ENSR
Consulting • Engineering • Remediation

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October 20, 1999
Project: 6908-050-300

Mr. Barney Chan
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway, 2nd Floor
Alameda, California, 94502

Subject: **Installation of Groundwater Monitoring Wells**
Oakland International Airport
United Airlines Building M-110
1100 Airport Drive, Oakland, California

Dear Mr. Chan:

ENSR Corporation (ENSR) on behalf of United Airlines, is submitting this results report documenting the installation of three groundwater monitoring wells at the Oakland International Airport, United Airlines Building M-110, 1100 Airport Drive, Oakland, California. The installation of the monitoring wells was in response to the Alameda County Environmental Health Services (ACEHS) letter to United Airlines, dated April 8, 1999.

The monitoring wells were installed to further define the lateral extent of petroleum hydrocarbons in groundwater at the perimeter of Building M-110, and to determine groundwater flow direction and gradient. In addition, groundwater samples were submitted for water quality analysis and soil samples were submitted for geotechnical analysis, to identify subsurface characteristics.

If you have any questions or comments regarding this report, please give Alan Klein a call at (916) 362-7100.

Sincerely,

ENSR

Alan J. Klein, R.E.A.
Senior Environmental Scientist

Alan D. Gibbs, R.G., C.HG., REA II
Department Manager

cc: Mr. Dale Klettke, Port of Oakland Environmental Compliance Department
Mr. Steve Morse, San Francisco Bay RWQCB
Mr. Dennis Moulton, United Airlines
Mr. Steven Sulgit, United Airlines
Mr. Daniel Tisoncik, United Airlines
Mr. Gene Barr, United Airlines
Mr. Ted Wells, United Airlines

RESULTS REPORT
INSTALLATION OF GROUNDWATER MONITORING WELLS

OAKLAND INT'L AIRPORT
UNITED AIRLINES BLDG. M-110
1100 Airport Drive
Oakland, California

September 1999

Prepared For:
Alameda County
Environmental Health Services

On Behalf Of:
United Airlines

Prepared By:
ENSR Corporation
10324 Placer Lane, Suite 200
Sacramento, California 95827
(916) 362-7100

ENSR Project No: 6908-050-300

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1.0 INTRODUCTION

This results report documents the installation of three groundwater monitoring wells in the vicinity of two former underground storage tanks, located at Oakland International (Int'l) Airport, United Airlines Building M-110, 1100 Airport Drive, Oakland, California (Figures 1 and 2). The work was performed in response to the Alameda County Environmental Health Services (ACEHS) letter to United Airlines, dated April 8, 1999 (Appendix A).

This results report also includes further definition of the lateral extent of petroleum hydrocarbons in groundwater at the perimeter of Building M-110, and groundwater flow direction and gradient. In addition, groundwater samples were collected and submitted for water quality analysis and soil samples were submitted for geotechnical analysis, to identify subsurface characteristics.

2.0 BACKGROUND

2.1 UST Removal Activities

were removed.

On January 15, 1999, one 10,000-gallon diesel fuel UST, one 10,000-gallon unleaded gasoline underground storage tank (UST), a dispenser island and associated piping. Approximately 758 cubic-yards of soil were removed and properly disposed of during over-excavation activities. The results of the UST removal activities are documented in ENSR's report titled, "*Underground Storage Tanks Closure Report*", dated March 1999.

2.2 Site Description

The subject area is located on the northwest side of United Airlines Building M-110, which is used for airplane maintenance. The surrounding surface area is a graded, relatively flat area, paved with asphalt concrete. The site exists at an approximate elevation of five feet above mean sea level. The nearest body of water is the San Francisco Bay located approximately 0.5 miles south of the Site (U.S.G.S. San Leandro Quadrangle, Photo-revised 1980).

3.0 WORK PERFORMED

3.1 Task 1 – Project Setup

Prior to beginning work at the site, ENSR obtained the necessary permits for well installation. ENSR then scheduled the subcontractors and coordinated field activities with United Airlines, the Port of Oakland, Alameda County and site personnel.

3.2 Task 2 – Underground Utilities Clearance

ENSR marked the proposed well locations and notified Underground Service Alert (USA), at least 48-hours prior to implementing field activities. ENSR reviewed available as-built drawings of underground utilities, provided by United Airlines. In addition, a geophysical survey was performed by NORCAL Geophysical Consultants, Inc. of Petaluma, CA, on July 20, 1999 (prior to beginning drilling activities) using electromagnetic field inductions and ground penetrating radar, to locate potential underground utility hazards at the proposed well locations. A copy of the borehole site survey is presented in Appendix B.

3.3 Task 3 – Installation of Groundwater Monitoring Wells

On July 21, 1999, three soil borings were advanced approximately 25 feet below ground surface (bgs), using a hollow stem auger drilling rig, at the locations illustrated on Figure 2. Soil samples were collected in the unsaturated soil zone at five-foot intervals, and geologically logged by an ENSR geologist. Encountered soils were screened for the presence of volatile organic compounds (VOCs) by visual observation and the use of a photoionization detector (PID). Field activities were conducted under the oversight of a geologist registered with the state of California.

The soil borings were completed as four-inch-diameter groundwater monitoring wells MW-1, MW-2, and MW-3. The wells were completed to a depth of approximately 25 feet bgs, and developed per the guidelines stipulated by the California Code of Regulations, Title 23, Subchapter 16, Article 4, Sections 2647 and 2648. All field sampling activities were performed in accordance with ENSR's Standard Operating Procedures (SOPs) presented in Appendix C. Boring logs and well construction details are presented in Appendix D.

Drill cuttings were stored in 55-gallon Department of Transportation (DOT) drums. A total of eight drums of soil cuttings were generated during the installation of monitoring wells MW-1, MW-2, and MW-3. On July 28, 1999, two four-point composite samples were collected from the soil drums for characterization. Based on the analytical results, the soil will be disposed of at an appropriate facility.

3.4 Task 4 – Groundwater Monitoring and Sampling

On July 28, 1999 groundwater samples were collected from monitoring wells MW-1, MW-2, and MW-3. Prior to sampling, each monitoring well was purged of approximately four well casing volumes using a submersible pump. Physical properties including temperature, pH, and conductivity were monitored during purging activities. The groundwater samples were collected after these parameters showed relative stability (e.g., - less than 10% change), and the water level in each well recharged 80% of the depth measured prior to purging.

Generated purge water and wash water was containerized onsite in 55-gallon drums. A total of three drums of water were generated. Based on analytical groundwater results the water in these drums will be disposed of at an appropriate facility.

The groundwater monitoring wells were surveyed by Tronoff Associates of Emeryville, California, a California Licensed Land Surveyor. ENSR collected depth to groundwater levels in groundwater monitoring wells MW-1, MW-2 and MW-3. Groundwater level data was used to determine groundwater direction and gradient at the subject site.

Groundwater samples were collected using a new disposable bailer for each well. The groundwater samples were transferred to the appropriate sample containers and stored in a cooler containing ice for preservation. The samples were delivered under chain-of-custody to McCampbell Analytical, Inc. of Pacheco, California, a California certified laboratory.

3.5 Task 5 – Laboratory Analysis

Three groundwater samples were submitted for the following chemical analysis:

- Total Petroleum Hydrocarbons as diesel (TPH-d) fuel by DHS Luft;
- Total Petroleum Hydrocarbons as gasoline (TPH-g) by DHS Luft;
- Benzene, toluene, ethylbenzene and total xylenes (BTEX) by EPA Method 8020; and
- Oxygenates including Methyl tert-butyl ether (MTBE), Di-isopropyl Ether (DIPE), Ethyl tert-Butyl Ether (ETBE), tert-Amyl Methyl Ether (TAME), and tert-butanol by EPA 8260.

Two groundwater samples were submitted for the following water quality analysis:

- General Mineral by EPA 6000/7000 Series Method;
- Specific Conductivity by EPA Method 120.1;
- pH by EPA Method 150.1;
- Total Dissolved Solids by EPA Method 160.1; and
- Dissolved Oxygen by EPA Method 360.1.

Two soil samples were submitted for the following geotechnical analysis:

- Particle Size Analysis, by ASTM D422;
- Porosity by Phase Relation;
- Moisture Content and Density by ASTM D2937; and
- Specific Gravity by ASTM D854.

4.0 RESULTS

4.1 Groundwater Levels and Hydraulic Gradient

On July 28, 1999, depth to groundwater measurements were collected from monitoring wells MW-1, MW-2, and MW-3 prior to purging and sampling. The measurements were recorded to the nearest 0.01-foot from the referenced (top-of-casing) elevations. Groundwater level data is summarized in Table 3 and a copy of the well survey and the field documentation forms are included in Appendix E.

The groundwater flow direction was toward the north at a hydraulic gradient of approximately 0.0004 ft/ft on July 28, 1999. Figure 3 is a potentiometric surface map generated from the groundwater data collected that day.

4.2 Groundwater Sampling Results

The chemical analytical results of groundwater samples collected from monitoring wells MW-1, MW-2, and MW-3 are summarized in Table 2. Copies of the laboratory data sheets are included in Appendix F.

The following is a summary of the analytical results:

- TPH-d was detected in groundwater sample MW-2 at 160 micrograms per Liter (µg/L);
- MTBE was detected in groundwater samples MW-2 at 130 µg/L, and in MW-3 at 270 µg/L; and
- TPH-g and BTEX, were not detected at or above the laboratory reporting limits in groundwater samples collect from monitoring wells MW-1, MW-2, and MW-3.

Water quality analyses were performed on groundwater samples collected from monitoring wells MW-1 and MW-3. The results are summarized in Table 3 and the laboratory data sheets are presented in Appendix F. The analytical results indicated the following:

- TDS for groundwater samples MW-1 was 6,600 milligrams per Liter (mg/L), and MW-2 was 5,100 mg/L;
- Dissolved oxygen for groundwater sample MW-1 was 5.2 mg/L, and MW-2 was 3.0 mg/L;
- Conductivity for groundwater sample MW-1 was 12,000 micro mhos per centimeter (µmhos) and MW-2 was 9,400 µmhos; and
- pH (measured in the field) for groundwater sample MW-1 was 7.31, MW-2 was 7.37 and MW-3 was 7.29.

4.3 Geotechnical Results

Geotechnical soil sampling results are summarized in Table 4 and the laboratory reports are presented in Appendix G. Laboratory testing indicated the following:

- Percent (%) water content for soil samples MW-2 @ 6.0 feet (ft) bgs was 6.8 % and MW-3 @ 6.0 ft bgs was 5.1 %;
- Dry density for soil samples MW-2 @ 6.0 ft bgs was 104.7 pounds per cubic feet (pcf) and MW-3 @ 6.0 ft bgs was 107.8 pcf;
- Specific gravity for soil samples MW-2 @ 6.0 ft bgs was 2.68 and MW-3 @ 6.0 ft bgs was 2.71; and
- Porosity by phase relation for soil samples MW-2 @ 6.0 ft bgs was 0.3753 and MW-3 @ 6.0 ft bgs was 0.3620.

5.0 CONCLUSIONS

This site appears to be excluded from the California State Water Board "Sources of Drinking Water" policy, based on the relatively high levels of total dissolved solids (greater than 3,000 mg/L).

The build-up of petroleum hydrocarbon vapors in the unsaturated soil zone is not considered an exposure pathway, based on the absence of TPH-g and BTEX in groundwater.

ENSR is requesting **"No Further Action"** from Alameda County Environmental Health Services, based on source removal, and no apparent threat to human health or the environment.

The reduction in mass, mobility, and concentration of residual petroleum hydrocarbons in groundwater will continue at this site as a result of natural attenuation. Natural attenuation is the biodegradation, dispersion, dilution, sorption, volatilization, and/or chemical and biochemical stabilization of contaminants to effectively reduce contaminant toxicity, mobility, or volume levels that are protective of human health and the ecosystem (U.S. EPA Office of Research and Development and Office of Solid Waste and Emergency Response).

TABLE 1
GROUNDWATER LEVEL DATA
Oakland International Airport
United Airlines Building M-110

Well	Date	Reference Level (feet)	Depth to Groundwater (feet)	Groundwater Elevation (feet)
MW-1	7/28/99	10.91	6.12	4.79
MW-2	7/28/99	12.30	7.47	4.83
MW-3	7/28/99	12.51	7.67	4.84

TABLE 2

ANALYTICAL RESULTS – GROUNDWATER

Oakland International Airport

United Airlines Building M-110

Sample ID	Date Collected	Total Petroleum Hydrocarbons		MTBE (µg/L)	Volatile Organic Compounds			
		Diesel (µg/L)	Gasoline (µg/L)		Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)
MW-1	7/28/99	ND	ND	ND	ND	ND	ND	ND
MW-2	7/28/99	160	ND	130	ND	ND	ND	ND
MW-3	7/28/99	ND	ND	270	ND	ND	ND	ND
Reporting Limit		50	50	1.0	0.5	0.5	0.5	0.5

explain how this happens?

Notes:

TTLC	Total Threshold Limit Concentration
MTBE	Methyl tert-Butyl Ether
NA	Not analyzed
ND	Not detected above laboratory reporting limits
µg/L	micrograms per Liter

TABLE 3
ANALYTICAL RESULTS - GROUNDWATER QUALITY
Oakland International Airport
United Airlines Building M-110

Sample ID	Date Collected	Dissolved Oxygen (mg/L)	pH	Total Dissolved Solids (mg/L)	Specific Conduc-tivity (µmhos/cm)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Manganese (mg/L)	Iron (mg/L)	Copper (mg/L)	Zinc (mg/L)
MW-1	7/28/99	5.2	7.31 @ 65.6° F*	6,600	12,000	210	2,300	81	180	2.4	55	0.066	103
MW-3	7/28/99	3.0	7.29 @ 64.4° F*	5,100	9,400	190	1,900	91	150	2.0	120	0.16	100
Reporting Limit	---	1.0	---	10	10	0.02	0.1	0.5	0.02	2.5	2.5	2.0	1.0

Notes:

mg/L	milligrams per Liter
µmhos/cm	micro mhos per centimeter
*	pH and Temperature measured in the field

TABLE 4

GEOTECHNICAL TEST RESULTS

Oakland International Airport

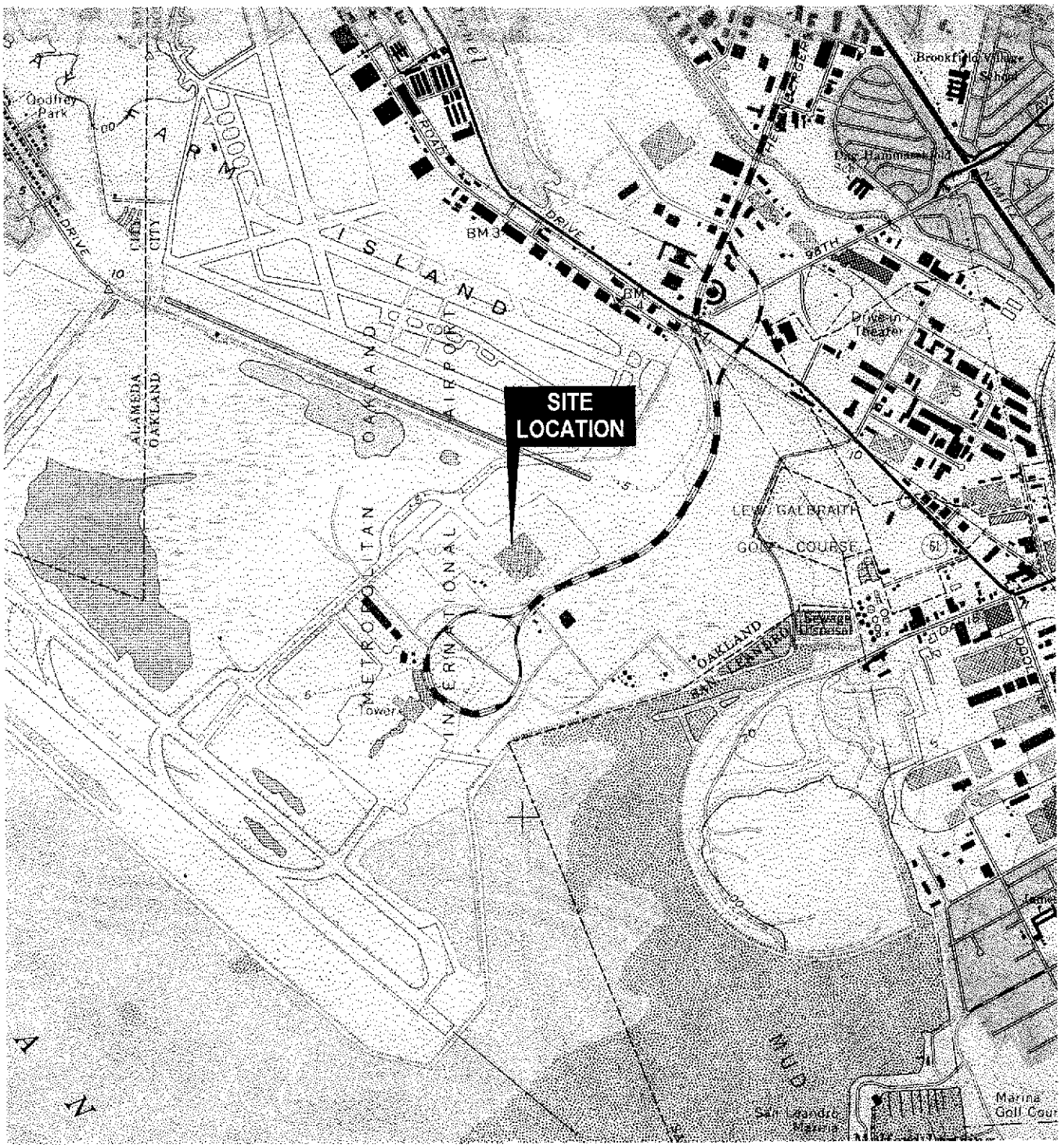
United Airlines Building M-110

Sample ID	Date	Water Content (%)	Dry Density (pcf)	Specific Gravity	Porosity by Phase Relation	Material Description*
MW-2 @ 6.0'	7/21/99	6.8	104.7	2.68	0.3753	Gray poorly graded SAND
MW-3 @ 6.0'	7/21/99	5.1	107.8	2.71	0.3620	Gray poorly graded SAND

Notes:

pcf Pounds per cubic foot

* Material description based on grain size distribution



USGS 7.5 MINUTE
SAN LEANDRO, CA QUADRANGLE
1959, PHOTOREVISED 1980

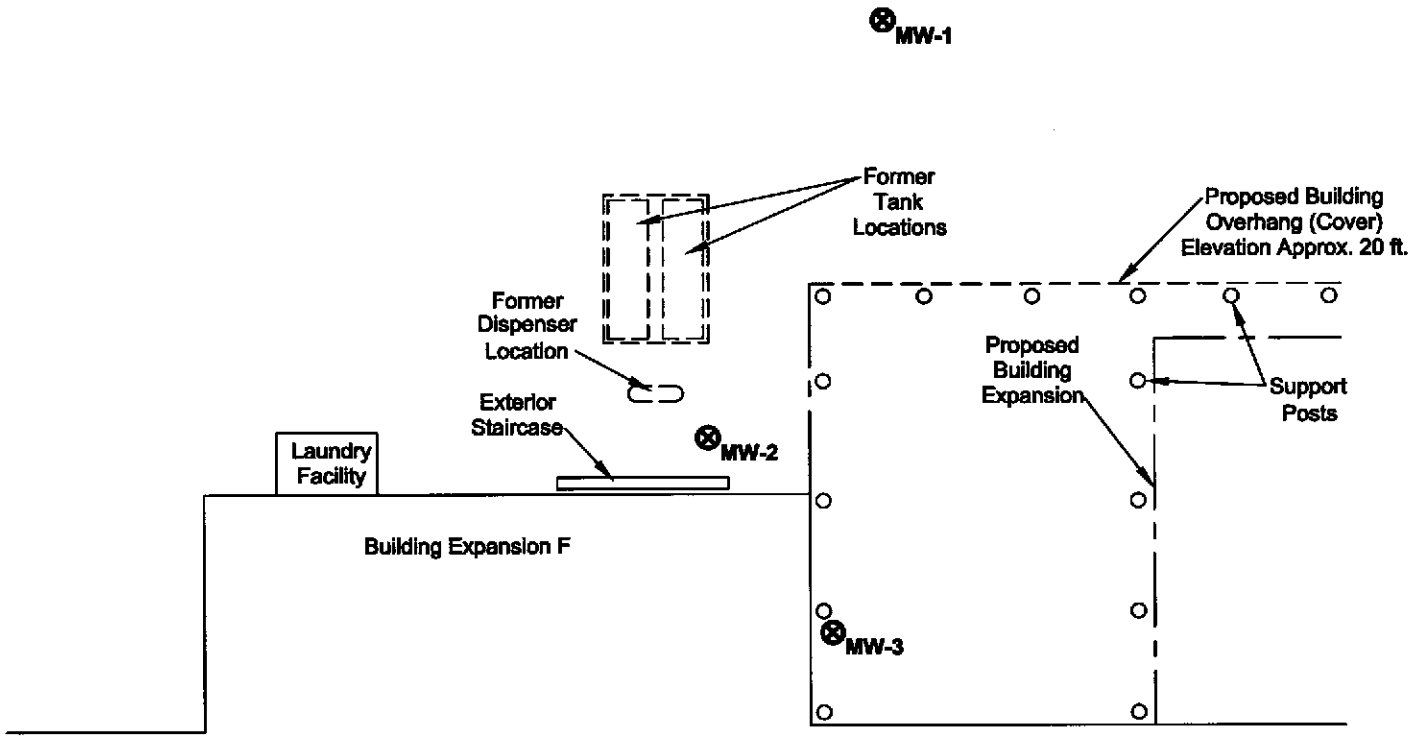
NORTH

0 1000 2000
FEET

ENSR

FIGURE 1
SITE LOCATION MAP
United Airlines
Oakland International Airport
Oakland, CA

DRAWN: J. Gierek	DATE: 9/22/98	PROJECT NO: 6908-A92	REV.
FILE: Ens\6908\050\UAL_inf.dsf			



LEGEND

MW-1 Well Location

NORTH

0 20 40

APPROX. SCALE IN FEET

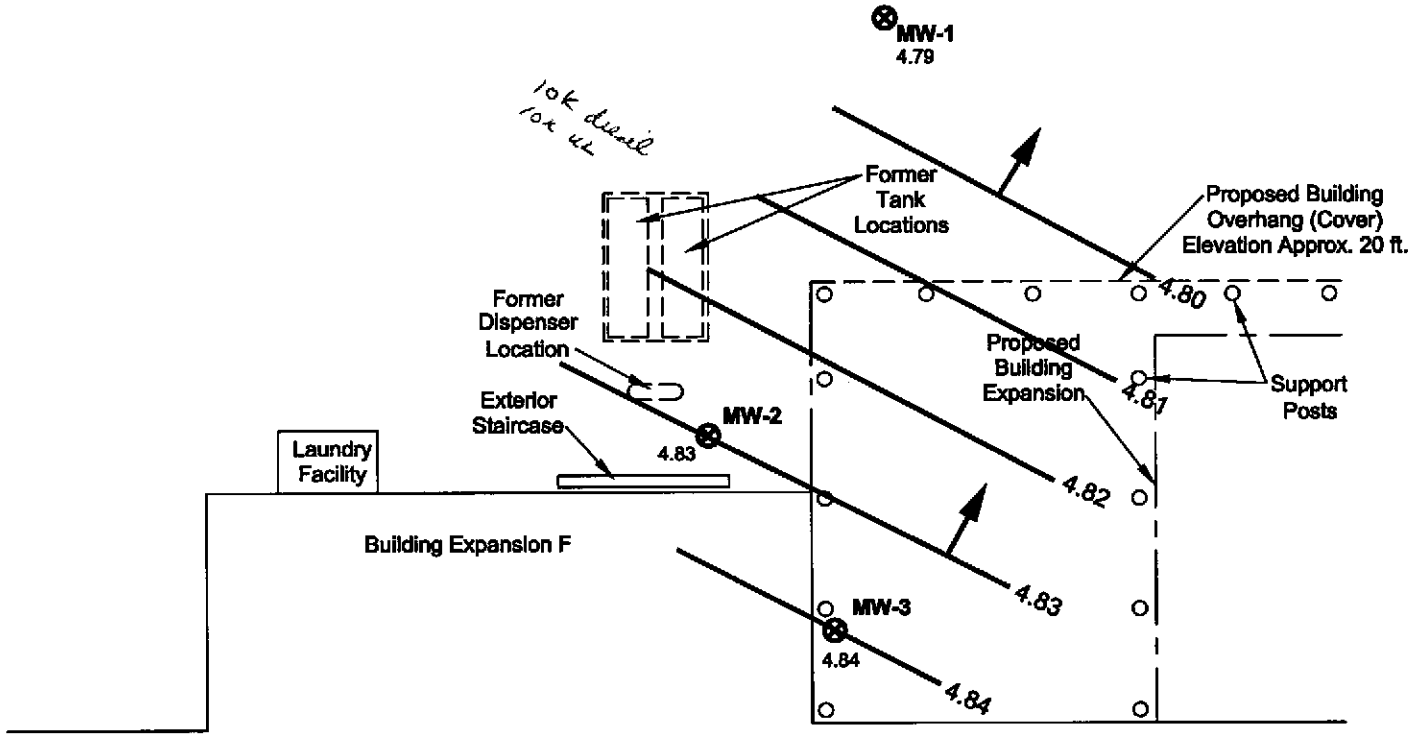
ENSR.

FIGURE 2

SITE MAP

United Airlines
Oakland International Airport
Oakland, CA

DRAWN: J. Gierek	DATE: 9/24/99	PROJECT NO: 6908-050-200	REV.
FILE: Ensr\6908\050\Wells_9_99.dwg			



LEGEND

- MW-1 / 4.79 — Monitoring Well Location; Groundwater Elevation in Feet
- Potentiometric Surface Contour Line
- Implied Groundwater Flow Direction
- Hydraulic Gradient: 0.0004 ft/ft

NORTH

0 20 40

APPROX. SCALE IN FEET

ENSR.

FIGURE 3

POTENTIOMETRIC SURFACE MAP - July 28, 1999

United Airlines
Oakland International Airport
Oakland, CA

DRAWN: J. Gierek	DATE: 9/24/99	PROJECT NO: 6908-050-300	REV.
FILE: Ens\6908\050\Pot_9_99.dwg			

APPENDIX A

ALAMEDA COUNTY
ENVIRONMENTAL HEALTH SERVICES LETTER

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

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

April 8, 1999
StID # 1049

Mr. Dennis Moulton
United Airlines
1100 Airport Drive
Oakland CA 94621

Re: Underground Tank Removals at United Airlines Maintenance Facility, 1100 Airport Drive, Oakland CA 94621

Dear Mr. Moulton:

Thank you for the onsite visit on April 7, 1999 which allowed me to see the location of the recently removed underground storage tanks and the other United Airline underground tank site. I have received and reviewed the **March 1999 ENSR Underground Storage Tanks Closure Report.** The report includes the details of the removal of the 10k diesel and 10k unleaded gasoline tanks, in addition to the closure-in-place of the two 8,500 gallon fire suppression tanks. Also included is the Burns & McDonnell October 22 and 23, 1997 report of soil and groundwater samples taken around both of these tank areas. Based on the absence of the detection of ethylene glycol in the soil and groundwater samples next to the fire suppression tanks, no further action is necessary for these tanks.

However, our office does not agree with the ENSR report, which recommends no further action for the former diesel and gasoline tanks. We agree that no further soil excavation is practical but the impact to groundwater will need further investigation. As you may be aware, the Regional Water Quality Control Board (RWQCB) has requirements for the closure of low risk soil and groundwater cases. Those requirements, which may be questioned for closure of this site are:

- The adequacy of site characterization
- Whether the contaminant plume is migrating and
- Whether water wells, surface water or other sensitive receptors are likely to be impacted

In addition, special concern is given in the presence of the chemical, MTBE, which has unique chemical properties, making it very difficult to remediate. Looking at the requirements in question, it is clear that residual soil and groundwater contamination exists and it likely extends beneath the existing building. Samples collected adjacent to the building indicate the presence of TPH and MTBE in soil and/or groundwater. Since the existing building limited the original investigation, the extent of the contamination was not fully delineated.

Because of the chemical properties of MTBE and the evolving Water Board policy, case closure of residual MTBE cases have additional requirements than that of petroleum. The site must not have any conduits, which could allow lateral or vertical migration. All potential receptors must be protective. Please submit a work plan for additional site characterization. Please submit your work plan **within 45 days or by May 21, 1999.** I recommend that you have your consultant contact me to discuss their recommendations.

Sincerely,

Barney M Chan

Barney M. Chan
Hazardous Materials Specialist

C: B. Chan, files
Mr. D. Klettke, Port of Oakland, 530 Water St., Oakland CA 94607
Mr. A. Klein, ENSR, 10324 Placer Lane, Suite 200, Sacramento, CA 95827
Wprq1100Airport

APPENDIX B

BOREHOLE SITE SURVEY

NORCAL GEOPHYSICAL CONSULTANTS, INC.

August 12, 1999

Mr. Alan Klein
ENSR
10324 Placer Lane, Suite 200
Sacramento, CA 95827

Subject: Borehole Site Surveys
United Air Lines Maintenance Facility
Oakland International Airport
Oakland, CA

Dear Mr. Klein:

The purpose of this letter is to confirm that NORCAL Geophysical Consultants, Inc. has completed the work authorized for the proposal submitted May 11, 1999. The field work was conducted on July 20, 1999 by NORCAL Geophysicist David Bissiri. NORCAL investigated a total of three (3) proposed boring locations at the United Air Lines Maintenance Facility at Oakland International Airport for detectable underground obstructions to drilling. Expected obstructions included underground utilities and reinforced concrete.

The borehole site surveys were performed with specific equipment and according to established field procedures. Detailed descriptions of the equipment, methodology, field procedures, and survey documentation are included in Appendix A. In addition to Appendix A, we have enclosed two (2) copies of the Borehole Site Survey Logs and the Daily Field Reports that were used to document our work. The Borehole Site Survey Logs provide information regarding the proximity of detectable utilities and other possible obstructions to the proposed boring locations. The Daily Field Report summarizes the order in which the field activities were performed each day.

We appreciate the opportunity to provide you with this information.

Respectfully,

NORCAL Geophysical Consultants, Inc.

David J. Bissiri
Geophysicist, GP-1009
DJB/WEB/jh

Enclosures: Appendix A, GEOPHYSICAL METHODOLOGY, FIELD PROCEDURES, AND SURVEY DOCUMENTATION

Appendix A

GEOPHYSICAL METHODOLOGY

NORCAL used electromagnetic line locating (EMLL) and ground penetrating radar (GPR) methods in an effort to detect underground utilities in the vicinity of proposed borehole locations as delineated by ENSR. Descriptions of the methods are provided below.

Electromagnetic Line Location

Electromagnetic line location techniques are used to locate the electromagnetic field resulting from an electric current flowing on a line. These fields can arise from currents already on the line (known as passive, or ambient signals) or currents applied to a line with a transmitter (active). The most common passive signals are generated by live electric lines, grounded water lines, and re-radiated radio signals. Active signals can be introduced onto conductive utilities by connecting the transmitter to the line at accessible locations. The transmitted signal will then travel along the specific utility. This is referred to as electromagnetic conduction (EMC). Additionally, a signal can be introduced onto a line through electromagnetic induction (EMI). This involves transmitting a high frequency electromagnetic field at, or above, the ground with either the transmitter placed in close proximity to the utility or by means of an induction clamp placed around specific metallic conduits. The transmitted field then induces a current into the line.

The detection of underground utilities is dependent upon the composition and construction of the line of interest. Utilities detectable with standard line location techniques include most continuously connected metal pipes, cables/wires or non-metallic utilities equipped with tracer wires. These generally include water, electric, natural gas, telephone, and other conduits related to facility operations. If there are no passive currents present, then these utilities must be exposed at the surface or accessible in utility vaults in order to have an active signal placed on them. Utilities that are not detectable using standard electromagnetic line location techniques include those made of non-electrically conductive materials such as PVC, fiberglass, vitrified clay, and metal pipes with insulating joints.

The EMLL instrumentation used for this investigation consisted of a Radiodetection RD-400 line locator and a Fisher TW-6 inductive pipe and cable locator.

Ground Penetrating Radar

Ground penetrating radar is a method that provides a continuous, high resolution cross-section depicting variations in the electrical properties of the shallow subsurface. The method is particularly sensitive to variations in electrical conductivity and electrical permittivity (the ability of a material to hold a charge when an electrical field is applied).

The system operates by repeatedly radiating an electromagnetic pulse into the ground from a transducer (antenna) as it is moved along a traverse. When the radar signal encounters an interface representing a change in permittivity (resulting in what is known as an impedance

contrast) some of the electromagnetic energy is reflected back to the surface. Notably, when the signal encounters a metal object, virtually all of the incident energy is reflected. The reflected signals are received by the transducer and are printed in cross-section form (time-depth) on a graphical recorder. The resulting records can provide information regarding the location of underground utilities and the shallow stratigraphy. Generally, electrically conductive materials, such as saturated clay can limit radar performance by reducing the depth of signal penetration.

For this investigation, we used a Geophysical Survey Systems, Inc. SIR-2 Subsurface Interface Radar System, equipped with a 500 megahertz (MHz) antenna. This frequency antenna is used to provide high resolution.

Equipment Functional Checks

At the beginning of the survey, NORCAL performed EMLL and GPR instrument checks, as recommended by the manufacturers, to ensure proper equipment function. These function checks included testing the batteries, as well as instrument response. Particular attention was paid to the GPR calibrations.

FIELD INVESTIGATION

We investigated a total of three (3) proposed borehole locations. The objective at each proposed location was to mark the locations of nearby underground utilities and other subsurface features that may be potential obstructions to the drilling operation. The investigation consisted of basically five tasks, as follows:

Task 1 — Site Reconnaissance: the vicinity of each proposed boring site area was inspected for surface evidence of underground utilities that may be within the general area.

Task 2 — EMLL Survey: We used the EMLL systems to investigate the areas of concern for potential subsurface obstructions such as utilities. The locations of any detected obstructions were marked with spray paint.

Task 3 — GPR Survey: We obtained GPR data over the proposed borehole locations along north-south and east-west trending traverses. Where possible, these traverses were approximately 20 feet long, and centered on the proposed borehole location. The GPR data were used to aid in confirming the locations of detected and suspected underground utility alignments. We examined the GPR records for patterns characteristic of underground utilities or variations in the subsurface material that may be associated with utility trenches. The locations of the utility alignments, and/or localized GPR anomalies were painted on the ground.

Task 4 Recommendations: Based on the findings of the above procedures, we determined whether the proposed boring locations had possible underground obstructions a safe distance away. If obstructions were in close proximity to the proposed boring locations, we recommended an alternative location . The cleared borehole locations were delineated by painting a white circle containing a fluorescent pink "N" (indicating that NORCAL had investigated that particular location) on the ground.

Task 5 Draft Borehole Site Survey Log: Upon completion of the borehole site survey, we prepared field sketches of the areas of investigation on Borehole Site Survey log forms.

Survey Documentation

We used the Daily Field Reports and the Borehole Site Survey Log forms to document our work. The Daily Field Report summarizes the day's activity. The Borehole Site Survey Logs present the pertinent information associated with each proposed borehole location. These logs are separated into three sections. The upper section of the log consists of the site specific information such as location, borehole number, etc. The center section of this log is a 1 inch equals 10 feet scale map showing the locations of the proposed borehole, the alternative location (if applicable), the GPR traverses, surface objects, anomaly locations, etc. The lower section of the log includes our explanations and remarks for each survey area. This includes a list of the equipment used and the procedures performed at each site. The blank area in the lower right hand corner of the log is used to list any site specific remarks that may be required to further explain the field activities or results.

NORCAL GEOPHYSICAL CONSULTANTS INC.

NORCAL

DAILY FIELD REPORT

Date: 7/20/99 Client/Location: ENSR / UAL - OAKLAND MAINT. FAC.

Personnel: D. BISSIRI Equipment: G-PR / EMLL

TIME	NOTES
12:00	ARRIVE MAINGATE
12:15	MEET ALAN KLEIN
12:30	REVIEW AS BUILT PLANS - Need utilities map
12:45	START FIELD WORK
	INVESTIGATE BORINGS: <MW-1, <MW-2, <MW-3>
14:30	START MAPPING FINDINGS / PACK EQUIPMENT
15:00	FINISH INVESTIGATION - LEAVE SITE
	NOTE: RECOMMEND HAND-AUGERING ALL HOLES
	ESPECIALLY MW-3. THOUGH NO UTILITIES WERE
	DETECTED CLOSER THAN 4 FEET, SUB SURFACE
	IS HIGHLY DISTURBED AND MAY RENDER SOME
	UTILITIES UNDETECTABLE

FIELD DAY SUMMARY COMPLETED 3 HRS Field work

Signature

NORCAL Representative DAVID BISSIRI

Signature

Representative Jeff Wendt

1350 INDUSTRIAL AVENUE SUITE A • PETALUMA, CA 94952
TELEPHONE (707) 763-1312 • FAX (707) 762-5587

PERSONNEL: DSB

JOB: | DATE: 7/20/99

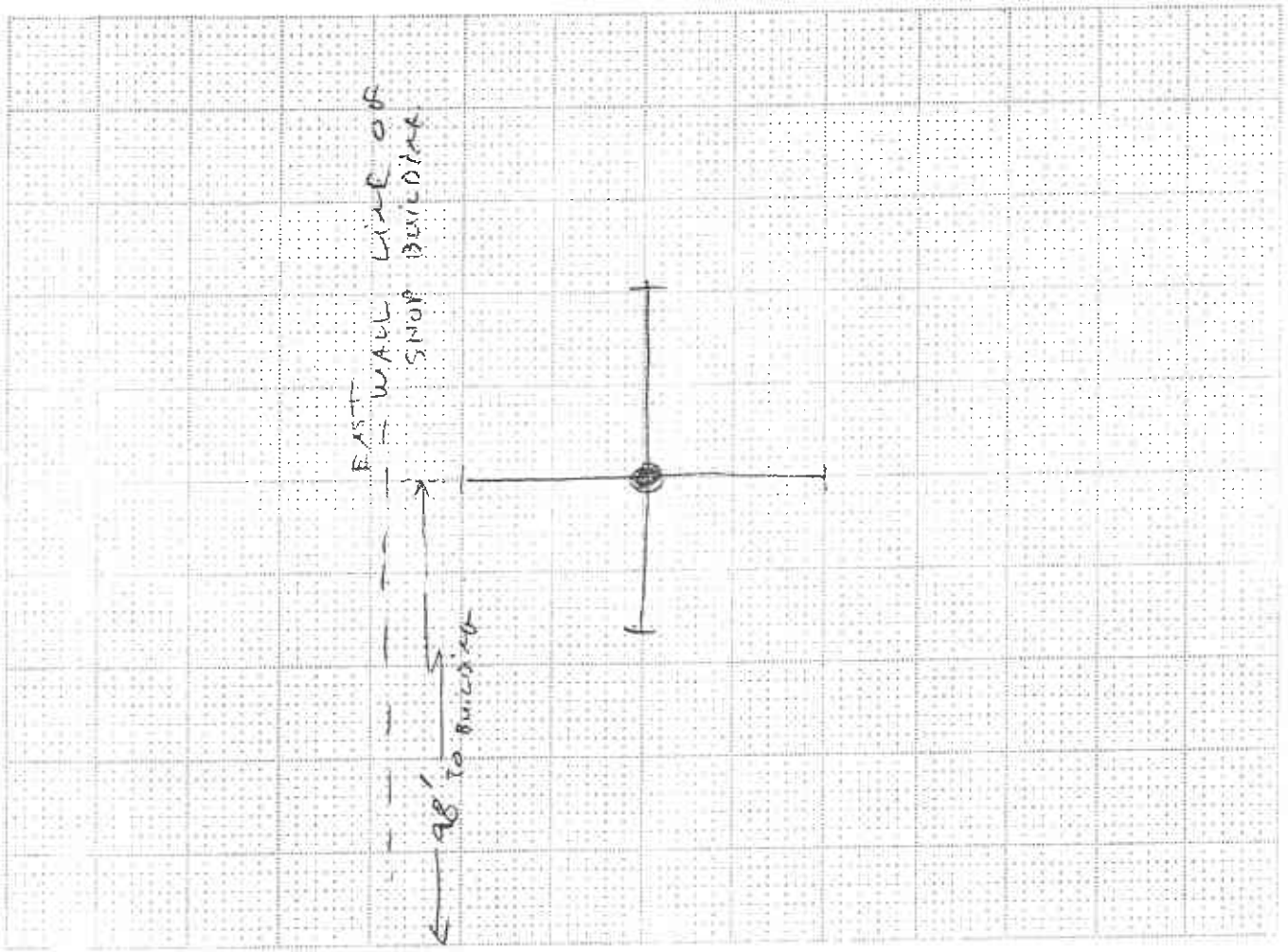
NORCAL GEOPHYSICAL CONSULTANTS INC.

NORCAL

CLIENT: ENSR

LOCATION: UAL – OAKLAND MAINT. FAC

BORING: MW-1



Scale: 1" = 10'

EXPLANATION

○	Original Boring Location
●	Final Boring Location
⊢——⊣	GPR Traverse
▭ OR ——	Localized GPR Anomaly
—— -- ——	Utility Alignment

Utilities

- _ T (Telephone, Comm.)
- _ E (Electric)
- _ NG (Natural Gas)
- _ CA (Compressed Air)
- _ STM (Steam)
- _ SS (Sanitary Sewer)
- _ SD (Storm Drain)
- _ W (Water)
- _ FS (Fire Supression)
- _ UU (Undifferentiated Utility)

Surface

- _ RC (Reinforced Concrete)
- _ AC (Asphalt)
- _ C (Concrete)
- _ Soil
- _ Gravel
- _ other

NOTES

Equipment:
- ~~GPR (Radar)~~
- _ RD 400
- ~~M Scope~~
- _ other

Procedure:
- ~~EMC (Conduction)~~
- ~~EMI (Induction)~~
- ~~Ambient~~
- ~~GPR~~

Surface Conditions:
- _ Wet
- ~~Dry~~
- _ other

REMARKS

PERSONNEL: DJB

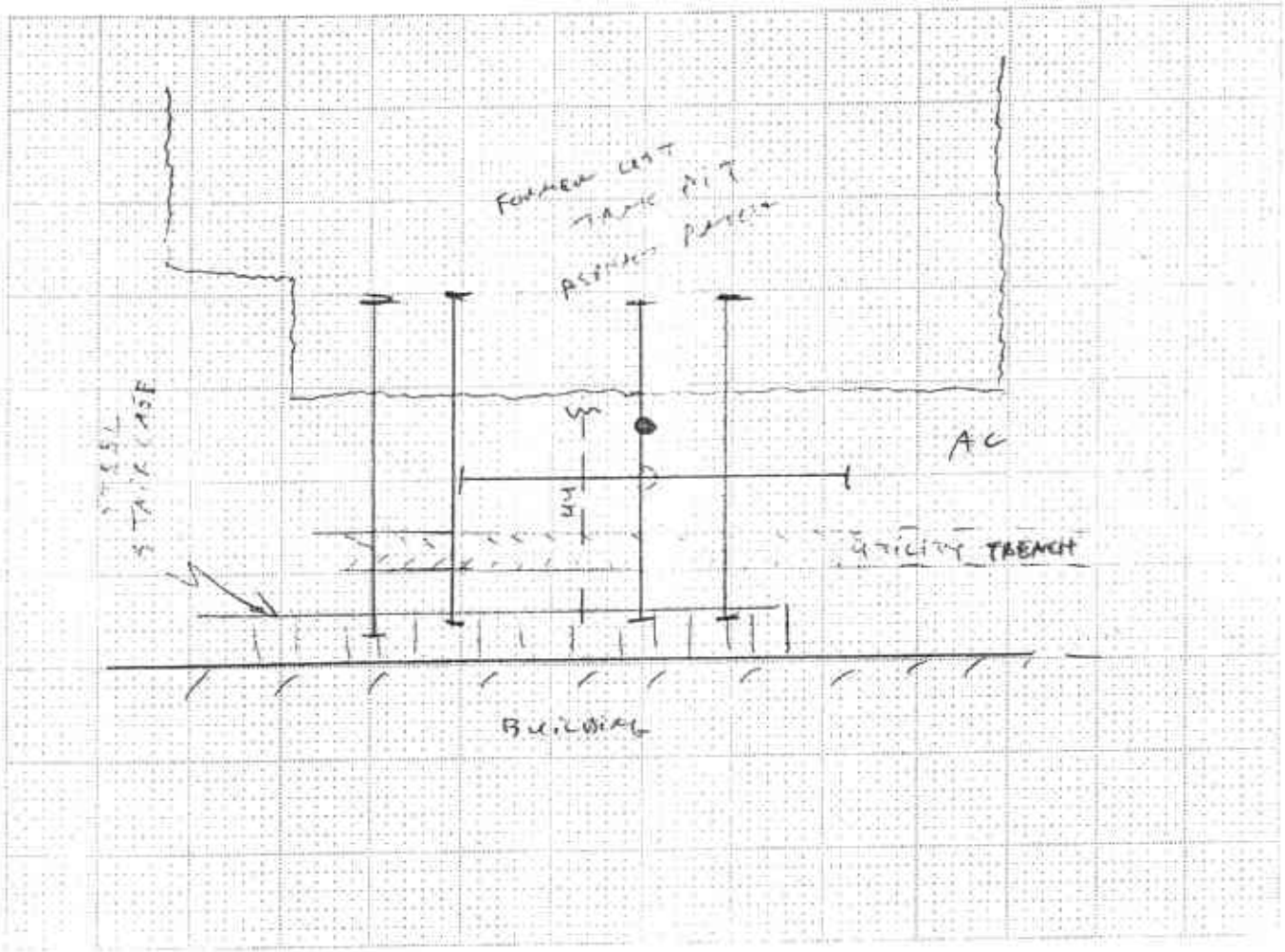
JOB: | DATE: 7/20/99

NORCAL GEOPHYSICAL CONSULTANTS INC.

CLIENT: EMSR

LOCATION: UAL - OAKLAND MAINT. FAC.

BORING: MW-2



Scale: 1" = 10'

EXPLANATION

- ○ Original Boring Location
- ● Final Boring Location
- ⊢——⊣ GPR Traverse
- □ OR ⟶ Localized GPR Anomaly
- — — — Utility Alignment

Utilities

- _ T (Telephone, Comm.)
- _ E (Electric)
- _ NG (Natural Gas)
- _ CA (Compressed Air)
- _ STM (Steam)
- _ SS (Sanitary Sewer)
- _ SD (Storm Drain)
- _ W (Water)
- _ FS (Fire Supression)
- ✓ UU (Undifferentiated Utility) — whats this

Surface

- _ RC (Reinforced Concrete)
- ✓ AC (Asphalt)
- _ C (Concrete)
- _ Soil
- _ Gravel
- _ other

NOTES

Equipment:
- _ GPR (Radar)
- _ RD 400
- ✓ M Scope
- _ other

Procedure:
- _ EMC (Conduction)
- ✓ EMI (Induction)
- ✓ Ambient
- _ GPR

Surface Conditions:
- _ Wet
- ✓ Dry
- _ other

REMARKS

PERSONNEL: DJB

JOB: | DATE: 7/20/99

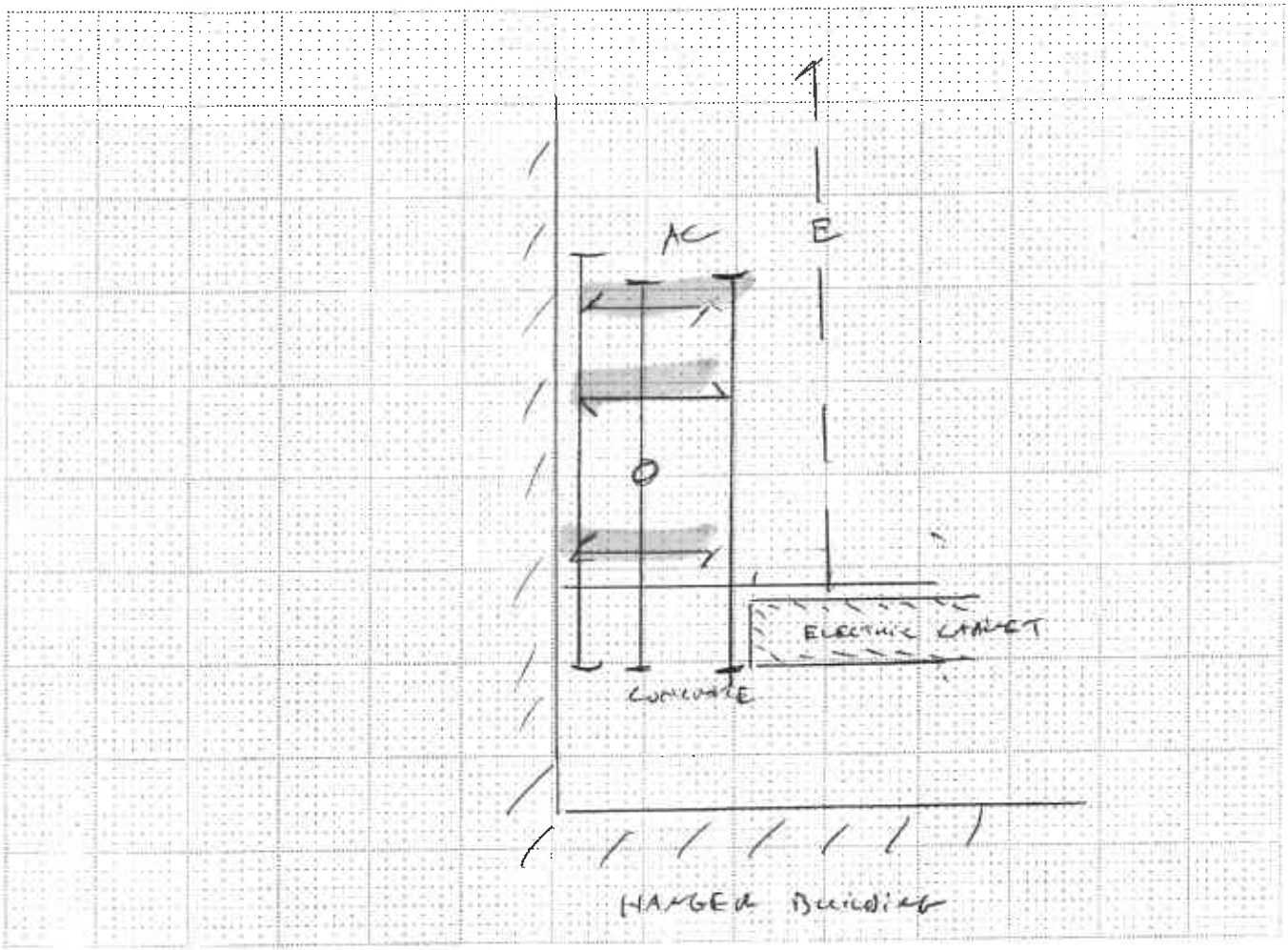
NORCAL GEOPHYSICAL CONSULTANTS INC.

NORCAL

CLIENT: RNSR

LOCATION: UAC – OAKLAND MAINT. FAC.

BORING: MW-3



Scale: 1" = 10'

EXPLANATION

- ○ Original Boring Location
- ● Final Boring Location
- GPR Traverse
- Localized GPR Anomaly
- Utility Alignment

Utilities

- _ T (Telephone, Comm.)
- _ E (Electric)
- _ NG (Natural Gas)
- _ CA (Compressed Air)
- _ STM (Steam)
- _ SS (Sanitary Sewer)
- _ SD (Storm Drain)
- _ W (Water)
- _ FS (Fire Supression)
- _ UU (Undifferentiated Utility)

Surface

- _ RC (Reinforced Concrete)
- ~~_ AC (Asphalt)~~
- ~~_ C (Concrete)~~
- _ Soil
- _ Gravel
- _ other

NOTES

Equipment:
- _ ~~GPR (Radar)~~
- _ RD 400
- _ ~~M Scope~~
- _ other

Procedure:
- _ EMC (Conduction)
- _ ~~EMI (Induction)~~
- _ ~~Ambient~~
- ~~GPR~~

Surface Conditions:
- _ Wet
- ~~Dry~~
- _ other

REMARKS

Recommend Hand-Auger this hole

APPENDIX C

ENSR STANDARD OPERATING PROCEDURES (SOPs)

STANDARD OPERATING PROCEDURE LIST

SOP-1	SOIL BORING SAMPLING
SOP-3	SOIL CLASSIFICATION
SOP-4	SAMPLE IDENTIFICATION AND CHAIN-OF-CUSTODY PROCEDURES
SOP-5	LABORATORY ANALYTICAL QUALITY ASSURANCE AND CONTROL
SOP-6	HOLLOW-STEM AUGER MONITORING WELL INSTALLATION AND DEVELOPMENT
SOP-7	GROUNDWATER PURGING AND SAMPLING
SOP-12	MEASURING LIQUID LEVELS USING A WATER LEVEL INDICATOR OR INTERFACE PROBE

STANDARD OPERATING PROCEDURES
RE: SOIL BORING SAMPLING
SOP-1

During drilling with a hollow-stem auger or air-rotary rig, soil samples are typically collected in thin-walled brass or stainless steel tubes 6 inches long by 2 inches outside diameter. Three of the tubes are set, typically, in an 18-inch-long split-barrel sampler. The sampler is usually lowered into the open borehole attached either to the end of drilling pipe or on a wire-line hammer device.

When possible, the split-barrel sampler is driven its entire length, either hydraulically or by repeatedly pounding a 140-pound hammer using a 30-inch drop. The number of drops (blows) used to drive the sampler is recorded on the boring log. The sampler is extracted from the borehole and the tubes containing the soil samples are removed. Upon removal from the sampler, the ends of the lowermost tube are typically covered with aluminum foil or "Teflon" sheets and plastic caps. The sample may be extruded from the tube and sealed within another appropriate cleaned sample container (e.g., glass jar). The sealed sample is labeled and refrigerated for delivery, under strict chain-of-custody, to the analytical laboratory. These procedures minimize the potential for cross-contamination and volatilization of volatile organic compounds (VOC) prior to chemical analysis.

Material from one of the other tubes is analyzed in the field, when required, using either a portable photoionization detector (PID) or equivalent analytical instrument. The purpose of this field analysis is to qualitatively determine the presence or absence of hydrocarbons. The soil sample is enclosed in a container (eg., plastic bag) to allow for some volatilization of VOC. The PID is then used to measure the concentrations of hydrocarbons within the container headspace. The data is recorded on the boring logs at the depth corresponding to the sampling point.

Any remaining soil collected from the sampler at that interval is described geologically using the USCS or other appropriate classification system) on a boring log. All drilling and sampling equipment are either steam-cleaned or washed prior to use at each site and between boreholes to minimize the potential for cross-contamination. Sampling equipment is also cleaned between samples.

STANDARD OPERATING PROCEDURES
RE: SOIL CLASSIFICATION
SOP-3

Soil samples are classified according to the Unified Soil Classification System. Representative portions of the samples may be submitted under strict chain-of-custody to an analytical laboratory for further examination and verification of the in-field classification, and analysis of soil mechanical and/or petrophysical properties. The soil types are indicated on logs of either excavations or borings together with depths corresponding to the sampling points, and other pertinent information.

STANDARD OPERATING PROCEDURES
RE: SAMPLE IDENTIFICATION AND CHAIN-OF-CUSTODY PROCEDURES
SOP-4

Sample identification and chain-of-custody procedures ensure sample integrity, and document sample possession from the time of collection to its ultimate disposal. Each sample container submitted for analysis is labeled to identify the job number, date, time of sample collection, a sample number unique to the sample, any name(s) of on-site personnel and any other pertinent field observations also recorded on the field excavation or boring log.

Chain-of-custody forms are used to record possession of the sample from time of collection to its arrival at the laboratory. During shipment, the person with custody of the samples will relinquish them to the next person by signing the chain-of-custody form(s) and noting the date and time. The sample-control officer at the laboratory will verify sample integrity, correct preservation, confirm collection in the proper container(s), and ensure adequate volume for analysis.

If these conditions are met, the samples will be assigned unique laboratory log numbers for identification throughout analysis and reporting. The log numbers will be recorded on the chain-of-custody forms and in the legally-required log book maintained in the laboratory. The sample description, date received, client's name, and any other relevant information will also be recorded.

STANDARD OPERATING PROCEDURES
RE: LABORATORY ANALYTICAL QUALITY ASSURANCE AND CONTROL
SOP-5

In addition to routine instrument calibration, replicates, spikes, blanks, spiked blanks, and certified reference materials are routinely analyzed at method-specific frequencies to monitor precision and bias. Additional components of the laboratory Quality Assurance/Quality Control program include:

1. Participation in state and federal laboratory accreditation/certification programs;
2. Participation in both U.S. EPA Performance Evaluation studies (WS and WP studies) and inter-laboratory performance evaluation programs;
3. Standard operating procedures describing routine and periodic instrument maintenance;
4. "Out-of-Control"/Corrective Action documentation procedures; and,
5. Multi-level review of raw data and client reports.

STANDARD OPERATING PROCEDURES
RE: HOLLOW-STEM AUGER MONITORING WELL INSTALLATION AND DEVELOPMENT
SOP-6

Boreholes for monitoring wells are drilled using a truck-mounted, hollow-stem auger drill rig. The borehole diameter will be a minimum of 4 inches larger than the outside diameter of the casing when installing well screen. The hollow-stem auger provides minimal interruption of drilling while permitting soil sampling at desired intervals. Soil samples are collected by either hammering or hydraulically pushing a conventional split-barrel sampler containing pre-cleaned 2-inch-diameter brass tubes. A geologist or engineer from ENSR, continuously logs each borehole during drilling and constantly checks drill cuttings for indications of both the first recognizable occurrence of groundwater and volatile hydrocarbons, using either a portable photoionization detector, flame ionization detector, or an explosimeter. The sampler is rinsed between samples and either steam cleaned or washed with all other drilling equipment between borings to minimize the potential for cross-contamination.

Monitoring wells are cased with threaded, factory-perforated and blank Schedule 40 PVC. The perforated interval consists of slotted casing, generally with 0.020-inch-wide by 1.5-inch-long slots, with 42 slots per foot. A PVC cap may be secured to the bottom of the casing with stainless steel screws; no solvents or cements are used. Centering devices may be fastened to the casing to ensure even distribution of filter material and grout within the borehole annulus. The well casing is thoroughly washed and/or steam cleaned, or may be purchased as pre-cleaned, prior to installation.

After setting the casing inside the hollow-stem auger, sand or gravel filter material is poured into the annular space to fill from boring bottom to generally 1 foot above the perforated interval. A 1- to 2-foot thick bentonite plug is set above this filter material to prevent grout from infiltrating into the filter pack. Either neat cement, containing about 5 percent bentonite, or sand-cement grout is then tremmied into the annular space from the top of the bentonite plug to near surface. A traffic-rated vault is installed around each wellhead for wells located in parking lots or driveways, while steel "stovepipes" are usually set over wellheads in landscaped areas.

After installation, the wells are thoroughly developed to remove residual drilling materials from the wellbore, and to improve well performance by removing fine material from the filter pack that may pass into the well. Well development techniques used may include pumping, surging, bailing, swabbing, jetting, flushing, and air-lifting. All development water is collected either in drums or tanks for temporary storage, and properly disposed of depending on laboratory analytical results. To minimize the potential for cross-contamination between wells, all development equipment is either steam cleaned or properly washed prior to use.

STANDARD OPERATING PROCEDURES
RE: GROUNDWATER PURGING AND SAMPLING
SOP-7

Prior to water sampling, each well is purged by evacuating a minimum of three wetted well-casing volumes of groundwater. When required, purging will continue until either the discharge water temperature, conductivity, or pH stabilize to within 10% of previously measured values; and a maximum of ten wetted casing volumes of groundwater have been recovered, or the well is bailed dry. When practical, the groundwater sample should be collected when the water level in the well recovers to at least 80 percent of its static level. Field measurements, observations and procedures are noted.

The sampling equipment consists of a clean bailer, or stainless steel bladder pump with a "Teflon" bladder. If the sampling system is dedicated to the well, then the bailer is usually "Teflon," but the bladder pump may be PVC with a polypropylene bladder. Sample container type, preservation, and volume depends on the intended analyses.

The groundwater sample is decanted into each VOA vial in such a manner that there is no meniscus at the top of the vial. A cap is quickly secured to the top of the vial. The vial is then inverted and gently tapped to see if air bubbles are present. If none are present, the vial is labeled and refrigerated for delivery, under strict chain-of-custody, to the analytical laboratory. Label information should include a unique sample identification number, job identification number, date, time, and the sampler's initials.

For quality control purposes, a duplicate water sample may be collected from a well. When required, a trip blank is prepared at the laboratory and placed in the transport cooler. It is labeled similar to the well samples, remains in the cooler during transport, and is analyzed by the laboratory along with the groundwater samples. In addition, a field blank may be prepared in the field when sampling equipment is not dedicated. The field blank is prepared after a pump or bailer has been either steam cleaned or properly washed, prior to use in the next well, and is analyzed along with the other samples. The field blank analysis demonstrates the effectiveness of in-field cleaning procedures to prevent cross-contamination.

To minimize the potential for cross-contamination between wells, all well development and water sampling equipment not dedicated to a well is either steam cleaned or properly washed between use. As a second precautionary measure, wells are sampled in order of lowest to highest concentrations as established by available previous analytical data.

In the event the water samples cannot be submitted to the analytical laboratory on the same day they are collected (e.g., due to weekends or holidays), the samples are temporarily stored until the first opportunity for submittal either on ice in a cooler, such as when in the field, or in a refrigerator.

STANDARD OPERATING PROCEDURES
RE: MEASURED LIQUID LEVELS USING A WATER LEVEL INDICATOR OR INTERFACE PROBE
SOP-12

Field equipment used for liquid-level gauging typically includes the measuring probe (water level or interface) and a clean product bailer(s). The field kit also includes cleaning supplies (buckets, TSP, spray bottles, and deionized water) to be used in cleaning the equipment between wells.

Prior to measurement, the probe tip is lowered into the well until it touches bottom. Using the previously established top-of-casing or top-of-box (i.e., wellhead vault) point, the probe cord (or halyard) is marked and a measuring tape (graduated in hundredths of a foot) is used to determine the distance between the probe end and the marking on the cord. This measurement is then recorded on the liquid-level data sheet as the "Measured Total Depth" of the well.

When necessary in using the interface probe to measure liquid levels, the probe is first electrically grounded to either the metal stove pipe or another metal object nearby. When no ground is available, reproducible measurements can be obtained by clipping the ground lead to the handle of the interface probe case.

The probe tip is then lowered into the well and submerged in the groundwater. An oscillating (beeping) tone indicates the probe is in water. The probe is slowly raised until either the oscillating tone ceases or becomes a steady tone. In either case, this is the depth-to-water (DTW) indicator and the DTW measurement is made accordingly. The steady tone indicates floating hydrocarbons. In this case, the probe is slowly raised until the steady tone ceases. This is the depth-to-product (DTP) indicator and the measurement of DTP is recorded. A corrected depth to groundwater to account for floating hydrocarbons can be calculated by using the following formula:

CDTW = DTW - (SP.G x LHT).
CDTW = Corrected depth to groundwater.
DTW = Measured depth to groundwater.
SP.G = Specific gravity: unweathered gasoline = 0.75; diesel = 0.80
LHT = Measured liquid hydrocarbon thickness.

The corresponding groundwater elevation is the difference between a previously determined well reference elevation and either the depth to groundwater or the corrected depth to groundwater.

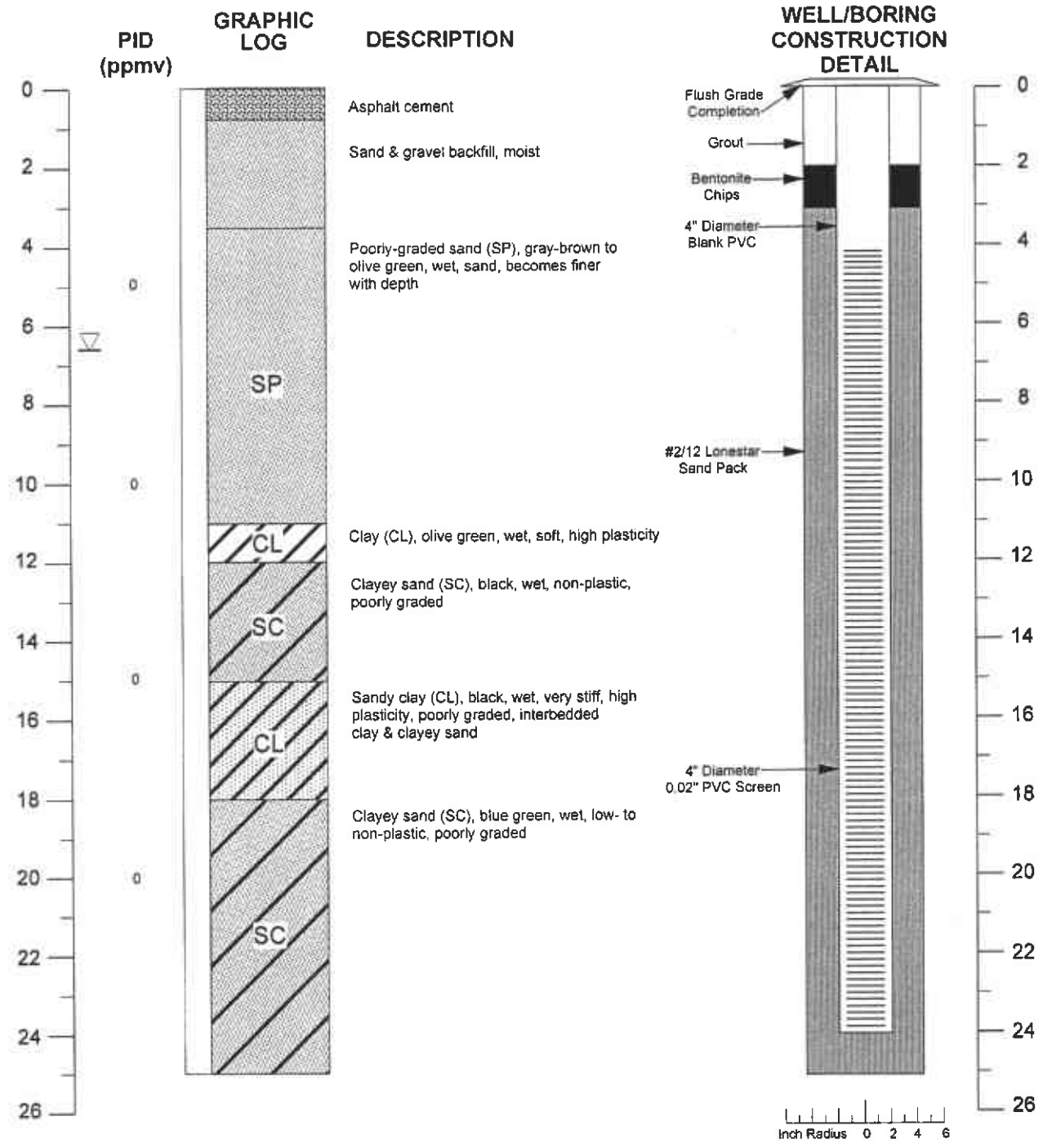
The process of lowering and raising the probe must be repeated several times to ensure accurate measurements. The DTW and DTP measurements are recorded on the liquid-level data sheet. When floating product is indicated by the probe's response, a product bailer is lowered partially through the product-water interface to confirm the product on the water surface, and as further indication of product thickness, particularly in cases where the product layer is quite thin. Either this measurement or the difference between DTW and DTP is recorded on the data sheet as "product thickness".

STANDARD OPERATING PROCEDURES
RE: MEASURED LIQUID LEVELS USING A WATER LEVEL INDICATOR OR INTERFACE PROBE
SOP-12 (cont.)

In order to avoid cross-contamination of wells during the liquid-level measurement process, wells are measured in the order of "clean" to "dirty" (where such information is available). In addition, all measurement equipment is cleaned with TSP or similar solution and thoroughly rinsed with deionized water before use, between measurements in respective wells, and at the completion of the day's activities.

APPENDIX D

BORING LOGS and WELL CONSTRUCTION DETAILS



Driller:	Gregg Drilling	End Date:	7/21/99	Type of Sampler:	Split spoon
Drilling Method:	Hollow Stem Auger	Groundwater:	6.5 ft. bgs	TD (Total Depth):	25 ft. bgs
Start Date:	7/21/99	Sampler:	Jeff Wendt		

Legend

- Water level in completed well
- First water found during drilling
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Contact: Solid where certain
- Contact: Dotted where approximate
- Contact: Dashed where uncertain

Monitoring Well MW-1

United Airlines
1100 Airport Drive
Oakland, CA

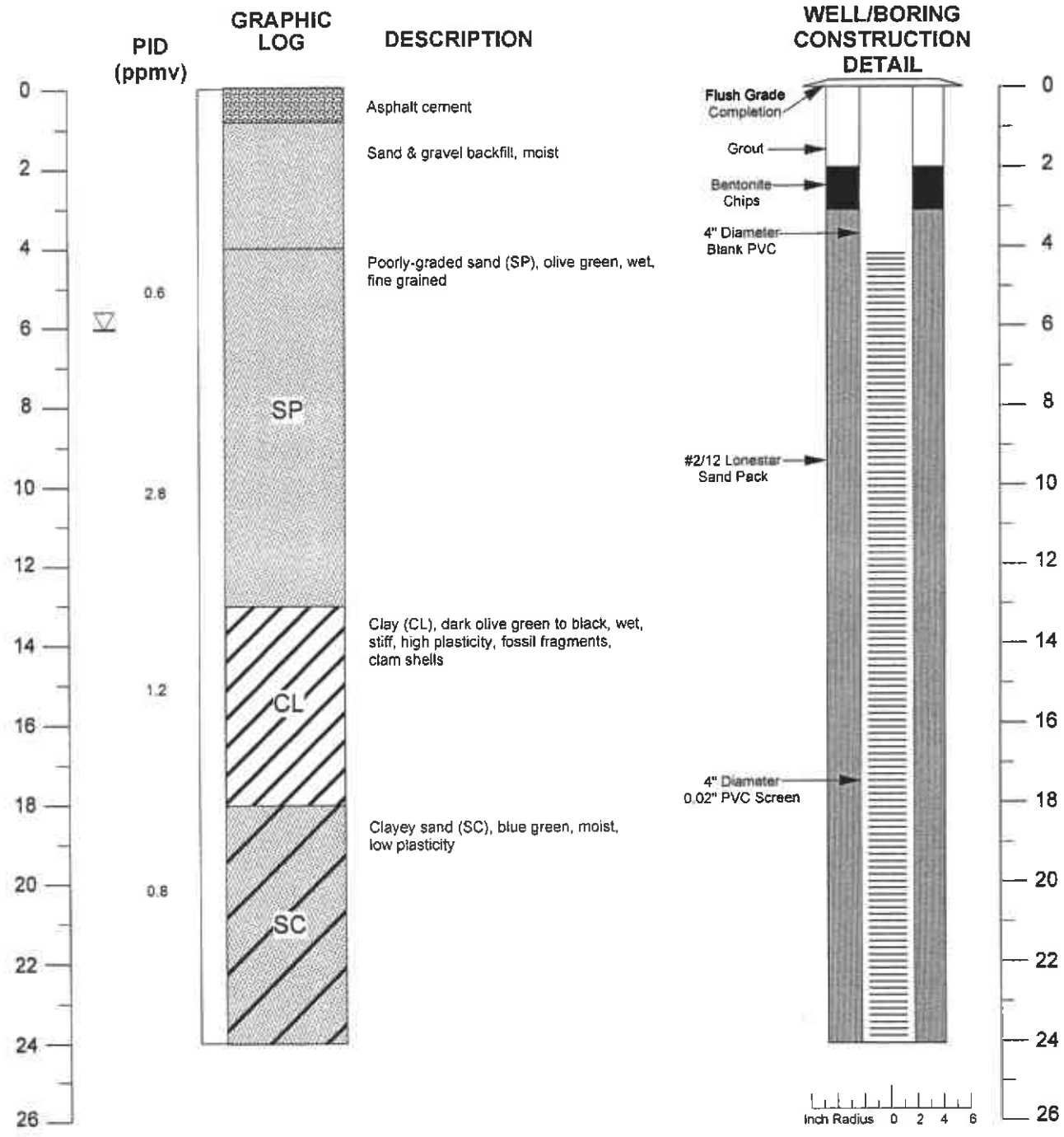
ENSR®

Page: 1 of 1

Drawn By:	J. Gierek	Date:	7/28/99
Revised By:	J. Gierek	Date:	8/10/99

Job Number: 6908-050

Ensr\6908\050\borings.dsf



Driller:	Gregg Drilling	End Date:	7/21/99	Type of Sampler:	Split spoon
Drilling Method:	Hollow Stem Auger	Groundwater:	6 ft. bgs	TD (Total Depth):	24 ft. bgs
Start Date:	7/21/99	Sampler:	Jeff Wendt		

Legend

- Water level in completed well
- First water found during drilling
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Contact: Solid where certain
- Contact: Dotted where approximate
- Contact: Dashed where uncertain

Monitoring Well MW-2

United Airlines
1100 Airport Drive
Oakland, CA

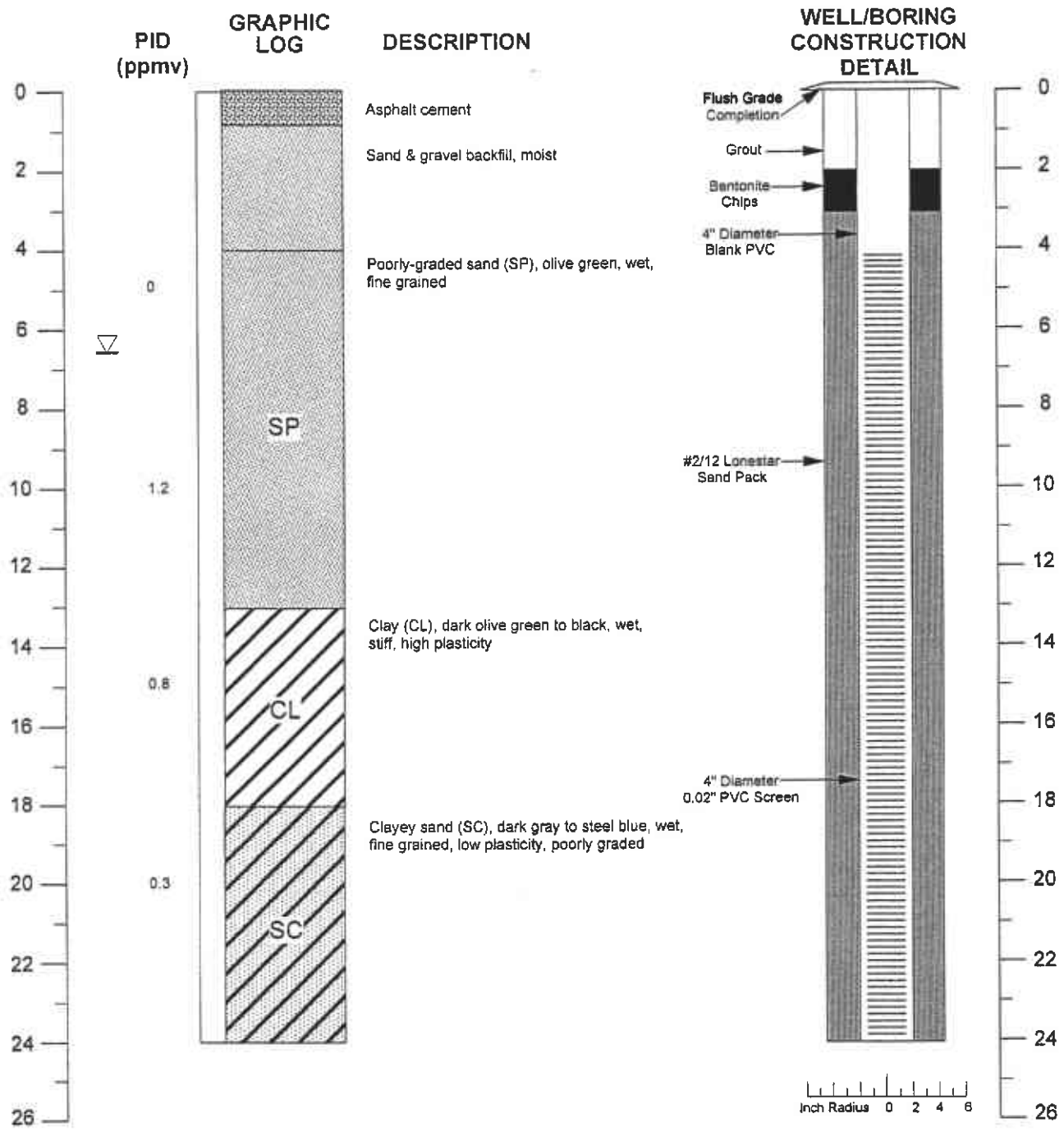
ENSR®

Page: 1 of 1

Drawn By:	J. Gierek	Date:	7/28/99
Revised By:	J. Gierek	Date:	8/10/99

Job Number: 6908-050

Ensr\6908\050\borings.dsf



Driller:	Gregg Drilling	End Date:	7/21/99	Type of Sampler:	Split spoon
Drilling Method:	Hollow Stem Auger	Groundwater:	6.5 ft. bgs	TD (Total Depth):	24 ft. bgs
Start Date:	7/21/99	Sampler:	Jeff Wendt		

Legend

- Water level in completed well
- First water found during drilling
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Contact: Solid where certain
- Contact: Dotted where approximate
- Contact: Dashed where uncertain

Monitoring Well MW-3

United Airlines
1100 Airport Drive
Oakland, CA

ENSR®

Page: 1 of 1

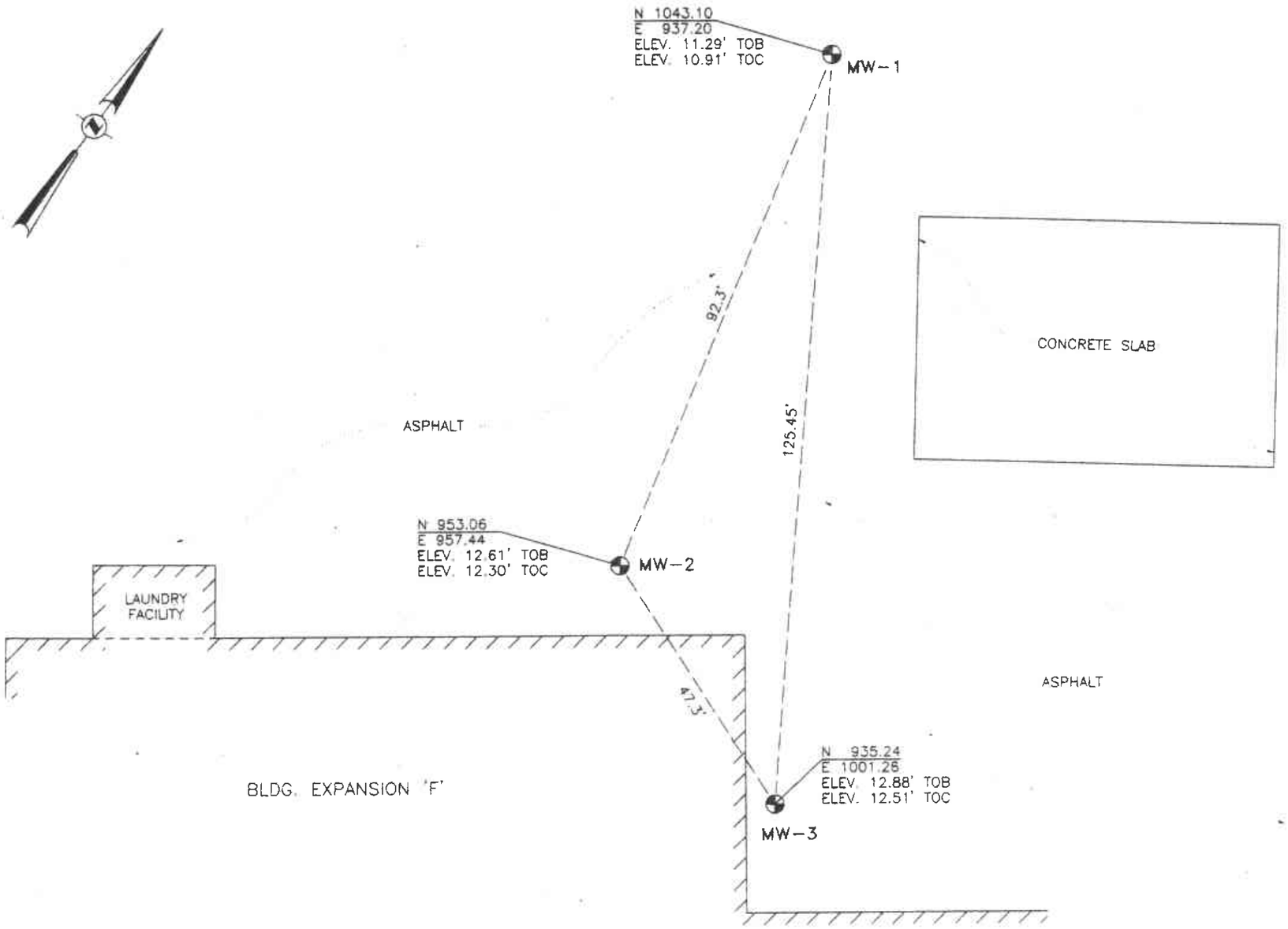
Drawn By:	J. Gierek	Date:	7/28/99
Revised By:	J. Gierek	Date:	8/10/99

Job Number: 6908-050

Ensr\6908\050\borings.dsf

APPENDIX E

WELL SURVEY and FIELD DOCUMENTATION FORMS



NOTES

1. VERTICAL DATUM: ASSUMED TO BE CITY OF OAKLAND PER GRADING PLAN DRAWING SP-2D, PORT FILE AA-1285, 10/16/77.
2. COORDINATE BASIS: LOCAL
3. TOB = SET PUNCH MARK N'LY SIDE WELL BOX.
4. TOC = MARK N'LY SIDE TOP 4" PVC CASING.

GROUNDWATER MONITORING WELL SURVEY
UNITED AIRLINES FACILITY
OAKLAND INTERNATIONAL AIRPORT

ALAMEDA COUNTY, CALIFORNIA

PREPARED FOR

ENSR

BY

TRONOFF ASSOCIATES - LAND SURVEYORS

5850 SHELLMOUND WAY, SUITE 300 EMERYVILLE, CA.

(510) 428-1515

SCALE 1"= 20' AUGUST 23, 1999

SURVEY NO. 4194

LICENSED LAND SURVEYOR
BRUCE T. TRONOFF
NO. 6415
STATE OF CALIFORNIA

BRUCE T. TRONOFF, LAND SURVEYOR NO. 6415 (RENEWAL DATE 12/31/02)

ENSR
GROUNDWATER/LIQUID LEVEL DATA
(measurements in feet)

Project Address: 1100 Airport Drive Bldg-110,Oakland,CA. **Date:** 7/28/99
Recorded by: TR **Project No.:** 6908-050.300

Well No.	Time	Well Elev	Measured Total Depth	Depth to Gr. Water	Depth to Product	Product Thickness	Comments (TOC/TOB) (product skimmer in well)
MW-1	0625		23.53	6.12			
MW-2	0630		21.75	7.47			
MW-3	0628		22.75	7.67			

Notes:

MONITORING WELL SAMPLING INFORMATION SHEET

ENSR

Client: UAL/OAKLAND Project No: 6908-050.300

Site: 1100 AIRPORT DR., BLDG-110 OAKLAND, CA Well Designation: MW-1

Is setup of traffic control devices required?: (NO) YES Setup & Takedown time: _____ hours

Is there standing water in well box?: (NO) YES (Above TOC Below TOC)

Is Top of Casing cut level?: NO (YES) (If NO please explain in remarks)

Is well cap sealed and locked?: NO (YES) (If NO please explain in remarks)

Height of Well Casing Riser (in inches): 10

General condition of Wellhead assembly: (Excellent) Good Fair Poor (Explain in remarks)

Purging Equipment: _____ 2" Disposable bailer X Submersible pump

_____ 2" PVC bailer _____ Dedicated bailer

_____ 4" PVC bailer

Sampled with: Disposable bailer: X Teflon bailer: _____

Well diameter:	2"	3"	4"	6"	8"	
Purge Vol. Multiplier:	0.163	0.367	0.653	1.47	2.61	gal/ft.

Initial Measurement

Time: 0625

Depth of well: 23.53

Depth to water: 6.12

Recharge Measurement

Time: 0726

Depth to water: 8.39

Calculated purge: 34

Actual purge: 50

Start purge: 0644 Sampling time: 0730 Sampling Date: 7/28/99

Time	Temp (F)	E.C.	pH	Turbidity	0 (ppm)	Volume (Gal.)
0656	65.6	8.3 mS	7.31			17
~~0656~~	64.8	9.14	7.29			34
0719	67.2	11.7 ↓	7.41			50

Sample appearance: SEMI-CLEAR

QC samples collected at his well: NONE Lock: DOLPHIN

Equipment replaced: (Check all that apply) Note condition of replaced item.

2" Locking Cap: Lock #2357: Lock #0909:

3" Locking Cap: Lock #3753: Lock-Dolphin:

4" Locking Cap: Chevron Lock:

Remarks: KEPT PUMPING DRY. PUMPED CLOUDY, GREY

Signature: JR Review: _____

MONITORING WELL SAMPLING INFORMATION SHEET

ENSR

Client: UAL/OAKLAND Project No: 6908-050.300

Site: 1100 AIRPORT DR., BLDG-110, OAKLAND, CA Well Designation: MW-2

Is setup of traffic control devices required?: (NO) YES Setup & Takedown time: _____ hours

Is there standing water in well box?: (NO) YES (Above TOC Below TOC)

Is Top of Casing cut level?: NO (YES) (If NO please explain in remarks)

Is well cap sealed and locked?: NO (YES) (If NO please explain in remarks)

Height of Well Casing Riser (in inches): 8

General condition of Wellhead assembly: (Excellent) Good Fair Poor (Explain in remarks)

Purging Equipment: _____ 2" Disposable bailer X Submersible pump

_____ 2" PVC bailer _____ Dedicated bailer

_____ 4" PVC bailer

Sampled with: Disposable bailer: X Teflon bailer: _____

Well diameter:	2"	3"	4"	6"	8"	
Purge Vol. Multiplier:	0.163	0.367	0.653	1.47	2.61	gal/ft.

Initial Measurement

Time: 0630

Depth of well: 21.75

Depth to water: 7.47

Recharge Measurement

Time: 0957

Depth to water: 8.64

Calculated purge: 28

Actual purge: 50

Start purge: 0852 Sampling time: 1000 Sampling Date: 7/28/99

Time	Temp (F)	E.C.	pH	Turbidity	0 (ppm)	Volume (Gal.)
0901	67.9	9.35mS	7.37			17
0915	66.7	7.68	7.23			34
0936	67.9	8.22	7.38			50

Sample appearance: SEMI-CLEAR/CLOUDY

QC samples collected at his well: NONE Lock: NONE

Equipment replaced: (Check all that apply) Note condition of replaced item.

2" Locking Cap: Lock #2357: Lock #0909:

3" Locking Cap: Lock #3753: Lock-Dolphin:

4" Locking Cap: Chevron Lock:

Remarks: DRY @ 28 GALS / PUMPS CAVE & SILTY, DRY @ 38, DRY @ 50

Signature: JR Review: _____

MONITORING WELL SAMPLING INFORMATION SHEET

ENSR

Client: UAL/OAKLAND Project No: 6908-050.300

Site: 1100 AIRPORT DR., BLDG-110 Well Designation: MW-3

OAKLAND, CA

Is setup of traffic control devices required?: (NO) YES Setup & Takedown time: _____ hours

Is there standing water in well box?: (NO) YES (Above TOC Below TOC)

Is Top of Casing cut level?: NO (YES) (If NO please explain in remarks)

Is well cap sealed and locked?: NO (YES) (If NO please explain in remarks)

Height of Well Casing Riser (in inches): 12

General condition of Wellhead assembly: (Excellent) Good Fair Poor (Explain in remarks)

Purging Equipment: _____ 2" Disposable bailer X Submersible pump

_____ 2" PVC bailer _____ Dedicated bailer

_____ 4" PVC bailer

Sampled with: Disposable bailer: X Teflon bailer: _____

Well diameter:	2"___	3"___	4" X	6"___	8"___
Purge Vol. Multiplier:	0.163	0.367	0.653	1.47	2.61 gal/ft.

Initial Measurement

Time: 0628

Depth of well: 22.85

Depth to water: 7.67

Recharge Measurement

Time: 0838

Depth to water: 8.93

Calculated purge: 30

Actual purge: 50

Start purge: 0747 Sampling time: 0840 Sampling Date: 7/28/99

Time	Temp (F)	E.C.	pH	Turbidity	0 (ppm)	Volume (Gal.)
0758	64.4	7.11mS	7.29			17
0810	64.3	8.20	7.27			34
0821	64.1	8.64	7.32			50

Sample appearance: SEMI-CLEAR / CLOUDY

QC samples collected at his well: NONE Lock: NONE

Equipment replaced: (Check all that apply) Note condition of replaced item.

2" Locking Cap: Lock #2357: Lock #0909:

3" Locking Cap: Lock #3753: Lock-Dolphin:

4" Locking Cap: Chevron Lock:

Remarks: DRY @ 20 GALS / LET RECHARGE - PUMPED GREY & SILTY

DRY @ 38 GALS, STILL SILTY & GREY.

Signature: YR Review: _____

McCAMPBELL ANALYTICAL INC.

110 2nd AVENUE SOUTH, #D7
PACHECO, CA 94553-5560
Telephone: (925) 798-1620 Fax: (925) 798-1622

CHAIN OF CUSTODY RECORD

TURN AROUND TIME ☐ RUSH ☐ 24 HOUR ☐ 48 HOUR ☒ 5 DAY

Report To ALAP KLEIN Bill To: ENSR
Company: ENSR
10324 PLACE LN #200
SACTO, CA. 95827
Tele: (916) 362-7100 Fax: (916) 362-8100
Project #: 1908-050.300 Project Name: UAL-OAKLAND
Project Location: 1100 AIRPORT DRIVE OAKLAND, CA
Sampler Signature: [signature] PRINT RANKIN

SAMPLE ID	LOCATION	SAMPLING Date	SAMPLING Time	# Containers	Type Containers	MATRIX: Water	Soil	Air	Sludge	Other	METHOD PRESERVED: Ice	HCl	HNO_3	Other	Analysis Request: BTEX & TPH as Gas (602/8020 + 8015) MTBE	TPH as Diesel (8015)	Total Petroleum Oil & Grease (5520 E&F/B&F)	Total Petroleum Hydrocarbons (418.1)	EPA 601 / 8010	BTEX ONLY (EPA 602 / 8020)	EPA 608 / 8080	EPA 608 / 8080 PCB's ONLY	EPA 624 / 8240 / 8260 OXYGENATES	EPA 625 / 8270	PAH's / PNA's by EPA 625 / 8270 / 8310	CAM-17 Metals	LUFT 5 Metals	Lead (7240/7421/239.2/6010)	RCI	Other: GEN MINERALS/EPA 6000/7000 SERIES	SPECIFIC CONDUCTIVITY EPA 120.1	pH EPA 150.1	TDS EPA 160.1	Comments: D.O. EPA 360.1
MW-1		7/28/99	0730	8		X					X	X	X		X	X							X							X	X	X	X	X
MW-3		↓	0840	8		↓					↓	↓	↓		↓	↓							↓							↓	↓	↓	↓	↓
MW-2		↓	1000	5		↓					↓	↓	↓		↓	↓							↓							↓	↓	↓	↓	↓

Relinquished By:	Date:	Time:	Received By:
[signature] PRINT RANKIN	7/28/99	1203	[signature] VIVIAN
Relinquished By:	Date:	Time:	Received By:
Relinquished By:	Date:	Time:	Received By:

Remarks:
General Mineral
Bicarbonate Alkalinity, Carbonate Alkalinity, Hydroxide Alkalinity, Calcium, Chloride, Copper, Foaming Agents (MBAS), Iron, Magnesium, Manganese, pH, Potassium, Sodium, Specific Conductance, Sulfate, Total Dissolved Solids, Total Hardness, Zinc

APPENDIX F

LABORATORY DATA SHEETS – GROUNDWATER

McCAMPBELL ANALYTICAL INC.
110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
http://www.mccampbell.com E-mail: main@mccampbell.com

ENSR 10324 Placer Lane, Suite200 Sacramento, CA 95827	Client Project ID: #6908-050.300; UAL-Oakland	Date Sampled: 07/28/99
		Date Received: 07/28/99
	Client Contact: Alan Klein	Date Extracted: 07/28/99
	Client P.O:	Date Analyzed: 07/28/99

08/05/99

Dear Alan:

Enclosed are:

1). the results of 3 samples from your **#6908-050.300; UAL-Oakland** project,

2). a QC report for the above samples

3). a copy of the chain of custody, and

4). a bill for analytical services.

All analyses were completed satisfactorily and all QC samples were found to be within our control limits. If you have any questions please contact me. McCampbell Analytical Laboratories strives for excellence in quality, service and cost. Thank you for your business and I look forward to working with you again.

Yours truly,

Edward Hamilton, Lab Director

McCAMPBELL ANALYTICAL INC.
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ENSR 10324 Placer Lane, Suite200 Sacramento, CA 95827	Client Project ID: #6908-050.300; UAL-Oakland	Date Sampled: 07/28/99
		Date Received: 07/28/99
	Client Contact: Alan Klein	Date Extracted: 07/28-08/02/99
	Client P.O:	Date Analyzed: 07/28-08/02/99

Gasoline Range (C6-C12) Volatile Hydrocarbons as Gasoline*, with Methyl tert-Butyl Ether* & BTEX*

EPA methods 5030, modified 8015, and 8020 or 602; California RWQCB (SF Bay Region) method GCFID(5030)

Lab ID	Client ID	Matrix	TPH(g)+	MTBE	Benzene	Toluene	Ethylben-zene	Xylenes	% Recovery Surrogate
16152	MW-1	W	ND	ND	ND	ND	ND	ND	108
16153	MW-3	W	ND	220/270	ND	ND	ND	ND	107
16154	MW-2	W	ND	130/190	ND	ND	ND	ND	107
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit		W	50 ug/L	5.0	0.5	0.5	0.5	0.5	
		S	1.0 mg/kg	0.05	0.005	0.005	0.005	0.005	

Excludes

* water and vapor samples are reported in ug/L, wipe samples in ug/wipe, soil and sludge samples in mg/kg, and all TCLP and SPLP extracts in ug/L

cluttered chromatogram; sample peak coelutes with surrogate peak

+The following descriptions of the TPH chromatogram are cursory in nature and McCampbell Analytical is not responsible for their interpretation: a) unmodified or weakly modified gasoline is significant; b) heavier gasoline range compounds are significant(aged gasoline?); c) lighter gasoline range compounds (the most mobile fraction) are significant; d) gasoline range compounds having broad chromatographic peaks are significant; biologically altered gasoline?; e) TPH pattern that does not appear to be derived from gasoline (?); f) one to a few isolated peaks present; g) strongly aged gasoline or diesel range compounds are significant; h) lighter than water immiscible sheen is present; i) liquid sample that contains greater than ~5 vol. % sediment; j) no recognizable pattern.

DHS Certification No. 1644

Edward Hamilton, Lab Director

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ENSR 10324 Placer Lane, Suite200 Sacramento, CA 95827	Client Project ID: #6908-050.300; UAL-Oakland	Date Sampled: 07/28/99
		Date Received: 07/28/99
	Client Contact: Alan Klein	Date Extracted: 07/28-08/04/99
	Client P.O:	Date Analyzed: 07/29-08/04/99

Diesel Range (C10-C23) Extractable Hydrocarbons as Diesel *

EPA methods modified 8015, and 3550 or 3510; California RWQCB (SF Bay Region) method GCFID(3550) or GCFID(3510)

Lab ID	Client ID	Matrix	TPH(d)+	% Recovery Surrogate
16152	MW-1	W	ND	92
16153	MW-3	W	ND	99
16154	MW-2	W	160,b	99
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit		W	50 ug/L	
		S	1.0 mg/kg	

* water and vapor samples are reported in ug/L, wipe samples in ug/wipe, soil and sludge samples in mg/kg, and all TCLP / STLC / SPLP extracts in ug/L

cluttered chromatogram resulting in coeluted surrogate and sample peaks, or; surrogate peak is on elevated baseline, or; surrogate has been diminished by dilution of original extract.

+The following descriptions of the TPH chromatogram are cursory in nature and McCampbell Analytical is not responsible for their interpretation: a) unmodified or weakly modified diesel is significant; b) diesel range compounds are significant; no recognizable pattern; c) aged diesel? is significant); d) gasoline range compounds are significant; e) medium boiling point pattern that does not match diesel (?); f) one to a few isolated peaks present; g) oil range compounds are significant; h) lighter than water immiscible sheen is present; i) liquid sample that contains greater than ~5 vol. % sediment.

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ENSR 10324 Placer Lane, Suite200 Sacramento, CA 95827	Client Project ID: #6908-050.300; UAL-Oakland	Date Sampled: 07/28/99
		Date Received: 07/28/99
	Client Contact: Alan Klein	Date Extracted: 08/01/99
	Client P.O:	Date Analyzed: 08/01/99

Oxygenated Volatile Organics By GC/MS

EPA method 8260 modified

Lab ID	16152	16153	16154		Reporting Limit	
Client ID	MW-1	MW-3	MW-2			
Matrix	W	W	W		S	W
Compound	Concentration*				ug/kg	ug/L
Di-isopropyl Ether (DIPE)	ND	ND<11	ND<9		5.0	1.0
Ethyl tert-Butyl Ether (ETBE)	ND	ND<11	ND<9		5.0	1.0
Methyl-tert Butyl Ether (MTBE)	ND	270	190		5.0	1.0
tert-Amyl Methyl Ether (TAME)	ND	ND<11	ND<9		5.0	1.0
tert-Butanol	ND	ND<55	ND<45		25	5.0
Surrogate Recoveries (%)						
Dibromofluoromethane	107	107	111			
Comments:						

* water samples are reported in ug/L, soil and sludge samples in ug/kg, wipes in ug/wipe and all TCLP / STLC / SPLP extracts in ug/L

ND means not detected above the reporting limit; N/A means surrogate not applicable to this analysis

(h) lighter than water immiscible sheen is present; (i) liquid sample that contains greater than ~5 vol. % sediment; (j) sample diluted due to high organic content

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http://www.mccampbell.com E-mail: main@mccampbell.com

ENSR 10324 Placer Lane, Suite200 Sacramento, CA 95827	Client Project ID: #6908-050.300; UAL-Oakland	Date Sampled: 07/28/99
		Date Received: 07/28/99
	Client Contact: Alan Klein	Date Extracted: 07/28/99
	Client P.O:	Date Analyzed: 07/28/99

Analytical methods			pH	Total Dissolved Solids	Specific Conductance
			EPA 150.1, 9040, 9045	EPA160.1, SM2540C	EPA 120.1, 9050 SM2510
Lab ID	Client ID	Matrix	pH @ _°C	TDS	Conductivity
16152	MW-1	W	7.40 @ 22.7°C	6600	12,000
16153	MW-3	W	7.37 @ 22.3°C	5100	9400
Reporting Limit or Method Accuracy unless otherwise stated; ND means not detected above the reporting limit; N/A means not applicable		W	± 0.05	10 mg/L	10 µmhos/cm
		S	± 0.1	N/A	N/A
Reporting Units		---	- log(a_H^+) @ _ °C	mg/L	µmhos/cm @ _ °C

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ENSR 10324 Placer Lane, Suite200 Sacramento, CA 95827	Client Project ID: #6908-050.300; UAL-Oakland	Date Sampled: 07/28/99
		Date Received: 07/28/99
	Client Contact: Alan Klein	Date Extracted: 07/28/99
	Client P.O:	Date Analyzed: 07/28/99

Analytical methods			**Dissolved Oxygen**
			EPA 360.1
Lab ID	Client ID	Matrix	DO*
16152	MW-1	W	5.2
16153	MW-3	W	3.0
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit		W, Liq	1.0 mg/L @ -°C
		S	N/A
		STLC,TCLP	N/A

*water samples are reported in mg/L, soil and sludge samples in mg/kg, wipes in ug/wipe and all TCLP / STLC / SPLP extracts in mg/L

° solid samples are extracted either in accordance with EPA method 1311 modified (DI TCLP) or California Title 22 DI STLC, depending upon the client's specification; the matrix column will indicate which extraction was performed.

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ENSR 10324 Placer Lane, Suite200 Sacramento, CA 95827	Client Project ID: #6908-050.300; UAL-Oakland	Date Sampled: 07/28/99
		Date Received: 07/28/99
	Client Contact: Alan Klein	Date Extracted: 07/28/99
	Client P.O:	Date Analyzed: 07/30/99

Metals by ICP*

EPA analytical methods 6010, 200.7

Lab ID	Client ID	Matrix	Extraction°	Magnesium*	Sodium*	Potassium*	Calcium*
16152	MW-1	W	TTLC	210	2300	81	180
16153	MW-3	W	TTLC	190	1900	91	150
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit		W	TTLC	0.02 mg/L	0.1	0.5	0.02
		S	TTLC	1.0 mg/kg	5.0	2.5	1.0
		---	STLC,TCLP	0.02 mg/L	0.1	0.5	0.02

* water samples are reported in mg/L, soil and sludge samples in mg/kg, wipes in ug/wipe and all TCLP / STLC / SPLP extracts in mg/L

° EPA extraction methods 1311(TCLP), 3010/3020(water,TTLC), 3040(organic matrices,TTLC), 3050(solids,TTLC); STLC - CA Title 22

& reporting limit raised due to matrix interference

i) liquid sample that contains greater than ~2 vol. % sediment; this sediment is extracted with the liquid, in accordance with EPA methodologies and can significantly effect reported metal concentrations; j) dissolved iron assumed to be equal to ferrous iron.

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ENSR 10324 Placer Lane, Suite200 Sacramento, CA 95827	Client Project ID: #6908-050.300; UAL-Oakland	Date Sampled: 07/28/99
		Date Received: 07/28/99
	Client Contact: Alan Klein	Date Extracted: 07/28/99
	Client P.O:	Date Analyzed: 07/29-07/30/99

Metals By ICP*

EPA analytical methods 6010/200.7

Lab ID	Client ID	Matrix	Extraction°	Manganese	Iron	Copper	Zinc	% Rec. Surrogate
16152	MW-1	W	TTLC	2.4	55	0.066	0.19	103
16153	MW-3	W	TTLC	2.0	120	0.16	0.34	100
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit		S	TTLC	2.5 mg/kg	2.5	2.0	1.0	
		W	TTLC	0.05 mg/L	0.05	0.05	0.05	
		--	STLC, TCLP	0.05 mg/L	0.05	0.5	0.05	

* water samples are reported in mg/L, soil and sludge samples in mg/kg, wipes in ug/wipe and all TCLP / STLC / SPLP extracts in mg/L

Lead is analysed using EPA method 6010 (ICP)for soils, STLC & TCLP extracts and method 239.2 (AA Furnace) for water samples

° EPA extraction methods 1311(TCLP), 3010/3020(water,TTLC), 3040(organic matrices,TTLC), 3050(solids,TTLC); STLC - CA Title 22

^ surrogate diluted out of range; N/A means surrogate not applicable to this analysis

& reporting limit raised due to matrix interference

i) liquid sample that contains greater than ~2 vol. % sediment; this sediment is extracted with the liquid, in accordance with EPA methodologies and can significantly effect reported metal concentrations.

DHS Certification No. 1644

Edward Hamilton, Lab Director

McCAMPBELL ANALYTICAL INC.
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Tele: 925-798-1620 Fax: 925-798-1622

QC REPORT FOR HYDROCARBON ANALYSES

Date: 07/28/99 Matrix: WATER

Analyte	Concentration (ug/L) Sample (#15973)	MS	MSD	Amount Spiked	% Recovery MS	MSD	RPD
TPH (gas)	0.0	107.4	105.8	100.0	107.4	105.8	1.5
Benzene	0.0	10.6	9.9	10.0	106.0	99.0	6.8
Toluene	0.0	10.8	10.2	10.0	108.0	102.0	5.7
Ethyl Benzene	0.0	11.0	10.3	10.0	110.0	103.0	6.6
Xylenes	0.0	32.2	31.0	30.0	107.3	103.3	3.8
TPH(diesel)	0.0	7520	7477	7500	100	100	0.6
TRPH (oil & grease)	0	22700	23800	23700	96	100	4.7

% Rec. = (MS - Sample) / amount spiked x 100

RPD = (MS - MSD) / (MS + MSD) x 2 x 100

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110 2nd Avenue South, #D7, Pacheco, CA 94553
Tele: 925-798-1620 Fax: 925-798-1622

QC REPORT FOR HYDROCARBON ANALYSES

Date: 07/29/99 Matrix: WATER

Analyte	Concentration (ug/L) Sample (#16108)	MS	MSD	Amount Spiked	% Recovery MS	MSD	RPD
TPH (gas)	0.0	105.6	105.6	100.0	105.6	105.6	0.0
Benzene	0.0	10.0	9.7	10.0	100.0	97.0	3.0
Toluene	0.0	10.1	9.9	10.0	101.0	99.0	2.0
Ethyl Benzene	0.0	10.4	10.2	10.0	104.0	102.0	1.9
Xylenes	0.0	31.2	30.6	30.0	104.0	102.0	1.9
TPH(diesel)	0.0	8587	8557	7500	114	114	0.3
TRPH (oil & grease)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

% Rec. = (MS - Sample) / amount spiked x 100

RPD = (MS - MSD) / (MS + MSD) x 2 x 100

McCAMPBELL ANALYTICAL INC.

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QC REPORT FOR VOCs (EPA 8240/8260)

Date: 08/01/99-08/02/99 Matrix: WATER

Analyte	Concentration (ug/kg,u Sample (#14482)	MS	MSD	Amount Spiked	% Recovery MS	MSD	RPD
1,1-Dichloroethe	0	96	99	100	96	99	3.1
Trichloroethene	0	82	83	100	82	83	1.2
EDB	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chlorobenzene	0	97	100	100	97	100	3.0
Benzene	0	95	98	100	95	98	3.1
Toluene	0	95	99	100	95	99	4.1

% Rec. = (MS - Sample) / amount spiked x 100

RPD = (MS - MSD) / (MS + MSD) x 2 x 100

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QC REPORT FOR ICP and/or AA METALS

Date: 07/30/99-07/31/99 Matrix: WATER

Extraction: TTLC

Analyte	Concentration (mg/L)			Amount	% Recovery		RPD
	Sample	MS	MSD		MS	MSD	
Total Calcium	0.00	0.96	0.98	1.00	96	98	1.4
Total Magnesium	0.00	0.96	0.95	1.00	96	95	1.2
Total Sodium	0.00	9.87	9.94	10.00	99	99	0.7
Total Lithium	0.00	0.94	0.96	1.00	94	96	1.9
Total Potassium	0.00	9.65	9.63	10.00	96	96	0.1
Total Copper	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Organic Le	N/A	N/A	N/A	N/A	N/A	N/A	N/A

% Rec. = (MS - Sample) / amount spiked x 100

RPD = (MS - MSD) / (MS + MSD) x 2 x 100

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QC REPORT FOR ICP and/or AA METALS

Date: 07/30/99-07/31/99 Matrix: WATER

Extraction: TTLC

Analyte	Concentration (mg/L)			Amount	% Recovery		RPD
	Sample	MS	MSD		MS	MSD	
Total Iron	0.00	0.48	0.48	0.50	95	96	0.5
Total Manganese	0.00	0.50	0.51	0.50	101	102	1.5
Total Chromium	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Nickel	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Zinc	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Copper	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Organic Le	N/A	N/A	N/A	N/A	N/A	N/A	N/A

% Rec. = (MS - Sample) / amount spiked x 100

RPD = (MS - MSD) / (MS + MSD) x 2 x 100

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Tele: 925-798-1620 Fax: 925-798-1622

QC REPORT FOR ICP and/or AA METALS

Date: 07/30/99-07/31/99 Matrix: WATER

Extraction: TTLC

Analyte	Concentration (mg/L)			Amount	% Recovery		RPD
	Sample	MS	MSD		MS	MSD	
Total Lead	0.00	4.87	4.96	5.00	97	99	1.9
Total Cadmium	0.00	5.44	5.53	5.00	109	111	1.7
Total Chromium	0.00	4.67	4.66	5.00	93	93	0.1
Total Nickel	0.00	4.96	5.00	5.00	99	100	0.7
Total Zinc	0.00	4.92	4.93	5.00	98	99	0.1
Total Copper	0.00	4.62	4.60	5.00	92	92	0.6
Total Silver	N/A	N/A	N/A	N/A	N/A	N/A	N/A

% Rec. = (MS - Sample) / amount spiked x 100

RPD = (MS - MSD) / (MS + MSD) x 2 x 100

160992KF55

McCAMPBELL ANALYTICAL INC.

110 2nd AVENUE SOUTH, #D7
PACHECO, CA 94553-5560
Telephone: (925) 798-1620 Fax: (925) 798-1622

CHAIN OF CUSTODY RECORD

TURN AROUND TIME ☐ RUSH ☐ 24 HOUR ☐ 48 HOUR ☒ 5 DAY

Report To ALAN KLEIN Bill To: ENSR
Company: ENSR
10324 PLACE LN #200
SACTO, CA. 95827
Tele: (916) 362-7100 Fax: (916) 362-8100
Project #: 6908-050.300 Project Name: VAL-OAKLAND
Project Location: 1100 AIRPORT DRIVE OAKLAND, CA
Sampler Signature: [signature] ALAN RANKIN

SAMPLE ID	LOCATION	SAMPLING Date	SAMPLING Time	# Containers	Type Containers	MATRIX: Water	Soil	Air	Sludge	Other	METHOD PRESERVED: Ice	HCl	HNO_3	Other
+ MW-1		7/28/99	0730	8		X					X	X	X	
+ MW-3		↓	0840	8		↓					↓	↓	↓	
+ MW-2		↓	1000	5		↓					↓	↓	↓	

Analysis Request															Other				Comments
BTEX & TPH as Gas (602/8020 + 8015) MTBE	TPH as Diesel (8015)	Total Petroleum Oil & Grease (5520 E&F/B&F)	Total Petroleum Hydrocarbons (418.1)	EPA 601 / 8010	BTEX ONLY (EPA 602 / 8020)	EPA 608 / 8080	EPA 608 / 8080 PCB's ONLY	EPA 624 / 8240 / 8260 OXYGENATES	EPA 625 / 8270	PAH's / PNA's by EPA 625 / 8270 / 8310	CAM-17 Metals	LUFT 5 Metals	Lead (7240/7421/239.2/6010)	RCI	GEN MINERALS (EPA 6000/7000 SEE BELOW)	SPECIFIC CONDUCTIVITY EPA 120.1	pH EPA 150.1	TDS EPA 160.1	D.O. EPA 360.1
X	X							X							X	X	X	X	X
↓	↓							↓							↓	↓	↓	↓	↓
↓	↓							↓							↓	↓	↓	↓	↓

16152
16153
16154

VOAS | O&G | METALS | OTHER

ICE/T ✓
GOOD CONDITION ✓
HEAD SPACE ABSENT ✓
PRESERVATION APPROPRIATE ✓
CONTAINERS ✓

Relinquished By:	Date:	Time:	Received By:
[signature]	7/28/99	1203	VOAS VOAS
Relinquished By:	Date:	Time:	Received By:
Relinquished By:	Date:	Time:	Received By:

Remarks:
General Mineral
Bicarbonate Alkalinity, Carbonate Alkalinity, Hydroxide Alkalinity, Calcium, Chloride, Copper, Foaming Agents (MBAS), Iron, Magnesium, Manganese, pH, Potassium, Sodium, Specific Conductance, Sulfate, Total Dissolved Solids, Total Hardness, Zinc

APPENDIX G

LABORATORY DATA SHEETS - GEOTECHNICAL

SIERRA TESTING LABORATORIES, INC.
GEOTECHNICAL AND MATERIALS TESTING SERVICES

Project No. 99-234
29 July 1999

ENSR
10324 Placer Lane, Suite 200
Sacramento, California 95827

Attention: Mr. Jeff Wendt
Subject: **UAL - Oakland**
ENSR Job #6908-050.300
LABORATORY TEST RESULTS

Dear Mr. Wendt:

As requested, Sierra Testing Laboratories, Inc. has performed laboratory testing on two samples of material from the subject site. The samples were identified as MW-2 @ 6.0' and MW-3 @ 6.0'. The samples were received by our laboratory on 29 July 1999. The tests performed on the submitted samples were as follows:

1) Sieve Analysis to #200 Sieve (ASTM D422)
2) Porosity by Phase Relation

The results of the Porosity by Phase Relation tests are presented on Table 1, attached. The results of the Sieve Analysis to #200 Sieve tests are presented on Figures 1 and 2, attached.

We appreciate the opportunity to be of service to you on this project and look forward to providing additional service, as needed, in the future.

Should you have any questions or require additional information, please contact our office at your convenience.

Very truly yours,

Chad M. Walker
Project Manager

enclosures: Table 1, Figures 1 and 2.

Table 1

Moisture Content (ASTM D2216)
UAL - Oakland
ENSR Job #6908-050.300
STL # 99-234

Sample Name	Porosity
MW-2 @ 6.0'	0.3753
MW-3 @ 6.0'	0.3620

Table 2

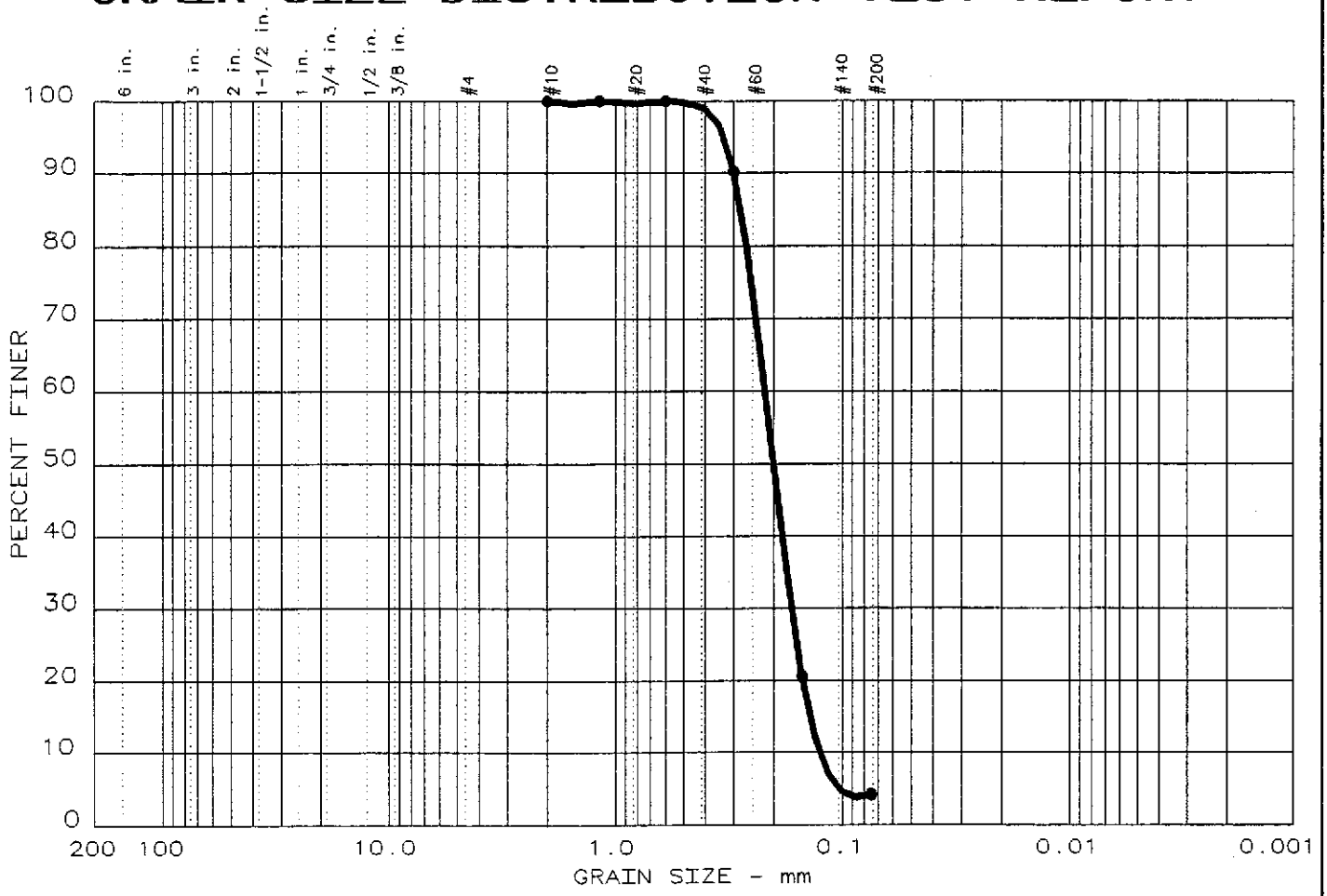
Moisture Content and Density (ASTM D2937)
UAL - Oakland
ENSR Job #6908-050.300
STL #99-234

Sample Name	Water Content (%)	Dry Density (pcf)
MW-2 @ 6.0'	6.8	104.7
MW-3 @ 6.0'	5.1	107.8

Table 3
Specific Gravity (ASTM D854)
UAL - Oakland
ENSR Job #6908-050.300
STL # 99-234

Sample Name	Specific Gravity
MW-2 @ 6.0'	2.68
MW-3 @ 6.0'	2.71

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	15	0.0	0.0	95.8	4.2	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	-	-	0.279	0.218	0.200	0.166	0.138	0.125	1.02	1.7

MATERIAL DESCRIPTION	USCS	AASHTO
● Gray poorly graded SAND	-	-

Project No.: 99-234
Project: UAL - Oakland
● Location: MW-2 @ 6.0'

Date: 8-3-99

GRAIN SIZE DISTRIBUTION TEST REPORT

SIERRA TESTING LABORATORIES, INC.

Remarks:

ENSR Job #6908-050.300

Figure No. 1

GRAIN SIZE DISTRIBUTION TEST DATA — Test No.: 15

Date: 8-3-99
Project No.: 99-234
Project: UAL - Oakland

Sample Data

Location of Sample: MW-2 @ 6.0'
Sample Description: Gray poorly graded SAND
USCS Class: - Liquid limit: -
AASHTO Class: - Plasticity index: -

Notes

Remarks: ENSR Job #6908-050.300

Fig. No.: 1

Mechanical Analysis Data

	Initial
Dry sample and tare=	201.10
Tare =	0.00
Dry sample weight =	201.10

Tare for cumulative weight retained= 0

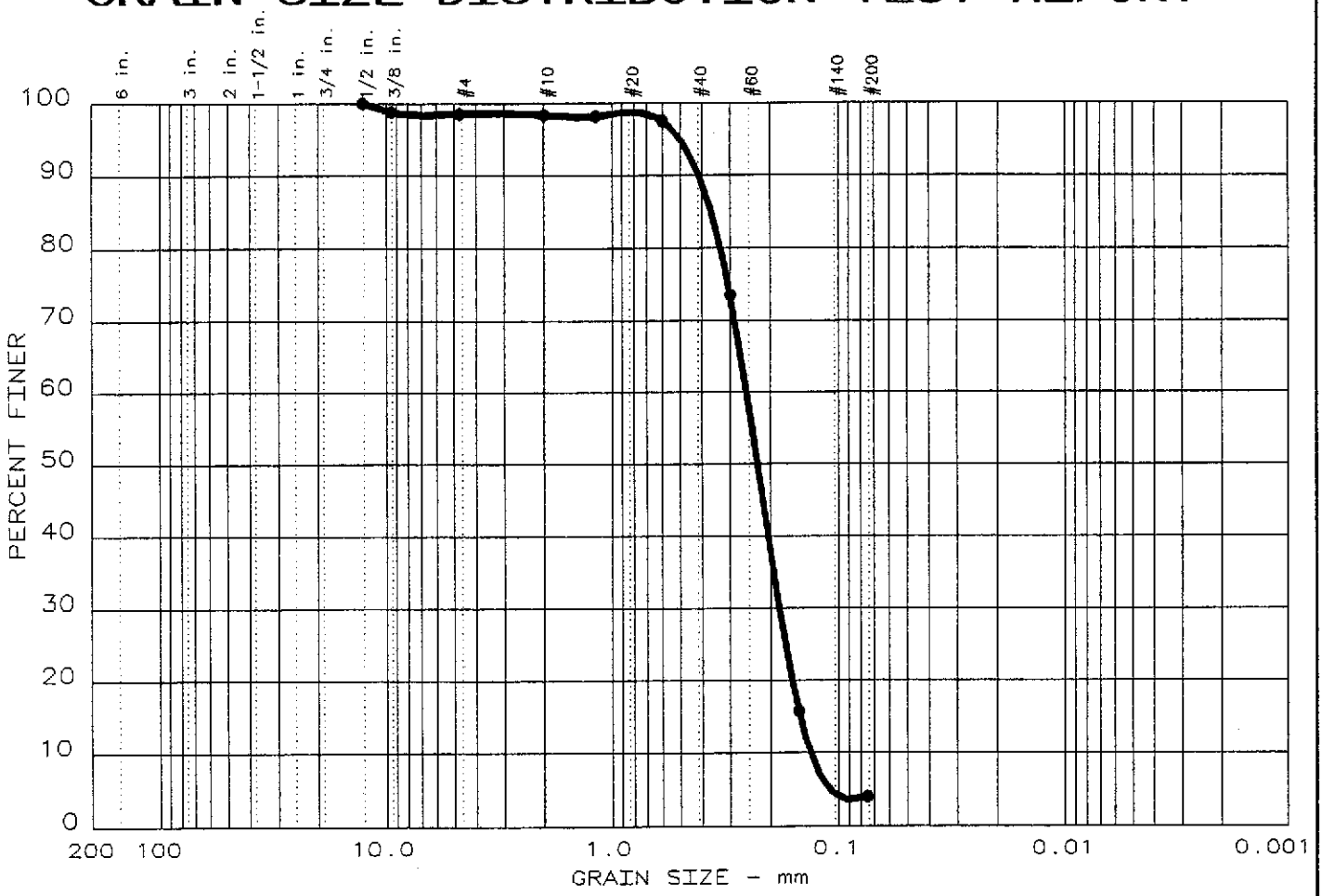
Sieve	Cumul. Wt. retained	Percent finer
# 10	0.00	100.0
# 16	0.01	100.0
# 30	0.04	100.0
# 50	19.80	90.2
# 100	159.60	20.6
# 200	192.70	4.2

Fractional Components

Gravel/Sand based on #4 sieve
Sand/Fines based on #200 sieve
% + 3 in. = 0.0 % GRAVEL = 0.0 % SAND = 95.8
% FINES = 4.2

D85= 0.28 D60= 0.218 D50= 0.200
D30= 0.1663 D15= 0.13820 D10= 0.12517
Cc = 1.0151 Cu = 1.7398

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	16	0.0	1.5	94.5	4.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	-	-	0.363	0.254	0.227	0.182	0.148	0.133	0.98	1.9

MATERIAL DESCRIPTION	USCS	AASHTO
● Gray poorly graded SAND	-	-

Project No.: 99-234
Project: UAL - Oakland
● Location: MW-3 @ 6.0'

Date: 8-3-99

GRAIN SIZE DISTRIBUTION TEST REPORT

SIERRA TESTING LABORATORIES, INC.

Remarks:

ENSR Job #6908-050.300

Figure No. 2

GRAIN SIZE DISTRIBUTION TEST DATA — Test No.: 16

Date: 8-3-99
Project No.: 99-234
Project: UAL - Oakland

Sample Data

Location of Sample: MW-3 @ 6.0'
Sample Description: Gray poorly graded SAND
USCS Class: - Liquid limit: -
AASHTO Class: - Plasticity index: -

Notes

Remarks: ENSR Job #6908-050.300

Fig. No.: 2

Mechanical Analysis Data

	Initial
Dry sample and tare=	203.60
Tare =	0.00
Dry sample weight =	203.60

Tare for cumulative weight retained= 0

Sieve	Cumul. Wt. retained	Percent finer
0.5 inches	0.00	100.0
0.375 inches	2.40	98.8
# 4	3.00	98.5
# 10	3.40	98.3
# 16	3.70	98.2
# 30	5.10	97.5
# 50	53.80	73.6
# 100	171.50	15.8
# 200	195.40	4.0

Fractional Components

Gravel/Sand based on #4 sieve
Sand/Fines based on #200 sieve
% + 3 in. = 0.0 % GRAVEL = 1.5 % SAND = 94.5
% FINES = 4.0

D85= 0.36 D60= 0.254 D50= 0.227
D30= 0.1822 D15= 0.14791 D10= 0.13305
Cc = 0.9829 Cu = 1.9077

M901378

ENSR

CHAIN OF CUSTODY RECORD

(#200)

Client/Project Name: UAL - OAKLAND	Project Location: 1100 AIRPORT DR.
Project Number: 6908-050.300	Field Logbook No.:
Sampler: (Print Name) /Affiliation: JEFF WENDT	Chain of Custody Tape No.:
Signature:	Send Results/Report to: ALAN KLEIN / ENSR

Analysis Requested

Field Sample No./ Identification	Date	Time	Grab	Comp	Sample Container (Size/Mat'l)	Sample Type (Liquid, Sludge, Etc.)	Preservative	Field Filtered	Particle Size ASTM D422	Moisture Content & Density ASTM D2937	Diesel/Motor Oil (Modified) Lloyd Kahn or Equivalent	Specific Gravity ASTM D854	Cal Wet Lake Porosity	Lab I.D.	Remarks
MW-2 @ 6'	7/21/99	14:15	X		2" x 6" BRASS	SOIL			X	X		X	X		
MW-3 @ 6'	7/21/99	11:15	X		2" x 6" BRASS	SOIL			X	X		X	X		
											AK				

Relinquished by: (Print Name) JEFF WENDT	Date: 7/22	Received by: (Print Name) ALAN J. KLEIN	Date: 7/29
Signature:	Time: 0800	Signature:	Time: 0800
Relinquished by: (Print Name) ALAN J. KLEIN	Date: 7/29	Received by: (Print Name)	Date:
Signature:	Time:	Signature:	Time:
Relinquished by: (Print Name)	Date:	Received by: (Print Name)	Date:
Signature:	Time:	Signature:	Time:

Analytical Laboratory (Destination):

SIERRA TESTING LABORATORIES

916/939 - 3460

Serial No. 13694