniline	NA
99-09-2	3-Nitroaniline	NA
132-64-9	Dibenzofuran	NA
100-01-6	4-Nitroaniline	NA

Chemist Chung P Li
Chung P. Li, Ph.D.

09/01/90
Date

ND=NOT DETECTED AT OR BELOW DETECTION LIMIT
NA=NOT AVAILABLE

POLYCHLORINATED BIPHENYLS (PCB)
EPA METHOD 8080

EUREKA LABORATORIES, INC.
6790 Florin-Perkins Road
Sacramento, CA 95828
(916) 381-7953

Order No: 90-08-215
Hazardous Waste Testing
Certification: E765

CLIENT: WOODWARD-CLYDE
PROJECT #: 90C0039D

DATE RECEIVED: 08/22/1990
DATE EXTRACTED: 08/24/1990
DATE COMPLETED: 08/29/1990

SAMPLE ID.	DATE SAMPLED	PCB CONTENT	AROCHLOR TYPE	D/L [mg/Kg(ppm)]
F1-1,2,3,4 COMP	8/16/90	<0.1		0.1
F5-1	8/16/90	<0.1		0.1
F8-1	8/16/90	<0.1		0.1
F9-1	8/16/90	<0.1		0.1
F10-1	8/16/90	<0.1		0.1
F12-1A	8/16/90	<0.1		0.1
F13-1	8/16/90	<0.1		0.1
F14-1	8/17/90	<0.1		0.1
F19-1	8/17/90	<0.1		0.1
F21-1	8/17/90	<0.1		0.1
BLANK		<0.1		0.1
F13-1 MATRIX SPIKE RECOVERY -	87%		1254	
F13-1 MATRIX SPIKE RECOVERY DUP. -	89%		1254	

Jeannette Chen
Jeannette Chen
Chemist

September 6, 1990
Date

OIL AND GREASE
EPA METHOD 413.2

EUREKA LABORATORIES, INC.
6790 Florin-Perkins Road
Sacramento, CA 95828
(916) 381-7953

Order No: 90-08-215
Hazardous Waste Testing
Certification: E765

CLIENT: WOODWARD-CLYDE
PROJECT #: 90C0039C

DATE RECEIVED: 08/22/1990
DATE EXTRACTED: 08/30/1990
DATE COMPLETED: 09/01/1990

SAMPLE ID.	DATE SAMPLED	CONCENTRATION [mg/Kg (ppm)]	D/L
BLANK		<4	4
F1-1	08/16/1990	<4	4
F1-5	08/16/1990	<4	4
F2-1	08/16/1990	<4	4
F2-3	08/16/1990	<4	4
F5-1	08/16/1990	9.0	4
F7-1	08/16/1990	174	4
F8-1	08/16/1990	28	4
F9-1	08/16/1990	<4	4
F10-1	08/16/1990	<4	4
F12-1A	08/16/1990	210	4
F13-1	08/16/1990	<4	4
F20-1	08/17/1990	780	40

F10-1 MATRIX SPIKE RECOVERY - 101%
F10-1 MATRIX SPIKE RECOVERY DUP. - 103%

Samir Samaan
Chemist

September 6, 1990
Date

TOTAL LEAD
EPA 6010

EUREKA LABORATORIES, INC.
6790 Florin-Perkins Road
Sacramento, CA 95828
(916) 381-7953

Order No: 90-08-215
Hazardous Waste Testing
Certification: E765

CLIENT: WOODWARD-CLYDE
PROJECT #: 90C0039D

DATE RECEIVED: 08/22/1990
DATE EXTRACTED: 08/23/1990
DATE COMPLETED: 09/04/1990

SAMPLE ID.	DATE SAMPLED	LEAD [mg/Kg(ppm)]
F1-1	8/16/90	3.2
F1-2	8/16/90	3.5
F1-3	8/16/90	9.2
F1-4	8/16/90	29.8
F1-5	8/16/90	5.5
F2-1	8/16/90	3.9
F2-2	8/16/90	5.3
F2-3	8/16/90	<3.0
F3-3	8/16/90	<3.0
F4-1	8/16/90	<3.0
F4-2	8/16/90	<3.0
F5-1	8/16/90	<3.0
F5-2	8/16/90	<3.0
F5-3	8/16/90	<3.0
F6-1	8/16/90	<3.0
F7-1	8/16/90	177
F7-2	8/16/90	11.9
F7-3	8/16/90	3.1
F8-1	8/16/90	391
F8-2	8/16/90	<3.0
F8-3	8/16/90	<3.0
F9-1	8/16/90	3.0
F9-2	8/16/90	<3.0
F9-3	8/16/90	<3.0
F10-1	8/16/90	4.0
F10-2	8/16/90	NO SAMPLE
F10-3	8/16/90	6.3
F11-1	8/16/90	<3.0
F12-1A	8/16/90	172
F12-1B	8/16/90	9.3
F12-2	8/16/90	4.3
F13-2	8/16/90	<3.0
F14-1	8/17/90	4.4
F14-2	8/17/90	6.5
F14-3	8/17/90	11.0

F15-1	8/17/90	4.1
F15-2	8/17/90	5.7
F15-3	8/17/90	4.2
F15-4	8/17/90	<3.0
F16-1	8/17/90	5.8
F16-2	8/17/90	4.5
F16-3	8/17/90	3.9
F17-1	8/17/90	263
F17-2	8/17/90	15.8
F18-1	8/17/90	83.9
F18-2	8/17/90	21.7
F19-1	8/17/90	69.1
F20-1	8/17/90	105
F21-1	8/17/90	80.6
F3-1	8/16/90	<3.0
F3-2	8/16/90	3.2
F13-1	8/16/90	<3.0
BLANK		<3.0

F15-4 MATRIX SPIKE RECOVERY - 95%
F15-4 MATRIX SPIKE RECOVERY DUP. - 91%

F3-2 MATRIX SPIKE RECOVERY - 90%
F3-2 MATRIX SPIKE RECOVERY DUP. - 89%

F8-2 MATRIX SPIKE RECOVERY - 87%
F8-2 MATRIX SPIKE RECOVERY DUP. - 75%

DETECTION LIMIT: 3.0 [mg/Kg(ppm)]

This detection limit is based on dilution factor of 50.

Josie Quiambao — September 6, 1990
Josie Quiambao, Chemist — Date

TOTAL RECOVERABLE HYDROCARBONS
EPA METHOD 418.1

EUREKA LABORATORIES, INC.
6790 Florin-Perkins Road
Sacramento, CA 95828
(916) 381-7953

Order No: 90-08-215
Hazardous Waste Testing
Certification: E765

CLIENT: WOODWARD-CLYDE
PROJECT #: 90C0039C

DATE RECEIVED: 08/22/1990
DATE EXTRACTED: 08/30/1990
DATE COMPLETED: 09/01/1990

SAMPLE ID.	DATE SAMPLED	CONCENTRATION [mg/Kg (ppm)]	D/L
BLANK		<4	4
F1-1	08/16/1990	<4	4
F1-5	08/16/1990	<4	4
F2-1	08/16/1990	<4	4
F2-3	08/16/1990	<4	4
F5-1	08/16/1990	<4	4
F7-1	08/16/1990	143	4
F8-1	08/16/1990	14	4
F9-1	08/16/1990	<4	4
F10-1	08/16/1990	<4	4
F12-1A	08/16/1990	126	4
F13-1	08/16/1990	<4	4
F20-1	08/17/1990	634	40

F10-1 MATRIX SPIKE RECOVERY - 103%
F10-1 MATRIX SPIKE RECOVERY DUP. - 106%

Samir Samaan
Chemist

September 6, 1990
Date

TOTAL PETROLEUM HYDROCARBONS
EPA METHOD 8015 (MODIFIED)

EUREKA LABORATORIES, INC.
6790 Florin-Perkins Road
Sacramento, CA 95828
(916) 381-7953

Order No: 90-08-215
Hazardous Waste Testing
Certification: E765

CLIENT: WOODWARD-CLYDE
PROJECT #: 90C0039C
SAMPLE ID: BLANK

DATE RECEIVED: 08/22/1990
DATE EXTRACTED: 08/30/1990
DATE COMPLETED: 08/31/1990

PETROLEUM HYDROCARBONS	CONCENTRATION [mg/Kg (ppm)]	DETECTION LIMIT [mg/Kg (ppm)]
Gasoline Range	<5	5
Diesel Range	<10	10
Motor Oil Range	<25	25
Total Petroleum Hydrocarbons	-	-
CARBON NO. RANGE		
Gasoline Range	-	-
Diesel Range	-	-
Motor Oil Range	-	-
PEAK CARBON NO		
Gasoline Range	-	-
Diesel Range	-	-
Motor Oil Range	-	-

Sandia Kao
Senior Chemist, Organic Group

September 6, 1990
Date

TOTAL PETROLEUM HYDROCARBONS
EPA METHOD 8015 (MODIFIED)

EUREKA LABORATORIES, INC.
6790 Florin-Perkins Road
Sacramento, CA 95828
(916) 381-7953

Order No: 90-08-215
Hazardous Waste Testing
Certification: E765

CLIENT: WOODWARD-CLYDE
PROJECT #: 90C0039C
SAMPLE ID: F1-1

DATE RECEIVED: 08/22/1990
DATE EXTRACTED: 08/30/1990
DATE COMPLETED: 08/31/1990
DATE SAMPLED: 08/16/1990

PETROLEUM HYDROCARBONS	CONCENTRATION [mg/Kg (ppm)]	DETECTION LIMIT [mg/Kg (ppm)]
Gasoline Range	<5	5
Diesel Range	<10	10
Motor Oil Range	<25	25
Total Petroleum Hydrocarbons	-	-
CARBON NO. RANGE		
Gasoline Range	-	-
Diesel Range	-	-
Motor Oil Range	-	-
PEAK CARBON NO		
Gasoline Range	-	-
Diesel Range	-	-
Motor Oil Range	-	-

Sandia Kao
Senior Chemist, Organic Group

September 6, 1990
Date

TOTAL PETROLEUM HYDROCARBONS
EPA METHOD 8015 (MODIFIED)

EUREKA LABORATORIES, INC.
6790 Florin-Perkins Road
Sacramento, CA 95828
(916) 381-7953

Order No: 90-08-215
Hazardous Waste Testing
Certification: E765

CLIENT: WOODWARD-CLYDE
PROJECT #: 90C0039C
SAMPLE ID: F5-1

DATE RECEIVED: 08/22/1990
DATE EXTRACTED: 08/30/1990
DATE COMPLETED: 08/31/1990
DATE SAMPLED: 08/16/1990

PETROLEUM HYDROCARBONS	CONCENTRATION [mg/Kg (ppm)]	DETECTION LIMIT [mg/Kg (ppm)]
Gasoline Range	<5	5
Diesel Range	<10	10
Motor Oil Range	<25	25
Total Petroleum Hydrocarbons	-	-
CARBON NO. RANGE		
Gasoline Range	-	-
Diesel Range	-	-
Motor Oil Range	-	-
PEAK CARBON NO		
Gasoline Range	-	-
Diesel Range	-	-
Motor Oil Range	-	-

Sandia Kao
Senior Chemist, Organic Group

September 6, 1990
Date

TOTAL PETROLEUM HYDROCARBONS
EPA METHOD 8015 (MODIFIED)

EUREKA LABORATORIES, INC.
6790 Florin-Perkins Road
Sacramento, CA 95828
(916) 381-7953

Order No: 90-08-215
Hazardous Waste Testing
Certification: E765

CLIENT: WOODWARD-CLYDE
PROJECT #: 90C0039C
SAMPLE ID: F8-I

DATE RECEIVED: 08/22/1990
DATE EXTRACTED: 08/30/1990
DATE COMPLETED: 08/31/1990
DATE SAMPLED: 08/16/1990

PETROLEUM HYDROCARBONS	CONCENTRATION [mg/Kg (ppm)]	DETECTION LIMIT [mg/Kg (ppm)]
Gasoline Range	<5	5
Diesel Range	<10	10
Motor Oil Range	57	25
Total Petroleum Hydrocarbons	57	-
CARBON NO. RANGE		
Gasoline Range	-	-
Diesel Range	-	-
Motor Oil Range	C18-C28	-
PEAK CARBON NO		
Gasoline Range	-	-
Diesel Range	-	-
Motor Oil Range	C24	-

Sandia Kao
Senior Chemist, Organic Group

September 6, 1990
Date

TOTAL PETROLEUM HYDROCARBONS
EPA METHOD 8015 (MODIFIED)

EUREKA LABORATORIES, INC.
6790 Florin-Perkins Road
Sacramento, CA 95828
(916) 381-7953

Order No: 90-08-215
Hazardous Waste Testing
Certification: E765

CLIENT: WOODWARD-CLYDE
PROJECT #: 90C0039C
SAMPLE ID: F12-1A

DATE RECEIVED: 08/22/1990
DATE EXTRACTED: 08/30/1990
DATE COMPLETED: 08/31/1990
DATE SAMPLED: 08/16/1990

PETROLEUM HYDROCARBONS	CONCENTRATION [mg/Kg (ppm)]	DETECTION LIMIT [mg/Kg (ppm)]
Gasoline Range	<5	5
Diesel Range	<10	10
Motor Oil Range	71	25
Total Petroleum Hydrocarbons	71	-
CARBON NO. RANGE		
Gasoline Range	-	-
Diesel Range	-	-
Motor Oil Range	C18-C28	-
PEAK CARBON NO		
Gasoline Range	-	-
Diesel Range	-	-
Motor Oil Range	C24	-

Sandia Kao
Senior Chemist, Organic Group

September 6, 1990
Date

TOTAL PETROLEUM HYDROCARBONS
EPA METHOD 8015 (MODIFIED)

EUREKA LABORATORIES, INC.
6790 Florin-Perkins Road
Sacramento, CA 95828
(916) 381-7953

Order No: 90-08-215
Hazardous Waste Testing
Certification: E765

CLIENT: WOODWARD-CLYDE
PROJECT #: 90C0039C
SAMPLE ID: F19-1

DATE RECEIVED: 08/22/1990
DATE EXTRACTED: 08/30/1990
DATE COMPLETED: 08/31/1990
DATE SAMPLED: 08/17/1990

PETROLEUM HYDROCARBONS	CONCENTRATION [mg/Kg (ppm)]	DETECTION LIMIT [mg/Kg (ppm)]
Gasoline Range	<5	5
Diesel Range	<10	10
Motor Oil Range	371	25
Total Petroleum Hydrocarbons	371	-
CARBON NO. RANGE		
Gasoline Range	-	-
Diesel Range	-	-
Motor Oil Range	C18-C28	-
PEAK CARBON NO		
Gasoline Range	-	-
Diesel Range	-	-
Motor Oil Range	C24	-

Sandia Kao
Senior Chemist, Organic Group

September 6, 1990
Date

TOTAL PETROLEUM HYDROCARBONS
EPA METHOD 8015 (MODIFIED)

EUREKA LABORATORIES, INC.
6790 Florin-Perkins Road
Sacramento, CA 95828
(916) 381-7953

Order No: 90-08-215
Hazardous Waste Testing
Certification: E765

CLIENT: WOODWARD-CLYDE
PROJECT #: 90C0039C
SAMPLE ID: MATRIX SPIKE RECOVERY *

DATE RECEIVED: 08/22/1990
DATE EXTRACTED: 08/30/1990
DATE COMPLETED: 08/31/1990

PETROLEUM HYDROCARBONS	SPIKE RECOVERY
Gasoline Range	87%
Diesel Range	-
Motor Oil Range	79%
Total Petroleum Hydrocarbons	

CARBON NO. RANGE	
Gasoline Range	-
Diesel Range	-
Motor Oil Range	-

PEAK CARBON NO	
Gasoline Range	-
Diesel Range	-
Motor Oil Range	-

* This set of matrix spike is from another sample of the same matrix and of the same analytical batch.

Sandia Kao
Senior Chemist, Organic Group

September 6, 1990
Date

TOTAL PETROLEUM HYDROCARBONS
EPA METHOD 8015 (MODIFIED)

EUREKA LABORATORIES, INC.
6790 Florin-Perkins Road
Sacramento, CA 95828
(916) 381-7953

Order No: 90-08-215
Hazardous Waste Testing
Certification: E765

CLIENT: WOODWARD-CLYDE
PROJECT #: 90C0039C
SAMPLE ID: MATRIX SPIKE RECOVERY DUP. *

DATE RECEIVED: 08/22/1990
DATE EXTRACTED: 08/30/1990
DATE COMPLETED: 08/31/1990

PETROLEUM HYDROCARBONS	SPIKE RECOVERY
Gasoline Range	88%
Diesel Range	-
Motor Oil Range	81%
Total Petroleum Hydrocarbons	
CARBON NO. RANGE	
Gasoline Range	-
Diesel Range	-
Motor Oil Range	-
PEAK CARBON NO	
Gasoline Range	-
Diesel Range	-
Motor Oil Range	-

* This set of matrix spike is from another sample of the same matrix and of the same analytical batch.

Sandia Kao
Senior Chemist, Organic Group

September 6, 1990
Date

90-08-215 A49

Woodward-Clyde Consultants

500 12th Street, Suite 100, Oakland, CA 94607-4041
(415) 893-3600

Chain of Custody Record

PROJECT NO. 90C0039C

SAMPLERS: (Signature) D. Copeland

DATE	TIME	SAMPLE NUMBER	Sample Matrix (S)oil, (W)ater, (A)ir	EPA Method	EPA Method	EPA Method	EPA Method	Oil & Grease - 5520 E	Total PB - ICP	CAM 17 Metals	8270 VOC	8020 - BTEX	TPH - Diesel - 8015	Number of Containers	REMARKS (Sample preservation, handling procedures, etc.)
8-16-90		F1-1	S					X	X	X	X	X	X	1	
		F1-2							X	X	X	X		1	
		F1-3							X	X	X	X		1	
		F1-4							X	X	X	X		1	
		F1-5 native						X	X					1	
		F2-1						X	X					1	
		F2-2							X					1	
		F2-3						X	X					1	
		F3-1							X					1	
		F3-2							X					1	
		F3-3 native							X					1	
		F4-1							X					1	
		F4-2							X					1	
		F5-1						X	X			X	X	1	
		F5-2							X					1	
		F5-3 native							X					1	
		F6-1 native							X					1	
		F7-1						X	X					1	
		F7-2							X					1	
		F7-3 native							X					1	
		F8-1						X	X	X	X	X	X	1	
		F8-2							X					1	
		F8-3 native							X					1	
		F9-1						X	X			X		1	
		F9-2							X					1	
		F9-3 native							X					1	
		F10-1						X	X			X		1	
8-16-90		F10-2							X					1	

Composite

TOTAL NUMBER OF CONTAINERS: 28

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)

METHOD OF SHIPMENT	SHIPPED BY: (Signature)	COURIER: (Signature)	RECEIVED FOR LAB BY: (Signature)	DATE/TIME

Woodward-Clyde Consultants

500 12th Street, Suite 100, Oakland, CA 94607-4041
(415) 893-3600

D4E

Chain of Custody Record

PROJECT NO. 90C00390

SAMPLERS (Signature) D. Copeland

DATE	TIME	SAMPLE NUMBER	Sample Matrix (S)oil, (W)ater, (A)ir	EPA Method	EPA Method	EPA Method	EPA Method	ANALYSES: Oil & Grease - 5520	Total Pb	CAM 17 Metals	8270 VOC	8080 - PCB	TPH - diesel - 8015	Number of Containers	REMARKS (Sample preservation, handling procedures, etc.)
8-16-90		F10-3 native	S						X					1	
		F11-1							X					1	
		F12-1A						X	X			X	X	1	
		F12-1B							X					1	
		F12-2							X					1	
		F13-1						X	X			X		1	
8-16-90		F13-2 native							X					1	
8-17-90		F14-1							X			X		1	
		F14-2							X					1	
		F14-3							X					1	
		F15-1							X					1	
		F15-2							X					1	
		F15-3							X					1	
		F15-4 native							X					1	
		F16-1							X					1	
		F16-2							X					1	
		F16-3							X					1	
		F17-1							X					1	
		F17-2							X					1	
		F18-1							X					1	
		F18-2							X					1	
		F19-1							X			X	X	1	
		F20-1						X	X					1	
8-17-90		F21-1							X			X		1	

NORMAL TAT

Results to B Copeland (415) 874-3192 FAX (415) 874-3268

TOTAL NUMBER OF CONTAINERS: 24

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME