

June 14, 1993
SCI 851.001

200113 11:50

STIP 425T

Ms. Susan Hugo
Alameda County Health Care Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

6/16/93
Final approval of
the WP per the following
conditions:
1) include BTEX analyses
2) move boring under
#2 to between #6 & #7

Work Plan
Gasoline Contamination Assessment
4050 Horton Street
Emeryville, California

Dear Ms. Hugo:

Presented herein is a proposed work plan for the referenced site to define the vertical and lateral extent of gasoline contaminated soil resulting from release(s) from a 1000 gallon fuel storage tank. This work plan was prepared in response to your letter dated May 7, 1993. ✓

In brief, the site is currently occupied by a one-story structure. ✓
In December 1990, a 1000 gallon underground storage tank was removed from the property under the direction of Zaccor, Inc. ✓
Samples of the native soil obtained from beneath the fuel tank contained elevated concentrations of oil and grease, diesel, gasoline and benzene, toluene, xylene and ethylbenzene (BTXE). In addition, free floating product was observed on groundwater within the tank excavation. ✓

In June 1992, Subsurface Consultants, Inc. (SCI) drilled and sampled seven test borings in an attempt to define the extent of soil contamination associated with the previous underground storage tank. The test boring locations are shown on Plate 1. The analytical test data generated to date are presented in Tables 1 through 3 and graphically on Plates 7 and 8.

Soil Contamination Investigation

In our opinion, the oil and grease and diesel contamination have been relatively well defined by the previous investigation. In addition, the gasoline contamination has been defined in areas to the south and west of the previous tank. To further characterize

■ Subsurface Consultants, Inc.

Ms. Susan Hugo
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the extent of gasoline contaminated soil, SCI proposes to drill up to 6 additional test borings to the north and east of the previous tank. The proposed boring locations are shown on Plate 1. During our field investigation, an organic vapor meter (OVM) will be used to screen the soil samples. If there are indications of volatile organic vapors in the soils additional borings will be drilled further away from the tank. The exact location of the additional borings, if necessary, will be determined during the field investigation.

Groundwater Quality Investigation

Groundwater monitoring wells will be installed following characterization of soil contamination. A work plan for the study will be prepared and submitted for ACHCSA review. The well locations will be selected, in consultation with the ACHCSA. Groundwater samples will be obtained and analyzed to determine the extent of groundwater contamination. Additional monitoring wells will be installed, if necessary, to define the extent of the contaminant plume. The location of the additional wells will be selected in consultation with the ACHCSA.

Field Investigation - Test Borings and Monitoring Wells

The test borings will be drilled using truck-mounted, 8-inch-diameter, hollow stem auger equipment. Our engineer will observe drilling operations and prepare detailed logs of the borings. Soil samples will be obtained from the borings using a California Drive Sampler having an outside diameter of 2.5 inches and an inside diameter of 2.0 inches. Soil samples will be obtained at frequent intervals. A portable organic vapor meter (OVM) will be used to screen all samples obtained from the test borings.

Soil samples will be retained in brass sample liners and sealed with duct tape. Teflon sheeting will be placed between the caps and the soil samples. Upon sealing and labeling, the samples will be promptly refrigerated on-site in an ice chest. Samples will remain under refrigeration until delivery to the laboratory.

At least two soil samples will be analyzed from each boring. Once the extent of soil contamination is defined, we will evaluate remediation alternatives.

All augers, drill rods, sampling equipment etc., that will be placed in the test borings will be cleaned prior to their initial use and prior to each subsequent use to reduce the likelihood of

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■ Subsurface Consultants, Inc.

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The groundwater monitoring wells will be constructed of 2-inch-diameter, schedule 40 PVC pipe having flush threaded joints. The lower portion of the well will consist of machine slotted well screen having 0.020 inch slots. The annular space around the screened section will be backfilled with Lonestar #3 sand. A bentonite seal, approximately 12 inches thick, will be placed above the sand. The annular space above the bentonite seal will be backfilled with cement/bentonite grout. The wells will be finished below grade in a Christy box and will be secured by a locking cap.

The wells will be developed, until the water becomes relatively free of turbidity. The water will be placed in steel drums and left on-site for later disposal. Groundwater samples will be obtained using disposable, pre-cleaned Teflon sampling devices. Water samples will be placed in pre-cleaned containers and refrigerated until delivery to the analytical laboratory. The soil and water samples will be accompanied by Chain-of-Custody records.

Analytical Testing

Soil and groundwater samples will be analyzed by a California Department of Health Services (DHS) certified analytical laboratory. Soil samples will be analytically tested for:

- ✓ 1. Total volatile hydrocarbons - EPA Methods 5030/8015.

Groundwater samples will be analytically tested for:

1. Oil and grease (O&G) - SMWW17:5520,
2. Total extractable hydrocarbons (TEH) - EPA Methods 3550/8015,
3. Total volatile hydrocarbons - EPA Methods 5030/8015,
4. Purgeable aromatics (BTEX) - EPA Method 8020, and
5. Heavy metals (Cd, Cn, Pb, Ni, Zn).

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Alameda County Health Care Services Agency
SCI 851.001
June 14, 1993
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■ Subsurface Consultants, Inc.

Report

Based upon the results of the investigation, SCI will prepare a report recording our conclusions/recommendations regarding:

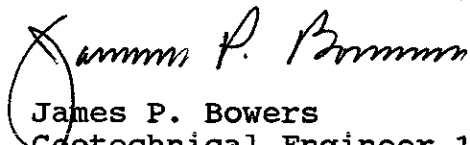
1. Soil and groundwater conditions;
2. The extent of soil contamination; ✓
3. The significance of contaminant levels with respect to local and state criteria; ✓
4. Remediation alternatives; and
5. The scope of subsequent investigation, if required.

The report will include boring logs, analytical test results and Chain-of-Custody records.

We look forward to your favorable review of our work plan. If you have any questions, please call.

Yours very truly,

Subsurface Consultants, Inc.



James P. Bowers
Geotechnical Engineer 157 (expires 3/31/95)

MK:JPB:egh

cc: Mr. Jeff Hunt
Plywood and Lumber Sales, Inc.

Mr. Richard Hiett
Regional Water Quality Control Board

Attachments: Table 1 Hydrocarbon Concentrations in Soil
Table 2 Heavy Metal Concentrations in Soil
Table 3 Volatile Organic Chemical Concentrations
in Soil
Plate 1 Site Plan
Plate 7 Oil and Grease Concentrations in Soil
Plate 8 Gasoline Concentrations in Soil

Table 1
Hydrocarbon Concentrations in Soil

Boring	Depth (feet)	Oil and Grease (mg/kg) ³	TEH ¹ as Diesel (mg/kg)	TVH ² as Gasoline (mg/kg)	Benzene (ug/kg) ⁴	Toluene (ug/kg)	Ethyl- Benzene (ug/kg)	Xylene (ug/kg)
1	6.0	60	30	150	5300	5100	5500	17000
1	8.0	ND(50)	ND(1)	2	43	15	7	15
1	10.5	ND(50)	ND(1)	1	30	24	ND(5)	9
2	4.0	ND(50)	3	13	250	29	180	220
2	6.0	ND(50)	34	170	ND(400)	420	1300	1500
3	6.0	170	57	210	570	ND(400)	2100	950
3	7.5	ND(50)	ND(1)	1	ND(5)	6	ND(5)	5
4	4.0	ND(50)	ND(1)	2	14	5	ND(5)	9
4	6.0	ND(50)	ND(1)	2	14	ND(5)	ND(5)	6
5	6.0	ND(50)	4	160	ND(200)	490	630	ND(200)
5	8.0	ND(50)	ND(1)	ND(1)	ND(5)	11	ND(5)	ND(5)
7	4.0	ND(50)	7	7	120	68	4	270
7	6.0	ND(50)	ND(1)	1	270	28	ND(5)	12

-
- 1 TEH = Total extractable hydrocarbons
2 TVH = Total volatile hydrocarbons
3 mg/kg = milligrams per kilogram
4 ug/kg = micrograms per kilogram
5 ND(50) = None detected (detection limit)

Table 2
Heavy Metal Concentrations in Soil

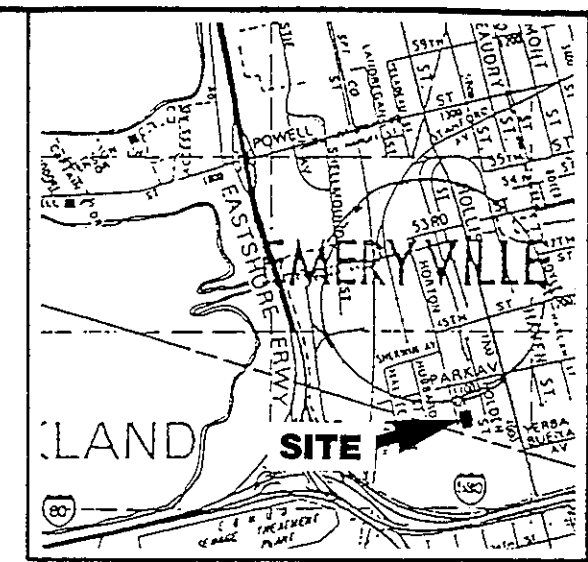
<u>Boring</u>	<u>Depth (feet)</u>	<u>Cadmium (mg/kg)¹</u>	<u>Chromium (total) (mg/kg)</u>	<u>Lead (mg/kg)</u>	<u>Nickel (mg/kg)</u>	<u>Zinc (mg/kg)</u>
1	6.0	1.3	33.3	761	44.7	421
2	4.0	0.32	36.8	5	35.0	37
3	6.0	ND(0.25) ²	33.1	5	30.6	171
4	4.0	ND(0.25)	36.6	4	32.3	45
5	6.0	ND(0.25)	36.0	3	28.5	30

¹ mg/kg = milligrams per kilogram

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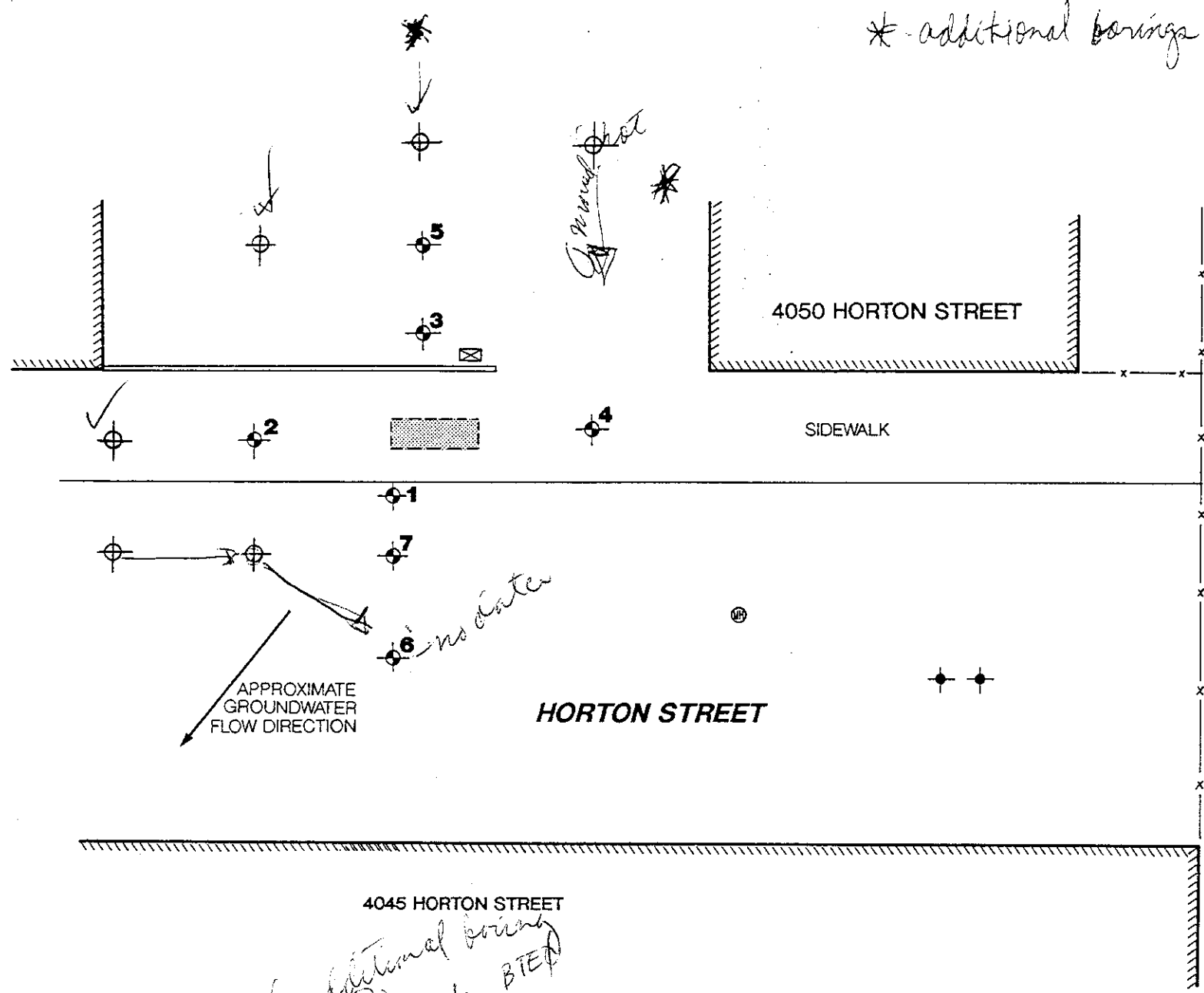
Table 3
Volatile Organic Chemical Concentrations in Soil

<u>Boring</u>	<u>Depth (feet)</u>	<u>EPA 8010 Chemicals (mg/kg)</u>
1	6.0	ND
2	4.0	ND
3	6.0	ND
4	4.0	ND
5	6.0	ND



VICINITY MAP

* additional borings

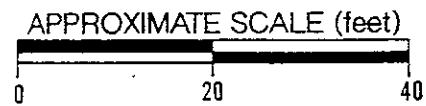


APPROXIMATE GROUNDWATER FLOW DIRECTION

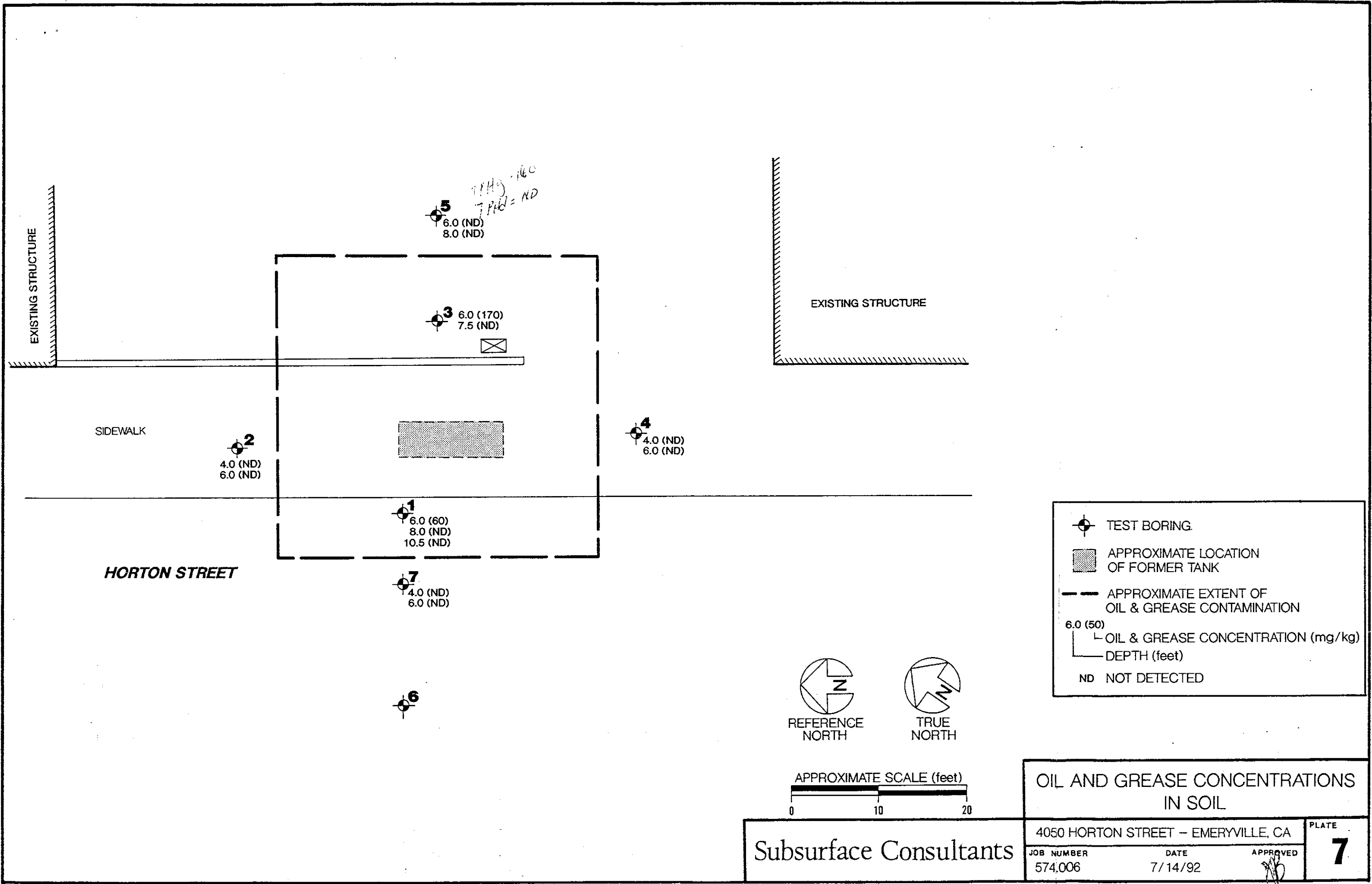
no water

need additional borings
near #7 TPHs BTEX

- PROPOSED TEST BORING
- TEST BORING
- EXISTING MONITORING WELL BY OTHERS
- PREVIOUS TANK
- PREVIOUS FUEL DISPENSER
- EXISTING BUILDING
- EXISTING FENCE
- MANHOLE COVER

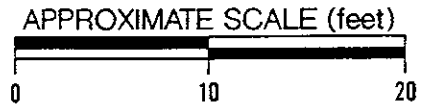


Subsurface Consultants			SITE PLAN	
			4050 HORTON STREET - EMERYVILLE, CA	
JOB NUMBER	DATE	APPROVED	<div style="font-size: 2em; font-weight: bold;">1</div>	
574.006	6/24/92			



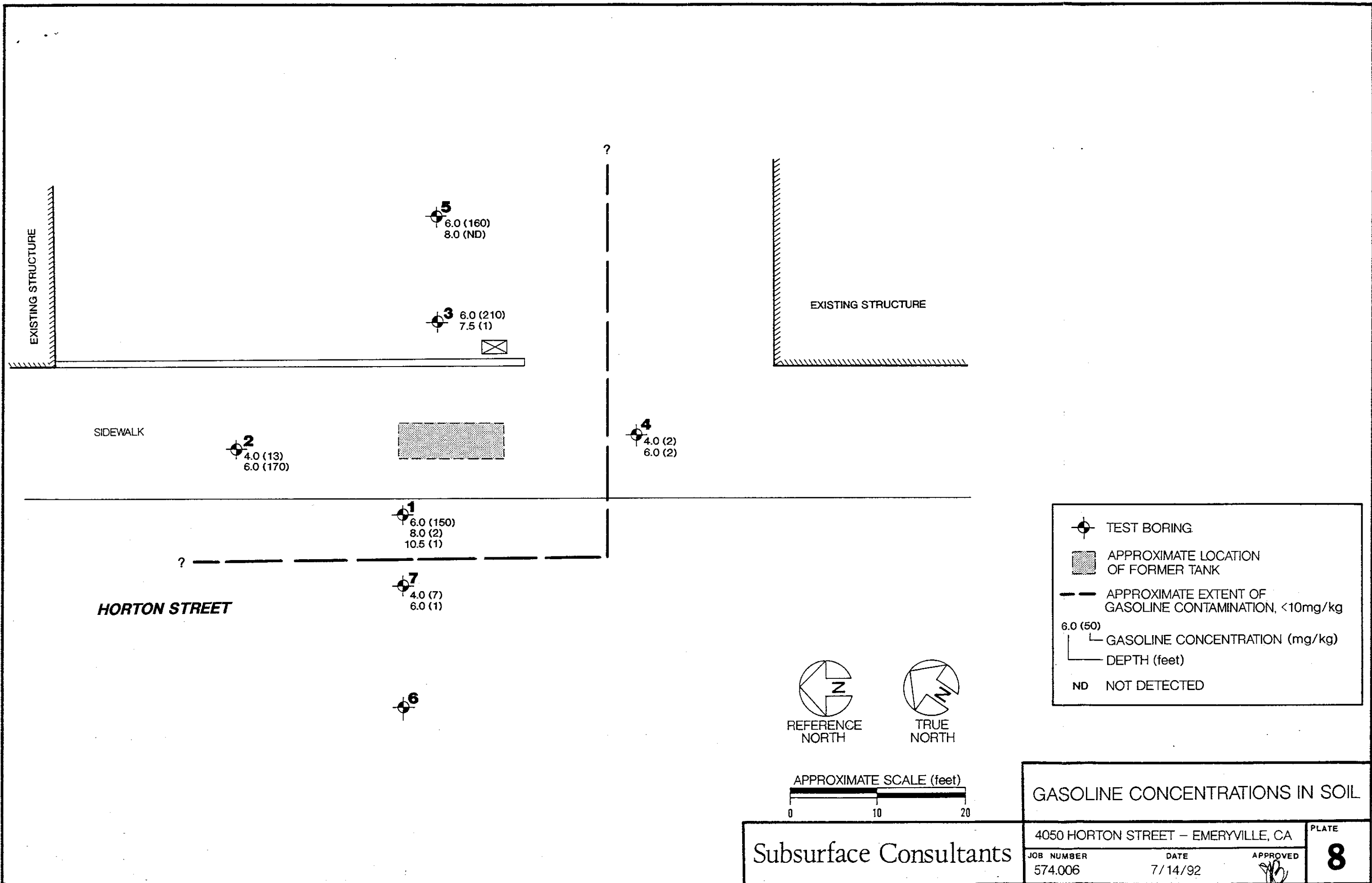
TEST BORING.
 APPROXIMATE LOCATION OF FORMER TANK
 APPROXIMATE EXTENT OF OIL & GREASE CONTAMINATION
 6.0 (50)
 OIL & GREASE CONCENTRATION (mg/kg)
 DEPTH (feet)
 ND NOT DETECTED

REFERENCE NORTH
 TRUE NORTH



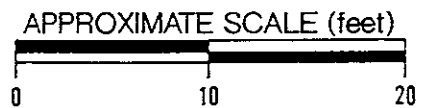
OIL AND GREASE CONCENTRATIONS IN SOIL

Subsurface Consultants	4050 HORTON STREET -- EMERYVILLE, CA		PLATE
	JOB NUMBER 574,006	DATE 7/14/92	APPROVED
			7



TEST BORING
 APPROXIMATE LOCATION OF FORMER TANK
 APPROXIMATE EXTENT OF GASOLINE CONTAMINATION, <10mg/kg
 6.0 (50)
 GASOLINE CONCENTRATION (mg/kg)
 DEPTH (feet)
 ND NOT DETECTED

REFERENCE NORTH
 TRUE NORTH



GASOLINE CONCENTRATIONS IN SOIL

Subsurface Consultants	4050 HORTON STREET - EMERYVILLE, CA		PLATE
	JOB NUMBER 574.006	DATE 7/14/92	APPROVED 8

Subsurface Consultants, Inc.
Consulting Engineers

FAX TRANSMISSION COVER SHEET

To: Susan Hugo Receiver's Fax: 569-4757
Company: Alameda Co. Health Care Svcs. Agency

From: Mark Kawakami **RUSH!**
Please Deliver Immediately

Date: 6/14/93 SCI Job No.: _____ Pages Transmitted: 11

Project: 4050 Horton Street Subject: Work Plan

- | | |
|---|---|
| <input type="checkbox"/> For Your Review and Comment | <input type="checkbox"/> As Requested |
| <input checked="" type="checkbox"/> Original Will Be Mailed | <input type="checkbox"/> Please Return an Executed Copy |
| <input checked="" type="checkbox"/> For Your Information | <input type="checkbox"/> _____ |

Copies have also been sent to: _____

Remarks: _____

Subsurface Consultants, Inc.
171 - 12th Street, Suite 201
Oakland, California 94607
510-268-0481 FAX 510-268-0137

James P. Bowers, PE
R. William Rudolph, Jr., PE

June 14, 1993
SCI 851.001

Ms. Susan Hugo
Alameda County Health Care Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

Work Plan
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171 12th Street • Suite 201 • Oakland, California 94607 • Telephone 510-268-0461 • FAX 510-268-0137

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Page 2

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■ Subsurface Consultants, Inc.

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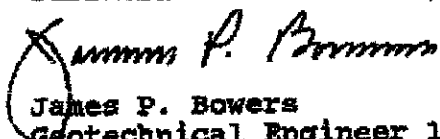
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The report will include boring logs, analytical test results and Chain-of-Custody records.

We look forward to your favorable review of our work plan. If you have any questions, please call.

Yours very truly,

Subsurface Consultants, Inc.


James P. Bowers
Geotechnical Engineer 157 (expires 3/31/95)

MK:JPB:egh

cc: Mr. Jeff Hunt
Plywood and Lumber Sales, Inc.

Mr. Richard Hiatt
Regional Water Quality Control Board

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Ms. Susan Hugo
Alameda County Health Care Services Agency
SCI 851.001
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■ Subsurface Consultants, Inc.

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 5 ND(50) = None detected (detection limit)

Table 2
Heavy Metal Concentrations in Soil

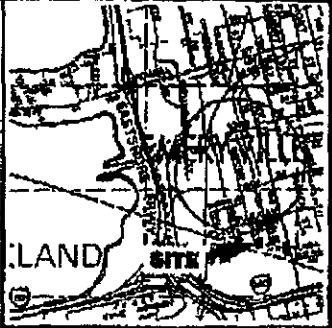
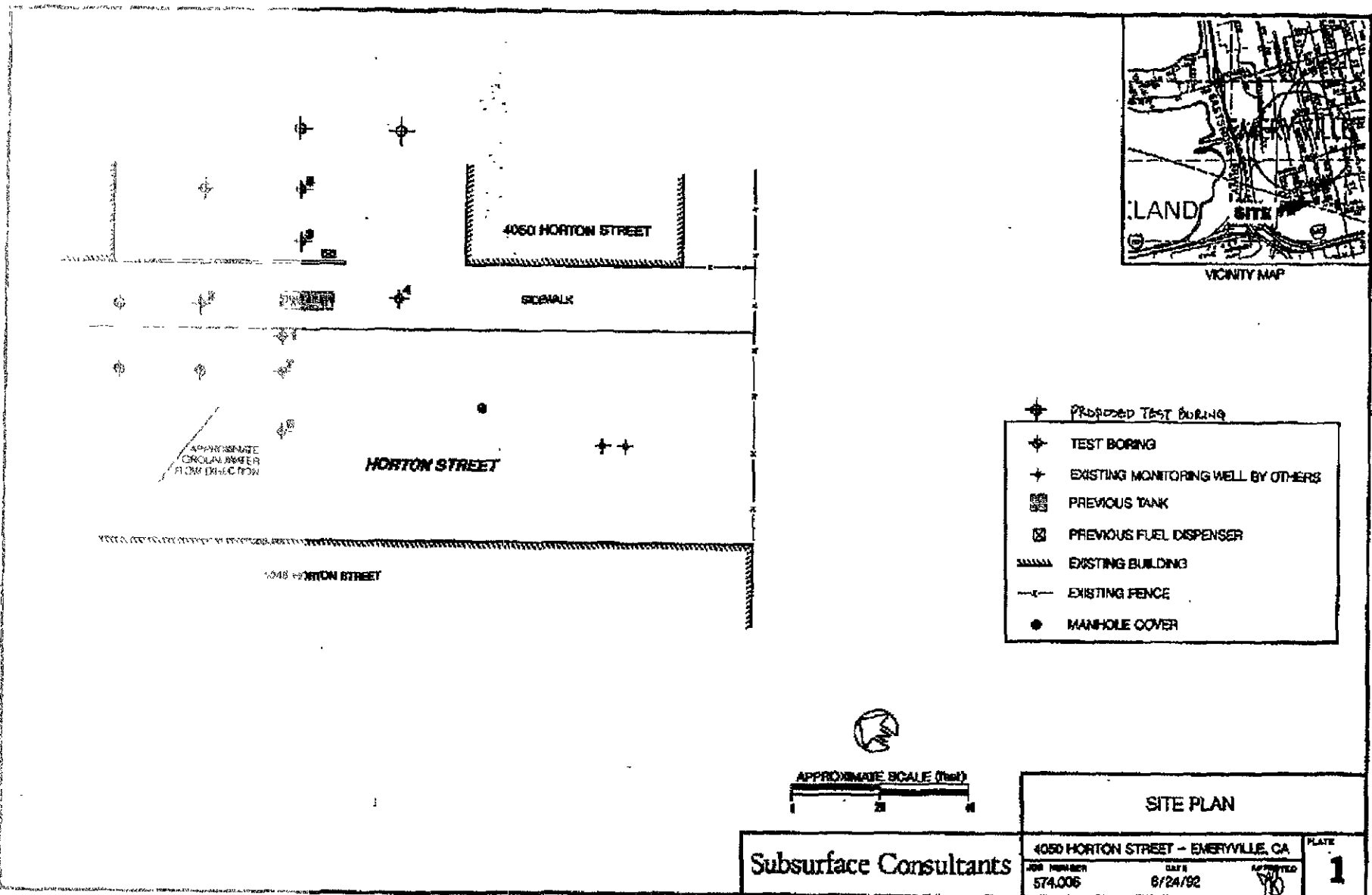
<u>Boring</u>	<u>Depth (feet)</u>	<u>Cadmium (mg/kg)¹</u>	<u>Chromium (total) (mg/kg)</u>	<u>Lead (mg/kg)</u>	<u>Nickel (mg/kg)</u>	<u>Zinc (mg/kg)</u>
1	6.0	1.3	33.3	761	44.7	421
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3	6.0	ND(0.25) ²	33.1	5	30.6	171
4	4.0	ND(0.25)	36.6	4	32.3	45
5	6.0	ND(0.25)	36.0	3	28.5	30

¹ mg/kg = milligrams per kilogram

² ND(0.25) = Non detectable (detection limit)

Table 3
Volatile Organic Chemical Concentrations in Soil

<u>Boring</u>	<u>Depth (feet)</u>	<u>EPA 8010 Chemicals (mg/kg)</u>
1	6.0	ND
2	4.0	ND
3	6.0	ND
4	4.0	ND
5	6.0	ND



VICINITY MAP

- ◆ PROPOSED TEST BORING
- ◆ TEST BORING
- + EXISTING MONITORING WELL BY OTHERS
- PREVIOUS TANK
- ⊠ PREVIOUS FUEL DISPENSER
- ▩ EXISTING BUILDING
- EXISTING FENCE
- MANHOLE COVER



APPROXIMATE SCALE (feet)

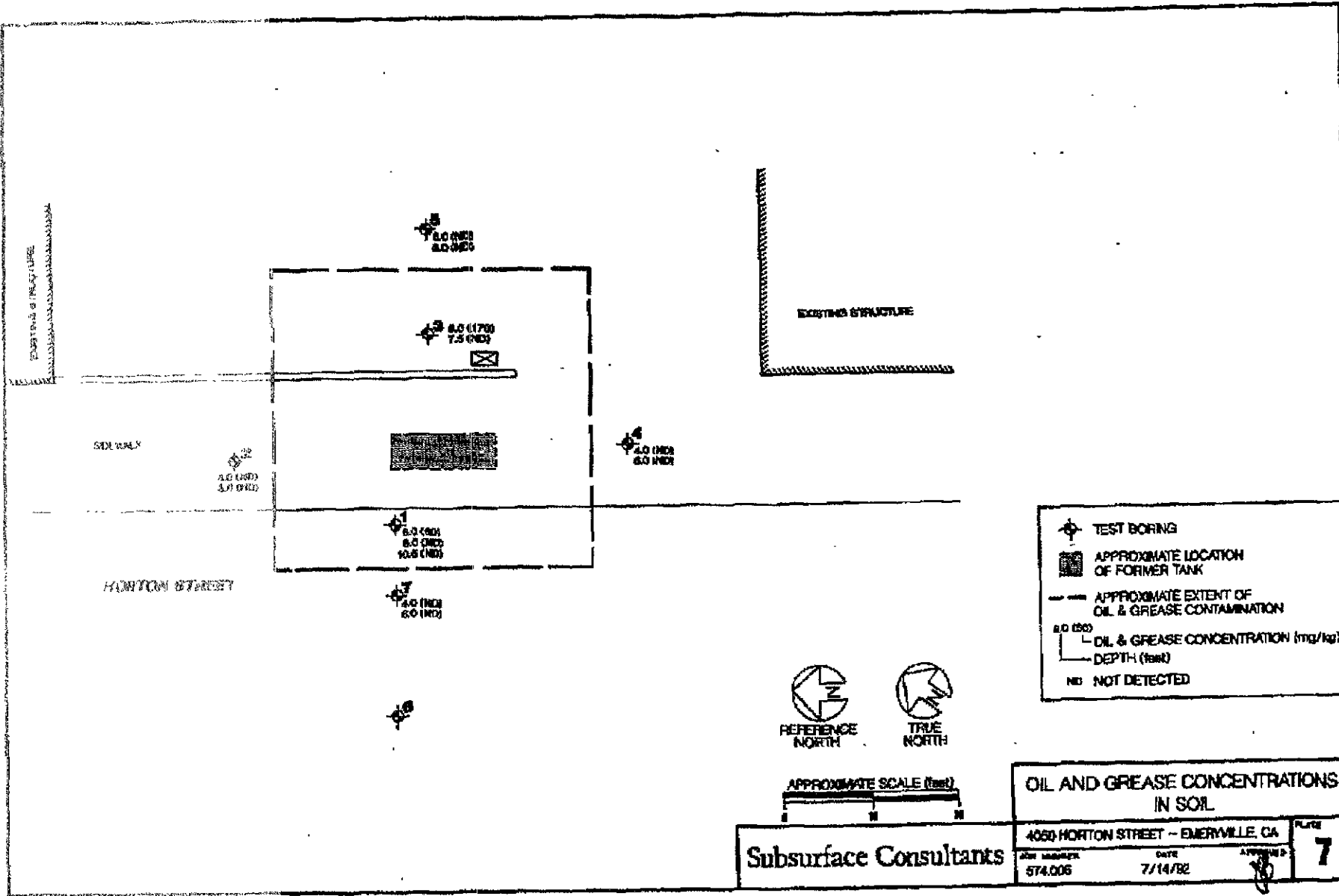


SITE PLAN

Subsurface Consultants	4050 HORTON STREET - EMERYVILLE, CA			PLATE
	JOB NUMBER 574.006	DATE 8/24/92	APPROVED 	1

15 14 000 000 100 2 10 0 1

15 14 000 000 100 2 10 0 1



TEST BORING
 APPROXIMATE LOCATION OF FORMER TANK
 APPROXIMATE EXTENT OF OIL & GREASE CONTAMINATION
 OIL & GREASE CONCENTRATION (mg/kg)
 DEPTH (ft)
 NO NOT DETECTED

REFERENCE NORTH
 TRUE NORTH

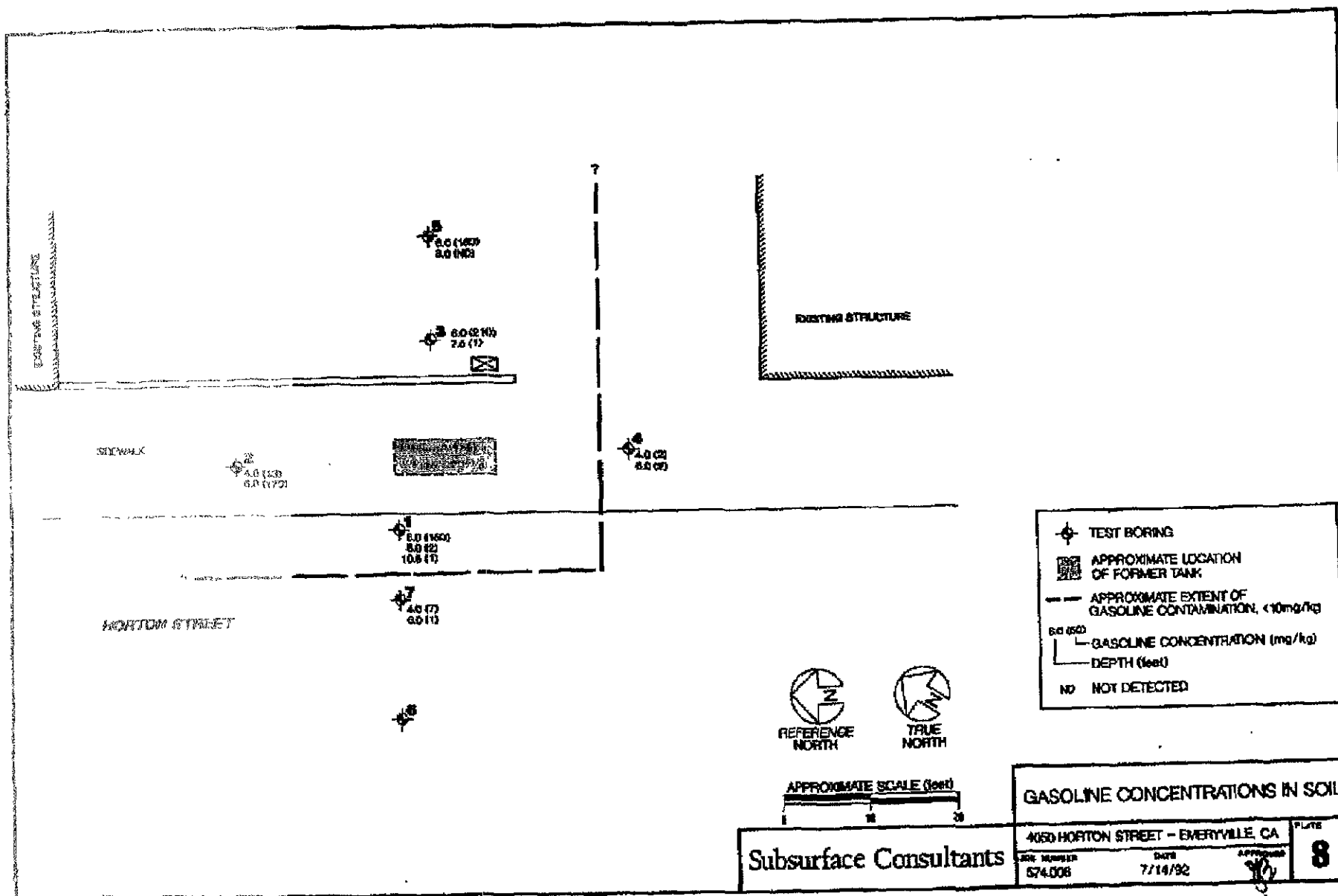


OIL AND GREASE CONCENTRATIONS IN SOIL

4050 HORTON STREET - EMERYVILLE, CA		PLATE
JOB NUMBER 574.006	DATE 7/14/82	APPROVED
		7

Subsurface Consultants

TEL NO: 415-258-2137
TEL NO: 415-258-2137
TEL NO: 415-258-2137





REDHORSE
CONSTRUCTORS INC.

ALCO
HAZMAT

94 JUN 14 AM 11:28

THIS SITE SAFETY PLAN IS SPECIFICALLY PREPARED FOR:

Plywood and Lumber Sales

Project Location: 4050 Horton Street
Emeryville, CA

Redhorse Job Number: 648

Date: 13 June 1994

ALL PERSONNEL PARTICIPATING IN THE FIELD MUST BE TRAINED IN THE GENERAL AND SPECIFIC HAZARDS UNIQUE TO THIS JOB AND, IF APPLICABLE MEET RECOMMENDED MEDICAL EXAMINATION REQUIREMENTS. ALL SITE PERSONNEL AND VISITORS SHALL FOLLOW THE GUIDELINES, RULES, AND PROCEDURES CONTAINED IN THIS SAFETY PLAN. THE PROJECT MANAGER OR SITE SAFETY OFFICER MAY IMPOSE ANY OTHER PROCEDURES OR PROHIBITIONS THAT THEY BELIEVE ARE NECESSARY FOR SAFE OPERATIONS.

THIS PLAN IS PREPARED TO INFORM ALL FIELD PERSONNEL, INCLUDING REDHORSE CONSTRUCTORS AND REDHORSE SUBCONTRACTORS, OF THE POTENTIAL HAZARDS ON THE SITE. HOWEVER, EACH CONTRACTOR OR SUBCONTRACTOR MUST ASSUME DIRECT RESPONSIBILITY FOR HIS OWN EMPLOYEES' HEALTH AND SAFETY.

REDHORSE CONSTRUCTORS, INC. SITE SAFETY PLAN

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program. This includes providing field supervision, maintaining restricted work areas, enforcing safe work and hygiene practices, requiring proper use of personal protective equipment, and communicating approved modified safety requirements to site personnel. Specific site duties include, but are not limited to: conducting daily health and safety field meetings and safety inspections, at a minimum, maintaining a first aid kit, providing first aid as necessary, notifying the proper response agency in the event of an emergency, conducting site specific employee training and information sessions, conducting general air monitoring as directed, and completing the necessary record keeping.

The Project Manager, Project Safety Manager, or On-Site Safety Coordinator have the authority to stop unsafe acts or correct unsafe conditions as noted. Ultimate responsibility for worker safety and compliance with general safe work practices will be born by the individual workers, individual contractors or subcontractors and their employees. In addition, all project personnel should initiate personal efforts to sense conditions that can contribute to an accident and initiate the most appropriate remedial measure to eliminate the unsafe act or condition recognized.

G. THE POSSIBLE HAZARDS ON THIS JOB ARE EXPECTED TO BE:

Chief chemical hazards known or thought to exist on site and addressed in this plan:

Soils containing hydrocarbons as diesel and gasoline and metals including lead.

The following hazards have also been identified and will or may be present during Redhorse activities on the site:

Potential for lead in airborne contaminated dust or soil.

Highway vehicles moving at high speeds.

Heat stress.

Back injuries from improper lifting.

Fire from failing to eliminate fire hazards, etc.

Slip, trip, fall injuries.

Head injuries from falling objects, low overheads, etc.

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Eye injuries from dusts, flying objects, etc.

Electrical shocks from improperly grounded equipment, etc.

Confined Spaces

Hand and foot injuries from improper use of hand tools, sharp objects, falling objects, etc.

Smoking will not be permitted in the restricted work areas. Smoking will be permitted in designated areas in the support zone only. Smoking will not be permitted near fuel storage areas or similar potential fire hazards.

Consideration will be given to all moving physical hazards such as being struck by, struck against, or being caught in, on, or between site materials, structures, or machinery.

Moving equipment or machinery will have all the necessary safety devices required by OSHA.

The above list of potential physical hazards is not all inclusive. California Construction Safety Orders (CAL-OSHA) will be referenced as necessary in further reducing job hazards as they are identified. Each worker should make a conscious effort to work safely.

Overall Hazard:

HIGH **MODERATE** **LOW XX** **UNKNOWN**

H. JUSTIFICATION FOR OVERALL HAZARD RATING:

A soil investigation has been completed which characterized the soils of concern with respect to hydrocarbons, BTEX and lead. Procedures to be followed during all work activities at the site is contained in this SSP. These procedures, if followed, should mitigate employee exposures to the contaminants on the site. Ammendments to this Site Specific Safety and Workplan will be communicated to all affected personnel as soon as possible and incorporated thereafter. Special Hazards and/or substances and procedures for limiting hazard exposure are presented herein.

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II. WORK PLAN

A. Team Composition:

<u>Team Member</u>	<u>Responsibility</u>
Mark Warner	Project Manager
Greg Rainey	Site Safety Manager
"	Site Supervisor/Site Safety Coordinator

B. Work Plan Overview:

Site Activities:

- X Demolition
- Drilling
- Construction
- Tank Excavation
- X Soil Excavation
- X Work in Traffic Area
- Groundwater Extraction or system installation
- Vapor Extraction or system installation
- In Situ Remediation
- X Above Ground Remediation (at later date)

Outline of Activities:

Hydrocarbon- and metal-impacted soils have been found in areas of the site. The work plan is intended to outline, in general, the activities involved in excavation of this impacted soil. It is noted that variations in the extent and degree of contamination by metals, and variations in ground water levels, may occur within the project limits beyond the points explored. It is acknowledged that the Contractor shall notify the Engineer immediately of any such variation uncovered by the work as soon as it has knowledge of any such variation(s).

C. Perimeter Establishment:

The area surrounding the excavation and within the enclosed area shall be defined as the Restricted Work Area. No unauthorized entry to the Restricted Work Area will be permitted without acknowledgement of this Site Safety Plan and the required

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training described herein.

The Perimeter boundaries will be firmly established at the first daily tailgate safety meeting prior to entrance to the site.

D. Zone(s) of Contamination Identified:

The Restricted Work Area shall be considered the Zone of contamination.

The contaminants of concern have been found to a depth of approximately 7 feet below the southwest portion of the site, below and around the perimeter of the timber shed, below the planter, below the sidewalk and extending onto and under a portion of Horton Street. The zone of contamination is outlined in the Site Map (Figure 1).

Contamination zone boundaries will be established during the first safety meeting prior to entrance to the site.

E. Equipment expected to be used:

Demo, Cat 225
Excavation, Case 580E or Cat 416

Loading: Same

Trucking: Semi-end dump provided by Den Beste Trucking, Inc.

Compaction Water truck if needed.
and Dust ctrl:

G. Excavation and Tentative Schedule:

It is expected that work will begin 6-16-94.

The work will be two-staged:

Stage 1: Begins 6-16-94. A backhoe will be used to excavate all soil believed to contain lead contaminants. This soil will be stockpiled on site on top of and underlined with visquene and receive further treatment or disposal arrangements. It is expected that the maximum depth of this excavation will be approximately 7 feet. The pit will be loosely backfilled pending sidewall analytical if access to the rest of the site is restricted by the location of the pit. At the time of the first stage of

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excavation, concrete railing and temporary fencing will be placed to prohibit access of unauthorized traffic and personnel.

Stage 2: Begins 6-20-94 (expected). Soil will be excavated beginning at the rear of the site progressing towards the street to an overall depth of approximately 7 feet throughout the area designated. More precise direction along the perimeters will be aided by results of field screening instruments. This soil contaminated with hydrocarbons will be loaded by the excavator directly into semi end dumps which will then transport the material to the designated disposal site.

H. Trucking and disposal:

Trucking of soils shall be provided by Licensed Hazardous Waste Transporters (Den. Beste Trucking, Inc.). All soil leaving the site will be manifested by special "Non-Hazardous Waste Manifests" and each manifest and load will be tracked using a Redhorse "Trucking Manifest Log." Soil being stockpiled on site need not be accompanied by a manifest. Upon return from the disposal site, the truck driver shall return one signed copy of the manifest from the previous load prior to receiving his next load. "Generator" copies of each manifest shall be provided to the Generator within a reasonable amount of time after they are received from the disposal facility.

I. Demo & Offhaul Concrete:

Demolition shall take place before the involvement of Redhorse Constructors, Inc. After that stage no concrete is expected to be generated at this site.

J. Road Lane and/or Sidewalk Closure:

The project may require a lane closure. At a minimum, there will be a need for partial shoulder closure to provide a safety margin for workers doing excavation expected to extend into the street, and to prevent exposure of traffic to moving heavy equipment.

If, at any time, it becomes necessary to block all or a portion of any lane or street, all applicable Caltrans general specifications and conditions shall apply and will be enforced.

When lane closures are necessary concrete barriers will be in place between traffic and the work area which shall prevent entrance to the site or work area by unauthorized vehicular traffic.

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Exposure for the general public will be limited by preventing contact between the public and work areas by 6' temporary fencing with locked gates and administrative means. Pedestrian traffic shall be prevented from coming into contact with equipment or contaminants generated from the site.

Site operations must be conducted in such a fashion that the risk of injury or accident from and to vehicular and pedestrian traffic is minimized.

K. Safety Meetings:

A tailgate safety meeting will occur prior to commencing work which will address all aspects of this safety plan. Those attending will sign this plan, acknowledging its contents.

Tailgate safety meetings will occur daily and will be recorded. Topics will include but will not be limited to the following: Previous day's work activities, safety concerns brought about by these activities, anticipated work activities for the day, changes in scope of activities or original work, introduction and orientation of new employees (if any), review of previous day's sampling or analytical results, lines of communication, evacuation routes, changes in Protection Levels required.

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III. SITE-SPECIFIC SAFETY WORKPLAN

A. Site Description: The site and approximate work area are shown on the Site Map.

B. Site-Waste Characteristics: Data are attached as Appendix A.

	<u>Known:</u>	<u>Suspected:</u>	<u>Max. Levels:(mg/kg)</u>
Asbestos			
Acetone			
Arsenic			
Benzene	X		5.3
Cadmium	X		1.3
Chromium	X		36.8
1,2 Dichloroethane	X		0.00
Diesel	X		57
Ethylbenzene	X		5.500
Fuel Oil			
Gasoline	X		210
Kerosene			
Lead (Total)	X		761
Mercury			
Methyl Chloride			
Nickel	x		46.6
Oil and Grease	X		177
PCBs			
Silica			
Tetrachloroethane			
Toluene	X		5.100
Trichloroethene			
Vinyl Chloride			
Xylene	X		17.000
Carbon Monoxide.			
Zinc	X		421

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Waste type(s):

Liquid: Solid: X Sludge: Gas:

Characteristics:

Corrosive: No Volatile: No
Ignitable: No Toxic: Possible
Radioactive: No Reactive: No
Unknown:

C. Facility Description:

The site is located at 4050 Horton Street near the 80/580 interchange. The contaminants of concern for this project are assumed to have been released by an underground fuel storage tank, previously removed.

D. Unusual Features: None known

E. Site Status:

Active: Inactive: xx Unknown:

F. History (agency action, complaints, injuries, etc.):

Unknown

G. Hazard Evaluation - Parameters:

Analysis of the contamination levels indicates that airborne exposure levels should be well below Cal-OSHA allowable levels (50 micrograms of lead per cubic meter of air Time-weight averaged over 8 hours), and that a primary concern is exposure to lead is through ingestion of contaminated soil. Ingestion can occur through eating, drinking, or smoking with hands or faces that are contaminated with lead containing soil. An additional concern is that shoes or clothing contaminated with lead containing soils would be taken to cars, offices, or homes and provide a source for lead contamination and ingestion there.

Lead can cause both short and long term health effects, often with serious consequences. Lead enters the body through inhalation or ingestion. Except for certain organic lead compounds it is not absorbed through the skin.

If you use food, cigarettes, chewing tobacco, makeup, or drinks that have leaded soils on them or handle them with soil contaminated hands or utensils, you could

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ingest lead.

Once in your body, lead is a potent systemic poison that serves no known useful function. Some is quickly filtered out and excreted, but some remains in the blood and other tissues, often for long periods of time.

To minimize the potential for contamination and ingestion of lead contaminated soils, the following work practices will be adopted for Stage 1 excavation activities at this site which will be focusing on areas of soil having elevated lead levels:

- 1) Keep blowing dust to an absolute minimum with water or other approved dust reducing agents.
- 2) Minimize contamination by using protective/sacrificial clothing and footwear (rubber boots/jobsite only boots) that is used on jobsite only. Store this clothing on the jobsite or in a manner that will prevent contamination. Clean boots before leaving jobsite. Have contaminated clothing washed commercially, or wash separate from families clothes.
- 3) Prevent soil ingestion by not eating, smoking, or drinking near work operations. Wash hands and face before eating, drinking, smoking, or using bathroom. This requires an adequate supply of wash water, soap, and towels on site.) Store food and water so it will not be contaminated.
- 4) Read and review this written compliance plan.

In areas or stages of the project where soil has not been analyzed or analyses indicate contamination by lead, the above practices should be followed.

Levels of Protection - General: The following levels as defined by the Environmental Protection Agency may be necessary on this site.

Level A: Not expected. Should be worn when the hazardous substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on either the measured (or potential for) high concentration of atmospheric vapors, gases, or particulates; or the site operations and work functions involve a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to skin or capable of being absorbed through the intact skin or substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible or total atmospheric concentrations on

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direct reading instruments indicate 500-1,000 ppm of unidentified substances.

Level B: Not expected. Should be worn when the type and atmosphere concentrations have been identified and require a high level of respiratory protection but less skin protection or the atmosphere contains less than 19.5% oxygen or total atmosphere concentrations on direct reading instruments indicate 5-500 ppm of unidentified substances.

Level C: Not expected. Should be worn when the atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin or the types of air contaminants have been identified, concentrations measured, and an air purifying respirator is available that can remove the contaminants or total atmospheric concentrations on direct reading instruments indicate 0-5 ppm of unidentified substances.

Level D: Should be worn when the atmosphere contains no known hazard or work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

The characteristics of this site indicate that Full Level D protection should be worn for Stage 1 excavation (approx 1/2 day) activities or until air sampling indicates that the Level of protection can be safely downgraded to modified Level D. Conditions will be continually monitored and changing work conditions will be assessed in the even protection levels should be upgraded.

Stage 2 excavation shall occur under modified Level D protection, however, conditions will be continually monitored and changing work conditions will be assessed in the event that protection levels need upgrading.

Summary Required Protective Equipment: Employees will be provided with the required personal protective equipment.

Stage 1: Each employee entering the excavation or exclusion area during intrusive activities shall be required to wear the following: Hard hat, Tyvek or Poly-coated coveralls, Nitrile or neoprene outer gloves, latex inner gloves, Safety glasses (as required), Steel toe and steel shank boots with disposable overboots, hearing

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protection (as required). Half or Full-face air-purifying respirator equipped with organic vapor cartridges with HEPA filters will be used if requested or if dust cannot be effectively controlled (half face respirators are generally preferred to allow for maximum visibility). Powered Air-Purifying Respirators (PAPRs) will be supplied upon request.

Stage 2: It is expected that minimum soil handling will occur during this stage. Each employee entering the excavation or exclusion area shall be required to wear the following: Hard hat, Safety glasses (as required), Steel toe and steel shank boots, hearing protection (as required). Half or Full-face air-purifying respirator equipped with organic vapor cartridges with HEPA filters will be used if requested or if dust cannot be effectively controlled (half face respirators are generally preferred to allow for maximum visibility) or if hydrocarbons are detected above 10 ppm for one minute continuously. Powered Air-Purifying Respirators (PAPRs) will be supplied upon request. If soil handling occurs, Nitrile gloves shall be worn. Where there is risk of contamination of clothes, tyvek suits shall be worn.

Head Injuries: All personnel will be required to wear a hard hat during excavation and soil handling while in the restricted work area. The hat must be worn properly and not altered in any way that would lessen the degree of protection offered. All hard hats must meet ANSI Standard Z89.1.

Foot Injuries: Steel toe safety boots for all on-site personnel are required. To afford maximum protection, all safety boots must meet ANSI Standard Z41.1/75. Where potential exposure to chemical hazards exist, employees should avoid contact of skin, clothing, and shoes with contaminated materials.

Epidermal: Nitrile gloves shall be worn when handling contaminated soils or equipment. The gloves shall be removed upon exiting the site and disposed of in a suitable previously specified receptacle. Employees must wash with soap and water after removal of the gloves.

Eyes: All safety eyewear must meet ANSI Standard Z87.1. Contact lenses will not be worn on-site. Safety eyewear is not expected to be needed on this project.

Ingestion: No eating or drinking will be permitted in the Restricted Work Area.

Inhalation: No smoking is permitted in the Restricted Work Area.

Airborne contaminants, primarily resulting from fugitive dust emissions generated by

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intrusive Project activities are not expected to exceed current occupational limits for exposure to hydrocarbons or metals including lead. Exposure to lead is specifically regulated under OSHA 29 CFR 1910.1025 and is considered a carcinogen under OSHA and California proposition 65. A program for dust suppression shall be implemented to ensure that fugitive dust emissions are not transporting contaminants of concern off-site.

Dust Monitoring:

Dust monitoring shall occur by visually inspecting the site during the first stage of excavation. Dust monitoring shall be recorded. The minimum frequency of visual dust monitoring during Stage 1 will be every 30 minutes. During stage 1, visual dust for one full, continuous minute shall constitute action level. During subsequent stages, dust shall be visually monitored and recorded when excessive. During these subsequent stages, visual dust observed for five full consecutive minutes shall constitute the action level. PPE requirements shall be enforced accordingly.

Lead Monitoring:

Controlling dust, limiting contact with soils, and proper hygiene should minimize the need for monitoring for lead. If at any time there arises suspicion of an overexposure, a potential exposure, or levels of contamination greater than expected and previous characterization would suggest, work will cease, and a Lead Monitoring Program shall be implemented as follows:

In addition to real-time air monitoring, personal air samples will be collected and analyzed for total dust and lead during the initial stage of intrusive Project activities. Sampling and analysis procedures for lead exposure will follow those described in method 7082 of the National Institute for Occupational Safety and Health (NIOSH) Manual of Analytical Methods. Personal air samples will be collected using low-flow personal air sampling pumps. Full-shift personal air samples will be taken from the most likely exposed individuals (worst-case scenario) during the first day of invasive activities. This data will be used to identify exposure levels, if any, and to correlate potential exposure to specific Project Site activities. When the area of operation changes or where contaminants or levels of contaminants may change, additional sampling will be performed to identify potential exposures related to the new operations. The results of the sampling efforts will be evaluated in terms of lead content per total dust to determine an approximate ratio of these compounds in air. This data will be used to assess the basis for the total dust AL established for Project Site activities.

Air samples may also be collected from selected locations around the Project Site to

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determine the extent to which fugitive dust emissions are migrating off-site. Sampling and analysis procedures for perimeter lead monitoring will follow those described in method 7105 of the National Institute for Occupational Safety and Health (NIOSH) Manual of Analytical Methods. Low-flow personal air sampling pumps will be used to collect these samples. The results of these analyses will be used to determine if the dust suppression practices are adequate.

Dust Control Measures:

Efforts will be made to minimize the emission of dust during on-site activity. If necessary a water truck or equivalent will be on-site continuously to water excavation areas and transportation routes. Potentially dusty work areas will be watered before work begins each morning, at any time dust is visually noticed, and at the end of the work day.

Acoustical: On-site personnel may have limited unnecessary exposures to occupational noise. The control of occupational noise exposures will comply with Title 8, CCR, 5095. On-site personnel who operate or are within 10 feet of operating gasoline or diesel powered equipment will wear approved hearing protection to limit unnecessary exposure to hazardous levels of noise.

Electrical: An attempt shall be made to locate and mark all underground and overhead utilities prior to work in the proposed work area.

Physical: Individuals will not be allowed to enter excavations or trenches over five feet deep unless they have been properly braced and shored or sloped in accordance with applicable OSHA regulations.

Trench spoils will be located at least two feet from the edge of trenches over five feet deep.

All trenches will be barricaded or securely covered if they have not been filled in by the end of the work day.

An adequate means of egress will be present at least every 25 feet for trenches over four feet deep which individuals may enter.

Trenching and excavation work will not commence until a reasonable effort has been made to locate underground utilities. Additional guidelines for trench entrance by site workers shall be followed for any work that extends beneath the "clean" soil cap or through the shoring, such as air monitoring according to the guidelines set forth in that section of this plan. Additionally, for trenches deeper than 4 feet, periodic

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monitoring will be performed for percent oxygen and explosive levels of gasses, to protect workers from exposure to a potential oxygen-deficient environment or explosion hazard. Under no circumstances will any worker enter a trench in which their personal breathing zone is at a level lower than the existing grade surrounding the trench, without approval of the Health and Safety Coordinator after he/she has sampled breathing zone conditions within the trench. No ignition sources will be allowed within trenches until the Health and Safety Coordinator has approved the use of the ignition source on the basis of measurement of explosive gas levels within the trench.

Mechanical: There will be no riders on equipment. Backup warning devices shall be operational. Buckets and equipment blades will be lowered when equipment is parked or no longer in use.

Chemical: Low levels of Hydrocarbons and Airborne Lead (addressed under **Lead Monitoring**).

Radioactive: No Radioactive hazards are expected to be on this site.

O2 Deficiency: N/A

Confined Space: No confined spaces are expected to be encountered on this site. Confined space entry is not permitted on this site.

Biohazard: N/A

H. Special Precautions and Comments: No smoking, eating or drinking in the work area. Observe traffic hazards. Be aware of and avoid moving heavy equipment. Avoid stirring or creating dust.

I. Personal Protection:

Level of Protection: A ___ B ___ C ___ D X

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Required	Standby	
Body:	<input type="checkbox"/>	Full Encapsulating Suit
	<input type="checkbox"/>	Two Piece Rainsuit, Material:
	<input type="checkbox"/>	One Piece Splash Suit, Material:
	<input type="checkbox"/>	Hooded Tyvek Suit
	<input type="checkbox"/>	Hooded Tyvek/Saranax Suit
	<input checked="" type="checkbox"/>	Non-Hooded Tyvek/Polyethylene Suit
	<input type="checkbox"/>	Cloth Coveralls
	<input checked="" type="checkbox"/>	High Visibility Vest
	<input type="checkbox"/>	Other Body Equipment:
Lung:	<input type="checkbox"/>	SCBA (open circuit, pressure demand):
	<input type="checkbox"/>	Full Face Respirator, cartridge: OV w/HEPA
	<input type="checkbox"/>	Supplied Air, Airline
	<input checked="" type="checkbox"/>	Half Mask Respirator, cartridge: OV w/HEPA
	<input type="checkbox"/>	Other lung Protection:
Head:	<input checked="" type="checkbox"/>	Hardhat
Eye/Face:	<input type="checkbox"/>	Faceshield
	<input type="checkbox"/>	Chemical Goggles
	<input checked="" type="checkbox"/>	Safety Goggles (side shield meeting ANSI Z87.1)
Hands:	<input checked="" type="checkbox"/>	Gloves, type: Rubber, Nitrile, or Neoprene
Ear:	<input type="checkbox"/>	Earplugs, type: Disposable
	<input checked="" type="checkbox"/>	Earmuffs, type: E.A.R. model 2000
Foot:	<input checked="" type="checkbox"/>	Steel-toed Boots, type: Meeting ANSI Z41.1/75
	<input type="checkbox"/>	Disposable Overboots, type:
 Other Safety Equipment:		
	<input type="checkbox"/>	Ventilation Blower/Fan
	<input checked="" type="checkbox"/>	Traffic cones
	<input checked="" type="checkbox"/>	Barrier tape
	<input type="checkbox"/>	Blast alarm
	<input type="checkbox"/>	Lifeline harness
	<input type="checkbox"/>	Radiation Dosimeter

Comments:

Modifications: N/A

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J. Surveillance Equipment & Materials:

<u>O2 Instrument:</u> N/A	<u>Action Level:</u> < 19.5%
<u>LEL:</u> N/A	<u>Action Level:</u> 10% L.E.L.
<u>PID:</u> TBD	<u>Action Level:</u> 10 ppm above background
<u>Colorimetric Tubes</u> if needed	<u>Action Level:</u> 0.5 ppm (TWA) Benzene PEL=1 ppm (TWA)
<u>Dust</u> N/A	<u>Action Level(s):</u> visible dust for 1 minute observed continuously during Stage 1. Ensure proper dust suppression.
<u>Lead</u> N/A	<u>Action Level (s):</u> ≥ 30.0 ug/cm (TWA) PEL=50 ug/cm (cubic meters)

K. Site Entry Procedures:

Permission of onsite, authorized personnel, medical surveillance and training as required by OSHA CFR 1910.120. Modified Level D personnel protective equipment unless upgraded to full Level D or Level C by SHSO upon review of monitoring/analytical. Enter exclusion zone only through designated area.

L. Exit and Decontamination Procedures:

Exit exclusion area only through designated area. Specific procedures for the decontamination of personal protective equipment and operational equipment used in the work area will be addressed by the on-site Safety Coordinator as necessary. A decontamination station shall be set up in an appropriate location at the perimeter of the exclusion zone.

Personnel: All personnel must decontaminate prior to leaving exclusion zone. Before being removed, grossly contaminated protective clothing will be scrubbed and rinsed with copious amounts of water, collecting the rinsate. Remove other protective equipment and outer gloves and deposit in receptacle specified by the site Safety Coordinator. Respirators will be removed last, when worn.

Wash hands with soap and water after leaving the work zone.

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Equipment Decontamination: The excavation and loading equipment will be decontaminated by dry broom or hand-held dry brush cleaning prior to removal from the site.

M. First Aid (equipment available): A standard first aid kit will be available in REDHORSE company vehicles.

N. Work Limitations (time of day, weather, heat/cold stress): Work will stop during periods of heavy rainfall or strong winds if dust cannot be effectively mitigated.

O. Medical Surveillance

A medical surveillance program has been established for Redhorse personnel which provides baseline records and monitoring of significant biological parameters.

The Redhorse medical surveillance program includes:

Personal History - includes age, sex, marital status, number of children, alcohol and tobacco use, medications or drug use.

Occupational History - the employee's occupational history is evaluated for: type of work performed, duration of each type of activity, use of personal protective equipment, and nature and agents or substances to which the worker has been exposed, if known.

Clinical Medical Evaluation - includes:

Routine examination of physiological systems including: head and neck, eyes, ears, nose, throat, respiratory.

Evaluation of results of any past biological or medical monitoring and previous physical examinations.

Evaluations of laboratory tests: routine and specific tests for suspected disease agents (e.g., blood for Lead, Barium, Arsenic, Cadmium, and other metals, and/or urine test for these specific agents; chest or other X-rays, liver function tests).

Evaluation of lung function for respirator qualification.

Specific medical qualifications or monitoring beyond the Redhorse program required

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for this job: None.

P. Respiratory Program

INTRODUCTION

Redhorse Constructors, Inc. has established a program to provide for the care and cleaning of respirators. The purpose of the program is to assure that all respirators are maintained at their original effectiveness. If they are modified in any way, their Protection Factors may be voided. Redhorse has designated the Safety Program Director to be responsible for inspecting, cleaning, repairing, and storing respirators.

The Program includes:

- Inspection (including a leak check) at least quarterly**
- Cleaning and disinfection after each exposure or use**
- Repair**
- Storage**

INSPECTION

Inspect respirators at least quarterly and after each use.

Inspect a respirator that is kept ready for emergency use monthly to assure it will perform satisfactorily.

On air-purifying respirators, thoroughly check all connections for gaskets and "O" rings and for proper tightness. Check the condition of the facepiece and all its parts, connecting air tube, and headbands. Inspect rubber or elastomer parts for pliability and signs of deterioration.

Maintain a record for each respirator inspection, including date, inspector, and any unusual conditions or findings.

Maintenance records will be kept by using the "Personal Safety Kit Checklist and Maintenance Log."

CLEANING AND DISINFECTION

Clean and disinfect respirators as follows:

- Remove all cartridges, canisters, and filters, plus gaskets or seals not affixed to their seats.**

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- Remove elastic headbands.
- Remove exhalation cover.
- remove speaking diaphragm or speaking diaphragm-exhalation valve assembly.
- Remove inhalation valves.
- Wash facepiece and breathing tube in cleaner/sanitizer powder mixed with warm water, preferably at >120 degrees. Wash components separately from the facemask, as necessary. Remove heavy soil from surfaces with a hand brush.
- Remove all parts from the wash water and rinse twice in clean warm water.
- Air dry parts in a designated clean area.
- Wipe facepieces, valves, and seats with a damp lint-free cloth to remove any remaining soap or other foreign materials.

NOTE: Most respirator manufacturers market their own cleaners/sanitizers as dry mixtures of a bactericidal agents and a mild detergent. One-ounce packets for individual use and bulk packages for quantity use are usually available.

REPAIRS

Only trained personnel with proper tools and replacement parts shall work on respirators. No one shall ever attempt to replace components or to make adjustments or repairs beyond the manufacturer's recommendations. It may be necessary to send high-pressure-side components of SCBA's to an authorized facility for repairs.

Repairs will be made as follows:

- Disassemble and hand clean the pressure-demand and exhalation valve assembly (SCBA's only). Exercise care to avoid damage to the rubber diaphragm.
- Replace all faulty or questionable parts or assemblies. Use parts only

REDHORSE CONSTRUCTORS, INC. SITE SAFETY PLAN

specifically designed for the particular respirator.

-Reassemble the entire respirator and visually inspect the completed assembly.

-Insert new filters, cartridges, or canisters, as required. Make sure that gaskets or seals are in place and tightly sealed.

STORAGE

All respirators shall be stored at the main office (whenever possible) in sealed plastic bags and in clean, dry ice chests to shield from exposure to the elements.

-After respirators have been inspected, cleaned, and repaired, store them so to protect against dust, excessive moisture, damaging chemicals, extreme temperatures and direct sunlight.

-Do not store respirators in clothes lockers, bench drawers, or tool boxes.

DONNING RESPIRATORS

1/2 Face Respirators:

1. Remove your protective eyewear (if worn), then grasp the front of the respirator with one hand and the upper strap with the other hand. Then place the portion of the facepiece containing the exhalation valve under the chin.

2. Position the narrow portion of the respirator on the nose bridge and place the cradle suspension system on the head so that the top strap rests across the top of the head and the bottom strap rests above the ears, on the back of the head. Then hook the bottom headband strap behind the neck, below the ears, and adjust the position of the face piece on the face for best fit and comfort.

3. The length of the headband straps are adjustable; tighten or loosen by holding the respirator body or headband yoke with one hand and pulling on the elastic material in the appropriate direction with the other hand. (For a comfortable fit, the headband straps must be adjusted equally on both sides of the respirator).

4. Position the facepiece so that the nose section rests as low on the

REDHORSE CONSTRUCTORS, INC. SITE SAFETY PLAN

bridge of the nose as is comfortable, and tighten the upper headband strap on both sides just tight enough so that the respirator doesn't slide down on the nose. Do not over tighten. If the respirator pinches the nose, loosen the upper strap slightly.

5. Tighten the lower headband strap on both sides just tight enough to secure the respirator under the chin. If you previously removed your protective eyewear, put it back on at this time.

Negative Pressure Fit Check:

Place the palms of the hands over the openings in the filter covers or unscrew the air-purifying elements from the respirator and place the palms of the hands over the inhalation connectors, inhale and hold your breath for about 5 seconds. If the facepiece collapses slightly and no air leaks between the facepiece and the face are detected, a good fit has been obtained. If air leaks are detected, reposition the facepiece on the face and/or readjust the tension of the elastic straps and repeat the negative pressure check until a tight seal is obtained.

Positive Pressure Fit Check:

Using the hands to close the openings in the exhalation valve guard, simultaneously exhale. If the facepiece bulges slightly and no air leaks between the facepiece and the face are detected, a tight fit has been obtained. If air is detected to be leaking out between the facepiece and the face, reposition the facepiece on the face and /or readjust the tension of the head harness straps to eliminate the leakage. This check must be repeated until a tight seal of the facepiece to face is obtained.

Banana Oil (isoamyl acetate vapor) Fit Test (at least every 12 months):

In conducting the Banana Oil test, the respirator wearer will need assistance from a co-worker. The respirator must be equipped with organic vapor cartridges in order to conduct the Banana Oil test. The person assisting the wearer must unscrew the filter cartridges that may be connected to the respirator and screw on a pair of organic vapor cartridges. Check to be sure that each cartridge is tightly sealed against the gasket. The person assisting with the test should take one of the North Respirator Fit Test Ampules, crush it and move the crushed ampule around the area where the facepiece seals to the face. If no banana odor is detected, a good fit has been obtained. If banana odor is

REDHORSE CONSTRUCTORS, INC. SITE SAFETY PLAN

detected, reposition the facepiece on the face and/or readjust the tension of the head harness straps, and repeat the test until a tight seal is obtained.

Once a tight facepiece-to-face seal has been obtained, the person assisting the respirator wearer with the test must unscrew the organic vapor cartridges, if they are not appropriate for the intended use, from the respirator and assemble a pair of appropriate filter and/or cartridges to the respirator.

REDHORSE CONSTRUCTORS, INC. SITE SAFETY PLAN

IV. EMERGENCY INFORMATION

A. Emergency Warning Systems: Several warning systems may be utilized, depending on the work site conditions or emergency involved, including:

Verbal communications
Portable hand-held radios
Vehicle horns
Portable hand-held compressed gas horns

One long blast is used to signify emergency evacuation of the immediate restricted work area to a predetermined location, upwind, where a head count will be taken and further instructions given. The predetermined location will be addressed at daily safety briefings.

Repeated short blasts will be used to signify evacuation of all personnel from the site to a predetermined location, upwind, where further instructions will be given after a head count is taken.

Emergency Conditions: During the site specific training, workers will be trained in the provisions of this emergency response plan. In addition, emergency response plan details will be discussed, as necessary, at the daily safety briefings.

Emergencies include accidental releases of gases, chemical spills, fires, explosions, and personal injuries. Time is a critical factor in an emergency. Personnel must try to remain calm in an emergency to ensure clear thoughts for appropriate decision making.

During the site specific training and daily safety meetings, site workers will be trained in, and reminded of, provisions of this emergency response plan, the communication systems, and evacuation routes.

Emergency Procedures:

General: The on-site Safety Coordinator shall be notified immediately of all emergencies.

The on-site Safety Coordinator has the responsibility for responding to and correcting emergency situations. This may include taking appropriate measures to

REDHORSE CONSTRUCTORS, INC. SITE SAFETY PLAN

protect the safety of site personnel and the public. Possible actions may involve evacuation of personnel from the area. The on-site Safety Coordinator is additionally responsible for monitoring that appropriate persons are notified, corrective measures are being implemented, and follow-up reports completed.

Upon hearing an alarm, all non-emergency communications will cease. Crew members will proceed to give all pertinent information to the project Safety Coordinator in a systematic and orderly manner.

Power equipment will be shut down and operators will stand-by for instruction. Individuals not assigned specific contingency response duties will proceed immediately to a predesignated safe site.

Upon arrival at the safe site, a complete head count will be given to the project Safety Coordinator. Individuals will stay at the safe site until the contingency is secured or further instructions given.

One 10-lb ABC-type dry chemical fire extinguisher shall be provided at the work area and one extinguisher shall be stationed in each Redhorse vehicle. Heavy equipment shall be equipped with an appropriate size and type fire extinguisher as requested by OSHA.

Accidental Release of a Gas:

Notify all personnel within the immediate area of the release.

Evacuate the area if the release of the gas cannot be secured safely.

Notification of immediate supervisor is required.

The on-site Safety Coordinator will take the appropriate actions.

Chemical Spill:

Notify all personnel within the immediate area of the spill.

Evacuate the area if the spill cannot be contained or cleaned up safely.

Notify immediate supervisor.

The on-site Safety Coordinator will take the appropriate actions.

REDHORSE CONSTRUCTORS, INC. SITE SAFETY PLAN

Fires:

Notify all personnel within the immediate area of the fire.

Evacuate the area in the event the fire cannot be extinguished safely.

Go directly to the closest telephone and summon the Fire Department by dialing 911.

Notify the on-site Safety Coordinator.

Explosions:

If uninjured, report to the trailer for a head count.

Stand by for further assignment from on-site Safety Coordinator.

Personal Injuries:

All personal injuries must be reported to the individual's immediate Supervisor.

Supervisors must report all worker personal injuries to the on-site Safety Coordinator.

First-aid trained personnel should administer first-aid to the injured party. Medical attention may be required beyond first-aid treatment. Refer to Figure 2 for the location of the nearby hospital.

Transport/move injured only if the injuries will permit.

Medical Emergency:

In the event of a medical emergency, apply first aid as necessary. Depending on the severity of the condition, the person requiring attention may be transported to the hospital (Figure 2) or an ambulance may be summoned by dialing 911.

REDHORSE CONSTRUCTORS, INC. SITE SAFETY PLAN

B. Local Resources:

Ambulance:	911
Hospital Emergency Room: Alta Bates Hospital	510-204-4444
Poison Control Center:	1-800-523-2222
Police:	911
Fire Department:	911
Explosives Unit:	911
Agency Contact: National Response Center (NAC) Toxic Chemical and Oil Spills:	1-800-424-8802

C. Site Resources:

Water Supply:	Portable containers
Telephone:	In REDHORSE Company Vehicle - onsite
Radio:	In Company Vehicle
Other:	N/A

D. Emergency Contacts:

Mr. Greg Rainey	<u>Phone:</u> 415-457-8506
Mr. Mark Warner	" "
Redhorse Constructors, Inc.	<u>Mobile:</u> 415-999-2434

REDHORSE CONSTRUCTORS, INC. SITE SAFETY PLAN

E. Emergency Routes:

To Hospital Emergency Room: See Figure 2.

Phone: 510-204-4444

Directions: From the site, travel north on Horton to 53rd Street. Turn right on 53rd Street, then turn left (North) onto Hollis Street. Turn right (East) onto Ashby Ave, proceed on Ashby for approximately 1.5 miles to Colby Street. Turn right on Colby Street. Hospital is on immediate left, one-half block from Ashby Avenue/Colby Street intersection.

LIMITATIONS: THIS SITE SAFETY PLAN WAS DEVELOPED IN ACCORDANCE WITH GENERALLY ACCEPTED STANDARDS OF CURRENT SAFETY PRACTICE IN THE STATE OF CALIFORNIA. THE TERMS OF THIS PLAN SHOULD NOT BE CONSIDERED VALID AFTER 1 YEAR BECAUSE OF THE CHANGING REGULATIONS IN ENVIRONMENTAL AND SAFETY PRACTICE.

REDHORSE CONSTRUCTORS, INC., IS NOT ABLE TO ELIMINATE THE RISKS ASSOCIATED WITH ENVIRONMENTAL AND HAZARDOUS WASTE OR TOXIC SITES. NO OTHER REPRESENTATION AND NO GUARANTEES OR WARRANTS, EXPRESS OR IMPLIED, ARE PROVIDED BY OR WITH THIS PLAN.

REDHORSE CONSTRUCTORS, INC. SITE SAFETY PLAN

V. DOCUMENTATION

This Site Safety Plan has been reviewed by the following persons prior to commencing the field work:

Redhorse Constructors, Inc.
Health and Safety Manager: Name:

Signature:

Redhorse Constructors, Inc.
Project Manager: Name:

Signature:

This Site Safety Plan has been reviewed on site as part of the Site Safety Meeting on the first day of work by all participants in the field work, including employees of Redhorse Constructors, Inc., and employees of subcontractors. Additionally, all personnel attending daily safety meetings at the site shall be recorded.

Name of Firm: Name of Person:
Date: Signature:

Name of Firm: Name of Person:
Date: Signature:

Name of Firm: Name of Person:
Date: Signature:

Name of Firm: Name of Person:
Date: Signature:

Name of Firm: Name of Person:
Date: Signature:

Name of Firm: Name of Person:
Date: Signature:

Name of Firm: Name of Person:
Date: Signature:

REDHORSE CONSTRUCTORS, INC. SITE SAFETY PLAN

Figure 1. SITE LOCATION AND SITE MAP

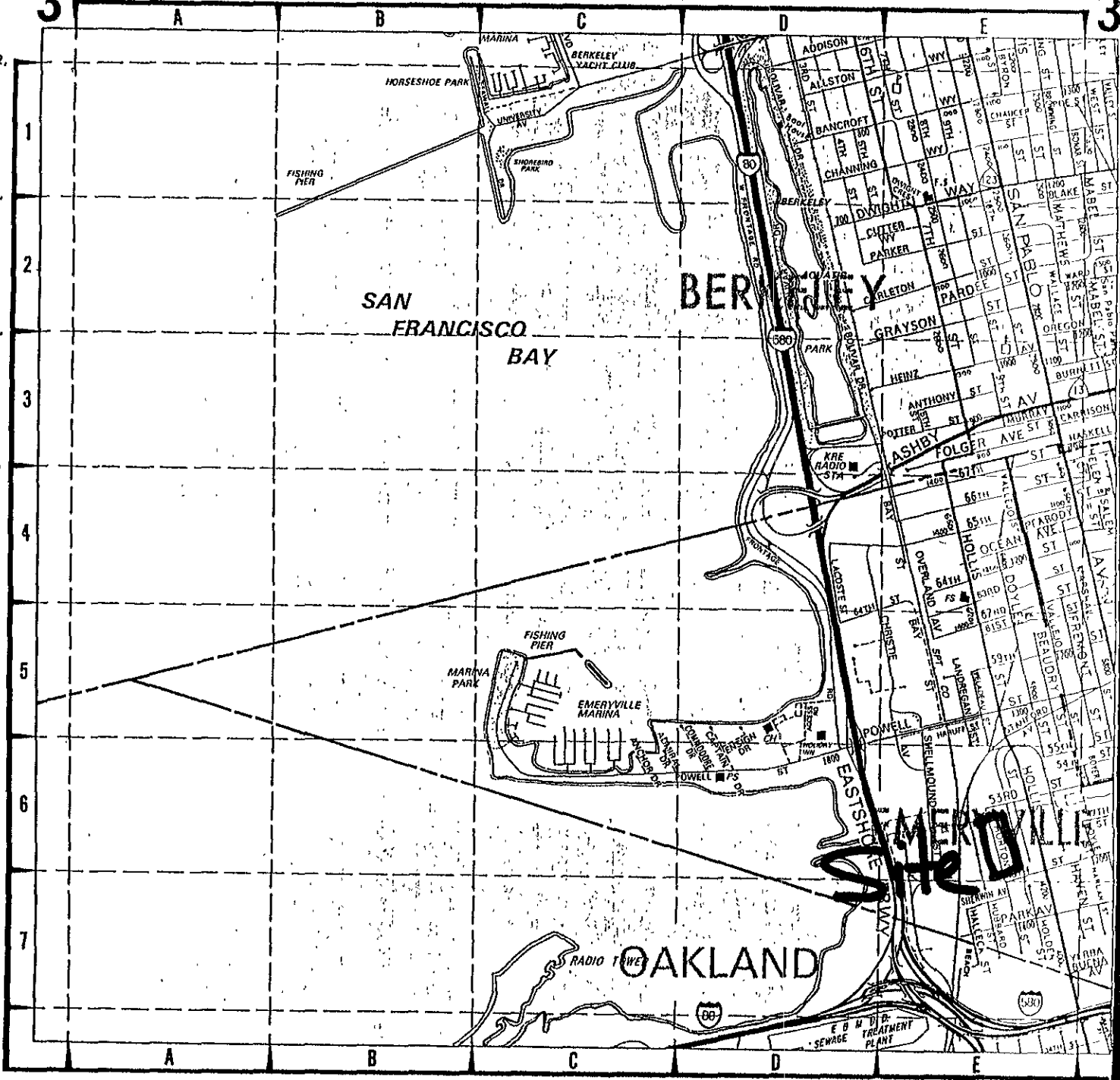
3

FOR CONTINUATION SEE MAP 1

3

COPYRIGHT, © 1989 BY Thomas Bros. Maps

502.
500.
498.
496.
494.
492.
490.
488.



1,470,

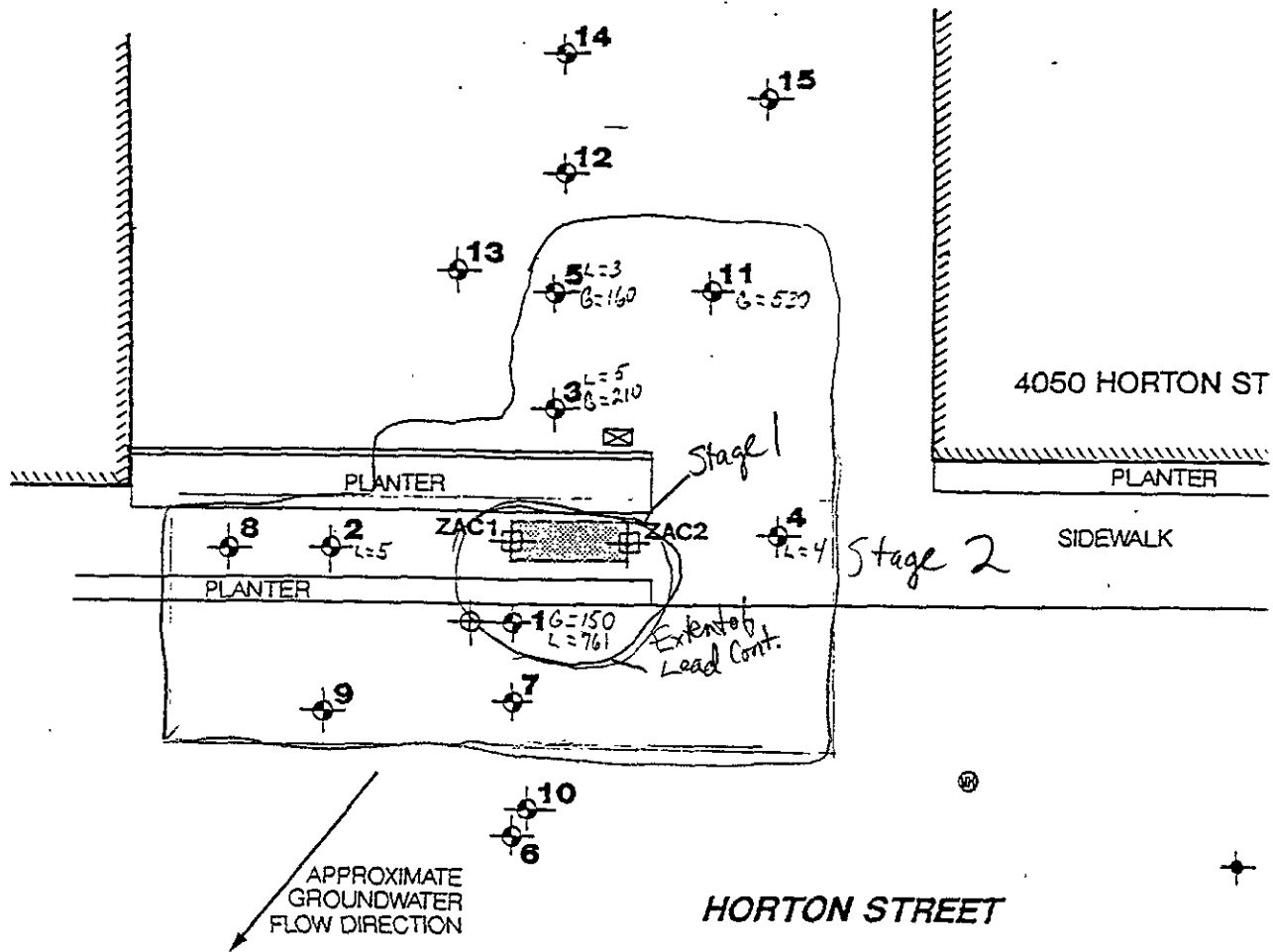
1,473,

FOR CONTINUATION SEE MAP 7

1,482,

1,485,

Site location



4045 HORTON STREET
(EXISTING BUILDING)

Not to Scale

Sub

171 12th

Site Map

REDHORSE CONSTRUCTORS, INC. SITE SAFETY PLAN

Figure 2. EMERGENCY ROOM PROXIMITY TO SITE.

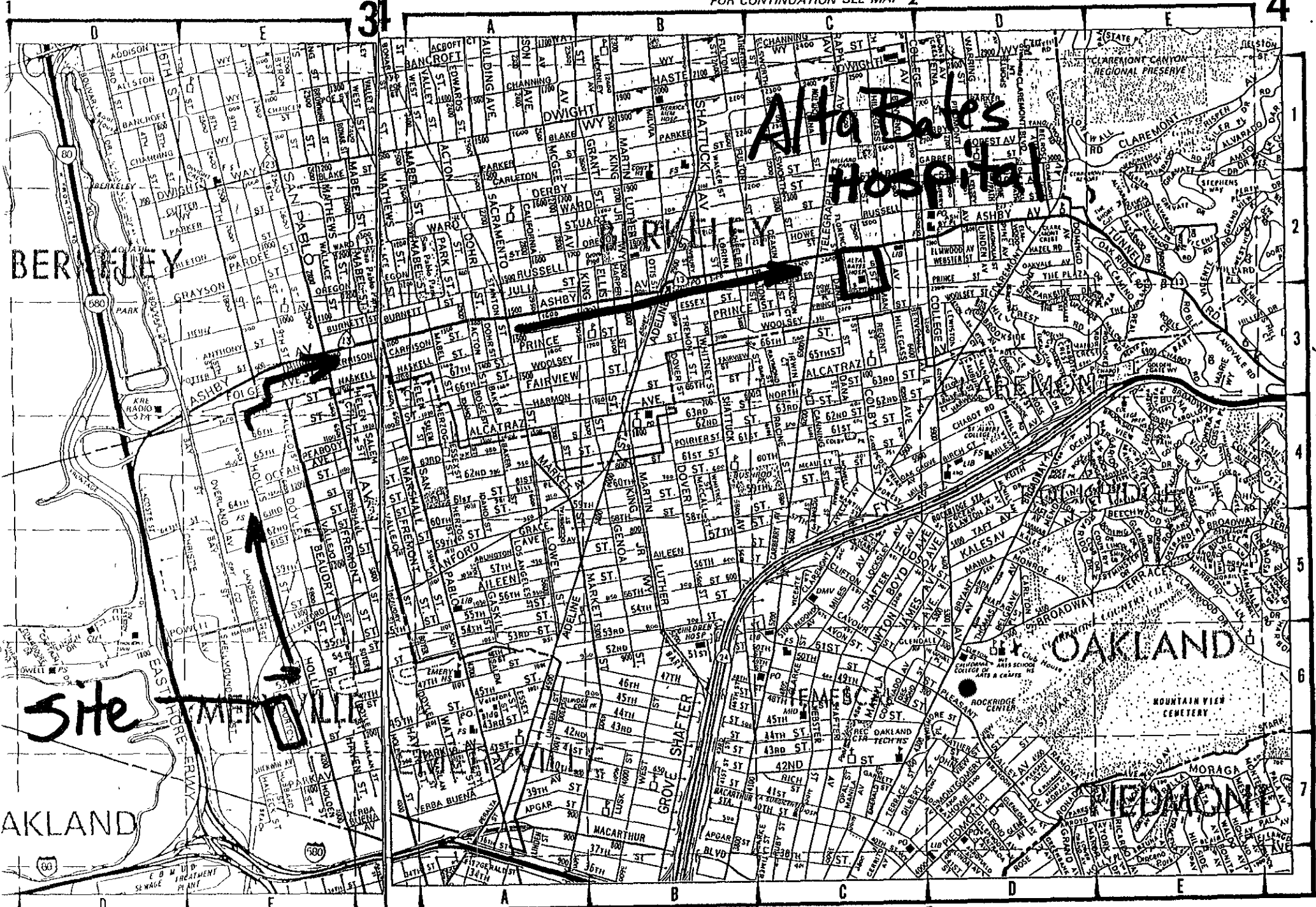
Alta Bates Hospital

Phone: 510-204-4444

Directions: From the site, travel north on Horton to 53rd Street. Turn right on 53rd Street, then turn left (North) onto Hollis Street. Turn right (East) onto Ashby Ave, proceed on Ashby for approximately 1.5 miles to Colby Street. Turn right on Colby Street. Alta Bates Hospital is on immediate left, one-half block from Ashby Avenue/Colby Street intersection.

510 - 204 - 4441

FOR CONTINUATION SEE MAP 2



BERKELEY

Alta Bates Hospital

Site

OAKLAND

FREMONT

FOR CONTINUATION SEE MAP 9

FOR CONTINUATION SEE MAP 6

7

1,485

1,485

1,485

1,488

1,497

1,500

REDHORSE CONSTRUCTORS, INC. SITE SAFETY PLAN

Appendix A. SUMMARY OF DATA

Table 1
Hydrocarbon Concentrations in Soil

<u>Boring</u>	<u>Depth (feet)</u>	<u>Oil and Grease (mg/kg)³</u>	<u>TEH¹ (mg/kg)</u>	<u>TVH² (mg/kg)</u>	<u>Benzene (ug/kg)⁴</u> PPB	<u>Toluene (ug/kg)</u>	<u>Ethyl-Benzene (ug/kg)</u>	<u>Xylene (ug/kg)</u>
Zac 1 ⁶	6.0	177	<10	26	2200	1600	310	540
Zac 2	6.0	<30	44	68	130	240	450	1100
1	6.0	60	30	150	5300	5100	5500	17000
1	8.0	<50	<1	2	43	15	7	15
1	10.5	<50	<1	1	30	24	<5	9
2	4.0	<50	3	13	250	29	180	220
2	6.0	<50	34	170	<400	420	1300	1500
3	6.0	170	57	210	570	<400	2100	950
3	7.5	<50	<1	1	<5	6	<5	5
4	4.0	<50	<1	2	14	5	<5	9
4	6.0	<50	<1	2	14	<5	<5	6
5	6.0	<50	4	160	<200	490	630	<200
5	8.0	<50	<1	<1	<5	11	<5	<5
7	4.0	<50	7	7	120	68	4	270
7	6.0	<50	<1	1	270	28	<5	12
8	6.5	---	<1	<1	<5	<5	<5	<5
8	9.5	---	---	<1	---	---	---	---
9	6	---	<1	<1	<5	<5	<5	<5
9	9	---	---	<1	---	---	---	---
10	6	---	---	<1	<5	<5	<5	<5
11	6	---	---	530	---	---	---	---
12	3	---	---	<1	---	---	---	---
12	6	---	---	<1	<5	<5	<5	<5
13	3	---	---	<1	---	---	---	---
13	6	---	---	<1	<5	<5	<5	<5
15	3	---	---	<1	---	---	---	---
15	6	---	---	<1	<5	<5	<5	<5

¹ TEH = Total extractable hydrocarbons, as diesel

² TVH = Total volatile hydrocarbons, as gasoline

³ mg/kg = milligrams per kilogram

⁴ ug/kg = micrograms per kilogram

⁵ Test not requested

⁶ Samples obtained by Zaccor, Inc. following tank removal

Table 2
Heavy Metal Concentrations in Soil

<u>Boring</u>	<u>Depth (feet)</u>	<u>Cadmium (mg/kg)¹</u>	<u>Chromium (total) (mg/kg)</u>	<u>Lead (mg/kg)</u>	<u>Nickel (mg/kg)</u>	<u>Zinc (mg/kg)</u>
Zac 1	6.0	0.34	28.1	61	46.6	179
Zac 2	6.0	<0.25	30.5	6.6	27.9	29.1
1	6.0	1.3	33.3	761	44.7	421
2	4.0	0.32	36.8	5	35.0	37
3	6.0	<0.25	33.1	5	30.6	171
4	4.0	<0.25	36.6	4	32.3	45
5	6.0	<0.25	36.0	3	28.5	30

Table 3
Volatile Organic Chemical Concentrations in Soil

<u>Boring</u>	<u>Depth (feet)</u>	<u>1,2 DCA² (ug/kg)³</u>	<u>EPA 8010 Chemicals (mg/kg)</u>
Zac 1	6.0	<50	ND ⁴
Zac 2	6.0	2.2	ND
1	6.0	<250	ND
2	4.0	<10	ND
3	6.0	<250	ND
4	4.0	<5	ND
5	6.0	<25	ND

¹ mg/kg = milligrams per kilogram

² 1,2-dichloroethane

³ micrograms per kilograms

⁴ not detected above the reporting limits

REDHORSE CONSTRUCTORS, INC. SITE SAFETY PLAN

Appendix B. MSDSs

Dear Customer: This Safety Sheet contains important information about the hazardous substances in your employees who recently ordered this product. Please make sure this information is given to them. If you need the product, this Safety Sheet should be given to the Buyer. This Form may be reproduced without permission.

Chem 011 bc

Material Safety Data Sheet

Prepared According to the OSHA Hazard Communication Standard (29 CFR 1910.1200)
Formerly Called MATERIAL INFORMATION BULLETIN



CMS 201303

CHEVRON Regular Gasoline

HAZARD:

HARMFUL OR FATAL IF SWALLOWED
VAPOR HARMFUL
LONG-TERM EXPOSURE TO VAPOR HAS CAUSED CANCER IN LABORATORY ANIMALS
MAY CAUSE EYE AND SKIN IRRITATION
EXTREMELY FLAMMABLE
CONTAINS LEAD
KEEP OUT OF REACH OF CHILDREN

TYPICAL COMPOSITION

Mix of paraffins, naphthenes, aromatics and olefins including less than the percentages indicated for the following: 25% toluene (CAS 108-88-3), 20% xylenes (CAS 130-20-7), 10% methyl tert butyl ether (MTBE) (CAS 1634-04-4), 5% benzene (CAS 71-43-2), 5% n-hexane (CAS 110-54-3), 5% cyclohexane (CAS 110-82-7), 5% ethyl benzene (CAS 100-41-4) and 5% naphthalene (CAS 91-20-3)
See end of this MSDS for more data on Typical Composition

EXPOSURE STANDARD

The ACGIH (1985-86) TLV for gasoline is 300 ppm for a daily 8-hour exposure. No Federal OSHA exposure standard has been established for this material. See Additional Health Data for discussion of benzene exposure limits.

PHYSIOLOGICAL & HEALTH EFFECTS

Eye irritation may result from contact with the liquid or exposure to the vapor. The scientific literature warns that vapor concentrations above 500 ppm are irritating.

Prolonged or frequently repeated liquid contact may cause skin irritation or may cause the skin to become cracked or dry from the defatting action of this material. See Additional Health Data.

Prolonged or repeated breathing of gasoline vapor may be harmful. See Additional Health Data.

This material is expected to be only slightly toxic by ingestion. Note to Physicians: (See Additional Health Data.)

EMERGENCY & FIRST AID PROCEDURES

Eyes

Flush eyes immediately with fresh water for at least 15 minutes while holding the eyelids open. If irritation persists, see a doctor.

Skin

Wash skin thoroughly with soap and water. See a doctor if any signs or symptoms described in this MSDS develop or if any skin irritation occurs. Launder contaminated clothing.

Inhalation

Move exposed person to fresh air. If breathing has stopped, apply artificial respiration. Call a doctor immediately. See Respiratory Protection, Page 2.

Ingestion

If swallowed, DO NOT make person vomit. Call a doctor immediately.

ADDITIONAL HEALTH DATA

See following pages

SPECIAL PROTECTIVE INFORMATION

Eye Protection: Keep away from eyes. Eye contact can be avoided by wearing chemical safety goggles.

Skin Protection: Keep away from skin. Skin contact can be minimized by wearing impervious protective clothing including gloves.

Respiratory Protection: Avoid prolonged breathing of vapor by using approved respiratory protection. In open areas, such as outdoor gasoline transfer areas, ventilation is usually adequate to prevent prolonged breathing of high gasoline vapor concentrations. See Additional Health Data.

Ventilation: Use this material only in well ventilated areas.

Comment: If you experience any of the signs or symptoms described in this MSDS, you may be exposed to harmful gasoline levels. Your exposure can be minimized if you follow the protective measures presented above.

HAZARD PROTECTION

This product presents an extreme fire hazard. Liquid very quickly evaporates, even at low temperatures, and forms vapor (fumes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches.

Flash Point: (P-M) < -49°F (-45°C)

Autoignition Temp.: NDA

Flammability Limits: 1.4-7.5%

Extinguishing Media: CO₂, Dry Chemical, Foam, Water Fog.

Special Fire Fighting Procedures: For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment. This may include self-contained breathing apparatus to protect against the hazardous effects of normal products of combustion or oxygen deficiency. Read the entire MSDS.

SPECIAL PRECAUTIONS

See following pages

ENVIRONMENTAL PROTECTION

2-MSDS 94-15

Environmental Impact: Certain geographical areas have air pollution restrictions concerning the use of materials in work situations which may release volatile components to the atmosphere. Air pollution regulations should be studied to determine if this material is regulated in the area where it is to be used. This material is considered to be a water pollutant and releases of this product should be prevented from contaminating soil and water and from entering drainage and sewer systems.

Precautions if Material is Released or Spilled: Eliminate all sources of ignition in vicinity of spill or released vapor. Clean up small spills using appropriate techniques such as sorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Follow prescribed procedures for reporting and responding to larger releases.

Waste Disposal Methods: Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations. Contact local environmental or health authorities for approved disposal of this material.

REACTIVITY DATA

Stability (Thermal, Light, etc.): Stable.

Incompatibility (Materials to Avoid): May react with strong oxidizing materials.

Hazardous Decomposition Products: Normal combustion forms carbon dioxide and water vapor; incomplete combustion can produce carbon monoxide.

Hazardous Polymerization: Will not occur.

PHYSICAL PROPERTIES

Solubility: Soluble in hydrocarbons; insoluble in water.

Appearance (Color, Odor, etc.): Orange to bronze liquid.

Boiling Point: 25-225°C (Range)*

Melting Point: n/a

Specific Gravity: 0.7-0.8 (Range)

Vapor Pressure: 5-15 psi (max.) @ 100°F (Range)*

Vapor Density (Air=1): 2-4 (Range)

Percent Volatile (Volume %): 99+

Evaporation: NDA

*Variable with season and location.

n/a = Not Applicable

NDA = No Data Available

This information is based on data of which we are aware and is believed to be correct as of the date hereof. Since the information contained herein may be applied under conditions beyond our control and with which we may be unfamiliar and since data from multiple independent sources may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon the condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

NO. 243

hepatocellular carcinomas (liver cancer) in female mice, and (3) lung inflammation in male and female rats. Subsequent testing has shown that the six to ten carbon isoparaffinic compounds in gasoline are apparently responsible for the early kidney damage seen in the male rat in the API study although the larger isoparaffins have not been individually tested. Information collected by the API and others indicates that the damage occurs only in the male rat, does not occur in female rats or mice and monkeys of either sex and may not occur in man. How this early kidney injury relates to the development of kidney tumors seen in the API study is currently unknown.

The significance to man of the results of the studies discussed above is not known. While we believe that low level or infrequent exposure to gasoline vapor is not likely to cause cancer or other serious disease, in light of the above information, the precautions outlined in this MSDS should be carefully observed. If strong odor of gasoline is present or if any irritation occurs, individuals should leave the area or institute suitable protective measures (see page 2 - Special Protective Information).

SPECIAL PRECAUTIONS

NEVER siphon gasoline by mouth. READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL.

Use only as a motor fuel. Do not use for cleaning, pressure appliance fuel, or any other such use. DO NOT USE OR STORE near flame, sparks or hot surfaces. USE AND STORE ONLY IN COOL, WELL VENTILATED AREA. Keep container closed. DO NOT TRANSFER LIQUID TO AN UNLABELED CONTAINER. DO NOT weld, heat or drill container. Replace cap or bung. Emptied container still contains hazardous or explosive vapor or liquid.

Typical Composition: (Cont. from page 1)

They contain less than 1 g/gal lead (as lead alkyl) and less than 0.1% other additives including ethylene dibromide (CAS 106-93-4) and ethylene dichloride (CAS 107-06-2).

Hazard Safety Data Sheet
 is used to comply with
 OSHA's Hazard Communication Standard,
 29 CFR 1910.1200. Standard must be
 consulted for specific requirements.

U.S. Department of Labor
 Occupational Safety and Health Administration
 (Non-Mandatory Form)
 Form Approved
 OMS No. 1218-0072

IDENTITY (As Used on Label and SDS)
Benzene

Note: Check boxes and fill in where applicable. If any data is not available, or no information is available, the space must be marked as unknown.

Section I
 Manufacturer's Name
 Address (Number, Street, City, State, and ZIP Code)
 Emergency Telephone Number
 Telephone Number for Information
(415) 938-5610
 Date Prepared
26 December 1987
 Signature of Preparer (printed)

Section II - Hazardous Ingredients/Identity Information

Hazardous Components (Specify Chemical Name, Common Name(s))	OSHA PEL	ACDH TLV	Other Limits Recommended	% (mass/vol)
<i>Benzene</i>	<i>1 ppm</i>	<i>10 ppm</i>		
			<i>IDLH = 2000 ppm</i>	

Section III - Physical/Chemical Characteristics

Boiling Point	<i>176°F</i>	Specific Gravity (H ₂ O = 1)	<i>0.8794</i>
Vapor Pressure (mm Hg.)	<i>75 mm</i>	Melting Point	<i>42°F</i>
Vapor Density (AIR = 1)	<i>2.77</i>	Evaporation Rate (Butyl Acetate = 1)	
Solubility in Water	<i>0.18%</i>		
Appearance and Color	<i>Colorless liquid with an aromatic odor</i>		

Section IV - Fire and Explosion Hazard Data

Flash Point (Closed Cup)	<i>12°F</i>	Flammable Limits	LEL <i>1.4%</i>	UEL <i>8%</i>
Extinguishing Media	<i>Foam, CO₂, Dry Chemicals</i>			
Special Fire Fighting Procedures	<i>N/A</i>			

Section V - Reactivity and Stability

Can react vigorously with oxidizing materials

Section V - Reactivity Data

Stability	Unstable	Conditions to Avoid
	Stable	X

Incompatibility (Materials to Avoid) *None*

Hazardous Decomposition or Byproducts *CO₂*

Hazardous Polymerization	May Occur	Conditions to Avoid
	Will Not Occur	X

Section VI - Health Hazard Data

Hazard(s) of Entry: Inhalation? *Primary* Skin? *Secondary* Ingestion?

Health Hazard (Acute and Chronic) *Irritation of eyes and respiratory tract, dermatitis, possible liver damage*

Corrosivity: RTE? *No* HFC Management? *N/A* OSHA PPE? *N/A*

Signs and Symptoms of Exposure *Eye irritation, dizziness, drowsiness, staggering*

Medical Conditions Generally Aggravated by Exposure *Dermatitis, respiratory problems*

Emergency and First Aid Procedures *Wash off, irrigate eyes, remove to fresh air give O₂ if necessary*

Section VII - Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled *Stop leak, soak up material, keep material out of sewers and waterways*

Waste Disposal Method *Reclaim if possible, dispose of in a hazardous waste landfill*

Precautions to Be Taken in Handling and Storage *Avoid high temperatures*

Other Precautions

Section VIII - Control Measures

Respiratory Protection (Minimum 1/2 face respirator with organic vapor cartridges)	Local Exhaust	Best
	Mechanical (General)	Other
Protective Clothing	<i>Silver shield</i>	
Eye Protection	<i>Safety glasses or goggles</i>	

Other Protective Clothing or Equipment *Tyvek coveralls*

Hygiene Practices *Wash hands before eating, drinking or smoking*

records required to be maintained by paragraph (n) of this section to affected employees, former employees, and their designated representatives, and to the Assistant Secretary and the Director for examination and copying.

(6) *Transfer of records.* (1) Whenever the employer ceases to do business, the successor employer shall receive and retain all records required to be maintained by paragraph (n) of this section.

(ii) Whenever the employer ceases to do business and there is no successor employer to receive and retain the records required to be maintained by this section for the prescribed period, these records shall be transmitted to the Director.

(iii) At the expiration of the retention period for the records required to be maintained by this section, the employer shall notify the Director at least 3 months prior to the disposal of such records and shall transmit those records to the Director if requested within the period.

(iv) The employer shall also comply with any additional requirements involving transfer of records set forth in 29 CFR 1910.20(h).

(o) *Observation of monitoring.* (1) Employee observation. The employer shall provide affected employees or their designated representatives an opportunity to observe any monitoring of employee exposure to lead conducted pursuant to paragraph (d) of this section.

(2) *Observation procedures.* (i) Whenever observation of the monitoring of employee exposure to lead requires entry into an area where the use of respirators, protective clothing or equipment is required, the employer shall provide the observer with and assure the use of such respirators, clothing and equipment, and shall require the observer to comply with all other applicable safety and health procedures.

(ii) Without interfering with the monitoring, observers shall be entitled to:

(A) Receive an explanation of the measurement procedures;

(B) Observe all steps related to the monitoring of lead performed at the place of exposure; and

(C) Record the results obtained or receive copies of the results when returned by the laboratory.

(p) *Effective date.* This standard (§ 1926.62) shall become effective June 3, 1993.

(q) *Appendices.* The information contained in the appendices to this section is not intended by itself, to create any additional obligations not otherwise imposed by this standard nor detract from any existing obligation.

(r) *Startup dates.* (1) The requirements of paragraphs (c) through (o) of this section, including administrative controls and feasible work practice controls, but not including engineering controls specified in paragraph (e)(1) of this section, shall be complied with as soon as possible, but no later than 60 days from the effective date of this section.

(2) Feasible engineering controls specified by paragraph (e)(1) of this section shall be implemented as soon as possible, but no later than 120 days from the effective date of this section.

APPENDIX A TO § 1926.62—SUBSTANCE DATA SHEET FOR OCCUPATIONAL EXPOSURE TO LEAD

I. Substance Identification

A. *Substance:* Pure lead (Pb) is a heavy metal at room temperature and pressure and is a basic chemical element. It can combine with various other substances to form numerous lead compounds.

B. *Compounds covered by the standard:* The word "lead" when used in this interim final standard means elemental lead, all inorganic lead compounds and a class of organic lead compounds called lead soaps. This standard does not apply to other organic lead compounds.

C. *Uses:* Exposure to lead occurs in several different occupations in the construction industry, including demolition or salvage of structures where lead or lead-containing materials are present; removal or encapsulation of lead-containing materials, new construction, alteration, repair, or renovation of structures that contain lead or materials containing lead; installation of products containing lead. In addition, there are construction related activities where exposure to lead may occur, including transportation, disposal, storage, or containment of lead or materials containing lead on construction sites, and maintenance operations associated with construction activities.

D. *Permissible exposure:* The permissible exposure limit (PEL) set by the standard is 50

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micrograms of lead per cubic meter of air (50 µg/m³), averaged over an 8-hour workday.

E. *Action level:* The interim final standard establishes an action level of 30 micrograms of lead per cubic meter of air (30 µg/m³), averaged over an 8-hour workday. The action level triggers several ancillary provisions of the standard such as exposure monitoring, medical surveillance, and training.

II. Health Hazard Data

A. *Ways in which lead enters your body.* When absorbed into your body in certain doses, lead is a toxic substance. The object of the lead standard is to prevent absorption of harmful quantities of lead. The standard is intended to protect you not only from the immediate toxic effects of lead, but also from the serious toxic effects that may not become apparent until years of exposure have passed. Lead can be absorbed into your body by inhalation (breathing) and ingestion (eating). Lead (except for certain organic lead compounds not covered by the standard, such as tetraethyl lead) is not absorbed through your skin. When lead is scattered in the air as a dust, fume respiratory tract. Inhalation of airborne lead is generally the most important source of occupational lead absorption. You can also absorb lead through your digestive system if lead gets into your mouth and is swallowed. If you handle food, cigarettes, chewing tobacco, or make-up which have lead on them or handle them with hands contaminated with lead, this will contribute to ingestion. A significant portion of the lead that you inhale or ingest gets into your blood stream. Once in your blood stream, lead is circulated throughout your body and stored in various organs and body tissues. Some of this lead is quickly filtered out of your body and excreted, but some remains in the blood and other tissues. As exposure to lead continues, the amount stored in your body will increase if you are absorbing more lead than your body is excreting. Even though you may not be aware of any immediate symptoms of disease, this lead stored in your tissues can be slowly causing irreversible damage, first to individual cells, then to your organs and whole body systems.

B. *Effects of overexposure to lead—(1) Short term (acute) overexposure.* Lead is a potent, systemic poison that serves no known useful function once absorbed by your body. Taken in large enough doses, lead can kill you in a matter of days. A condition affecting the brain called acute encephalopathy may arise which develops quickly to seizures, coma, and death from cardiorespiratory arrest. A short term dose of lead can lead to acute encephalopathy. Short term occupational exposures of this magnitude are highly unusual, but not impossible. Similar forms of encephalopathy may, however, arise from ex-

tended, chronic exposure to lower doses of lead. There is no sharp dividing line between rapidly developing acute effects of lead, and chronic effects which take longer to acquire. Lead adversely affects numerous body systems, and causes forms of health impairment and disease which arise after periods of exposure as short as days or as long as several years.

(2) *Long-term (chronic) overexposure.* Chronic overexposure to lead may result in severe damage to your blood-forming, nervous, urinary and reproductive systems. Some common symptoms of chronic overexposure include loss of appetite, metallic taste in the mouth, anxiety, constipation, nausea, pallor, excessive tiredness, weakness, insomnia, headache, nervous irritability, muscle and joint pain or soreness, fine tremors, numbness, dizziness, hyperactivity and colic. In lead colic there may be severe abdominal pain. Damage to the central nervous system in general and the brain (encephalopathy) in particular is one of the most severe forms of lead poisoning. The most severe, often fatal, form of encephalopathy may be preceded by vomiting, a feeling of dullness progressing to drowsiness and stupor, poor memory, restlessness, irritability, tremor, and convulsions. It may arise suddenly with the onset of seizures, followed by coma, and death. There is a tendency for muscular weakness to develop at the same time. This weakness may progress to paralysis often observed as a characteristic "wrist drop" or "foot drop" and is a manifestation of a disease to the nervous system called peripheral neuropathy. Chronic overexposure to lead also results in kidney disease with few, if any, symptoms appearing until extensive and most likely permanent kidney damage has occurred. Routine laboratory tests reveal the presence of this kidney disease only after about two-thirds of kidney function is lost. When overt symptoms of urinary dysfunction arise, it is often too late to correct or prevent worsening conditions, and progression to kidney dialysis or death is possible. Chronic overexposure to lead impairs the reproductive systems of both men and women. Overexposure to lead may result in decreased sex drive, impotence and sterility in men. Lead can alter the structure of sperm cells raising the risk of birth defects. There is evidence of miscarriage and stillbirth in women whose husbands were exposed to lead or who were exposed to lead themselves. Lead exposure also may result in decreased fertility, and abnormal menstrual cycles in women. The course of pregnancy may be adversely affected by exposure to lead since lead crosses the placental barrier and poses risks to developing fetuses. Children born of parents either one of whom were exposed to excess lead levels are more likely to have birth defects, mental retardation, behavioral disorders or die during the first year of child-

food. Overexposure to lead also disrupts the blood-forming system resulting in decreased hemoglobin (the substance in the blood that carries oxygen to the cells) and ultimately anemia. Anemia is characterized by weakness, pallor and fatigability as a result of decreased oxygen carrying capacity in the blood.

(3) *Health protection goals of the standard.* Prevention of adverse health effects for most workers from exposure to lead throughout a working lifetime requires that a worker's blood lead level (BLL, also expressed as PbB) be maintained at or below forty micrograms per deciliter of whole blood (40 µg/dl). The blood lead levels of workers (both male and female workers) who intend to have children should be maintained below 30 µg/dl to minimize adverse reproductive health effects to the parents and to the developing fetus. The measurement of your blood lead level (BLL) is the most useful indicator of the amount of lead being absorbed by your body. Blood lead levels are most often reported in units of milligrams (mg) or micrograms (µg) of lead (1 mg=1000 µg) per 100 grams (100g), 100 milliliters (100 ml) or deciliter (dl) of blood. These three units are essentially the same. Some-time BLLs are expressed in the form of mg% or µg%. This is a shorthand notation for 100g, 100 ml, or dl. (References to BLL measurements in this standard are expressed in the form of µg/dl.)

BLL measurements show the amount of lead circulating in your blood stream, but do not give any information about the amount of lead stored in your various tissues. BLL measurements merely show current absorption of lead, not the effect that lead is having on your body or the effects that past lead exposure may have already caused. Past research into lead-related diseases, however, has focused heavily on associations between BLLs and various diseases. As a result, your BLL is an important indicator of the likelihood that you will gradually acquire a lead-related health impairment or disease.

Once your blood lead level climbs above 40 µg/dl, your risk of disease increases. There is a wide variability of individual response to lead, thus it is difficult to say that a particular BLL in a given person will cause a particular effect. Studies have associated fatal encephalopathy with BLLs as low as 150 µg/dl. Other studies have shown other forms of diseases in some workers with BLLs well below 80 µg/dl. Your BLL is a crucial indicator of the risks to your health, but one other factor is also extremely important. This factor is the length of time you have had elevated BLLs. The longer you have an elevated BLL, the greater the risk that large quantities of lead are being gradually stored in your organs and tissues (body burden). The greater your overall body burden, the greater the chances of substantial permanent damage. The best way to prevent all forms of

lead-related impairments and diseases—both short term and long term—is to maintain your BLL below 40 µg/dl. The provisions of the standard are designed with this end in mind.

Your employer has prime responsibility to assure that the provisions of the standard are complied with both by the company and by individual workers. You, as a worker, however, also have a responsibility to assist your employer in complying with the standard. You can play a key role in protecting your own health by learning about the lead hazards and their control, learning what the standard requires, following the standard where it governs your own actions, and seeing that your employer complies with provisions governing his or her actions.

(4) *Reporting signs and symptoms of health problems.* You should immediately notify your employer if you develop signs or symptoms associated with lead poisoning or if you desire medical advice concerning the effects of current or past exposure to lead or your ability to have a healthy child. You should also notify your employer if you have difficulty breathing during a respirator fit test or while wearing a respirator. In each of these cases, your employer must make available to you appropriate medical examinations or consultations. These must be provided at no cost to you and at a reasonable time and place. The standard contains a procedure whereby you can obtain a second opinion by a physician of your choice if your employer selected the initial physician.

APPENDIX B TO § 1926.62—EMPLOYEE STANDARD SUMMARY

This appendix summarizes key provisions of the Interim final standard for lead in construction that you as a worker should become familiar with.

I. Permissible Exposure Limit (PEL)—Paragraph (C)

The standard sets a permissible exposure limit (PEL) of 50 micrograms of lead per cubic meter of air (50 µg/m³), averaged over an 8-hour workday which is referred to as a time-weighted average (TWA). This is the highest level of lead in air to which you may be permissibly exposed over an 8-hour workday. However, since this is an 8-hour average, short exposures above the PEL are permitted so long as for each 8-hour work day your average exposure does not exceed this level. This interim final standard, however, takes into account the fact that your daily exposure to lead can extend beyond a typical 8-hour workday as the result of overtime or other alterations in your work schedule. To deal with this situation, the standard contains a formula which reduces your permissible exposure when you are exposed more than 8 hours. For example, if you are exposed

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to lead for 10 hours a day, the maximum permitted average exposure would be 40 µg/m³.

II. Exposure Assessment—Paragraph (D)

If lead is present in your workplace in any quantity, your employer is required to make an initial determination of whether any employee's exposure to lead exceeds the action level (30 µg/m³ averaged over an 8-hour day). Employee exposure is that exposure which would occur if the employee were not using a respirator. This initial determination requires your employer to monitor workers' exposures unless he or she has objective data which can demonstrate conclusively that no employee will be exposed to lead in excess of the action level. Where objective data is used in lieu of actual monitoring the employer must establish and maintain an accurate record, documenting its relevancy in assessing exposure levels for current job conditions. If such objective data is available, the employer need proceed no further on employee exposure assessment until such time that conditions have changed and the determination is no longer valid.

Objective data may be compiled from various sources, e.g., insurance companies and trade associations and information from suppliers or exposure data collected from similar operations. Objective data may also comprise previously-collected sampling data including area monitoring. If it cannot be determined through using objective data that worker exposure is less than the action level, your employer must conduct monitoring or must rely on relevant previous personal sampling, if available. Where monitoring is required for the initial determination, it may be limited to a representative number of employees who are reasonably expected to have the highest exposure levels. If your employer has conducted appropriate air sampling for lead in the past 12 months, he or she may use these results, provided they are applicable to the same employee tasks and exposure conditions and meet the requirements for accuracy as specified in the standard. As with objective data, if such results are relied upon for the initial determination, your employer must establish and maintain a record as to the relevancy of such data to current job conditions.

If there have been any employee complaints of symptoms which may be attributable to exposure to lead or if there is any other information or observations which would indicate employee exposure to lead, this must also be considered as part of the initial determination.

If this initial determination shows that a reasonable possibility exists that any employee may be exposed, without regard to respirators, over the action level, your employer must set up an air monitoring program to determine the exposure level representative of each employee exposed to lead

at your workplace. In carrying out this air monitoring program, your employer is not required to monitor the exposure of every employee, but he or she must monitor a representative number of employees and job types. Enough sampling must be done to enable each employee's exposure level to be reasonably represent full shift exposure. In addition, these air samples must be taken under conditions which represent each employee's regular, daily exposure to lead. Sampling performed in the past 12 months may be used to determine exposures above the action level if such sampling was conducted during work activities essentially similar to present work conditions.

The standard lists certain tasks which may likely result in exposures to lead in excess of the PEL and, in some cases, exposures in excess of 50 times the PEL. If you are performing any of these tasks, your employer must provide you with appropriate respiratory protection, protective clothing and equipment, change areas, hand washing facilities, biological monitoring, and training until such time that an exposure assessment is conducted which demonstrates that your exposure level is below the PEL.

If you are exposed to lead and air sampling is performed, your employer is required to notify you in writing within 5 working days of the air monitoring results which represent your exposure. If the results indicate that your exposure exceeds the PEL (without regard to your use of a respirator), then your employer must also notify you of this in writing, and provide you with a description of the corrective action that has been taken or will be taken to reduce your exposure.

Your exposure must be rechecked by monitoring, at least every six months if your exposure is at or over the action level but below the PEL. Your employer may discontinue monitoring for you if 2 consecutive measurements, taken at least 7 days apart, are at or below the action level. Air monitoring must be repeated every 3 months if you are exposed over the PEL. Your employer must continue monitoring for you at this frequency until 2 consecutive measurements, taken at least 7 days apart, are below the PEL but above the action level, at which time your employer must repeat monitoring of your exposure every six months and may discontinue monitoring only after your exposure drops to or below the action level. However, whenever there is a change of equipment, process, control, or personnel or a new type of job is added at your workplace which may result in new or additional exposure to lead, your employer must perform additional monitoring.

III. Methods of Compliance—Paragraph (E)

Your employer is required to assure that no employee is exposed to lead in excess of the PEL as an 8-hour TWA. The Interim final

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Appendix C. SUMMARY OF THE STANDARD

100d. Overexposure to lead also disrupts the blood-forming system resulting in decreased hemoglobin (the substance in the blood that carries oxygen to the cells) and ultimately anemia. Anemia is characterized by weakness, pallor and fatigability as a result of decreased oxygen carrying capacity in the blood.

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lead-related impairments and diseases—both short term and long term—is to maintain your BLL below 40 µg/dl. The provisions of the standard are designed with this end in mind.

Your employer has prime responsibility to assure that the provisions of the standard are complied with both by the company and by individual workers. You, as a worker, however, also have a responsibility to assist your employer in complying with the standard. You can play a key role in protecting your own health by learning about the lead, hazards and their control, learning what the standard requires, following the standard where it governs your own actions, and seeing that your employer complies with provisions governing his or her actions.

(4) *Reporting signs and symptoms of health problems.* You should immediately notify your employer if you develop signs or symptoms associated with lead poisoning or if you desire medical advice concerning the effects of current or past exposure to lead or your ability to have a healthy child. You should also notify your employer if you have difficulty breathing during a respirator fit test or while wearing a respirator. In each of these cases, your employer must make available to you appropriate medical examinations or consultations. These must be provided at no cost to you and at a reasonable time and place. The standard contains a procedure whereby you can obtain a second opinion by a physician of your choice if your employer selected the initial physician.

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to lead for 10 hours a day, the maximum permitted average exposure would be 40 µg/m³.

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Objective data may be compiled from various sources, e.g., insurance companies and trade associations and information from suppliers or exposure data collected from similar operations. Objective data may also comprise previously-collected sampling data including area monitoring. If it cannot be determined through using objective data that worker exposure is less than the action level, your employer must conduct monitoring or must rely on relevant previous personal sampling, if available. Where monitoring is required for the initial determination, it may be limited to a representative number of employees who are reasonably expected to have the highest exposure levels. If your employer has conducted appropriate air sampling for lead in the past 12 months, he or she may use these results, provided they are applicable to the same employee tasks and exposure conditions and meet the requirements for accuracy as specified in the standard. As with objective data, if such results are relied upon for the initial determination, your employer must establish and maintain a record as to the relevancy of such data to current job conditions.

If there have been any employee complaints of symptoms which may be attributable to exposure to lead or if there is any other information or observations which would indicate employee exposure to lead, this must also be considered as part of the initial determination.

If this initial determination shows that a reasonable possibility exists that any employee may be exposed, without regard to respirators, over the action level, your employer must set up an air monitoring program to determine the exposure level representative of each employee exposed to lead

at your workplace. In carrying out this air monitoring program, your employer is not required to monitor the exposure of every employee, but he or she must monitor a representative number of employees and job types. Enough sampling must be done to enable each employee's exposure level to be reasonably represent full shift exposure. In addition, these air samples must be taken under conditions which represent each employee's regular, daily exposure to lead. Sampling performed in the past 12 months may be used to determine exposures above the action level if such sampling was conducted during work activities essentially similar to present work conditions.

The standard lists certain tasks which may likely result in exposures to lead in excess of the PEL and, in some cases, exposures in excess of 50 times the PEL. If you are performing any of these tasks, your employer must provide you with appropriate respiratory protection, protective clothing and equipment, change areas, hand washing facilities, biological monitoring, and training until such time that an exposure assessment is conducted which demonstrates that your exposure level is below the PEL.

If you are exposed to lead and air sampling is performed, your employer is required to notify you in writing within 5 working days of the air monitoring results which represent your exposure. If the results indicate that your exposure exceeds the PEL (without regard to your use of a respirator), then your employer must also notify you of this in writing, and provide you with a description of the corrective action that has been taken or will be taken to reduce your exposure.

Your exposure must be rechecked by monitoring, at least every six months if your exposure is at or over the action level but below the PEL. Your employer may discontinue monitoring for you if 2 consecutive measurements, taken at least 7 days apart, are at or below the action level. Air monitoring must be repeated every 3 months if you are exposed over the PEL. Your employer must continue monitoring for you at this frequency until 2 consecutive measurements, taken at least 7 days apart, are below the PEL but above the action level, at which time your employer must repeat monitoring of your exposure every six months and may discontinue monitoring only after your exposure drops to or below the action level. However, whenever there is a change of equipment, process, control, or personnel or a new type of job is added at your workplace which may result in new or additional exposure to lead, your employer must perform additional monitoring.

III. Methods of Compliance—Paragraph (E)

Your employer is required to assure that no employee is exposed to lead in excess of the PEL as an 8-hour TWA. The interim final

standard for lead in construction requires employers to institute engineering and work practice controls including administrative controls to the extent feasible to reduce employee exposure to lead. Where such controls are feasible but not adequate to reduce exposures below the PEL they must be used nonetheless to reduce exposures to the lowest level that can be accomplished by these means and then supplemented with appropriate respiratory protection.

Your employer is required to develop and implement a written compliance program prior to the commencement of any job where employee exposures may reach the PEL as an 8-hour TWA. The interim final standard identifies the various elements that must be included in the plan. For example, employers are required to include a description of operations in which lead is emitted, detailing other relevant information about the operation such as the type of equipment used, the type of material involved, employee job responsibilities, operating procedures and maintenance practices. In addition, your employer's compliance plan must specify the means that will be used to achieve compliance and, where engineering controls are required, include any engineering plans or studies that have been used to select the control methods. If administrative controls involving job rotation are used to reduce employee exposure to lead, the job rotation schedule must be included in the compliance plan. The plan must also detail the type of protective clothing and equipment, including respirators, housekeeping and hygiene practices that will be used to protect you from the adverse effects of exposure to lead.

The written compliance program must be made available, upon request, to affected employees and their designated representatives, the Assistant Secretary and the Director.

Finally, the plan must be reviewed and updated at least every 6 months to assure it reflects the current status in exposure control.

IV. Respiratory Protection—Paragraph (F)

Your employer is required to provide and assure your use of respirators when your exposure to lead is not controlled below the PEL by other means. The employer must pay the cost of the respirator. Whenever you request one, your employer is also required to provide you a respirator even if your air exposure level is not above the PEL. You might desire a respirator when, for example, you have received medical advice that your lead absorption should be decreased. Or, you may intend to have children in the near future, and want to reduce the level of lead in your body to minimize adverse reproductive effects. While respirators are the least satisfactory means of controlling your exposure, they are capable of providing significant protection if properly chosen, fitted, worn,

cleaned, maintained, and replaced when they stop providing adequate protection.

Your employer is required to select respirators from the types listed in Table I of the Respiratory Protection section of the standard. Any respirator chosen must be approved by the Mine Safety and Health Administration (MSHA) or the National Institute for Occupational Safety and Health (NIOSH). This respirator selection table will enable your employer to choose a type of respirator which will give you a proper amount of protection based on your airborne lead exposure. Your employer may select a type of respirator that provides greater protection than that required by the standard; that is, one recommended for a higher concentration of lead than is present in your workplace. For example, a powered air purifying respirator (PAPR) is much more protective than a typical negative pressure respirator, and may also be more comfortable to wear. A PAPR has a filter, cartridge or canister to clean the air, and a power source which continuously blows filtered air into your breathing zone. Your employer might make a PAPR available to you to ease the burden of having to wear a respirator for long periods of time. The standard provides that you can obtain a PAPR upon request.

Your employer must also start a Respiratory Protection Program. This program must include written procedures for the proper selection, use, cleaning, storage, and maintenance of respirators.

Your employer must assure that your respirator facepiece fits properly. Proper fit of a respirator facepiece is critical. Obtaining a proper fit on each employee may require your employer to make available two or three different mask types. In order to assure that your respirator fits properly and that facepiece leakage is minimized, your employer must give you either a qualitative fit test or a quantitative fit test (if you use a negative pressure respirator) in accordance with appendix D. Any respirator which has a filter, cartridge or canister which cleans the work room air before you breathe it and which requires the force of your inhalation to draw air through the filtering element is a negative pressure respirator. A positive pressure respirator supplies air to you directly. A quantitative fit test uses a sophisticated machine to measure the amount, if any, of test material that leaks into the facepiece of your respirator.

You must also receive from your employer proper training in the use of respirators. Your employer is required to teach you how to wear a respirator, to know why it is needed, and to understand its limitations.

Your employer must test the effectiveness of your negative pressure respirator initially and at least every six months thereafter with a "qualitative fit test." In this test, the fit of the facepiece is checked by seeing if

you can smell a substance placed outside the respirator. If you can, there is appreciable leakage where the facepiece meets your face.

The standard provides that if your respirator uses filter elements, you must be given an opportunity to change the filter elements whenever an increase in breathing resistance is detected. You also must be permitted to periodically leave your work area to wash your face and respirator facepiece whenever necessary to prevent skin irritation. If you ever have difficulty in breathing during a fit test or while using a respirator, your employer must make a medical examination available to you to determine whether you can safely wear a respirator. The result of this examination may be to give you a positive pressure respirator (which reduces breathing resistance) or to provide alternative means of protection.

V. Protective Work Clothing and Equipment—Paragraph (G)

If you are exposed to lead above the PEL as an 8-hour TWA, without regard to your use of a respirator, or if you are exposed to lead compounds such as lead arsenate or lead azide which can cause skin and eye irritation, your employer must provide you with protective work clothing and equipment appropriate for the hazard. If work clothing is provided, it must be provided in a clean and dry condition at least weekly, and daily if your airborne exposure to lead is greater than 200 µg/m³. Appropriate protective work clothing and equipment can include coveralls or similar full-body work clothing, gloves, hats, shoes or disposable shoe covers, and face shields or vented goggles. Your employer is required to provide all such equipment at no cost to you. In addition, your employer is responsible for providing repairs and replacement as necessary, and also is responsible for the cleaning, laundering or disposal of protective clothing and equipment.

The interim final standard requires that your employer assure that you follow good work practices when you are working in areas where your exposure to lead may exceed the PEL. With respect to protective clothing and equipment, where appropriate, the following procedures should be observed prior to beginning work:

1. Change into work clothing and shoe covers in the clean section of the designated changing areas;

2. Use work garments of appropriate protective gear, including respirators before entering the work area; and

3. Store any clothing not worn under protective clothing in the designated changing area.

Workers should follow these procedures upon leaving the work area:

1. HEPA vacuum heavily contaminated protective work clothing while it is still being worn. At no time may lead be removed from protective clothing by any means which result in uncontrolled dispersal of lead into the air;

2. Remove shoe covers and leave them in the work area;

3. Remove protective clothing and gear in the dirty area of the designated changing area. Remove protective coveralls by carefully rolling down the garment to reduce exposure to dust.

4. Remove respirators last; and
5. Wash hands and face.

Workers should follow these procedures upon finishing work for the day (in addition to procedures described above):

1. Where applicable, place disposal coveralls and shoe covers with the abatement waste;

2. Contaminated clothing which is to be cleaned, laundered or disposed of must be placed in closed containers in the change room.

3. Clean protective gear, including respirators, according to standard procedures;

4. Wash hands and face again. If showers are available, take a shower and wash hair. If shower facilities are not available at the work site, shower immediately at home and wash hair.

VI. Housekeeping—Paragraph (H)

Your employer must establish a housekeeping program sufficient to maintain all surfaces as free as practicable of accumulations of lead dust. Vacuuming is the preferred method of meeting this requirement, and the use of compressed air to clean floors and other surfaces is generally prohibited unless removal with compressed air is done in conjunction with ventilation systems designed to contain dispersal of the lead dust. Dry or wet sweeping, shoveling, or brushing may not be used except where vacuuming or other equally effective methods have been tried and do not work. Vacuums must be used equipped with a special filter called a high-efficiency particulate air (HEPA) filter and emptied in a manner which minimizes the reentry of lead into the workplace.

VII. Hygiene Facilities and Practices—Paragraph (I)

The standard requires that hand washing facilities be provided where occupational exposure to lead occurs. In addition, change areas, showers (where feasible), and lunchrooms or eating areas are to be made available to workers exposed to lead above the PEL. Your employer must assure that except in these facilities, food and beverage is not present or consumed, tobacco products are not present or used, and cosmetics are

not applied, where airborne exposures are above the PEL. Change rooms provided by your employer must be equipped with separate storage facilities for your protective clothing and equipment and street clothes to avoid cross-contamination. After showering, no required protective clothing or equipment worn during the shift may be worn home. It is important that contaminated clothing or equipment be removed in change areas and not be worn home or you will extend your exposure and expose your family since lead from your clothing can accumulate in your house, car, etc.

Lunchrooms or eating areas may not be entered with protective clothing or equipment unless surface dust has been removed by vacuuming, downdraft booth, or other cleaning method. Finally, workers exposed above the PEL must wash both their hands and faces prior to eating, drinking, smoking or applying cosmetics.

All of the facilities and hygiene practices just discussed are essential to minimize additional sources of lead absorption from inhalation or ingestion of lead that may accumulate on you, your clothes, or your possessions. Strict compliance with these provisions can virtually eliminate several sources of lead exposure which significantly contribute to excessive lead absorption.

VIII. Medical Surveillance--Paragraph (J)

The medical surveillance program is part of the standard's comprehensive approach to the prevention of lead-related disease. Its purpose is to supplement the main thrust of the standard which is aimed at minimizing airborne concentrations of lead and sources of ingestion. Only medical surveillance can determine if the other provisions of the standard have effectively protected you as an individual. Compliance with the standard's provision will protect most workers from the adverse effects of lead exposure, but may not be satisfactory to protect individual workers (1) who have high body burdens of lead acquired over past years, (2) who have additional uncontrolled sources of non-occupational lead exposure, (3) who exhibit unusual variations in lead absorption rates, or (4) who have specific non-work related medical conditions which could be aggravated by lead exposure (e.g., renal disease, anemia). In addition, control systems may fail, or hygiene and respirator programs may be inadequate. Periodic medical surveillance of individual workers will help detect those failures. Medical surveillance will also be important to protect your reproductive ability regardless of whether you are a man or woman.

All medical surveillance required by the Interim final standard must be performed by or under the supervision of a licensed physician. The employer must provide required medical surveillance without cost to employees and at a reasonable time and place. The

standard's medical surveillance program has two parts—periodic biological monitoring and medical examinations. Your employer's obligation to offer you medical surveillance is triggered by the results of the air monitoring program. Full medical surveillance must be made available to all employees who are or may be exposed to lead in excess of the action level for more than 30 days a year and whose blood lead level exceeds 40 µg/dl. Initial medical surveillance consisting of blood sampling and analysis for lead and zinc protoporphyrin must be provided to all employees exposed at any time (1 day) above the action level.

Biological monitoring under the standard must be provided at least every 2 months for the first 6 months and every 6 months thereafter until your blood lead level is below 40 µg/dl. A zinc protoporphyrin (ZPP) test is a very useful blood test which measures an adverse metabolic effect of lead on your body and is therefore an indicator of lead toxicity.

If your BLL exceeds 40 µg/dl the monitoring frequency must be increased from every 6 months to at least every 2 months and not reduced until two consecutive BLLs indicate a blood lead level below 40 µg/dl. Each time your BLL is determined to be over 40 µg/dl, your employer must notify you of this in writing within five working days of his or her receipt of the test results. The employer must also inform you that the standard requires temporary medical removal with economic protection when your BLL exceeds 50 µg/dl. (See Discussion of Medical Removal Protection-Paragraph (k).) Anytime your BLL exceeds 50 µg/dl your employer must make available to you within two weeks of receipt of these test results a second follow-up BLL test to confirm your BLL. If the two tests both exceed 50 µg/dl, and you are temporarily removed, then your employer must make successive BLL tests available to you on a monthly basis during the period of your removal.

Medical examinations beyond the initial one must be made available on an annual basis if your blood lead level exceeds 40 µg/dl at any time during the preceding year and you are being exposed above the airborne action level of 30 µg/m³ for 30 or more days per year. The initial examination will provide information to establish a baseline to which subsequent data can be compared.

An initial medical examination to consist of blood sampling and analysis for lead and zinc protoporphyrin must also be made available (prior to assignment) for each employee being assigned for the first time to an area where the airborne concentration of lead equals or exceeds the action level at any time. In addition, a medical examination or consultation must be made available as soon as possible if you notify your employer that you are experiencing signs or symptoms commonly associated with lead poisoning or

that you have difficulty breathing while wearing a respirator or during a respirator fit test. You must also be provided a medical examination or consultation if you notify your employer that you desire medical advice concerning the effects of current or past exposure to lead on your ability to procreate a healthy child.

Finally, appropriate follow-up medical examinations or consultations may also be provided for employees who have been temporarily removed from exposure under the medical removal protection provisions of the standard. (See Part IX, below.)

The standard specifies the minimum content of pre-assignment and annual medical examinations. The content of other types of medical examinations and consultations is left up to the sound discretion of the examining physician. Pre-assignment and annual medical examinations must include (1) a detailed work history and medical history; (2) a thorough physical examination, including an evaluation of your pulmonary status if you will be required to use a respirator; (3) a blood pressure measurement; and (4) a series of laboratory tests designed to check your blood chemistry and your kidney function. In addition, at any time upon your request, a laboratory evaluation of male fertility will be made (microscopic examination of a sperm sample), or a pregnancy test will be given.

The standard does not require that you participate in any of the medical procedures, tests, etc. which your employer is required to make available to you. Medical surveillance can, however, play a very important role in protecting your health. You are strongly encouraged, therefore, to participate in a meaningful fashion. The standard contains a multiple physician review mechanism which will give you a chance to have a physician of your choice directly participate in the medical surveillance program. If you are dissatisfied with an examination by a physician chosen by your employer, you can select a second physician to conduct an independent analysis. The two doctors would attempt to resolve any differences of opinion, and select a third physician to resolve any firm dispute. Generally your employer will choose the physician who conducts medical surveillance under the lead standard—unless you and your employer can agree on the choice of a physician or physicians. Some companies and unions have agreed in advance, for example, to use certain independent medical laboratories or panels of physicians. Any of these arrangements are acceptable so long as required medical surveillance is made available to workers.

The standard requires your employer to provide certain information to a physician to aid in his or her examination of you. This information includes (1) the standard and its appendices, (2) a description of your duties as

they relate to occupational lead exposure, (3) your exposure level or anticipated exposure level, (4) a description of any personal protective equipment you wear, (5) prior blood lead level results, and (6) prior written medical opinions concerning you that the employer has. After a medical examination or consultation the physician must prepare a written report which must contain (1) the physician's opinion as to whether you have any medical condition which places you at increased risk of material impairment to health from exposure to lead, (2) any recommended special protective measures to be provided to you, (3) any blood lead level determinations, and (4) any recommended limitation on your use of respirators. This last element must include a determination of whether you can wear a powered air purifying respirator (PAPR) if you are found unable to wear a negative pressure respirator.

The medical surveillance program of the Interim lead standard may at some point in time serve to notify certain workers that they have acquired a disease or other adverse medical condition as a result of occupational lead exposure. If this is true, these workers might have legal rights to compensation from public agencies, their employers, firms that supply hazardous products to their employers, or other persons. Some states have laws, including worker compensation laws, that disallow a worker who learns of a job-related health impairment to sue, unless the worker sues within a short period of time after learning of the impairment. (This period of time may be a matter of months or years.) An attorney can be consulted about these possibilities. It should be stressed that OSHA is in no way trying to either encourage or discourage claims or lawsuits. However, since results of the standard's medical surveillance program can significantly affect the legal remedies of a worker who has acquired a job-related disease or impairment, it is proper for OSHA to make you aware of this.

The medical surveillance section of the standard also contains provisions dealing with chelation. Chelation is the use of certain drugs (administered in pill form or injected into the body) to reduce the amount of lead absorbed in body tissues. Experience accumulated by the medical and scientific communities has largely confirmed the effectiveness of this type of therapy for the treatment of very severe lead poisoning. On the other hand, it has also been established that there can be a long list of extremely harmful side effects associated with the use of chelating agents. The medical community has balanced the advantages and disadvantages resulting from the use of chelating agents in various circumstances and has established when the use of these agents is acceptable. The standard includes these accepted limitations due to a history of abuse

of chelation therapy by some lead companies. The most widely used chelating agents are calcium disodium EDTA, (Ca Na₂ EDTA), Calcium Disodium Versenate (Versenate), and D-penicillamine (penicillamine or Cupramine)

The standard prohibits "prophylactic chelation" of any employee by any person the employer retains, supervises or controls. "Prophylactic chelation" is the routine use of chelating or similarly acting drugs to prevent elevated blood levels in workers who are occupationally exposed to lead, or the use of these drugs to routinely lower blood lead levels to predesignated concentrations believed to be "safe". It should be emphasized that where an employer takes a worker who has no symptoms of lead poisoning and has chelation carried out by a physician (either inside or outside of a hospital) solely to reduce the worker's blood lead level, that will generally be considered prophylactic chelation. The use of a hospital and a physician does not mean that prophylactic chelation is not being performed. Routine chelation to prevent increased or reduce current blood lead levels is unacceptable whatever the setting.

The standard allows the use of "therapeutic" or "diagnostic" chelation if administered under the supervision of a licensed physician in a clinical setting with thorough and appropriate medical monitoring. Therapeutic chelation responds to severe lead poisoning where there are marked symptoms. Diagnostic chelation involved giving a patient a dose of the drug then collecting all urine excreted for some period of time as an aid to the diagnosis of lead poisoning.

In cases where the examining physician determines that chelation is appropriate, you must be notified in writing of this fact before such treatment. This will inform you of a potentially harmful treatment, and allow you to obtain a second opinion.

IX. Medical Removal Protection—Paragraph (K)

Excessive lead absorption subjects you to increased risk of disease. Medical removal protection (MRP) is a means of protecting you when, for whatever reasons, other methods, such as engineering controls, work practices, and respirators, have failed to provide the protection you need. MRP involves the temporary removal of a worker from his or her regular job to a place of significantly lower exposure without any loss of earnings, seniority, or other employment rights or benefits. The purpose of this program is to cease further lead absorption and allow your body to naturally excrete lead which has previously been absorbed. Temporary medical removal can result from an elevated blood lead level, or a medical opinion. For up to 18 months, or for as long as the job the employee was removed from lasts, protection is

provided as a result of either form of removal. The vast majority of removed workers, however, will return to their former jobs long before this eighteen month period expires.

You may also be removed from exposure even if your blood lead level is below 50 µg/dl if a final medical determination indicates that you temporarily need reduced lead exposure for medical reasons. If the physician who is implementing your employers medical program makes a final written opinion recommending your removal or other special protective measures, your employer must implement the physician's recommendation. If you are removed in this manner, you may only be returned when the doctor indicates that it is safe for you to do so.

The standard does not give specific instructions dealing with what an employer must do with a removed worker. Your job assignment upon removal is a matter for you, your employer and your union (if any) to work out consistent with existing procedures for job assignments. Each removal must be accomplished in a manner consistent with existing collective bargaining relationships. Your employer is given broad discretion to implement temporary removals so long as no attempt is made to override existing agreements. Similarly, a removed worker is provided no right to veto an employer's choice which satisfies the standard.

In most cases, employers will likely transfer removed employees to other jobs with sufficiently low lead exposure. Alternatively, a worker's hours may be reduced so that the time weighted average exposure is reduced, or he or she may be temporarily laid off if no other alternative is feasible.

In all of these situations, MRP benefits must be provided during the period of removal—i.e., you continue to receive the same earnings, seniority, and other rights and benefits you would have had if you had not been removed. Earnings includes more than just your base wage; it includes overtime, shift differentials, incentives, and other compensation you would have earned if you had not been removed. During the period of removal you must also be provided with appropriate follow-up medical surveillance. If you were removed because your blood lead level was too high, you must be provided with a monthly blood test. If a medical opinion caused your removal, you must be provided medical tests or examinations that the doctor believes to be appropriate. If you do not participate in this follow up medical surveillance, you may lose your eligibility for MRP benefits.

When you are medically eligible to return to your former job, your employer must return you to your "former job status." This means that you are entitled to the position, wages, benefits, etc., you would have had if you had not been removed. If you would still

be in your old job if no removal had occurred that is where you go back. If not, you are returned consistent with whatever job assignment discretion your employer would have had if no removal had occurred. MRP only seeks to maintain your rights, not expand them or diminish them.

If you are removed under MRP and you are also eligible for worker compensation or other compensation for lost wages, your employer's MRP benefits obligation is reduced by the amount that you actually receive from these other sources. This is also true if you obtain other employment during the time you are laid off with MRP benefits.

The standard also covers situations where an employer voluntarily removes a worker from exposure to lead due to the effects of lead on the employee's medical condition, even though the standard does not require removal. In these situations MRP benefits must still be provided as though the standard required removal. Finally, it is important to note that in all cases where removal is required, respirators cannot be used as a substitute. Respirators may be used before removal becomes necessary; but not as an alternative to a transfer to a low exposure job, or to a lay-off with MRP benefits.

X. Employee Information and Training—Paragraph (L)

Your employer is required to provide an information and training program for all employees exposed to lead above the action level or who may suffer skin or eye irritation from lead compounds such as lead arsenate or lead azide. The program must train these employees regarding the specific hazards associated with their work environment, protective measures which can be taken, including the contents of any compliance plan in effect, the danger of lead to their bodies (including their reproductive systems), and their rights under the standard. All employees must be trained prior to initial assignment to areas where there is a possibility of exposure over the action level.

This training program must also be provided at least annually thereafter unless further exposure above the action level will not occur.

XI. Signs—Paragraph (M)

The standard requires that the following warning sign be posted in work areas where the exposure to lead exceeds the PEL:

WARNING
LEAD WORK AREA
POISON
NO SMOKING OR EATING

These signs are to be posted and maintained in a manner which assures that the legend is readily visible.

XII. Recordkeeping—Paragraph (N)

Your employer is required to keep all records of exposure monitoring for airborne lead. These records must include the name and job classification of employees measured, details of the sampling and analytical techniques, the results of this sampling, and the type of respiratory protection being worn by the person sampled. Such records are to be retained for at least 30 years. Your employer is also required to keep all records of biological monitoring and medical examination results. These records must include the names of the employees, the physician's written opinion, and a copy of the results of the examination. Medical records must be preserved and maintained for the duration of employment plus 30 years. However, if the employee's duration of employment is less than one year, the employer need not retain that employee's medical records beyond the period of employment if they are provided to the employee upon termination of employment.

Recordkeeping is also required if you are temporarily removed from your job under the medical removal protection program. This record must include your name and social security number, the date of your removal and return, how the removal was or is being accomplished, and whether or not the reason for the removal was an elevated blood lead level. Your employer is required to keep each medical removal record only for as long as the duration of an employee's employment.

The standard requires that if you request to see or copy environmental monitoring, blood lead level monitoring, or medical removal records, they must be made available to you or to a representative that you authorize. Your union also has access to these records. Medical records other than BLL's must also be provided upon request to you, to your physician or to any other person whom you may specifically designate. Your union does not have access to your personal medical records unless you authorize their access.

XIII. Observation of Monitoring—Paragraph (O)

When air monitoring for lead is performed at your workplace as required by this standard, your employer must allow you or someone you designate to act as an observer of the monitoring. Observers are entitled to an explanation of the measurement procedure, and to record the results obtained. Since results will not normally be available at the time of the monitoring, observers are entitled to record or receive the results of the monitoring when returned by the laboratory. Your employer is required to provide the observer with any personal protective devices required to be worn by employees working in

the area that is being monitored. The employer must require the observer to wear all such equipment and to comply with all other applicable safety and health procedures.

XIV. Effective Date—Paragraph (P)

The standard's effective date is June 3, 1993. Employer obligations under the standard begin as of that date with full implementation of engineering controls as soon as possible but no later than within 4 months, and all other provisions completed as soon as possible, but no later than within 2 months from the effective date.

XV. For Additional Information

A. A copy of the interim standard for lead in construction can be obtained free of charge by calling or writing the OSHA Office of Publications, room N-3101, United States Department of Labor, Washington, DC 20210; Telephone (202) 219-4667.

B. Additional information about the standard, its enforcement, and your employer's compliance can be obtained from the nearest OSHA Area Office listed in your telephone directory under United States Government/Department of Labor.

APPENDIX C TO § 1926.62—Medical Surveillance Guidelines

Introduction

The primary purpose of the Occupational Safety and Health Act of 1970 is to assure, so far as possible, safe and healthful working conditions for every working man and woman. The interim final occupational health standard for lead in construction is designed to protect workers exposed to inorganic lead including metallic lead, all inorganic lead compounds and organic lead soaps.

Under this interim final standard occupational exposure to inorganic lead is to be limited to 50 µg/m³ (micrograms per cubic meter) based on an 8 hour time-weighted average (TWA). This permissible exposure limit (PEL) must be achieved through a combination of engineering, work practice and administrative controls to the extent feasible. Where these controls are in place but are found not to reduce employee exposures to or below the PEL, they must be used nonetheless, and supplemented with respirators to meet the 50 µg/m³ exposure limit.

The standard also provides for a program of biological monitoring for employees exposed to lead above the action level at any time, and additional medical surveillance for all employees exposed to levels of inorganic lead above 30 µg/m³ (TWA) for more than 30 days per year and whose BLL exceeds 40 µg/dl.

The purpose of this document is to outline the medical surveillance provisions of the in-

terim standard for inorganic lead in construction, and to provide further information to the physician regarding the examination and evaluation of workers exposed to inorganic lead.

Section 1 provides a detailed description of the monitoring procedure including the required frequency of blood testing for exposed workers, provisions for medical removal protection (MRP), the recommended right of the employee to a second medical opinion, and notification and recordkeeping requirements of the employer. A discussion of the requirements for respirator use and respirator monitoring and OSHA's position on prophylactic chelation therapy are also included in this section.

Section 2 discusses the toxic effects and clinical manifestations of lead poisoning and effects of lead intoxication on enzymatic pathways in heme synthesis. The adverse effects on both male and female reproductive capacity and on the fetus are also discussed.

Section 3 outlines the recommended medical evaluation of the worker exposed to inorganic lead, including details of the medical history, physical examination, and recommended laboratory tests, which are based on the toxic effects of lead as discussed in Section 2.

Section 4 provides detailed information concerning the laboratory tests available for the monitoring of exposed workers. Included also is a discussion of the relative value of each test and the limitations and precautions which are necessary in the interpretation of the laboratory results.

I. Medical Surveillance and Monitoring Requirements for Workers Exposed to Inorganic Lead

Under the interim final standard for inorganic lead in the construction industry, initial medical surveillance consisting of biological monitoring to include blood lead and ZPP level determination shall be provided to employees exposed to lead at or above the action level on any one day. In addition, a program of biological monitoring is to be made available to all employees exposed above the action level at any time and additional medical surveillance is to be made available to all employees exposed to lead above 30 µg/m³ TWA for more than 30 days each year and whose BLL exceeds 40 µg/dl. This program consists of periodic blood sampling and medical evaluation to be performed on a schedule which is defined by previous laboratory results, worker complaints or concerns, and the clinical assessment of the examining physician.

Under this program, the blood lead level (BLL) of all employees who are exposed to lead above 30 µg/m³ for more than 30 days per year or whose blood lead is above 40 µg/dl but exposed for no more than 30 days per year is to be determined at least every two months

for the first six months of exposure and every six months thereafter. The frequency is increased to every two months for employees whose last blood lead level was 40 µg/dl or above. For employees who are removed from exposure to lead due to an elevated blood lead, a new blood lead level must be measured monthly. A zinc protoporphyrin (ZPP) measurement is strongly recommended on each occasion that a blood lead level measurement is made.

An annual medical examination and consultation performed under the guidelines discussed in Section 3 is to be made available to each employee exposed above 30 µg/m³ for more than 30 days per year for whom a blood test conducted at any time during the preceding 12 months indicated a blood lead level at or above 40 µg/dl. Also, an examination is to be given to all employees prior to their assignment to an area in which airborne lead concentrations reach or exceed the 30 µg/m³ for more than 30 days per year. In addition, a medical examination must be provided as soon as possible after notification by an employee that the employee has developed signs or symptoms commonly associated with lead intoxication, that the employee desires medical advice regarding lead exposure and the ability to procreate a healthy child, or that the employee has demonstrated difficulty in breathing during a respirator fitting test or during respirator use. An examination is also to be made available to each employee removed from exposure to lead due to a risk of sustaining material impairment to health, or otherwise limited or specially protected pursuant to medical recommendations.

Results of biological monitoring or the recommendations of an examining physician may necessitate removal of an employee from further lead exposure pursuant to the standard's medical removal protection (MRP) program. The object of the MRP program is to provide temporary medical removal to workers either with substantially elevated blood lead levels or otherwise at risk of sustaining material health impairment from continued substantial exposure to lead.

Under the standard's ultimate worker removal criteria, a worker is to be removed from any work having an eight hour TWA exposure to lead of 30 µg/m³ when his or her blood lead level reaches 50 µg/dl and is confirmed by a second follow-up blood lead level performed within two weeks after the employer receives the results of the first blood sampling test. Return of the employee to his or her job status depends on a worker's blood lead level declining to 40 µg/dl.

As part of the interim standard, the employer is required to notify in writing each employee whose blood lead level exceeds 40 µg/dl. In addition each such employee is to be informed that the standard requires medical

removal with MRP benefits, discussed below, when an employee's blood lead level exceeds the above defined limit.

In addition to the above blood lead level criterion, temporary worker removal may also take place as a result of medical determinations and recommendations. Written medical opinions must be prepared after each examination pursuant to the standard. If the examining physician includes a medical finding, determination or opinion that the employee has a medical condition which places the employee at increased risk of material health impairment from exposure to lead, then the employee must be removed from exposure to lead at or above 30 µg/m³. Alternatively, if the examining physician recommends special protective measures for an employee (e.g., use of a powered air purifying respirator) or recommends limitations on an employee's exposure to lead, then the employer must implement these recommendations.

Recommendations may be more stringent than the specific provisions of the standard. The examining physician, therefore, is given broad flexibility to tailor special protective procedures to the needs of individual employees. This flexibility extends to the evaluation and management of pregnant workers and male and female workers who are planning to raise children. Based on the history, physical examination, and laboratory studies, the physician might recommend special protective measures or medical removal for an employee who is pregnant or who is planning to conceive a child when, in the physician's judgment, continued exposure to lead at the current job would pose a significant risk. The return of the employee to his or her former job status, or the removal of special protections or limitations, depends upon the examining physician determining that the employee is no longer at increased risk of material impairment or that special measures are no longer needed.

During the period of any form of special protection or removal, the employer must maintain the worker's earnings, seniority, and other employment rights and benefits (as though the worker had not been removed) for a period of up to 18 months or for as long as the job the employee was removed from lasts if less than 18 months. This economic protection will maximize meaningful worker participation in the medical surveillance program, and is appropriate as part of the employer's overall obligation to provide a safe and healthful workplace. The provisions of MRP benefits during the employee's removal period may, however, be conditioned upon participation in medical surveillance.

The lead standard provides for a multiple physician review in cases where the employee wishes a second opinion concerning potential lead poisoning or toxicity. If an employee wishes a second opinion, he or she