GEOMATRIX

HEALTH RISK EVALUATION AND SITE MANAGEMENT PLAN FOR NORTHWEST AREA MARINA VILLAGE ALAMEDA, CALIFORNIA

Prepared For:

Alameda Marina Village Associates
1150 Marina Village Parkway
Alameda, California

September 1996
Project No. 1736.14

Geomatrix Consultants

100 Pine Street, 10th Floor
San Francisco, CA 94111
(415) 434-9400 • FAX (415) 434-1365

GEOMATRIX

24 September 1996
Project 1736.14

Ms. Juliet Shin
Alameda County Health Care Services Agency
Division of Hazardous Materials
Department of Environmental Health
1131 Harbor Bay Parkway
Alameda, California 94502

Subject: Health Risk Evaluation and Site Management Plan for Northwest Area
Marina Village
Alameda, California

Dear Ms. Shin:

Geomatrix Consultants, Inc. (Geomatrix), is submitting the subject report on behalf of Alameda Marina Village Associates (AMVA). As discussed in the 18 September 1996 meeting with you, AMVA, and Geomatrix, it is our opinion that the site meets guidelines for closure under the Regional Water Quality Control Board, San Francisco Bay Region, Low Risk Soil Case Closure criteria outlined in its 5 January 1996 Memorandum. The site has been adequately characterized, and site data indicate that residual petroleum hydrocarbons remaining in site soil are not a source of dissolved constituents to groundwater, and do not pose a significant risk to human health or the environment under the existing and proposed commercial land uses. Therefore, we recommend that the site be considered for closure; once closure is granted, existing monitoring wells will be properly destroyed. Please contact either of the undersigned if you have any questions or require additional information.

Sincerely,

GEOMATRIX CONSULTANTS, INC.

Yvonne G. Pierce, R.G.
Senior Geologist

Elizabeth A. Nixon, P.E.
Senior Engineer

YGP/EAN:mdg
K:\WPDOCS\1736\HRE3-LTR.DOC (WORD)

Enclosure

cc: Mr. Rahn Verhaeghe, AMVA

GEOMATRIX

HEALTH RISK EVALUATION AND SITE MANAGEMENT PLAN FOR NORTHWEST AREA MARINA VILLAGE ALAMEDA, CALIFORNIA

Prepared For:

Alameda Marina Village Associates
1150 Marina Village Parkway
Alameda, California

September 1996
Project No. 1736.14

Geomatrix Consultants

HEALTH RISK EVALUATION AND SITE MANAGEMENT PLAN

Northwest Area
Marina Village
Alameda, California

1.0 INTRODUCTION

Geomatrix Consultants, Inc. (Geomatrix), has prepared this Health Risk Evaluation (HRE) and Site Management Plan (SMP) on behalf of Alameda Real Estate Investments (AREI) for the Northwest Area of the Marina Village Development (the Site) located in Alameda, California (Figure 1). This report has been prepared in accordance with our 30 July 1996 Work Plan for Additional Soil Sampling Program, Northwest Area, Alameda Marina Village in Alameda, California (Geomatrix, 1996a). The results of previous investigations at the Site indicate the presence of residual middle- to high-boiling petroleum hydrocarbons, toluene, and lead in soil. Recent groundwater analytical data indicate the presence of low concentrations of benzene and toluene at one location. The HRE evaluates the potential health risks associated with exposure to these chemicals assuming future commercial development of the Site, and the SMP addresses the need for notification or other requirements following Site closure based on the results of the HRE.

2.0 IDENTIFICATION OF CHEMICALS OF POTENTIAL CONCERN

Based on the results of site investigations performed since 1988, chemicals detected in soil at the Site include petroleum hydrocarbons characterized as weathered crude oil, total petroleum hydrocarbons (TPH) as diesel (TPHd), and motor oil/waste oil (TPHmo/wo); toluene; and lead. One other chemical, trichloroethylene (TCE), was detected only in one sample at a very low concentration (0.038 mg/kg) and, therefore, is not considered further in this evaluation.

Historical data summary tables showing concentrations of petroleum hydrocarbons, toluene, and lead are presented as Tables 1 and 2. Table 1 summarizes data from investigations performed at the Northwest Area, and Figure 2 (from Levine•Fricke, 1989) shows the sample locations.

These data primarily are from soil investigations conducted in 1988 and 1989 to investigate the distribution of petroleum hydrocarbons. Data from recent sampling (July 1996) of shallow soil to assess lead concentrations also are included in Table 1. Figure 3 (Geomatrix investigation) shows the sampling locations. It has been estimated that concentrations of petroleum hydrocarbon mixtures exceed 500 mg/kg in soil beneath an area of approximately 2.5 acres. Additionally, residual separate-phase weathered crude oil was identified in soil beneath an area of approximately 1 acre. Lead concentrations range from 33 to 520 mg/kg.

Table 2 summarizes data that are representative of a soil stockpile that was relocated to the Northwest Area in 1993. The soil stockpile was originally generated in 1988 from an excavation at a nearby property within Marina Village; the soil was used as a surcharge at another nearby property before being relocated to the Northwest Area. The data summarized in Table 2 represent petroleum hydrocarbon concentrations in the soil after the soil was excavated and stockpiled elsewhere (June 1988 samples), but before it was relocated to its current position. The position of the stockpile in the Northwest Area is shown on Figure 4. As part of the recent sampling of shallow soil to assess the presence of lead, one composite sample was collected from the stockpile. This data is presented in Table 2.

As shown in Table 4, the detected concentrations for toluene and lead are well below their respective industrial soil Preliminary Remediation Goals (PRGs) developed by the United States Environmental Protection Agency (U.S. EPA) Region IX (U.S. EPA, 1996). Based on these screening levels, these chemicals are not expected to pose a significant health risk assuming future commercial development of the Site and, therefore, are not considered chemicals of potential concern (COPCs). Industrial PRGs are not available for mixtures such as crude oil TPHd and TPHmo/wo; therefore, these chemical mixtures were identified as COPCs in soil at the Site.

Based on results of site investigations and groundwater monitoring performed since 1988, the presence of petroleum hydrocarbons in soil beneath the Site does not appear to be a significant source of dissolved petroleum hydrocarbon constituents to groundwater. Recent groundwater

data, collected in 1995 and 1996, indicate that there are no petroleum hydrocarbon or BTEX constituents in Site perimeter wells, with the exception of intermittent, low concentrations of benzene and toluene that were detected in one well in the 1996 sampling event. Petroleum hydrocarbons (TPHd) were detected in one upgradient well (LF-10) during the 1995 sampling event at a very low concentration of 0.07 mg/l. Several inches of residual separate-phase degraded crude oil continues to be observed in Well LF-8, located at the northwest property boundary. However, the material appears to be stable, relatively insoluble, and is not migrating beyond its current distribution.

As shown in Table 5, the highest detected concentrations of toluene and benzene are below their respective regulatory levels, including the maximum contaminant levels (MCLs) for drinking water. Given these low concentrations and the fact that site shallow groundwater is not a probable drinking water source, these chemicals are not considered to be COPCs in groundwater. As discussed previously, regulatory levels for mixtures of petroleum hydrocarbons are not available; therefore, petroleum hydrocarbons were identified as a COPC in groundwater.

As discussed in the work plan (Geomatrix, 1996a), the Alameda County Health Care Services Agency (ACHCSA) expressed a concern that wood fragments observed in shallow fill material at the Site might contain creosote. Review of available data from 1988 showed that a groundwater sample and a petroleum product sample from the shallow fill zone were screened for semi-volatile organic compounds in accordance with EPA Method 8270. No 8270 analytes (which includes creosote compounds) were detected in the groundwater sample (collected from well LF-8) or in the product sample (collected from northwest test pit 11 at a depth of 8 feet bgs). The locations of the well and test pit are shown on Figure 2 (from Levine•Fricke, 1989). It should be noted that detection limits in the product sample were higher than the method detection limits due to interference from the petroleum product, and therefore potential low concentrations would not have been identified. Based on these data, creosote-related compounds have not been detected at the Site; however, if these compounds were associated with wood fragments in shallow fill material, they would not be expected to be present at concentrations that would pose

a health risk assuming future commercial development of the Site. Therefore, they are not identified as COPCs in soil or groundwater at the Site.

3.0 HEALTH RISK EVALUATION

A site conceptual model was created based on our understanding of site conditions, potential future land use, and physical and chemical characteristics of the identified COPCs. As described in the U.S. EPA "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (1988), the purpose of a site conceptual model is to describe what is currently known about a chemical source, likely migration pathways, exposure routes, and possible exposure scenarios so that data necessary to complete a health risk assessment are identified. The Site conceptual model for the Northwest Area of the Marina Village Development is presented on Figure 5.

As shown in the Site conceptual model, potential receptors assuming future commercial development include future construction workers, future building occupants, and future maintenance workers. Potential exposures to future construction workers are expected to be short-term (less than 1 year), and should be addressed in a site-specific health and safety plan. Therefore, the only potential receptors addressed in this HRE are future building occupants and maintenance workers. Based on the types of commercial development of surrounding properties, it is expected that the Site will be covered by one or more buildings, asphalt or concrete paving, or landscaping after development. As such, direct contact with residual petroleum hydrocarbons in surface soil or fill material by future building occupants is not expected to occur. Future maintenance workers may be exposed to subsurface soil or fill material on a periodic basis during maintenance activities that require intrusion into the subsurface (e.g., repair of an underground utility). As shown in the Site conceptual model, these exposures could occur via incidental ingestion of soil, dermal contact with soil, or inhalation of soil particles. As discussed in Section 1.0, groundwater across the Site generally occurs at depths greater than 5 feet bgs. Therefore, future maintenance workers are not expected to directly contact groundwater during maintenance activities, even those associated with repair of underground utilities.

A risk evaluation was conducted for high-boiling petroleum hydrocarbons remaining in sub-surface soil at a nearby property occupied by 1101 Marina Village Parkway (Geomatrix, 1993). This risk evaluation concluded that the potential human health risks were low based on limited potential for human contact associated with the planned commercial development of the property and the conditions under which high-boiling petroleum hydrocarbons exert their toxicity. Although characterized as "asphalt-like," it is expected that the petroleum hydrocarbon mixture remaining at 1101 Marina Village Parkway is similar to the high-boiling petroleum hydrocarbons detected at the Site. In addition, the concentrations of TPHmo/wo at the Site is similar (i.e., within an order of magnitude) to the concentrations of asphalt-like material at 1101 Marina Village Parkway. Therefore, it is not expected that the high-boiling petroleum hydrocarbons remaining at the Site will pose a significant human health risk.

Several risk evaluations also have been conducted for middle-boiling petroleum hydrocarbons such as diesel fuel (Anthony, et al., 1995; Stansbury and Forgét, 1995; Millner, et al., 1992). These assessments have concluded that the presence of fresh diesel fuel in soil, which is expected to contain higher concentrations of the lighter and generally more toxic components of diesel fuel, is not likely to pose a risk to human health under industrial or residential exposure scenarios. Given that soil analytical results indicate that the middle-boiling petroleum hydrocarbons are degraded and that the lighter components of diesel fuel (e.g., BTEX) are either not present or present at very low concentrations, and the fact that future development is assumed to be for commercial purposes, it is not expected that the middle-boiling hydrocarbons remaining at the Site will pose a significant human health risk.

4.0 EVALUATION OF POTENTIAL MIGRATION TO OAKLAND INNER HARBOR

The Site is located adjacent to Oakland Inner Harbor as shown on Figure 1. To evaluate the potential for residual separate-phase petroleum hydrocarbons remaining in site soil or for dissolved-phase petroleum hydrocarbons to migrate toward the Oakland Inner Harbor, historical

and chemical data for the Site were reviewed. According to a historical report prepared for the Site (Shoup, 1988), in the early 1900s, marshlands were filled with material generated from dredging activities for the nearby shipping channels, harbors, and estuaries to create land to support a growing shipping industry. The Site was used for shipbuilding activities beginning in the early 1900s and continuing through World War I and World War II. Operations at the Site reportedly included materials storage and ship repair; off-site land uses included oil storage. The release of petroleum hydrocarbons to shallow soil was likely associated with both on-site and off-site activities during the first half of this century. Shipbuilding activities at the Site reportedly declined in the 1950s, and the Site and vicinity remained vacant from 1958 until Alameda Marina Village Associates acquired the property in 1977. Based on this information, petroleum hydrocarbons in soil associated with former shipbuilding activities have been present in the subsurface for at least 40 years, and are likely considerably degraded.

Laboratory fingerprint analysis has characterized the separate-phase petroleum hydrocarbon as weathered crude oil, a high-boiling petroleum product containing relatively little volatile or soluble constituents. Laboratory analysis of soil samples collected during investigations strongly indicate that the soluble components of petroleum hydrocarbons are absent, supporting that the petroleum hydrocarbons beneath the Site are highly degraded and are unlikely to become mobile in the future. The nature of the residual petroleum hydrocarbons in soil and the absence of significant concentrations of dissolved petroleum hydrocarbons and the associated constituents benzene, toluene, ethylbenzene and xylenes (BTEX) in groundwater from monitoring wells along the shoreline strongly suggest that migration of these constituents to Oakland Inner Harbor is unlikely to occur.

5.0 SITE MANAGEMENT PLAN

It is our understanding that the future development plans for the Site will be similar to other commercial developments in the Marina Village Area. Under this expected development plan, the stockpiled soil will be used as fill material and, along with the subsurface soil, will be covered by one or more buildings, asphalt or concrete paving, and/or landscaping. In addition,

groundwater at the Site is not considered to be a potential drinking water source and could not be used as a domestic water supply now or in the future. Therefore, the SMP for this Site addresses construction safety measures, buyer notification, potential off-site disposal, and future changes to the expected Site construction and redevelopment plans.

Construction Safety Measures

Prior to any significant construction activities at the Site, the contractor must prepare a site-specific health and safety plan. The plan should describe the construction activities and address standard safety precautions such as protective measures for workers, dust control, odor control, and soil handling issues, as appropriate.

Buyer Notification

The environmental conditions at the Site must be disclosed to all future buyers of the property to the extent required by the law. The disclosure must contain information regarding the nature and extent of petroleum hydrocarbons in the soil and reference the various reports that contain chemical data and assess potential human health risks. The disclosure also must specify that during possible future excavation work, exposed soil should be prevented from eroding away from the Site and that off-site disposal be in accordance with applicable regulations.

Future Off-Site Disposal

Should future work at the Site generate soil that requires off-site disposal, the soil will need to be tested appropriately and disposed of at a facility licensed for such disposal.

Changes to Future Construction or Redevelopment Plans

The results of this risk evaluation indicate that soil containing residual levels of petroleum hydrocarbons and lead at the Site should not pose a significant health hazard to future building occupants or future maintenance workers assuming future development of the Site for commercial purposes. However, in the event that there is a land use change that could result in

additional exposure pathways, the potential health risks associated with residual petroleum hydrocarbons and lead in soil at the Site would need to be reevaluated.

6.0 REFERENCES

Anthony, J.W., R.J. Sterrett, G.C. Millner, and M.J. Grant, 1995, Integrated risk analysis of residual diesel concentrations in soil after a train derailment, 10th Annual Conference on Contaminated Soils, University of Massachusetts at Amherst, 23-26 October.

Geomatrix Consultants, Inc. (Geomatrix), 1992, Soil and Groundwater Quality Investigation, Shipways Project, Marina Village Development, Alameda, California, prepared for Alameda Real Estate Investments, July.

Geomatrix, 1993, Phase I and Phase II Evaluation of Fill Material, Proposed Buildings 4 and 5 – Parcel H, Marina Village Development, Alameda, California, prepared for Alameda Real Estate Investments, January.

Geomatrix, 1995, Groundwater Monitoring Report July 1995, Lots 1 and 5 (Northwest Area), Marina Village, prepared for Alameda Marina Village Associates, Alameda, California, December.

Geomatrix, 1996a, Letter to Alameda County Health Care Services Agency, entitled "Work Plan for Additional Sampling Program, Northwest Area, Alameda Marina Village," Alameda, California, 30 July.

Geomatrix, 1996b, Groundwater Monitoring Report April 1996, Lots 1 and 5 (Northwest Area), Marina Village, prepared for Alameda Marina Village Associates, Alameda, California, September.

Levine•Fricke, 1988, Removal of Petroleum-Affected Soils from the Field Area South of the Powerhouse, Alameda Marina Village, Investigation of Northwest Area, Marina Village, Alameda, California, prepared for Vintage Properties/Alameda Commercial, 5 October.

Levine•Fricke, 1988, Investigation of Northwest Area, Marina Village, Alameda, California, prepared for Vintage Properties/Alameda Commercial, 6 October.

Levine•Fricke, 1989, Letter to Vintage Properties/Alameda Commercial, entitled "Results of Soil Investigation, Parcel 2, Northwest Study Area, Marina Village, Alameda, California, 27 November.

Levine•Fricke, 1989, Continued Soil and Groundwater Investigation of Parcel 5, Implementation of a Groundwater Monitoring Program and Proposed Remedial Measures in the Northwest Study Area, Marina Village, Alameda, California, 26 June.

Levine•Fricke, 1990, Results of Third Round of Groundwater Sampling, Northwest Area, Marina Village, Alameda, California, 13 April.

Millner, G.C., R.C. James, and A.C. Nye, 1992, Human health-based soil cleanup guidelines for diesel fuel no. 2: Journal of Soil Contamination, I (2).

Shoup, L.H., 1988, A History of Tract 29 and Environs, Marina Village, Alameda, California, prepared for Alameda Marina Village Associates, September.

Stansbury, J.S. and C.A. Forgét, 1995, Risk assessment of fuel-contaminated soils based on TPH concentrations, 10th Annual Conference on Contaminated Soils, University of Massachusetts at Amherst, 23-26 October.

United States Environmental Protection Agency (U.S. EPA), 1988, Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA: Office of Emergency and Remedial Response, Washington, D.C.

U.S. EPA, 1995, Drinking Water Standards and Health Advisories: Drinking Water Branch, San Francisco, California, December.

U.S. EPA, 1996, Region 9 Preliminary Remediation Goals (PRGs) 1996, 1 August.

GEOMATRIX

TABLE 2

HISTORICAL SUMMARY OF PETROLEUM HYDROCARBONS, TOLUENE AND LEAD DETECTED IN STOCKPILED SOIL SAMPLES

Northwest Area
Marina Village
Alameda, California

Units are in milligrams per kilogram (mg/kg)

Sample Location	Date Collected	TPHd	Toluene	Lead
PHFSP-1,2	6/23/88	170	--	--
PHFSP-3,4	6/23/88	230	--	--
PHFSP-5	6/23/88	85	--	--
PHFSP-6,7	6/24/88	320	--	--
PHFSP-8,9	6/24/88	300	--	--
PHFSP-10,11	6/24/88	170	--	--
PHFSP-12,13	6/24/88	87	--	--
PHFSP-14,15	6/24/88	150	--	--
PHFSP-16,17	6/24/88	98	--	--
PHFSP-18,19	6/24/88	280	--	--
PHFSP-20,21	6/24/88	190	--	--
PHFSP-22,23	6/24/88	160	--	--
PHFSP-24,25	6/24/88	150	--	--
PHFSP-26,27	6/24/88	370	--	--
PHFSP-10	6/24/88	--	0.014	--
PHFSP-11	6/24/88	--	0.018	--
PHFSP-26	6/24/88	--	0.013	--
PHFSP-27	6/24/88	--	0.014	--
TP-5	7/2/96	--	--	200

Notes:
1988 data from Levine•Fricke, Inc.
1996 data from Geomatrix, Inc.
"--" = not analyzed.
TPHd = Total petroleum hydrocarbons as diesel.

GEOMATRIX

TABLE 3

SUMMARY OF PETROLEUM HYDROCARBONS AND BTEX DETECTED IN GROUNDWATER MONITORING WELLS, 1995 AND 1996

Northwest Area
Marina Village
Alameda, California

Units are in milligrams per liter (mg/l)

Sample Location	Sample Date	TPHd	TPHmo/wo	Benzene	Ethylbenzene	Toluene	Xylenes	Petroleum Product Thickness (inches)
LF-6	7/12/95	<0.05	<0.2	--	--	<0.007	--	--
	4/17/96	<0.05	<0.25	--	--	<0.0005	--	--
LF-7	7/13/95	<0.05	<0.2	<0.0005	<0.0005	<0.0005	<0.002	--
	4/17/96	<0.05	<0.25	0.0007	<0.0005	0.0007	<0.0005	--
LF-8	7/11/95	--	--	--	--	--	--	Approx. 6
	4/17/96	--	--	--	--	--	--	Approx. 2
LF-9[1]	--	--	--	--	--	--	--	--
LF-10	7/14/95	0.06	<0.2	--	--	--	--	--
	7/14/95 (filtered)	0.07	<0.2	--	--	--	--	--
	4/17/96	<0.05	<0.25	--	--	--	--	--
LF-11	7/13/95	<0.05	<0.2	--	--	--	--	--
	4/17/96	<0.05	<0.25	--	--	--	--	--
LF-12	7/13/95	<0.05	<0.2	--	--	--	--	--
	4/17/96	<0.05	<0.25	--	--	--	--	--
LF-13	7/14/95	--	--	<0.0005	<0.0005	<0.0005	<0.002	--
	7/14/95 (filtered)	<0.05	<0.2	--	--	--	--	--
	4/17/96	<0.05	<0.25	<0.0005	<0.0005	<0.0005	<0.0005	--

GEOMATRIX

TABLE 3

SUMMARY OF PETROLEUM HYDROCARBONS AND BTEX DETECTED IN GROUNDWATER MONITORING WELLS, 1995 AND 1996

Northwest Area
Marina Village
Alameda, California

Sample Location	Sample Date	TPHd	TPHmo/wo	Benzene	Ethylbenzene	Toluene	Xylenes	Petroleum Product Thickness (inches)
LF-14[2]	4/17/96	<0.05	<0.25	--	--	--	--	--
LF-15[3]	4/17/96	--	--	<0.0005	<0.0005	<0.0005	<0.0005	--
WC-3	7/14/95 (filtered)	<0.05	<0.2	--	--	--	--	--
	4/17/96	<0.05	<0.25	--	--	--	--	--
GMW-2	7/12/95	<0.05	<0.2	--	--	--	--	--
	4/17/96	<0.05	<0.25	--	--	--	--	--

Notes:

"--" = not analyzed.
TPHd = Total petroleum hydrocarbons as diesel.
TPHmo/wo = Total petroleum hydrocarbons as motor oil or waste oil.
Petroleum product characterized as weathered crude oil.
[1] Monitoring well is not accessible.
[2] Duplicate sample of LF-10.
[3] This sample is a blind duplicate of LF-7.

GEOMATRIX

TABLE 4

SELECTION OF SOIL CHEMICALS OF POTENTIAL CONCERN

Northwest Area
Marina Village
Alameda, California

Units are in milligrams per kilogram (mg/kg)

Chemical	Maximum Detected Concentration	U.S. EPA Region IX Industrial Soil PRGs	COPC?
Lead	520	1000[1]	No
Middle and High Boiling Point Petroleum Hydrocarbons	28,000	NA	Yes
Toluene	0.7	880	No

Notes:

COPC = Chemical of potential concern.
NA = not available.
PRGs = Preliminary Remediation Goals.
[1] Based on the U.S. EPA's Integrated Exposure and Uptake Biokinetic Model (IEUBK).

GEOMATRIX

TABLE 5

SELECTION OF GROUNDWATER CHEMICALS OF POTENTIAL CONCERN

Northwest Area
Marina Village
Alameda, California

Units are in milligrams per liter (mg/l)

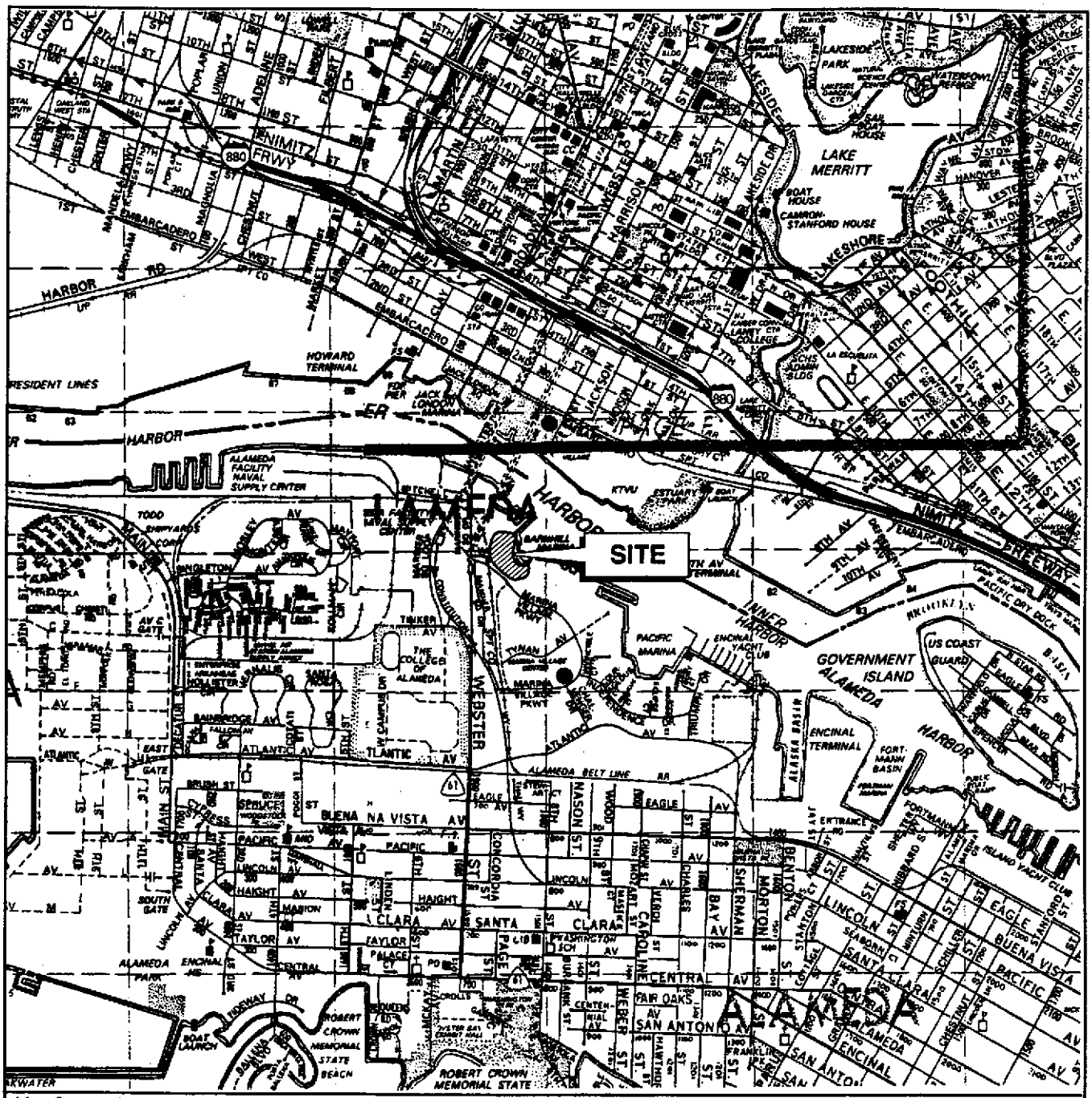
Chemical	Highest Detected Concentration (1995/1996)	California and U.S. EPA MCLs	COPC?
Benzene	0.0007[1]	0.001-0.005	No
Middle and High Boiling Point Petroleum Hydrocarbons	0.07[2]	NA	Yes
Toluene	0.0007[1]	0.15-1.0	No

Notes:

COPC = Chemical of potential concern.
NA = not available.
MCLs = Maximum contaminant levels.

1 Detected in only one well in 1996.

2 Detected in only one well, which is located upgradient from the Northwest Area, in 1995. It was not detected in 1996 at a detection limit of 0.05 mg/l.



Map Source: The Thomas Guide, Alameda County Street Guide and Directory, 1993

N

0 1/2 Mile

GEOMATRIX

SITE LOCATION MAP
Marina Village
Alameda, California

Figure
1

Project No.
1736.14

1736.14.002

105486

ESTUARY

N

BOAT DOCK

BOAT DOCK

BOAT DOCK

SHIPWAY 1

2

Parking Lot

LF-11

6

2NW3

WC3

2NW5

2NW2

5NW7

5NW6

5NW12

5NW5

5NW1

LF-6

5

5

5NW11

5NW3

5NW2

LF-12

5NW9

5NW8

5NW14

5NW4

5NW10

5NW13

17

Shoreline

1NW2

LF-7

4

2

1

1NW1

3

LF-13

18

1

11

NW PIT

LF-8

Parcel Boundaries

12

16

LF-9

6

13A

13

14

7

15

9

10

8

Work Street

MARINA VILLAGE PARKWAY

LF-10

POWER HOUSE

RR9

RR8

RR Tracks

TRAIN STATION

WEB

MARINER SQUARE DRIVE

WEBSTER STREET

0 100 200 feet

(Approximate)

EXPLANATION

LF-6 ● Shallow monitoring well, Levine-Fricke, 1988, 1989

WC3 ⊙ Shallow monitoring well, Woodward-Clyde, 1987

2 □ Test pit, Levine-Fricke, 1988

2NW5 ⊕ Test boring, Levine-Fricke, 1988, 1989

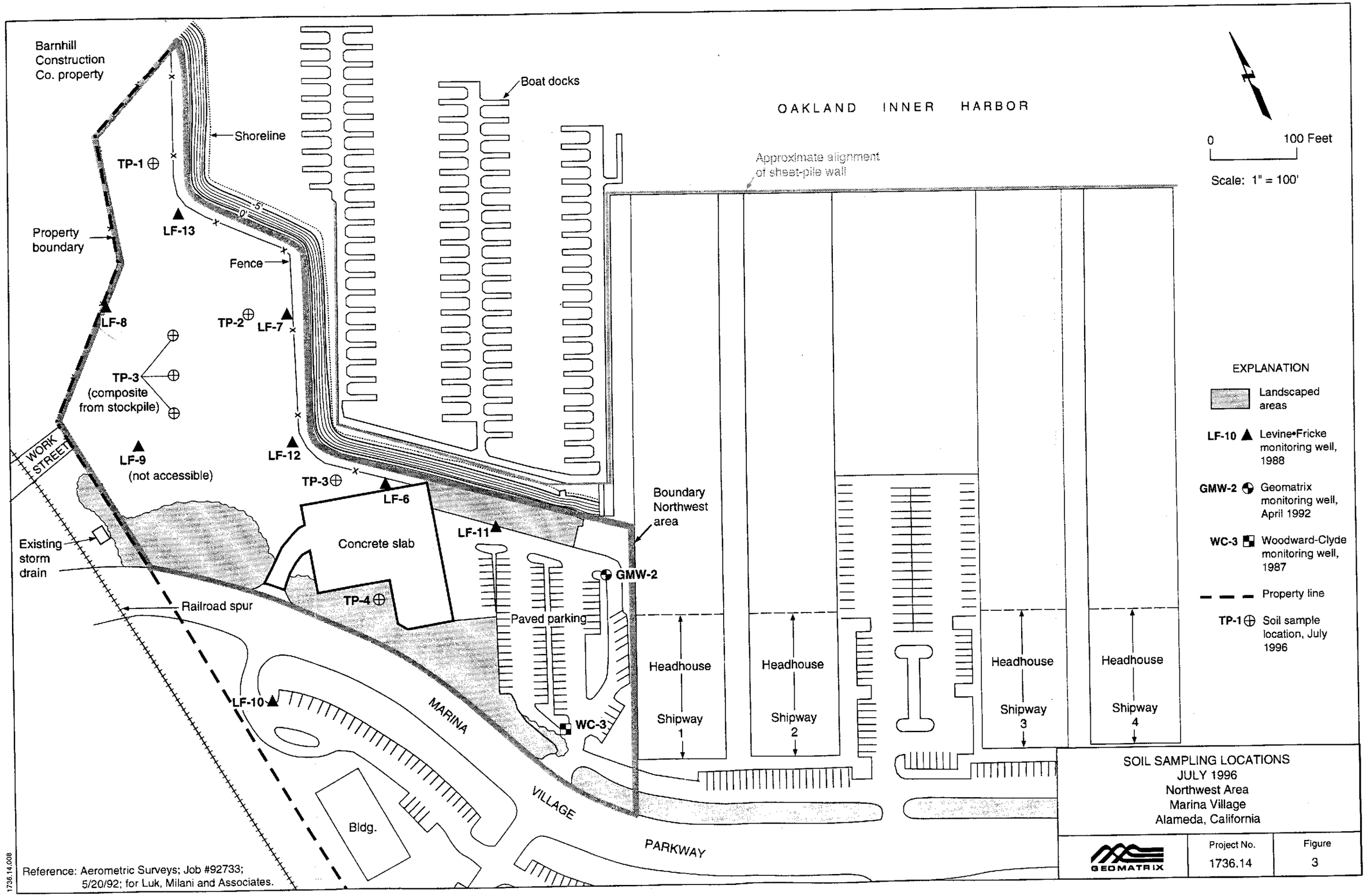
Figure 2:

SITE PLAN SHOWING NORTHWEST STUDY AREA AND LOCATIONS OF SOIL BORINGS AND MONITORING WELLS

Project No. 1245

LEVINE • FRICKE
CONSULTING ENGINEERS AND HYDROGEOLOGISTS

EAN31MAY89D1A


Barnhill Construction Co. property
Boat docks
OAKLAND INNER HARBOR
Shoreline
TP-1
LF-13
Approximate alignment of sheet-pile wall
0
100 Feet
Scale: 1" = 100'
Property boundary
Fence
LF-8
TP-2
LF-7
TP-3 (composite from stockpile)
WORK STREET
LF-9 (not accessible)
LF-12
TP-3
LF-6
Boundary Northwest area
LF-11
Concrete slab
Existing storm drain
GMW-2
TP-4
Railroad spur
Paved parking
Headhouse
Shipway 1
Headhouse
Shipway 2
Headhouse
Shipway 3
Headhouse
Shipway 4
LF-10
MARINA
WC-3
VILLAGE
PARKWAY
Bldg.
EXPLANATION
Landscaped areas
LF-10 Levine•Fricke monitoring well, 1988
GMW-2 Geomatrix monitoring well, April 1992
WC-3 Woodward-Clyde monitoring well, 1987
Property line
TP-1 Soil sample location, July 1996
Reference: Aerometric Surveys; Job #92733; 5/20/92; for Luk, Milani and Associates.
1736.14.008
SOIL SAMPLING LOCATIONS
JULY 1996
Northwest Area
Marina Village
Alameda, California
GEOMATRIX
Project No.
1736.14
Figure
3

Fence

Shoreline

Boat docks

OAKLAND INNER HARBOR

0 100 Feet

1' = 100'
Contour interval = 1'

4'

4'

3'

-5'

0'

75'

Existing perimeter swale

Direction of surface water flow

15'

2'

75'

Approximate limit of soil storage area

5'

Catch basin

Existing culvert

Existing storm drain

Concrete slab

Paved parking

Railroad spur

Headhouse

Shipway 1

Headhouse

Shipway 2

Headhouse

Shipway 3

Headhouse

Shipway 4

KEY

Landscaped areas

Note

Elevations based on Alameda City datum.

Bldg.

Reference: Topographic Survey from Aerometric Surveys; Job #92733; 5/20/92; for Luk, Milani and Associates.

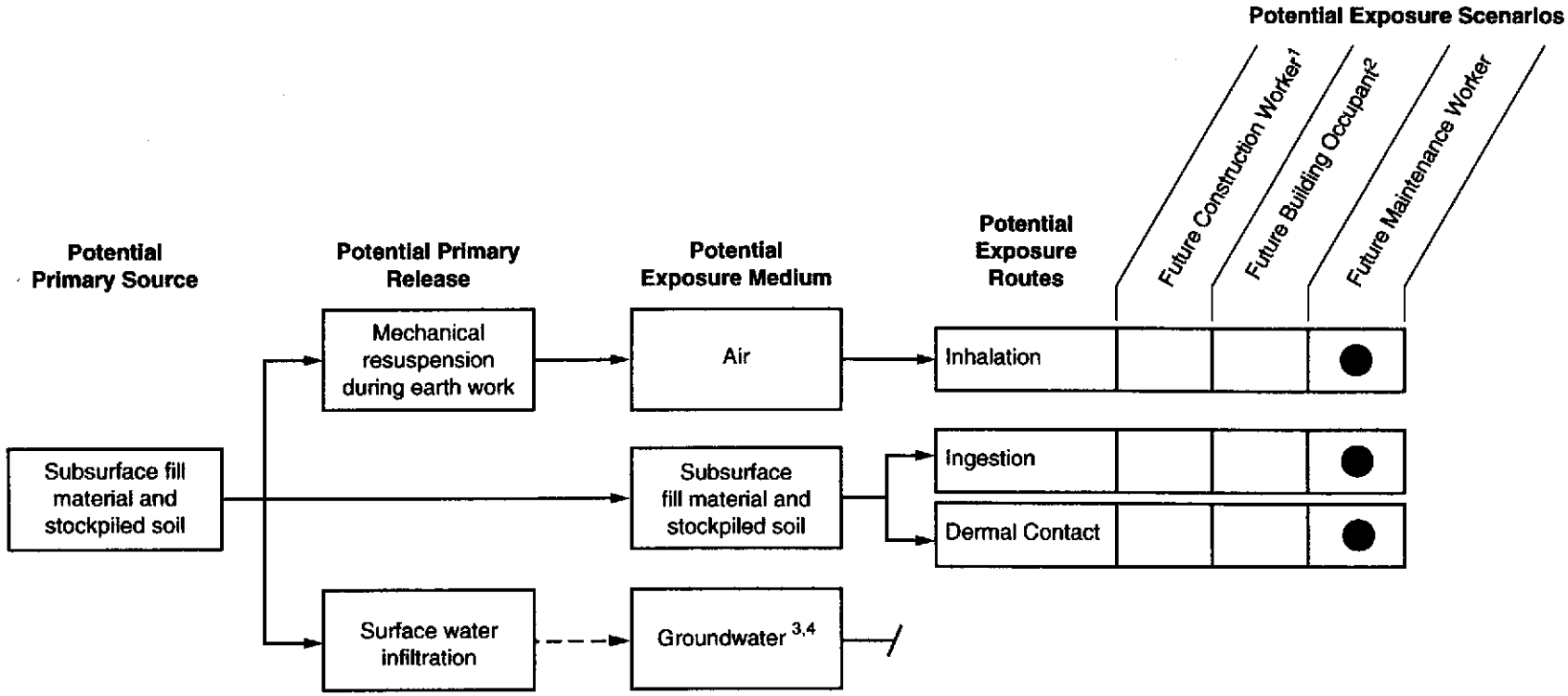
MARINA VILLAGE PARKWAY

SOIL STOCKPILE AREA
Marina Village
Alameda, California

GEOMATRIX

Project No.	Figure
1736.14	4

1736.14.014



Notes

[1] Potential exposures to future on-site construction workers will be addressed under a site health and safety plan.

[2] After redevelopment, the site will be covered by buildings, parking lot, and landscaping; therefore, direct contact with the soil by future building occupants is not expected.

[3] Groundwater across the site generally occurs at depths greater than 5 feet below ground surface. Therefore, future on-site maintenance workers are not expected to directly contact groundwater during maintenance activities, even at underground utilities.

[4] The residual degraded petroleum hydrocarbons do not appear to be mobile or a continuing source of dissolved petroleum constituents to groundwater; therefore, the potential for migration toward and impact to the Alameda Inner-Harbor is considered low.

GEOMATRIX

SITE CONCEPTUAL EXPOSURE MODEL
Northwest Area
Marina Village Development
Alameda, California

Figure 5

Project No. 1736.14

1736.14.009

GEOMATRIX

APPENDIX A

SOIL ANALYTICAL DATA FOR LEAD (GEOMATRIX 1996)

American Environmental Network

Certificate of Analysis

DOHS Certification: 1172 AIHA Accreditation: 11134

GEOMATRIX CONSULTANTS
100 PINE ST., SUITE 1000
SAN FRANCISCO, CA 94111

ATTN: YVONNE PIERCE
CLIENT PROJ. ID: 1736.14

C.O.C. NUMBER: 8123

REPORT DATE: 07/15/96

DATE(S) SAMPLED: 07/02/96

DATE RECEIVED: 07/02/96

AEN WORK ORDER: 9607043

PROJECT SUMMARY:

On July 2, 1996, this laboratory received 5 soil sample(s).

Client requested sample(s) be analyzed for chemical parameters. Results of analysis are summarized on the following page(s). Please see quality control report for a summary of QC data pertaining to this project.

Samples will be stored for 30 days after completion of analysis, then disposed of in accordance with State and Federal regulations. Samples may be archived by prior arrangement.

If you have any questions, please contact Client Services at (510) 930-9090.

Larry Klein
Laboratory Director

GEOMATRIX CONSULTANTS

SAMPLE ID: TP-1
AEN LAB NO: 9607043-01
AEN WORK ORDER: 9607043
CLIENT PROJ. ID: 1736.14

DATE SAMPLED: 07/02/96
DATE RECEIVED: 07/02/96
REPORT DATE: 07/15/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	230 *	3	mg/kg	07/12/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	07/08/96
Homogenization of sample		-		Prep Date	07/08/96

ND = Not detected at or above the reporting limit
* = Value at or above reporting limit

GEOMATRIX CONSULTANTS

SAMPLE ID: TP-2
AEN LAB NO: 9607043-02
AEN WORK ORDER: 9607043
CLIENT PROJ. ID: 1736.14

DATE SAMPLED: 07/02/96
DATE RECEIVED: 07/02/96
REPORT DATE: 07/15/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	400 *	3	mg/kg	07/12/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	07/08/96
Homogenization of sample		-		Prep Date	07/08/96

ND = Not detected at or above the reporting limit
* = Value at or above reporting limit

GEOMATRIX CONSULTANTS

SAMPLE ID: TP-3
AEN LAB NO: 9607043-03
AEN WORK ORDER: 9607043
CLIENT PROJ. ID: 1736.14

DATE SAMPLED: 07/02/96
DATE RECEIVED: 07/02/96
REPORT DATE: 07/15/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	33 *	3	mg/kg	07/12/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	07/08/96
Homogenization of sample		-		Prep Date	07/08/96

ND = Not detected at or above the reporting limit
* = Value at or above reporting limit

GEOMATRIX CONSULTANTS

SAMPLE ID: TP-4
AEN LAB NO: 9607043-04
AEN WORK ORDER: 9607043
CLIENT PROJ. ID: 1736.14

DATE SAMPLED: 07/02/96
DATE RECEIVED: 07/02/96
REPORT DATE: 07/15/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	130 *	3	mg/kg	07/12/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	07/08/96
Homogenization of sample		-		Prep Date	07/08/96

ND = Not detected at or above the reporting limit
* = Value at or above reporting limit

GEOMATRIX CONSULTANTS

SAMPLE ID: TP-5
AEN LAB NO: 9607043-05
AEN WORK ORDER: 9607043
CLIENT PROJ. ID: 1736.14

DATE SAMPLED: 07/02/96
DATE RECEIVED: 07/02/96
REPORT DATE: 07/15/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	200 *	3	mg/kg	07/12/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	07/08/96
Homogenization of sample		-		Prep Date	07/08/96

ND = Not detected at or above the reporting limit
* = Value at or above reporting limit

AEN (CALIFORNIA)
QUALITY CONTROL REPORT

AEN JOB NUMBER: 9607043
CLIENT PROJECT ID: 1736.14

Quality Control and Project Summary

All laboratory quality control parameters were found to be within established limits.

Definitions

Laboratory Control Sample (LCS)/Method Spikes(s): Control samples of known composition. LCS and Method Spike data are used to validate batch analytical results.

Matrix Spike(s): Aliquot of a sample (aqueous or solid) with added quantities of specific compounds and subjected to the entire analytical procedure. Matrix spike and matrix spike duplicate QC data are advisory.

Method Blank: An analytical control consisting of all reagents, internal standards, and surrogate standards carried through the entire analytical process. Used to monitor laboratory background and reagent contamination.

Not Detected (ND): Not detected at or above the reporting limit.

Relative Percent Difference (RPD): An indication of method precision based on duplicate analyses.

Reporting Limit (RL): The lowest concentration routinely determined during laboratory operations. The RL is generally 1 to 10 times the Method Detection Limit (MDL). Reporting limits are matrix, method, and analyte dependent and take into account any dilutions performed as part of the analysis.

Surrogates: Organic compounds which are similar to analytes of interest in chemical behaviour, but are not found in environmental samples. Surrogates are added to all blanks, calibration and check standards, samples, and spiked samples. Surrogate recovery is monitored as an indication of acceptable sample preparation and instrument performance.

D: Surrogates diluted out.

!: Indicates result outside of established laboratory QC limits.

ANALYSIS: Lead

MATRIX: Soil/Bulk

METHOD BLANK SAMPLES

SAMPLE TYPE: Blank-Method/Media blank | LAB ID: IFS_BLNK_H | INSTR RUN: AA V12\960712103000/1/
INSTRUMENT: Video 12 aa spectrometer | PREPARED: | BATCH ID: IFS070896-H
UNITS: mg/kg | ANALYZED: 07/12/96 | DILUTION: 1.000000
METHOD:

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in soil-flame	ND		3						

METHOD SPIKE SAMPLES

SAMPLE TYPE: Spike-Method/Media blank | LAB ID: IFS_MD_H | INSTR RUN: AA V12\960712103000/3/1
INSTRUMENT: Video 12 aa spectrometer | PREPARED: | BATCH ID: IFS070896-H
UNITS: mg/kg | ANALYZED: 07/12/96 | DILUTION: 1.000000
METHOD:

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in soil-flame	55.9	ND	3	50.0	112	80	119		

SAMPLE TYPE: Spike-Method/Media blank | LAB ID: IFS_MS_H | INSTR RUN: AA V12\960712103000/2/1
INSTRUMENT: Video 12 aa spectrometer | PREPARED: | BATCH ID: IFS070896-H
UNITS: mg/kg | ANALYZED: 07/12/96 | DILUTION: 1.000000
METHOD:

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in soil-flame	57.1	ND	3	50.0	114	80	119		

METHOD SPIKE DUPLICATES

SAMPLE TYPE: Method Spike Sample Duplicate | LAB ID: IFS_MR_H | INSTR RUN: AA V12\960712103000/4/2
INSTRUMENT: Video 12 aa spectrometer | PREPARED: | BATCH ID: IFS070896-H
UNITS: mg/kg | ANALYZED: 07/12/96 | DILUTION: 1.000000
METHOD:

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in soil-flame	55.9	57.1	3					2.12	10.5

MATRIX SPIKE SAMPLES

SAMPLE TYPE: Spike-Sample/Matrix | LAB ID: MD07043-03A | INSTR RUN: AA V12\960712103000/7/5
INSTRUMENT: Video 12 aa spectrometer | PREPARED: | BATCH ID: IFS070896-H
UNITS: mg/kg | ANALYZED: 07/12/96 | DILUTION: 1.000000
METHOD:

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in soil-flame	85.3	32.7	3	50.0	105	21	178		

SAMPLE TYPE: Spike-Sample/Matrix | LAB ID: MS07043-03A | INSTR RUN: AA V12\960712103000/6/5
INSTRUMENT: Video 12 aa spectrometer | PREPARED: | BATCH ID: IFS070896-H
UNITS: mg/kg | ANALYZED: 07/12/96 | DILUTION: 1.000000
METHOD:

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in soil-flame	81.4	32.7	3	50.0	97.4	21	178		

ANALYSIS: Lead

MATRIX: Soil/Bulk

MATRIX SPIKE DUPLICATES

SAMPLE TYPE: Spiked Sample Duplicate
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/kg
METHOD:

LAB ID: MR07043-03A
PREPARED:
ANALYZED: 07/12/96

INSTR RUN: AA V12\960712103000/8/6
BATCH ID: IFS070896-H
DILUTION: 1.000000

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in soil-flame	85.3	81.4	3	50.0				4.68	23

---------- End of Quality Control Report ----------

R-4, 5-F 9607043

Chain-of-Custody Record

№ 8123

Date: 2 July 1996

Page 1 of 1

Project No.: 1736.14

Samplers (Signatures): Nathaniel A. Taylor '96

ANALYSES

Date	Time	Sample Number	EPA Method 8010	EPA Method 8020	EPA Method 8240	EPA Method 8270	TPH as gasoline	TPH as diesel	TPH as BTEX	Lead	Cooled	Soil (S) or water (W)	Acidified	Number of containers
7/2	0945	TP-1 01A								X	X	S	N	1
	1015	TP-2 02A								X	X			1
	1030	TP-3 03A								X	X			1
	1045	TP-4 04A								X	X			1
	1110	TP-5 05A								X	X			1

REMARKS

Additional comments

- Please homogenize each sample prior to analysis
- Analyze for Lead (Pb)
- Fax Results to Yvonne Pierce @ 415 +434-1365

Turnaround time: Standard

Results to: Yvonne Pierce

Total No. of containers: 5

Relinquished by:	Date:	Relinquished by:	Date:	Relinquished by:	Date:	Method of shipment:
Nathaniel A. Taylor	7/2/96					Pick-Up.
Signature: NATHANIEL A. TAYLOR		Signature:		Signature:		Laboratory comments and Log No.:
Printed name: GEOMATRIX		Printed name:		Printed name:		Chain of Custody Seal intact upon arrival on Cooler. LLP 7-2-96
Company:		Company:		Company:		
Received by: Lori L. Pruett	Time: 7/2/96 1700	Received by:	Time:	Received by:	Time:	
Signature: Lori L. Pruett		Signature:		Signature:		
Printed name: ACES		Printed name:		Printed name:		
Company:		Company:		Company:		

Geomatrix Consultants
100 Pine St. 10th Floor
San Francisco, CA. 94111
(415) 434-9400