SOMA
CORPORATION

October 31, 1996

Ms. Susan Hugo
Alameda County
Department of Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Regarding: Corrective Action Plan: 1258 64th Street, Emeryville, California

Dear Ms. Hugo:

Enclosed is a copy of the SOMA Phase II Data and Corrective Action Plan Report. The results of the Phase II investigation have been combined into a single report with the Corrective Action Plan for purposes of efficiency. The information provided in this report was developed according to the SOMA Phase II Work Plan of August 20, 1996 to address concerns expressed by the Department of Environmental Health Services in a letter addressed to the Redevelopment Agency of the City of Emeryville dated May 21, 1996.

This report was prepared as a joint effort with Mr. Jeff Hennier, a California Certified Hydrogeologist, under whose direction all hydrogeologic and geologic information were prepared.

If you have any questions are comments, please feel free to call us at (510) 654-3900.

Sincerely,

Norman T. Ozaki, Ph.D.
President and Principal Toxicologist
SOMA Corporation

Jeff Hennier
Principal Hydrogeologist
California Registered Geologist (4605)
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enclosure

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COMBINED
SOIL AND GROUND-WATER INVESTIGATION
AND
CORRECTIVE ACTION PLAN

Vacant Lot
1258 64th Street
Emeryville, California

October 29, 1996

SOMA 96-2088

Prepared For:

City of Emeryville Redevelopment Agency
Department of Economic Development and Housing
2200 Powell Street, Suite 1200
Emeryville, California 94608-1806

Submitted To:

Alameda County
Department of Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

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1.0 INTRODUCTION

This combined Soil and Ground-Water Investigation and Corrective Action Plan (CAP) is submitted to the Alameda County Department of Environmental Health Services (ACDEH) on behalf of the property owner, City of Emeryville Redevelopment Agency Department of Economic Development and Housing (Redevelopment Agency) to address the presence of elevated concentrations of lead in soil at a vacant lot located at 1258 64th Street, Emeryville, California ("the Site"). A soil and ground-water investigation was conducted at the Site in accordance with a SOMA Workplan entitled "Workplan Phase II Site Characterization", submitted to the ACDEH on August 20, 1996, as amended by revisions during a meeting with ACDEH on August 28, 1996. The Redevelopment Agency intends to construct three residential units at the Site. In order to facilitate the construction of the three proposed residential housing units, the Redevelopment Agency desires to obtain site closure from ACDEH.

The objective of the soil and ground-water investigation is to assess the extent of lead in soil and ground-water at the Site. Pursuant to ACDEH guidelines, this CAP report contains a comprehensive summary and evaluation of the soil and ground-water investigations conducted at the Site. The objective of the corrective action plan is to assess : 1) target cleanup goal (TCG) , 2) alternative treatment methods, and 3) a cost effective plan which adequately protect[s] human health, safety and the environment.[1]

1.1 Site Description

The Site is located at 1258 64th Street in Emeryville, California, approximately 0.6 miles east of the San Francisco Bay (Figure 1). The Site is approximately 107 feet by 50 feet in size and is currently a vacant undeveloped lot secured by chain-link fence (Figure 2). The Alameda County Assessor's

[1] ACDEH 1996.

Parcel Number (APN) is 049-1470-005-01. The neighborhood consists primarily of mixed residential, commercial and industrial land uses. The ground surface in the Site vicinity is approximately 30 feet above mean sea level and slopes gently towards the San Francisco Bay. Due to the Site's proximity to the Bay, shallow-depth sediments in the Site vicinity consist primarily of fine-grained silt and clay sediments deposited in tidal marsh and esturine environments.

1.2 Background

Prior to 1911, the Site and the surrounding area was vacant. According to Sanborn Maps and aerial photographs, a house existed on the Site from 1911 to 1995. A shed existed on the northern edge of the property from 1911 to approximately the mid 1950s or the mid 1960s. Sometime between the mid 1950s and mid 1960s, the shed was removed and a garage was installed on the southeastern portion of the property.[2] Between September 26, 1995 and October 3, 1995, the house and garage were demolished.[3] Since October of 1995, the lot has remained vacant. The City of Emeryville has owned the property since March 2, 1995.[4] Although the adjacent property is residential in nature, commercial and industrial businesses are located as close as one-half block from the Site.[5] Elevated concentrations of lead in soil had been reported by various consultants in the past. A discussion of those studies along with copies of the original reports were presented in a Phase I report of March 26, 1996.[6] A summary of all available past lead studies is presented in Section 2.0 of this report. Because of data inadequacy issues associated with the earlier studies, SOMA Corporation (SOMA) performed a Phase II soil and ground-water investigation on September 12, 1996.

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2 A R.E.A. 1996.
3 BAAQMD 1995a.
4 The Foreclosure Company, Inc. 1995; Redevelopment Agency 1995.
5 A R.E.A. 1996.
6 A R.E.A. 1996.

2.1 Environmental Services

Environmental Services (ES) conducted a Housing and Urban Development (HUD) Evaluation of Lead-Based Paint Hazard Study at the Site in May 3, 1995.[7] Reportedly, ES collected 4 soil samples at the Site. Soil sample locations, depths, and collection techniques were not described in the ES report. Chain-of-custody forms and laboratory certificates were not included in the ES report. Laboratory methods for the soil sample analysis were not described. According to ES, laboratory results indicated "...that one of the four soil samples yielded results above our standard (500 ppm)" (Table 1).[8] ES reported that the other three soil samples were below the 500 ppm standard. Additionally, ES stated "The sample which yielded an elevated result (>500 ppm) was a composite drip line sample."[9]

2.2 Environmental Innovations Corporation

Environmental Innovations Corporation (EIC) conducted a building inspection, including a bulk material sampling for suspected asbestos containing materials in the existing house prior to demolition. EIC also performed soil sampling at the Site on May 31, 1995. The purpose of the soil sampling investigation was to evaluate lead concentrations in the soil before demolition activities were commenced. Nine soil samples were collected from 3 soil borings at the Site. Soil samples were collected at the surface, 1.0 foot below ground surface (bgs), and 3.0 feet bgs. The sample locations are presented on a non-scaled Site map prepared by EIC, which is reproduced in Appendix A (Figure A-1). The soil sampling techniques were not described in the EIC report. The soil samples were analyzed using Flame Atomic Absorption Spectroscopy (FLAA).[10] Chain-of-custody forms and laboratory certificates were not included in the EIC report. Laboratory results indicate that lead concentrations ranged from 258.2 mg/kg at 0.0 feet bgs from the sample collected along the north

7 ES 1995.
8 ES 1995.
9 ES 1995.
10 EIC 1995.

side of the house to 2,347.3 mg/kg at 0.0 feet bgs from the sample along the south side of the house (Table 1).

2.3 KELLCO

Historical records indicate KELLCO conducted 2 rounds of soil sampling at the Site during the period between August 2, 1995 (Pre-house demolition) and October 9, 1996 (Post-house demolition). On August 2, 1995, KELLCO collected 8 soil samples from the Site prior to demolition of the house and garage. Soil sampling methods and sample depths were not described. KELLCO's submittal to the City consisted of an unscaled map of sampling locations and laboratory certificates. According to a telephone conversation between the Redevelopment Agency, KELLCO, and SOMA, the 8 soil samples represent laterally composited samples.[11] As indicated on KELLCO laboratory certificates, each soil sample represents a composite of 3 to 6 discrete samples collected in lateral increments across the Site at a depth of approximately 2 inches bgs. The sample locations are presented on a unscaled Site map prepared by KELLCO, which is reproduced in Appendix A (Figure A-2). According to KELLCO's laboratory certificates, the soil samples were analyzed for lead using EPA Method 7240 using FLAA.[12] Analytical results indicate that lead concentrations ranged from 211.1 mg/kg (sample 8) to 2,634 mg/kg (sample 1) (Table 1).

On October 9, 1996, KELLCO collected 6 soil samples from the Site after completion of the demolition activities. Sample locations are presented on a unscaled map prepared by KELLCO, which is reproduced in Appendix A (Figure A-3). The sample methods and sample depths were not described in the KELLCO report. Soil samples were analyzed for lead using EPA Method 7240. Analytical results indicate that concentrations of lead range from 144.5 mg/kg (sample 1) to 580.7 kg/mg (sample 6) (Table 1).[13]

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[11] Redevelopment Agency 1996.
[12] KELLCO 1995.
[13] KELLCO 1995.

THE SOMA PHASE II SOIL AND GROUND-WATER INVESTIGATION

3.1 Soil Investigation

In September 1996, SOMA conducted a soil and ground-water investigation to assess the extent of residual lead in soil and ground-water at the Site. Eleven soil borings (SB-1 through SB-11) were drilled at the Site typically to depths of 2 to 4 feet bgs (Figures 2 and 3). Two of the borings, SB-1 and SB-2, were drilled to depths of 15 feet and 21 feet respectively and converted into temporary piezometers.

Three soil samples were collected at each sampling location at 0.5-, 1.5- and 4-foot depth intervals to assess the extent of lead in the following locations:

1) Areas anticipated to be uncovered (back yards and landscaped areas) after redevelopment of the Site
2) Areas anticipated to be covered (buildings and driveway) after redevelopment of the Site
3) The area below the roof drip line of the former house
4) The area below the roof drip line of the former shed
5) The area below the roof drip line of the former garage

For purposes of efficiency, the soil samples from a single location was used to evaluate multiple parameters. SB-9 was used to evaluate the approximate location of the roof drip line of the house and an uncovered area. The roof drip line is the area on the ground that lies below the roof edge of a structure extending approximately 2 to 3 feet from the exterior wall. Because of the unavailability of scaled drawings of the exact location of the former house and other structures that have existed on the property, the locations of the roof drip line of the former structures were only approximated.

Descriptions of the sediments encountered in the 11 soil borings are included in the lithologic logs presented in Appendix B. Field methods and procedures for bore hole drilling and soil sample collection are described in Appendix C. In general, sediments encountered in the borings consisted predominantly of relatively fine-grained silty clay and sandy clay sediments.

Three samples with the highest lead concentrations were resubmitted for STLC analysis to test for soluble lead. This requirement was made orally by the ACDEH on August 28, 1996 as an addendum to the Workplan of August 20, 1996.

3.1.1 Results of Soil Sample Analysis

Selected soil samples from borings SB-1 through SB-11 were analyzed for total lead using EPA Method 7420. The soil samples with the highest concentrations of total lead were analyzed for soluble lead using the California Waste Extraction Test (Title 22) combined with EPA Method 7420. Sample analysis results are summarized in Table 1. Chain-of-custody forms and laboratory analysis certificates are presented in Appendix D.

Areas of the Site Anticipated to be Left Uncovered After Redevelopment of the Site

Soil borings SB-2, SB-4, SB-5, SB-6, SB-7, SB-9 and SB-10 were installed to assess the presence of lead in areas anticipated to be left uncovered (landscaped) after redevelopment of the Site (Figure 4). Sample analysis results indicate lead was detected in soil samples collected at 0.5, 1.5, and 4.0 feet bgs (Table 1). In the sample interval 0.5 feet bgs, lead concentrations range from 5 mg/kg (sample SB-10-0.5) to 380 mg/kg (sample SB-9-05) (Figure 4). In the sample interval 1.5 feet bgs, lead concentrations range from 10 mg/kg (sample SB-5-1.5) to 110 mg/kg (sample SB-6-1.5). In the sample interval 4.0 feet bgs, lead concentrations range from 5 mg/kg (sample SB-5-4.0) to 9 mg/kg (sample SB-9-4.0).

The soil sample SB-9-0.5 (proposed Yard # 1, Figure 4) had the highest concentration of lead at the Site (380 mg/kg) at 0.5 feet bgs. The soil sample SB-7-0.5 (proposed Yard #2) had a lead concentration of 150 mg/kg. The two soil Samples SB-5-0.5 and SB-6-0.5 (proposed Yard # 3) had elevated concentrations of lead (310 mg/kg and 280 mg/kg, respectively). In general, lead concentrations in the soil decrease with depth.

The soil sample SB-9-0.5 (proposed Yard # 1) that had the highest detected concentration of lead at the Site, had a soluble lead concentration of 0.5 mg/L. The soil sample SB-5-0.5 (proposed Yard # 3) had a soluble lead concentration of 14 mg/L.

Areas Anticipated to be Covered After Redevelopment of the Site

Soil borings SB-1, SB-3, SB-8, and SB-11 were installed to assess the presence of lead in areas anticipated to be covered by buildings and driveways after redevelopment of the Site (Figure 4). Sample analysis results indicate lead was detected in soil samples collected at 0.5, 1.5, and 4.0 feet bgs (Table 1). In the sample interval 0.5 feet bgs, lead concentrations range from 16 mg/kg (sample SB-8-0.5) to 290 mg/kg (sample SB-1-05) (Figure 4). In the sample interval 1.5 feet bgs, lead concentrations range from 6 mg/kg (sample SB-3-1.5) to 28 mg/kg (sample SB-1-1.5). In the sample interval 4.0 feet bgs, lead concentrations range from 6 mg/kg (sample SB-3-4.0) to 17 mg/kg (sample SB-1-4.0).

Soil sample SB-1-0.5 (proposed Unit # 3) had the highest concentration of lead in the covered areas (290 mg/kg) at 0.5 feet bgs. Soil sample SB-3-0.5 (proposed driveway) had a lead concentration of 26 mg/kg at 0.5 feet bgs. The soil sample SB-11-0.5 (proposed Unit # 1, Figure 4) had a lead concentrations of 42 mg/kg at 0.5 feet bgs. Soil sample SB-8-0.5 (proposed Unit # 2) had a lead concentration of 16 mg/kg at 0.5 feet bgs. In general, lead concentrations decrease with increasing depth.

The soil sample SB-1-0.5 (proposed Unit # 3) had a soluble lead concentration of 10 mg/L.

Area Below the Approximate Roof Drip Line of the Former House

Soil borings SB-9 and SB-10 were installed to assess the presence of lead in the soil within the vicinity of the drip line of the former house (Figure 4). Sample analysis results indicate lead was detected in soil samples collected at 0.5, 1.5, and 4.0 feet bgs (Table 1). In the sample interval 0.5 feet bgs, lead concentrations range from 5 mg/kg (SB-10-0.5) to 380 mg/kg (SB-9-0.5).

Area Below the Approximate Roof Drip Line of the Former Shed

Soil boring SB-6 was installed to assess the presence of lead within the vicinity of the drip line of the former shed (Figure 4). Sample analysis results indicate lead was detected in soil samples collected from SB-6 at 0.5 feet bgs (280 mg/kg), at 1.5 feet bgs (110 mg/kg), and at 4.0 feet bgs (6 mg/kg) (Table 1).

Area Below the Approximate Roof Drip Line of the Former Garage

Soil borings SB-2 and SB-3 were installed to assess the presence of lead within the vicinity of the drip line of the former garage (Figure 4). Sample analysis results indicate lead was detected in soil samples collected at 0.5, 1.5, and 4.0 feet bgs (Table 1). In the sample interval 0.5 feet bgs, lead concentrations range from 26 mg/kg (SB-3-0.5) to 140 mg/kg (SB-2-0.5), and at 4.0 feet bgs the detected lead concentration was 6 mg/kg (Table 1).

3.2 Ground-Water Investigation

SOMA conducted a ground-water investigation at the Site in September 1996. Two ground-water grab sample borings (SB-1 and SB-2) were installed to assess the depth to ground water and collect ground-water samples at the Site. The two borings was chosen for their central location at the Site. Details of water sample collection methods are included in Appendix C.

On September 13, 1996, ground-water grab samples were collected from temporary piezometers in soil borings SB-1, and SB-2 (Figure 3). Ground-water samples from SB-1 and SB-2 were analyzed for lead using EPA Method 7420. Sampling analysis results are summarized in Table 2.

3.2.1 Results of Ground-Water Sample Analysis

Ground-water investigation data include samples collected from two on-site temporary piezometers. Temporary piezometers SB-1 and SB-2 were installed to depths of 15.0 feet and 21 feet bgs, respectively, to assess lead concentrations in on-site ground water. Analytical results from ground-water samples collected from SB-1 and SB-2 indicate lead was not detected (<0.1 mg/L) (Table 2).

3.2.2 Depth to Ground Water

Based on ground-water level measurements collected on September 13, 1996 from temporary piezometers installed at the subject Site, depth to ground water was 6.66 feet bgs in temporary piezometer SB-1 and 5.05 feet bgs in temporary piezometer SB-2 (Table 2).

3.2.3 Ground-Water Flow Direction and Gradient

Ground-water flow direction and gradient were estimated by reviewing environmental reports at two nearby sites (e.g., less than 2,000 feet from the subject Site). SOMA reviewed a ground-water investigation report prepared by Harding Lawson Associates (HLA) at 1600 63rd Street in

Emeryville, California and an environmental investigation/remediation report prepared by Subsurface Consultants, Inc. (S.C.) at 6707 Bay Street, in Emeryville, California.[14] Ground-water flow maps from these 2 sites are presented in Appendix E.

The 1600 63rd Street site is approximately 1,500 feet west of the subject Site (1258 64th Street). Based on a review of the HLA report, depth to ground water at 1600 63rd Street in Emeryville is approximately 4 to 7 feet bgs and ground-water flow direction is west towards the San Francisco Bay under a gradient of approximately 0.01 foot/foot (Figure E-1, Appendix E).[15]

The 6707 Bay Street site is approximately 2,400 feet west northwest of the subject Site (1258 64th Street). Based on review of the S.C. Report, ground-water at 6707 Bay Street in Emeryville is approximately 8 to 12 feet bgs and ground-water flow is to the northwest at a gradient of approximately 0.03 foot/foot (Figure E-2, Appendix E).[16]

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[14] HLA 1989; S.C. 1994.
[15] HLA 1989.
[16] S.C. 1994.

4.0
REGIONAL AND LOCAL HYDROGEOLOGY

The ground surface in the Site vicinity is approximately 30 feet above mean sea level and slopes gently west towards the San Francisco Bay. Ground water is encountered at a depth of approximately 5 feet to 6 feet bgs in the Site vicinity and generally flows in the direction of the natural surface topography (i.e., west) towards the San Francisco Bay. The San Francisco Bay is approximately 0.5 miles west of the Site. (Figure 1).

Due to the proximity of the Bay, shallow-depth sediments in the Site vicinity consist of fine-grained silt and clay sediments deposited in tidal marsh and estuarine environments. Regionally, the upper sediment intervals (within approximately 200 feet of ground surface) reportedly consist primarily of silt and clay sediments with no major regional aquifers present. Sand and gravel water-yielding strata within the upper sediment interval are likely present as lenticular units of limited lateral and vertical extent. Typical hydraulic conductivity values for the types of silt and clay sediments found at the Site range between 10^{-3} to 10^{-5} cm/s.

5.0
BENEFICIAL USES OF GROUND-WATER

The Site is relatively small (approximately 107 feet by 50 feet) and is located in a residential neighborhood with commercial and light industrial business as close as a half a block away. The Site is approximately 0.5 miles east of the San Francisco Bay (Figure 1). Potential beneficial uses of ground water within the San Francisco Bay Basin include municipal (domestic), industrial, and agricultural supply.

In 1989, Harding Lawson Associates (HLA) performed a literature search to assess ground-water usage within a 1-mile radius of a site located at 1600 63rd Street in Emeryville, California. The HLA site is approximately 1,500 feet west of the subject Site at 1258 64th Street. HLA obtained well information from the California State Department of Water Resources (DWR), County of Alameda Public Works Agency, and Alameda County Department of Environmental Health. HLA reported that no domestic drinking water wells were recorded in the area. An unspecified number of wells are used for industrial process water supply and cathodic protection.[17]

Water supplies for the subject Site and nearby facilities are provided by East Bay Municipal Utility District (EBMUD) from municipal water sources located outside of a 1/2-mile radius from the Site. The availability of water from EBMUD, institutional controls, and the use of deeper aquifer supplies precludes the use of shallow ground-water as a potential source for municipal, industrial and agricultural water supplies.

[17] HLA 1989.

6.0
DEVELOPMENT OF TARGET CLEANUP GOAL FOR LEAD

Lead is classified by the U.S. Environmental Protection Agency (U.S. EPA) as a Group B2 - Probable Human Carcinogen.[18] However, a cancer slope factor for lead has not been identified by the California Environmental Protection Agency (Cal EPA) or U.S. EPA. It has been shown that lead's noncarcinogenic effects are significant and sensitive for humans. Because of the unique toxicological characteristics of lead, lead concentration in blood or blood lead is used as the criterion for evaluating lead toxicity and calculating a target cleanup goal (TCG) for lead. Cal EPA's Department of Toxic Substances Control (DTSC) has developed a one-compartment bio-uptake model known as the Lead Risk Assessment Spreadsheet (LeadSpread) for use in quantifying potential risks associated with lead concentrations in soil. A TCG for lead was developed based on the use of LeadSpread, version Pb6 (hereafter referred to as "Pb6"). The algorithms used to quantify risks in Pb6 can also be run in reverse in order to "back-calculate" to a concentration of lead in soil that is health-protective, based upon a given target blood lead concentration criterion. The method and procedures used in the development of the TCG for lead are consistent with Cal EPA and U.S. EPA guidelines.[19]

In order to perform an evaluation with Pb6, certain information is required to model the conditions of interest. A risk-based TCG for lead in soil at the Site can be performed if site-specific information about the conditions which contribute to potential exposures at the Site are incorporated into the model. This process involves the quantification of site-specific exposure parameters that are used as input parameters in the Pb6.

6.1 Land-Use and Potential Receptor Populations

The Site is currently vacant and undeveloped. The Site consists of an unpaved, undeveloped lot zoned for residential land-use. Because current access to the Site is restricted by a chain-link fence at the street side of the property and a wooden fence that surrounds the remaining 3 sides of the property, there are no current receptor populations that are potentially at risk due to direct exposure

[18] U.S. EPA 1996.
[19] Cal EPA 1992; U.S> EPA 1989.

to lead-affected soils at the Site. Based upon the Site's intended future land-use as residential housing, children and adults residing at the Site represent potential future on-site receptors.

6.2 Potential Routes of Exposure

Potential routes of exposure to lead-affected soils include: incidental soil ingestion; direct dermal contact; and inhalation of lead-affected particulate matter. Because of the long half-life of lead in the human body, background exposures due to lead in food, drinking water and ambient air contribute to a long term body burden that is important to evaluating site-specific effects and identifying a health-protective TCG.

6.3 The Pb6 Model and Input Parameters

The health-protective criterion identified by both U.S. EPA and Cal EPA as an acceptable blood lead concentration is 10 µg/dL. Blood lead concentrations are favored in evaluating exposure to lead because of the extensive human epidemiological data supporting the relationship between blood lead concentrations and adverse health effects.

A child resident is considered to be the most sensitive receptor under a residential scenario. Based on an acceptable blood lead level of 10 µg/dL, the Pb6 model back-calculates an acceptable concentration of lead in soil that could exist at the Site and still be protective of human-health. Appendix F explains the assumptions underlying the Pb6 model and presents the input parameters and values that were used in the modeling. Table F-1 in Appendix F is a reproduction of the summary spreadsheet generated by the Pb6 model.

6.3.1 Drinking Water Lead Concentration

Site-specific drinking water samples were collected from a kitchen sink faucet at a newly constructed residence located at 1265 Ocean Avenue, Emeryville, California. Federal procedures for collecting drinking water samples were followed pursuant to 40 CFR 141.86. The sampling procedures are described in more detail in Appendix F, Section F-2.3. The first-draw sample contained 11 ug/L (ppb) of lead. The rationale behind this sample is that is it assumed to represent lead concentrations that were potentially introduced by the plumbing fixtures found in the building. The second sample was reported as not containing lead at the sample quantitation limit of 1 ug/L (ppb). This sample is assumed to represent the quality of the water that is distributed by the utility company. Based on previous experience, SOMA has found that both samples are normally reported as not detected for lead in newly constructed buildings or where new plumbing fixtures have been used to update the

plumbing. If the non-detect level for lead had been used as the drinking water concentration of lead in Pb6, a TCG for lead concentrations in soil of 388 mg/kg would have been acceptable at the Site.

Since SOMA used a drinking water concentration of 11 ug/L, the calculated TCG was lower at 320 mg/kg. If the three new residences at 1258 64th Street use lead-free plumbing fixtures, and the first draw lead concentrations in the drinking water is not detected at a sample quantitation limit of 1 ug/L, then a TCG of 388 mg/kg is appropriate for the Site. Since a TCG of 320 mg/kg will be implemented at the Site, the TCG will be conservative and will represent a comfortable safety margin for the City against future liabilities.

6.4 Pb6 Model-Generated Target Cleanup Goal (TCG) for Lead

The TCG for lead that represents the 95% UCL concentration of lead in soil is 320 mg/kg. Based on the use of Pb6, this concentration is considered to be health-protective for a child under a residential exposure scenario.

7.0
SUMMARY AND CONCLUSIONS

The Phase II Soil investigation results indicate that the highest concentrations of lead in Site soils are present in the near surface depth interval (0.0 to 0.5 feet bgs) in the central and northern portions of the Site (Figure 4). The magnitude of the distribution of lead in the near surface soil is not uniform and differs by as much as two orders of magnitude between sampling locations. The highest detected concentrations of lead in the Phase II investigation (380 mg/kg at SB-9 and 310 mg/kg at SB-5) does not confirm the highest concentrations reported in the EIC (2,347.3 mg/kg) and KELLCO (2,634 mg/kg) studies. The highest concentrations reported by both EIC and KELLCO were detected in the vicinity of the former house in an area that approximates the roof drip line surrounding the house. This area would be expected to exhibit elevated concentrations due to the weathering of lead-based paints from the exterior surfaces of the house.

Although KELLCO did not resample their predemolition sampling locations that yielded high concentrations of lead, KELLCO's post demolition sampling did yield lower lead concentrations. Demolition activities were not accompanied by soil removal and off-site disposal, therefore, the analytical results of all post demolition soil samples collected at the Site should be considered representative of the Site. KELLCO's post-demolition sampling results were lower than their pre-demolition samples. This phenomenon is consistent with the results of demolition activities where soil is moved due to grading of the property after removal of the house, garage and subsurface foundations. The differences in lead concentration between KELLCO's post demolition sampling and SOMA's Phase II investigation may be due to the depth at which the soil samples were collected. The depth at which KELLCO collected the soil samples is unknown but may have been closer to the surface (surface samples). SOMA collected the surface soil samples at 0.5 feet bgs. In general, lead concentrations decreased with increasing depth.

Lead concentrations detected in soil by past consultants and during the recent Phase II investigation are due to weathering of lead-based paints that was applied to the exterior surfaces of the house. This is based on the following evidence:

- The Site has been in continuous use for residential land use since 1911, and before that, was vacant land

- The highest concentrations of lead are found in near surface soil samples
- There is a concentration gradient from high to low as deeper soil samples are analyzed. Lead in the form of paint chips would not be expected to migrate to deeper depths unless physically disturbed or leached out of the paint matrix.
- The elevated concentrations of lead in the 2- to 3-foot depth interval at different locations of the Site are likely due to demolition activities and/or landscaping activities that resulted in mixing of lead-affected surface soils with the deeper soil

A conservative target cleanup goal for lead was identified based on risk using a bio-uptake model known as the Lead Risk Assessment Spreadsheet, version Pb6, that was developed by DTSC of Cal EPA. The basis of the model is the use of lead concentrations in blood, or blood lead, as a criterion for evaluating the significance of lead in the environment. SOMA used an acceptable blood lead concentration of 10 ug/dL as the model criterion for identifying the target cleanup goal. An explanation of the method is found in Section 6 of the report and fully documented in Appendix F. A TCG of 320 mg/kg was calculated as appropriate for the Site.

A comparison of on-site concentrations of lead with the calculated TCG of 320 mg/kg indicates that residual lead levels at the Site exceed the site-specific calculated TCG in only one location (380 mg/kg at sample SB-9-0.5).

WET Extraction test results from soil samples with the highest TTLC lead concentrations indicated that two of the samples (SB-1-1.5 and SB-5-0.5) exceeded the STLC of 5 mg/L for lead. The following table summarizes the results.

Table 7.1. TTLC and STLC Results

Sample Location	Depth (feet)	TTLC Results (mg/kg)	STLC Results (mg/L)
SB-1	0.5	290	10
SB-5	0.5	310	14
SB-9	0.5	380	0.5

For purposes of excavation and disposal, soil from sampling locations SB-1 and SB-5 would be classified by CalEPA as hazardous waste; however, if left in place, would not be considered hazardous

to public health under residential conditions since both sampling locations were characterized as having lead concentrations less than the TCG of 320 mg/kg.

The soluble lead values in SB-1 and SB-5 in near surface soils exceed STLC values. There is a potential that lead in near surface soils could migrate downward and affect ground-water. This may be a potential concern because of the shallow depth to ground water (5 to 6 feet bgs). However, several facts mitigate the concern:

- Ground water results indicate lead was not detected at a sample quantitation limit of 0.1 mg/l. Site ground water does not appear to be affected by on-site lead concentrations in soil.

- Access to municipal water supplies and institutional controls regulating the installation of water wells precludes the use of shallow ground water as a potential source for drinking water in the Site vicinity. No drinking water wells were identified within 1/4 mile of the Site.

- There is a marked decrease in lead concentrations with depth. The following table summarizes the lead concentrations at the 0.5-, 1.5- and 4-foot depth interval.

Table 7.2. Lead Concentrations with Depth

Sample Location	Lead Concentration 0.5-Foot Depth (mg/kg)	Lead Concentration 1.5-Foot Depth (mg/kg)	Lead Concentration 4.0-Foot Depth (mg/kg)
SB-1	290	28	17
SB-3	26	6	6
SB-5	310	10	5
SB-6	280	110	6
SB-9	380	32	9
SB-11	42	10	12

- Geotechnical requirements for the preparation of the property for construction require the top 6 inches of soil be removed to clear the top soil of plants material, a process known as clearing and grubbing. This procedure would essentially remove the soil sources of lead that exceed the STLC.

- In addition to the requirements for clearing and grubbing, SOMA is recommending that the top 10 inches of soil be removed to complete the remediation of lead-affected soil. This requirement will also remove the soil sources of lead that exceed the STLC.

- Based on the nature of the planned development of the Site, the majority of the Site will be covered by building structures or concrete walkways and driveways.

It is unlikely the present concentrations of lead in soil will remain the same after development of the Site and residual lead concentrations will mobilize to a significant extent.

Based on an evaluation of the analytical results of the Phase II soil samples and the calculated target cleanup goal for lead, only one sampling location exceeded the target cleanup goal of 320 mg/kg. A soil sample from the 6 inch depth interval at SB-9 was reported at 380 mg/kg. Since the amount of soil is relatively small, an extensive evaluation of remedial alternatives was not undertaken. SOMA's recommendation for addressing the remediation of the elevated lead concentration at SB-9 is presented below.

1) Remedial Action. Excavate soil that exceed the TCG of 320 mg/kg of lead and dispose off site at an appropriate landfill or rebury on site under building pads and driveways. The TCG is exceeded in only one location, SB-9, at a concentration of 380 mg/kg. In addition, SOMA recommends that soil from sampling location SB-5 be excavated and disposed since the concentration at SB-5 of 310 mg/kg is relatively close to the TCG of 320 mg/kg. The soil sample at SB-5 was a surface sample from the 6-inch depth interval at an uncovered area of the backyard of Unit 3. Its proximity made it a suspect location for direct contact exposures. Given the heterogeneity of soil, SOMA felt it was prudent to remove SB-5.

   A 10-foot diameter surround the two sampling locations to a depth of 1-foot will be excavated. Less than 10 cubic yards are estimated to be generated from the selected excavations. Stockpile the soil and collect a 4-point composite soil sample to determine appropriate disposal alternatives. In addition, a second sample will be taken to evaluate the possibility that the soil may be considered a RCRA waste. A total of five confirmation soil samples from the side walls and floor of each excavation location will be collected to confirm the attainment of the TCG.

2) Geotechnical Requirement. Excavate the top six inches of soil at the Site and transport it to an appropriate land fill for disposal (Class I or Class II landfill). The geotechnical report by Geotechnical Engineering Inc. recommends that all existing vegetation and debris be removed from the Site prior to construction. The report estimates that the stripping depth would be approximately six inches. Approximately 150 cubic yards of soil are estimated to be generated from the excavation.

Remedial Action. In order to accommodate geotechnical requirements, and at the same time, accomplish site remediation, SOMA recommends that the top 10 inches of soil be excavated from the entire Site. This depth is considered to take into consideration the heterogeneity of soil and account for the fact that both KELLCO and EIC reported lead concentrations in excess of 2000 mg/kg in the surface soil. Approximately 200 yd^3 of soil are estimated to be generated from the excavation. Two samples, each consisting of a composite of four discrete samples will be taken from this excavated soil to evaluate disposal options. An additional sample will be taken to evaluate the possibility that the soil may be considered a RCRA waste.

After the soil removal has been completed and stockpiled on site, 8 confirmation samples will be collected from the Site. Surface soil samples from the 3-inch depth interval from the following sample locations will be collected: SB-1, SB-2, SB-4, SB-5, SB-6, SB-7, SB-9, and SB-11. If the 95 percent UCL concentration for the confirmation lead samples are less than the TCG of 320 mg/kg, lead remediation will be assumed to be complete and in compliance with the ACDEH requirements for site closure. If any of the 8 discrete samples exceed the TCG, remediation will be considered complete as long as the sample(s) are beneath building pads and concrete driveways and walkways.

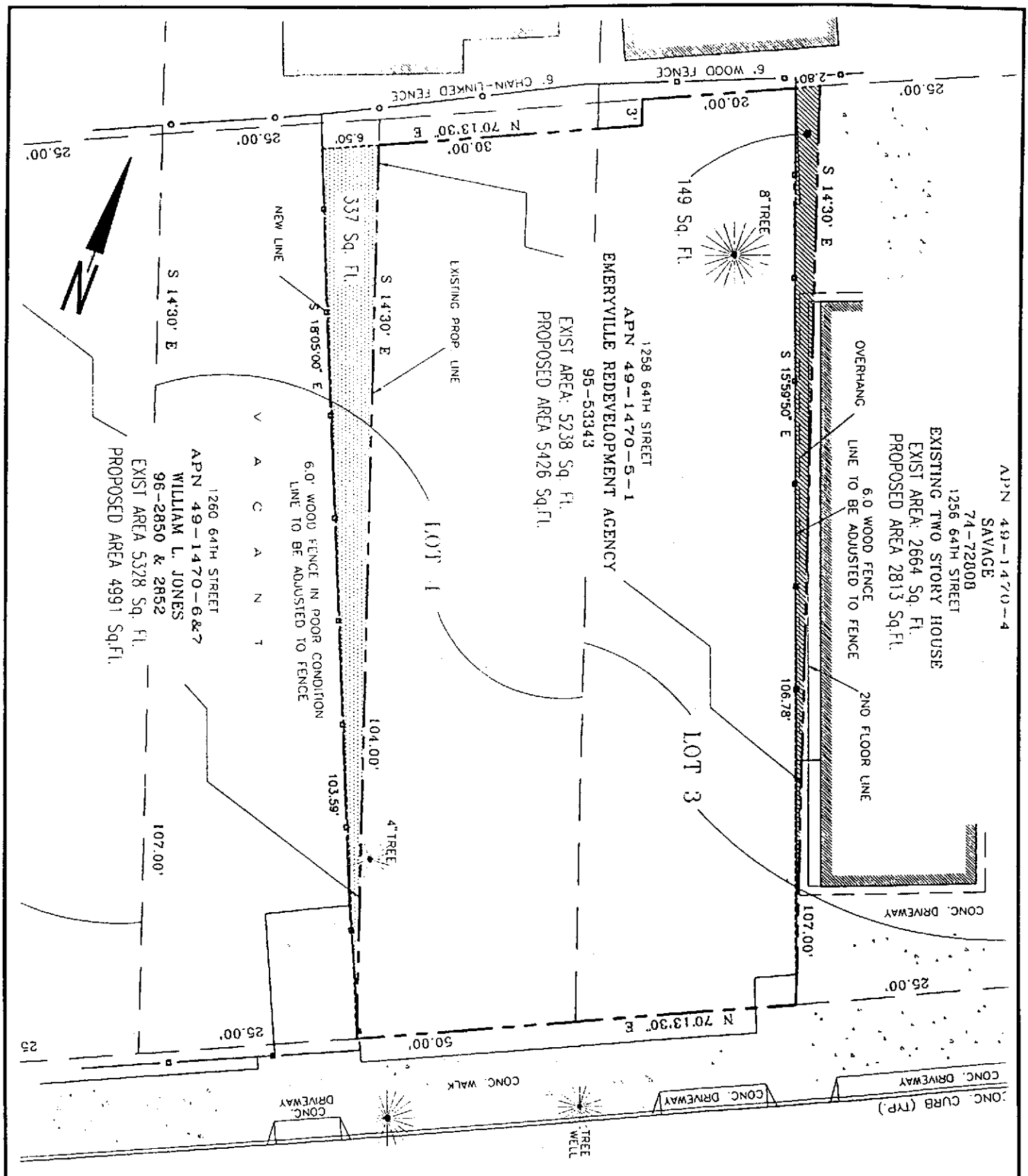
3) As an option to off-site soil disposal, evaluate the geotechnical feasibility of placing excavated soil below the proposed building slabs and driveways.

Source: U.S.G.S. Map presented as Figure 2 in A R E.A. 1996. Scale: 1" = 2000'

SOMA CORPORATION

Site Location Map
1258 64th Street • Emeryville, California

Project. No. 96-2088	October 1996	**Figure 1**

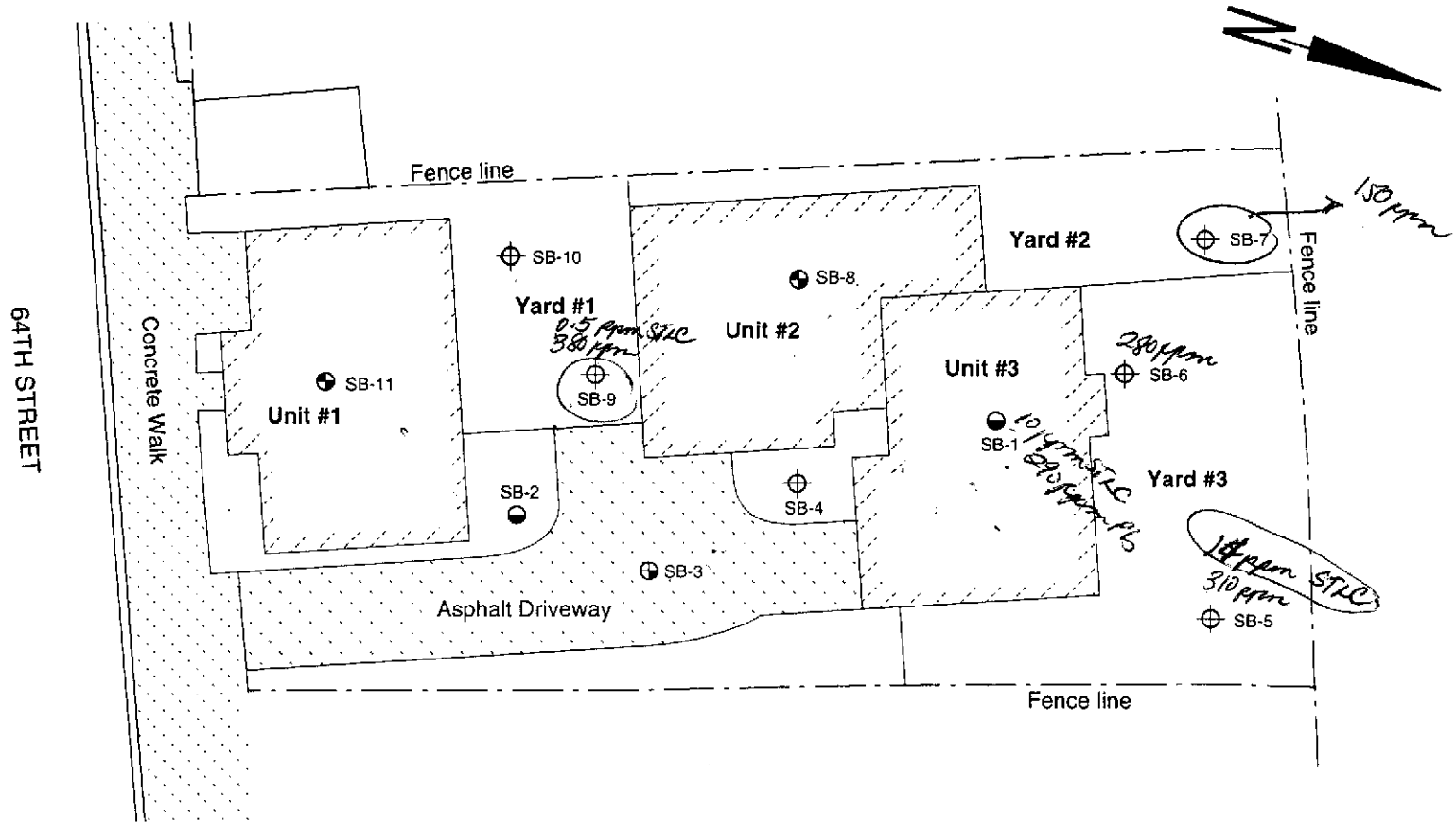


Source: Boundary & Topographic Survey by Humann Co., Inc presented in GEI 1995. Scale: 1" = 20'

SOMA CORPORATION

Site Plan
1258 64th Street • Emeryville, California

Project. No. 96-2088	October 1996	**Figure 2**



EXPLANATION

- ⊕ Soil boring in proposed exposed area
- ◒ Soil boring in proposed capped/covered area (concrete building pad / asphalt)
- ◒ Soil and Ground-Water sampling location

0 10 20

Approx. Scale in Feet

Source: Site Plan based on proposed redevelopment plan by Siegel&Strain (October 1995) and Lot Line Adjustment Survey by Humann Co., Inc. (March 1996).

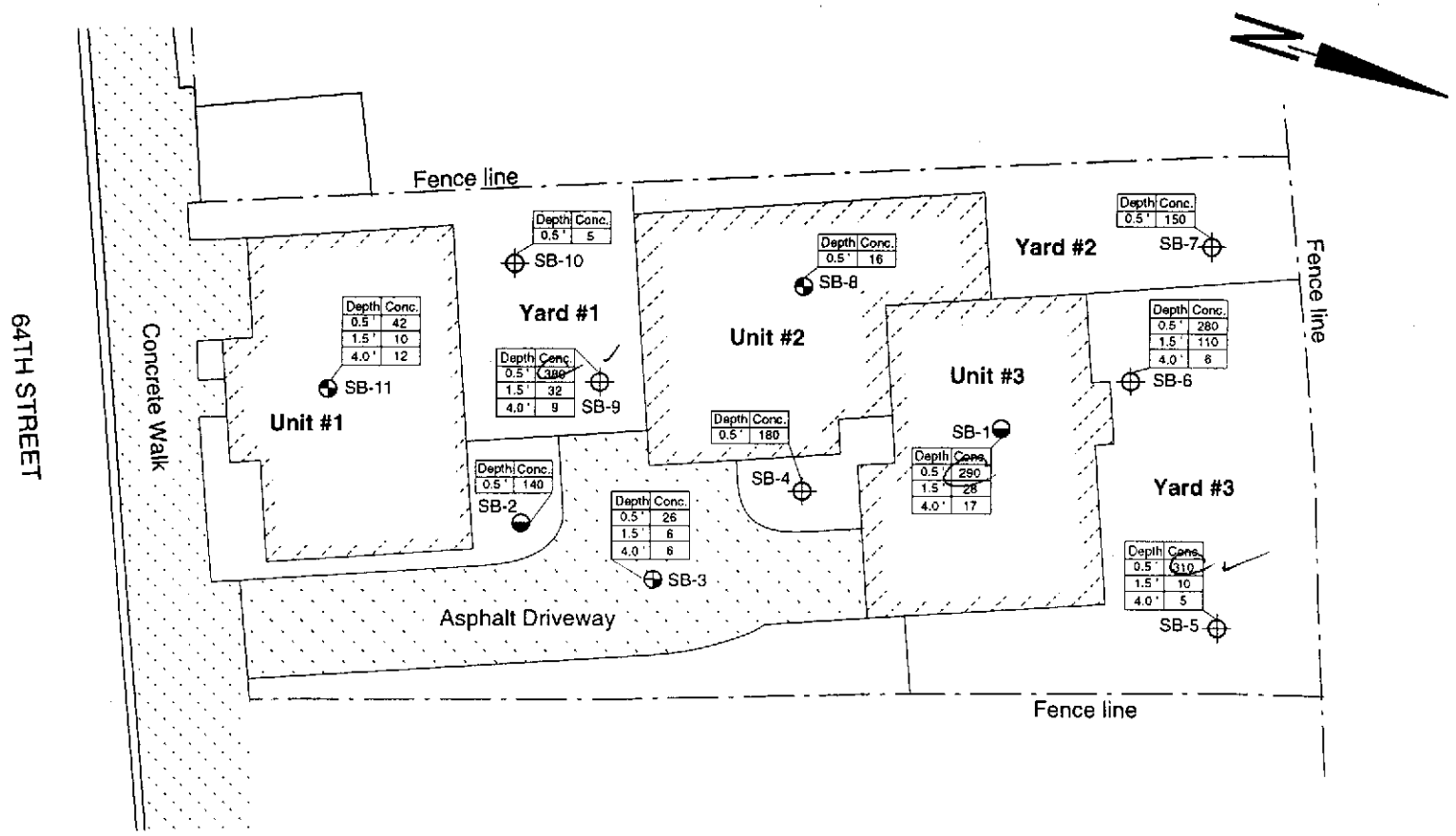
SOMA CORPORATION

Site Map Showing Soil and Ground-Water Sampling Locations
1258 64th Street • Emeryville, California

October 1996

Proj. No.96-2088

Figure 3



EXPLANATION

- Soil boring in proposed exposed area
- Soil boring in proposed capped/covered area (concrete building pad / asphalt)
- Soil and Ground-Water sampling location

0 10 20

Approx. Scale in Feet

Note: Lead concentrations are in the units of mg/kg (ppm)

Source: Site Plan based on proposed redevelopment plan by Siegel&Strain (October 1995) and Lot Line Adjustment Survey by Humann Co., Inc. (March 1996).

SOMA CORPORATION

Site Map Showing Lead Concentrations in Soil
1258 64th Street • Emeryville, California

October 1996

Proj. No.96-2088

Figure 4

Table 1
Historical Soil Quality - 1258 64th Street, Emeryville, California

Sample Number	Sample Depth (feet, inches bgs)	Sampling Date	Notes	EPA Analytical Method	Pb Analytical Result (mg/kg)	CA Waste Extraction Test (CA Title 22) Analytical Result (mg/L)
ENVIRONMENTAL SERVICES (Site Investigation conducted pre-demolition)						
U	U	3-May-95	(1)	U	> 500	NA
U	U	3-May-95		U	< 500	NA
U	U	3-May-95		U	< 500	NA
U	U	3-May-95		U	< 500	NA
ENVIRONMENTAL INNOVATIONS CORPORATION (Site Investigation conducted pre-demolition)						
North Side of House	0.0 '	31-May-95		FLAA	258.2	NA
North Side of House	1.0 '	31-May-95		FLAA	440.9	NA
North Side of House	2.0 ' - 3.0 '	31-May-95		FLAA	647.7	NA
East Side of House	0.0 '	31-May-95		FLAA	595.5	NA
East Side of House	1.0 '	31-May-95		FLAA	304.0	NA
East Side of House	2.0 ' - 3.0 '	31-May-95		FLAA	289.9	NA
South Side of House	0.0 '	31-May-95		FLAA	2347.3	NA
South Side of House	1.0 '	31-May-95		FLAA	318.4	NA
South Side of House	2.0 ' - 3.0 '	31-May-95		FLAA	365.4	NA
KELLCO (Site Investigation conducted pre-demolition)						
01	2 "	2-Aug-95	(2)	EPA 7420	2634	NA
02	2 "	2-Aug-95	(3)	EPA 7420	474.6	NA
03	2 "	2-Aug-95	(2)	EPA 7420	1421	NA
04	2 "	2-Aug-95	(4)	EPA 7420	341.4	NA
05	2 "	2-Aug-95	(3)	EPA 7420	297.8	NA
06	2 "	2-Aug-95	(3)	EPA 7420	391.2	NA
07	2 "	2-Aug-95	(3)	EPA 7420	444	NA
08	2 "	2-Aug-95	(3)	EPA 7420	211.1	NA
KELLCO (Site Investigation conducted post-demolition)						
01	U	9-Oct-95		EPA 7420	144.5	NA
02	U	9-Oct-95		EPA 7420	327.3	NA
03	U	9-Oct-95		EPA 7420	166.8	NA
04	U	9-Oct-95		EPA 7420	295.4	NA
05	U	9-Oct-95		EPA 7420	452.5	NA
06	U	9-Oct-95		EPA 7420	580.7	NA

Table 1
Historical Soil Quality - 1258 64th Street, Emeryville, California

Sample Number	Sample Depth (feet, inches bgs)	Sampling Date	Notes	EPA Analytical Method	Pb Analytical Result (mg/kg)	CA Waste Extraction Test (CA Title 22) Analytical Result (mg/L)
SOMA CORPORATION (Site Investigation conducted post-demolition) (5)						
SB-1-0.5	0.5 '	9-Sep-96		EPA 7420	290	10
SB-1-1.5	1.5 '	9-Sep-96		EPA 7420	28	NA
SB-1-4.0	4.0'	9-Sep-96		EPA 7420	17	NA
SB-2-0.5	0.5 '	9-Sep-96		EPA 7420	140	NA
SB-3-0.5	0.5 '	9-Sep-96		EPA 7420	26	NA
SB-3-1.5	1.5 '	9-Sep-96		EPA 7420	6	NA
SB-3-4.0	4.0'	9-Sep-96		EPA 7420	6	NA
SB-4-0.5	0.5 '	9-Sep-96		EPA 7420	180	NA
SB-5-0.5	0.5 '	9-Sep-96		EPA 7420	310	14
SB-5-1.5	1.5 '	9-Sep-96		EPA 7420	10	NA
SB-5-4.0	4.0'	9-Sep-96		EPA 7420	5	NA
SB-6-0.5	0.5 '	9-Sep-96		EPA 7420	280	NA
SB-6-1.5	1.5 '	9-Sep-96		EPA 7420	110	NA
SB-6-4.0	4.0'	9-Sep-96		EPA 7420	6	NA
SB-7-0.5	0.5 '	9-Sep-96		EPA 7420	150	NA
SB-8-0.5	0.5 '	9-Sep-96		EPA 7420	16	NA
SB-9-0.5	0.5 '	9-Sep-96		EPA 7420	380	0.5
SB-9-1.5	1.5 '	9-Sep-96		EPA 7420	32	NA
SB-9-4.0	4.0'	9-Sep-96		EPA 7420	9	NA
SB-10-0.5	0.5 '	9-Sep-96		EPA 7420	5	NA
SB-11-0.5	0.5 '	9-Sep-96		EPA 7420	42	NA
SB-11-1.5	1.5 '	9-Sep-96		EPA 7420	10	NA
SB-11-4.0	4.0'	9-Sep-96		EPA 7420	12	NA

NOTES:

U Unavailable; not documented in original report.
NA Not Analyzed.
FLAA Flame Atomic Absorption Spectroscopy.
(1) Composite drip line sample.
(2) Composite of 3 lateral samples.
(3) Composite of 4 lateral samples.
(4) Composite of 5 lateral samples.
(5) Samples analyzed by American Environmental Network (AEN).

Table 2
Summary of Ground-Water Sample Analysis - 1258 64th Street, Emeryville, California

Sample Number	Depth to Ground-Water (feet bgs)	Sampling Date	EPA Analytical Method	Pb Analytical Result (mg/L)
SOMA CORPORATION (Site Investigation conducted post-demolition) (1)				
SB-1	6.66 '	9-Sep-96	EPA 7420	ND < 0.1
SB-2	5.05 '	9-Sep-96	EPA 7420	ND < 0.1

NOTES:
(1) Samples analyzed by American Environmental Network (AEN).
ND Not Detected at or above the reporting limit for that particular sample.

Table 3
Summary of Tap Water Sample Analysis - 1265 Ocean Avenue, Emeryville, California

Sample Number	Sampling Date	EPA Analytical Method	Pb Analytical Result (mg/L)
SOMA CORPORATION (In conjunction with the site investigation conducted post-demolition) (1)			
TW-1 *	13-Sep-96	EPA 7420	0.011
TW-2 *	13-Sep-96	EPA 7420	ND < 0.001

NOTES:

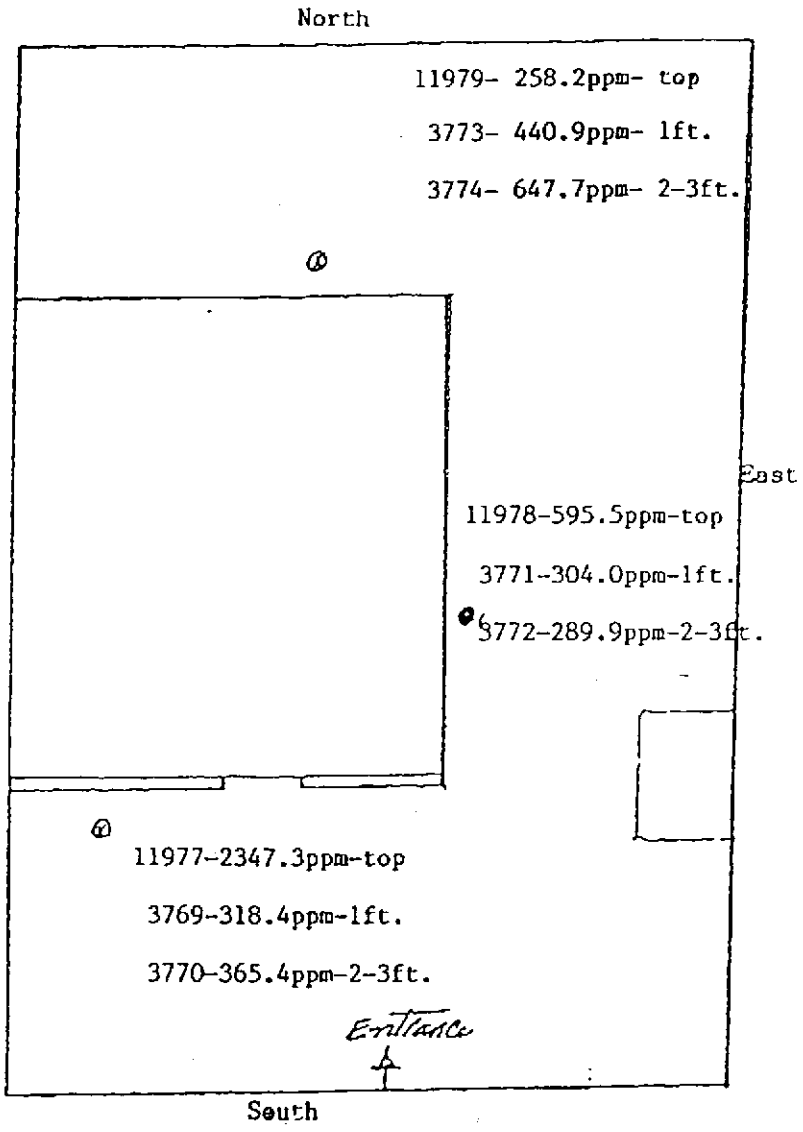
(1) Samples analyzed by American Environmental Network (AEN).

* TW-1 and TW-2 were collected at the kitchen sink tap from a residence at 1265 Ocean Avenue.

ND Not Detected at or above the reporting limit for that particular sample.

APPENDIX A

SOIL SAMPLE LOCATION MAPS FROM PREVIOUS CONSULTANTS

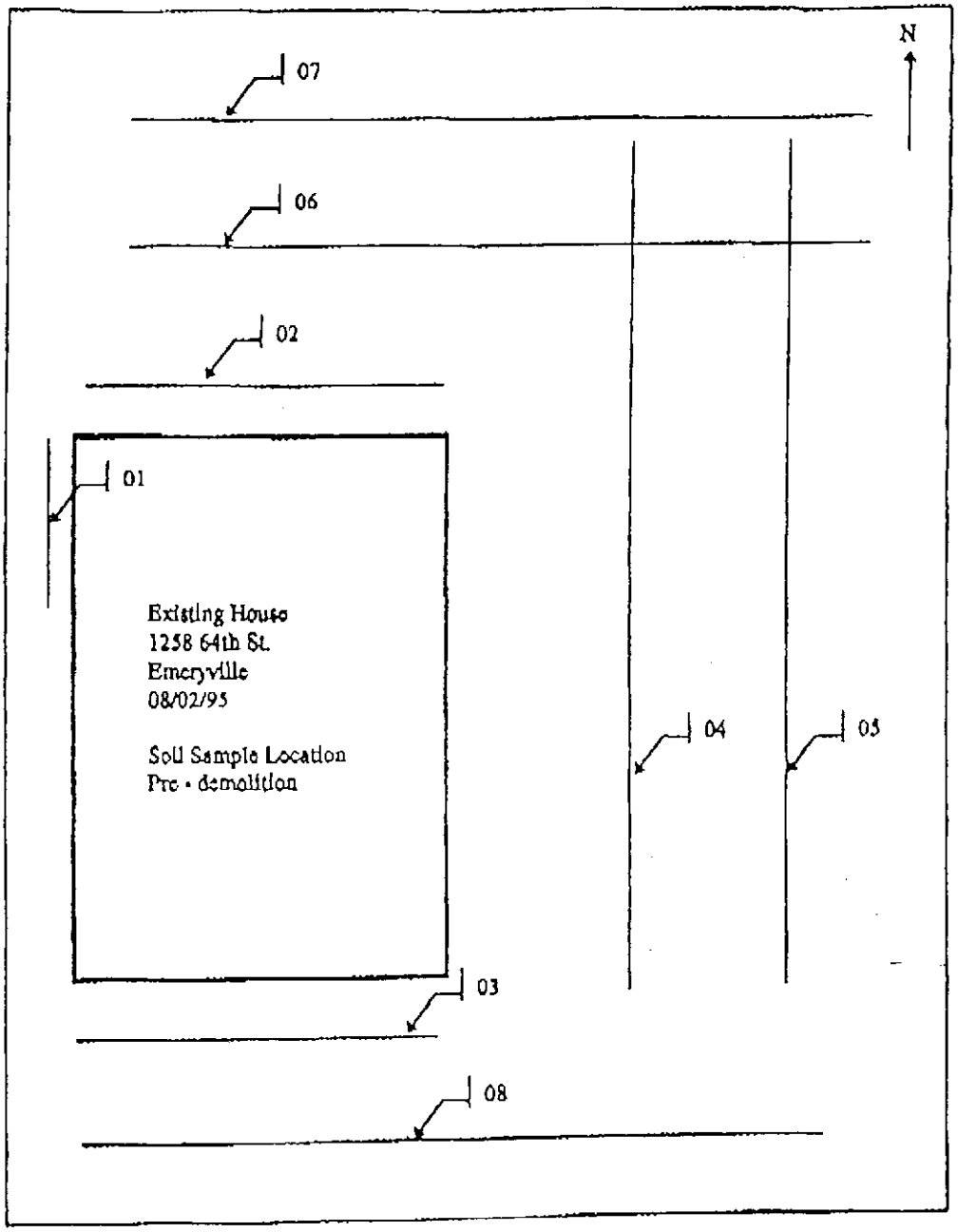


Source: EIC 1995. No Scale.

SOMA CORPORATION

Site Map Showing EIC Soil Sampling Locations
1258 64th Street • Emeryville, California

Project. No. 96-2088	October 1996	**Figure A-1**

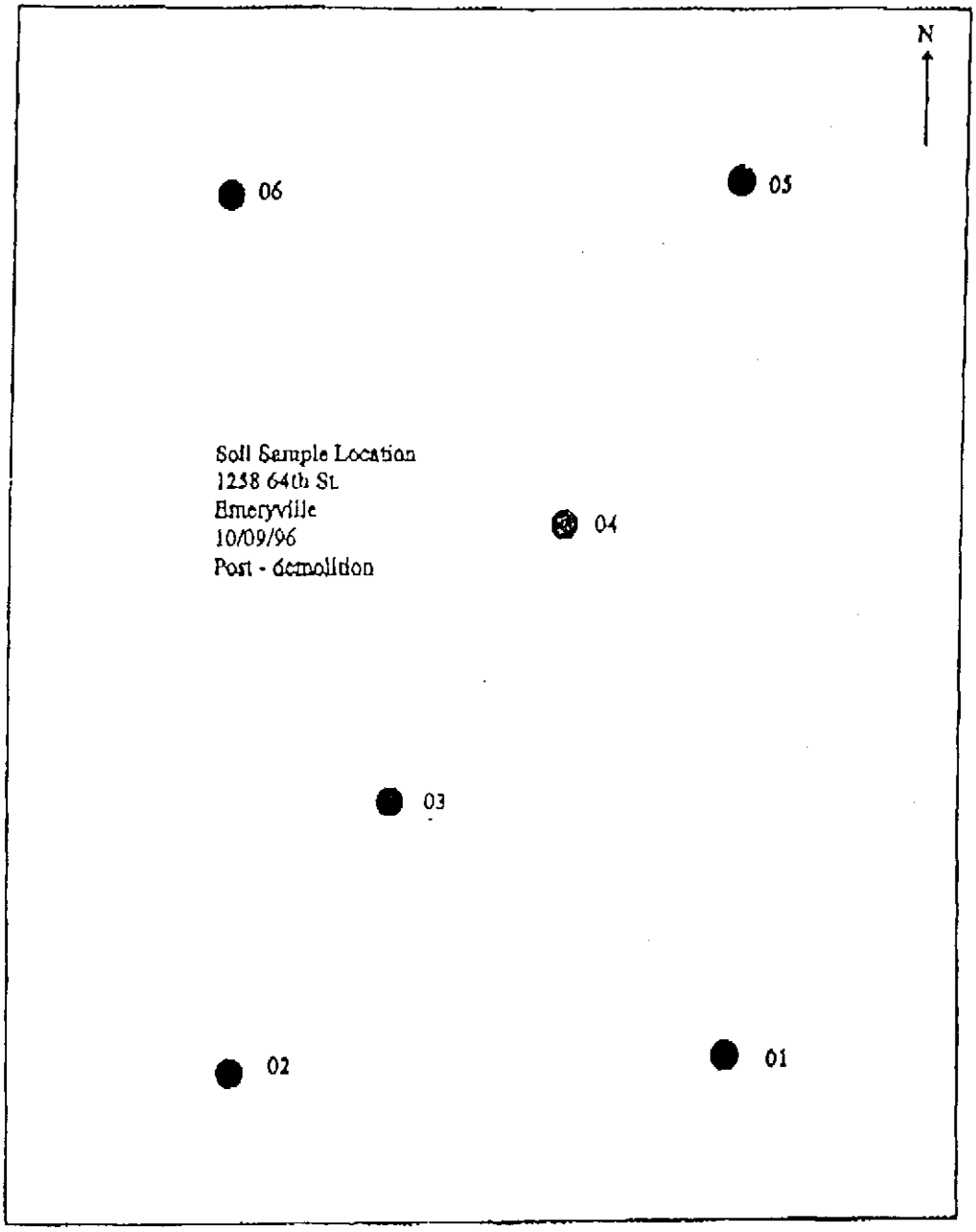


Source: KELLCO 1995. No Scale.

SOMA CORPORATION

Site Map Showing KELLCO Pre-Demolition Soil Sampling Locations
1258 64th Street • Emeryville, California

Project. No. 96-2088	October 1996	**Figure A-2**



Source: KELLCO 1995. No Scale.

SOMA CORPORATION

Site Map Showing KELLCO Post-Demolition Soil Sampling Locations
1258 64th Street • Emeryville, California

Project. No. 96-2088	October 1996	**Figure A-3**

LITHOLOGY				SAMPLE DATA
Depth (feet)	Boring No.	Graphic Log	Description	Sample Interval and No.
	SB-1		SILTY CLAY (CL), black (5Y 2.5/1) dry, medium plasticity, soft, roots, minor fine to medium sand, brick (?) material.	SB-1-0.5
			SANDY CLAY (CL), olive-brown 2.5 Y 4/4, moist, medium to high plasticity, very stiff, medium and coarse subangular sand, clay mottled dark yellowish brown (10YR 4/6), minor fine gravel	SB-1-1.5
				SB-1-4.0
5			SILTY CLAY (CL), olive brown 2.5Y 4/4, moist, medium to high plasticity, very stiff to hard, mottled with dark yellowish brown (10YR 4/6), minor medium sand.	5
	▼ 6.6' Depth to water		SANDY CLAY (CL) to CLAYEY SAND (SC), dark yellowish brown 10YR 4/4, very moist to wet at 8.3 feet, medium plasticity, subrounded medium and coarse sand, mottled clay strong brown 7.5YR 4/4, very moist to wet from 8.3 to 8.5 feet (3/4 inch wet zone), minor fine gravel.	
10			REFUSAL AT 8.5 FEET BELOW GROUND SURFACE (BGS) CONTINUOUS SAMPLING FROM 0 TO 8.5 FEET. Date drilled: 9-12-96 Date water level measured: 9-13-96	10
	SB-2		SILTY CLAY (CL), black (5Y 2.5/1) dry, medium plasticity, soft, roots, minor fine sand, brick (?) material. Color change to light gray (5YR 7/1) at 20 feet below ground surface. Mottled with yellowish red (5YR 5/8) Slightly moist at 2.5 feet. Color change at 3 feet increasing coarse sand, moist.	SB-2-0.5 SB-2-1.5 SB-2-4.0
5	▼ 5.39 ft. Depth to water		Minor (<5%) coarse sand and fine gravel at 5 feet.	5
			SANDY CLAY (CL) to CLAYEY SAND (SC), brown (7.5YR 4/4), moist, medium plasticity, medium stiff, rounded medium and coarse sand, minor (<10%) fine gravel, well graded.	10
				SB-2-10
			SILTY CLAY (CL), yellowish brown (10YR 5/4), moist, medium plasticity, stiff, 10 to 20% fine to medium sand.	
15			CONTINUOUS SAMPLING FROM 0 TO 15 FEET Date drilled: 9-12-96 Date water level measured: 9-13-96	15
				SB-2-15
20				20

SAND SILT CLAY GRAVEL

Drilling method: Direct push
Sampling method: Split spoon
Drilling company: Precision
Drillers: Mike & Jacob

Permit No.: 96633
Drilling date: 9-12-96
Geologist: G. Murray

SOMA CORPORATION

Lithology and Sample Data
Soil Borings No. SB-1 and SB-2
1258 64th St., Emeryville, California

September 1996
96-2088

Figure
F1

BAYAN1 10/98

Depth (feet)	Boring No.	Graphic Log	LITHOLOGY: Description	SAMPLE DATA: Sample Interval and No.
5	SB-3		SILTY CLAY (CL), black (5Y 2.5/1), dry, medium plasticity, soft, roots, minor fine sand, brick (?) material. SILTY CLAY (CL), olive brown (2.5Y 4/4), moist, medium to high plasticity, massive, minor fine sand. BOTTOM OF BORING AT 4 FEET.	SB-3-0.5 SB-3-1.5 SB-3-4.0
5	SB-4		SILTY CLAY (CL), black (5Y 2.5/1), dry, medium plasticity, soft, roots, wood, glass, brick (?). SILTY CLAY (CL), olive brown (2.5Y 4/4), moist, medium to high plasticity, stiff, minor fine sand. BOTTOM OF BORING AT 4 FEET.	SB-4-0.5 SB-4-1.5 SB-4-4.0
6	SB-5		SILTY CLAY (CL), black (5Y 2.5/1), dry, medium plasticity, soft, roots, wood. Very moist and very soft at 2 feet below ground surface. SILTY CLAY (CL), olive brown (2.5Y 4/4), moist, medium plasticity, stiff, minor fine sand. BOTTOM OF BORING AT 4 FEET.	SB-5-0.5 SB-5-1.5 SB-5-4.0
5	SB-6		SILTY CLAY (CL), black (5Y 2.5/1), dry, medium plasticity, soft, roots, wood. SILTY CLAY (CL), olive brown (2.5Y 4/4), moist, medium plasticity, stiff, minor fine sand. BOTTOM OF BORING AT 4 FEET.	SB-6-0.5 SB-6-1.5 SB-6-4.0

SAND SILT CLAY GRAVEL

Drilling method: Direct push
Sampling method: Split spoon
Drilling company: Precision
Drillers: Mike & Jacob

Permit No.: 96633
Drilling date: 9-12-96
Geologist: G. Murray

SOMA CORPORATION

Lithology and Sample Data Soil Borings
No. SB-3, SB-4, SB-5, and SB-6
1258 64th St., Emeryville, California

September 1996
96-2088

Figure 82

BAYANI 10/96

LITHOLOGY				SAMPLE DATA
Depth (feet)	Boring No.	Graphic Log	Description	Sample Interval and No.
5	SB-7		SILTY CLAY (CL), black (5Y 2.5/1), dry, medium plasticity, roots, ceramic (?) debris. SILTY CLAY (CL), olive brown (2.5Y 4/4), moist, medium plasticity, stiff. BOTTOM OF BORING AT 4 FEET.	SB-7-0.5 SB-7-1.5 SB-7-4.0
5	SB-8		SILTY CLAY (CL), black (5Y 2.5/1), dry, brick (?), tile (?), wood, roots, low plasticity, soft. SILTY CLAY (CL), olive brown (2.5Y 4/4), moist, medium plasticity , stiff. BOTTOM OF BORING AT 4 FEET.	SB-8-0.5 SB-8-1.5 SB-8-4.0
5	SB-9		SILTY CLAY (CL), black (5Y 2.5/1), dry, low plasticity, roots, wood, brick (?) debris. SILTY CLAY (CL), olive brown (2.5Y 4/4), moist, medium plasticity, stiff. BOTTOM OF BORING AT 4 FEET.	SB-9-0.5 SB-9-1.5 SB-9-4.0
5	SB-10		SILTY CLAY (CL), black (5Y 2.5/1), dry, low plasticity, roots, wood. SILTY CLAY (CL), olive brown (2.5Y 4/4), moist, medium plasticity, stiff, minor medium to coarse sand. BOTTOM OF BORING AT 4 FEET.	SB-10-0.5 SB-10-1.5 SB-10-4.0
5	SB-11		SILTY CLAY (CL), black (5Y 2.5/1), dry, low plasticity, roots, ceramic (?) debris. SILTY CLAY (CL), light yellowish brown (10YR 6/4), moist, medium plasticity, stiff, minor to medium coarse sand. BOTTOM OF BORING AT 4 FEET.	SB-11-0.5 SB-11-1.5 SB-11-4.0

SAND SILT

CLAY GRAVEL

Drilling method: Direct push
Sampling method: Split spoon
Drilling company: Precision
Drillers: Mike & Jacob

Permit No.: 96633
Drilling date: 9-12-96
Geologist: G. Murray

SOMA CORPORATION

Lithology and Sample Data Soil Borings
No. SB-7, SB-8, SB-9, SB-10, and SB-11
1258 64th St., Emeryville, California

September 1996
96-2088

Figure
B5

APPENDIX C

FIELD METHODS AND PROCEDURES

TABLE OF CONTENTS

APPENDIX C

FIELD METHODS AND PROCEDURES

C-1.0 BORE HOLE DRILLING SOIL SAMPLING METHODS AND TEMPORARY PIEZOMETER CONSTRUCTION

Soil borings SB-1 through SB-11 were drilled by Precision Sampling Inc. on September 12 1996 using a hydraulic powered direct push drill rig. Prior to conducting drilling activities, a survey of underground utilities was conducted by Underground Service Alert (USA) and by a private utility locating company (downUnder Technologies) to clear the boring locations for drilling access. Additionally, boring permits were obtained from Zone 7 Water Agency.

Soil samples were collected continuously for lithologic description using the Unified Soil Classification system. Soil samples were collected by driving a clean, 2-inch diameter split spoon sampler, ahead of the casing sleeve into undisturbed soil.

Thirty-five soil samples were submitted to American Environmental Network (AEN), a California State certified laboratory, for chemical analysis. The soil samples selected for chemical analysis were secured in glass jars, sealed, and labeled. The samples were placed in a chilled cooler for transport to the analytical laboratory under strict chain-of-custody procedures.

Soil borings SB-1 and SB-2 were converted into temporary piezometers. Upon completion of the boring one-inch diameter, slotted PVC casing was temporarily installed in each bore hole to allow ground-water sample collection. In soil boring SB-1 the slotted PVC casing was installed to a depth of 16 feet bgs. In soil boring SB-2 the slotted PVC casing was installed to a depth of 21 feet bgs.

C-2.0 WATER-LEVEL MEASUREMENT

Following installation of the temporary piezometers SB-1 and SB-2, water-level measurements were collected from the wells. Depth to water measurement was collected using an electric water-level meter. The ground surface was used as the reference point to measure depth to static water.

C-3.0 GROUND-WATER SAMPLING METHODS

Ground-water samples were collected from temporary piezometers SB-1 and SB-2 using a clean stainless steel bailer lowered into the PVC-cased bore hole. The water samples were gently poured from the bailer into laboratory supplied containers which were appropriate for the type of analyses performed on the samples. The water samples were labeled and placed in a chilled cooler immediately after collection for transport to the laboratory. After collecting the samples, the PVC casing was removed from the bore holes and the bore holes were sealed with a bentonite-grout mix.

All drilling activities were conducted under the supervision of a California Registered Geologist. All down hole drilling and sampling equipment was steam cleaned prior to use at each drilling location to prevent potential cross-contamination between locations. All borings were backfilled with cement-bentonite grout after completion of drilling and sampling activities.

C-4.0 DRILLING AND SAMPLING WASTE STORAGE

Waste soil generated during bore hole drilling activities and rinsate water generated during steam cleaning activities are temporarily being stored at the Site in separate drums. Approximately 50 gallons of rinsate water is stored in a 55-gallon drum. Approximately 45 pounds of drill cutting soil is stored in a 5-gallon capacity container. Appropriate disposal options for the waste soil and rinsate water will be evaluated.

APPENDIX D

LABORATORY CERTIFICATES

American Environmental Network

Certificate of Analysis

DOHS Certification: 1172 AIHA Accreditation: 11134

SOMA CORPORATION
1260B 45TH STREET
EMERYVILLE, CA 94608

ATTN: NORM OZAKI
CLIENT PROJ. ID: 96-2088

REPORT DATE: 10/24/96

DATE(S) SAMPLED: 09/13/96

DATE RECEIVED: 09/13/96

AEN WORK ORDER: 9610097

PROJECT SUMMARY:

On September 13, 1996, this laboratory received 2 water sample(s).

On October 8, 1996, client requested sample(s) be analyzed for additional 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.

RECEIVED 10-28-96 [illegible]

William Svoboda, for
Larry Klein
Laboratory Director

3440 Vincent Road • Pleasant Hill, CA 94523 • (510) 930-9090 • FAX (510) 930-0256
Analytical Services for the Environment

SOMA CORPORATION

SAMPLE ID: TW-1
AEN LAB NO: 9610097-01
AEN WORK ORDER: 9610097
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/13/96
DATE RECEIVED: 09/13/96
REPORT DATE: 10/24/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	SM 3113B	0.011 *	0.001	mg/L	10/17/96

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

SOMA CORPORATION

SAMPLE ID: TW-2
AEN LAB NO: 9610097-02
AEN WORK ORDER: 9610097
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/13/96
DATE RECEIVED: 09/13/96
REPORT DATE: 10/24/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	SM 3113B	0.001 *	0.001	mg/L	10/17/96

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

AEN (CALIFORNIA)
QUALITY CONTROL REPORT

AEN JOB NUMBER: 9610097
CLIENT PROJECT ID: 96-2088

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: Water

METHOD BLANK SAMPLES

SAMPLE TYPE: Blank-Method/Media blank
INSTRUMENT: TJA 4000, GFAA
UNITS: mg/L
METHOD:

LAB ID: GFDW_BLNK
PREPARED:
ANALYZED: 10/17/96

INSTR RUN: 4000\961017141100/1/
BATCH ID: GFDW101796
DILUTION: 0.500

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in water by GFAA	ND		0.001						

MATRIX SPIKE SAMPLES

SAMPLE TYPE: Spike-Sample/Matrix
INSTRUMENT: TJA 4000, GFAA
UNITS: mg/L
METHOD:

LAB ID: MD10097-02A
PREPARED:
ANALYZED: 10/17/96

INSTR RUN: 4000\961017141100/4/2
BATCH ID: GFDW101796
DILUTION: 0.500

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in water by GFAA	0.0454	0.00113	0.001	0.0400	111	35	153		

SAMPLE TYPE: Spike-Sample/Matrix
INSTRUMENT: TJA 4000, GFAA
UNITS: mg/L
METHOD:

LAB ID: MS10097-02A
PREPARED:
ANALYZED: 10/17/96

INSTR RUN: 4000\961017141100/3/2
BATCH ID: GFDW101796
DILUTION: 0.500

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in water by GFAA	0.0496	0.00113	0.001	0.0400	121	35	153		

MATRIX SPIKE DUPLICATES

SAMPLE TYPE: Spiked Sample Duplicate
INSTRUMENT: TJA 4000, GFAA
UNITS: mg/L
METHOD:

LAB ID: MR10097-02A
PREPARED:
ANALYZED: 10/17/96

INSTR RUN: 4000\961017141100/5/3
BATCH ID: GFDW101796
DILUTION: 0.500

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in water by GFAA	0.0454	0.0496	0.001					8.84	16

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

American Environmental Network

Certificate of Analysis

DOHS Certification: 1644 AIHA Accreditation: 11134

SOMA CORPORATION
1260B 45TH STREET
EMERYVILLE, CA 94608

ATTN: NORM OZAKI
CLIENT PROJ. ID: 96-2088

REPORT DATE: 09/24/96

DATE(S) SAMPLED: 09/12/96

DATE RECEIVED: 09/13/96

AEN WORK ORDER: 9609146

PROJECT SUMMARY:

On September 13, 1996, this laboratory received 35 soil sample(s).

Client requested 11 sample(s) be analyzed for chemical parameters; twenty-four samples were placed on hold. 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

SOMA CORPORATION

SAMPLE ID: SB-1-0.5
AEN LAB NO: 9609146-01
AEN WORK ORDER: 9609146
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 09/24/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	290 *	3	mg/kg	09/18/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	09/17/96

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

SOMA CORPORATION

SAMPLE ID: SB-2-0.5
AEN LAB NO: 9609146-04
AEN WORK ORDER: 9609146
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 09/24/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	140 *	3	mg/kg	09/18/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	09/17/96

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

SOMA CORPORATION

SAMPLE ID: SB-3-0.5
AEN LAB NO: 9609146-09
AEN WORK ORDER: 9609146
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 09/24/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	26 *	3	mg/kg	09/18/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	09/17/96

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

SOMA CORPORATION

SAMPLE ID: SB-4-0.5
AEN LAB NO: 9609146-12
AEN WORK ORDER: 9609146
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 09/24/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	180 *	3	mg/kg	09/18/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	09/17/96

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

SOMA CORPORATION

SAMPLE ID: SB-5-0.5
AEN LAB NO: 9609146-15
AEN WORK ORDER: 9609146
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 09/24/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	310 *	3	mg/kg	09/18/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	09/17/96

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

SOMA CORPORATION

SAMPLE ID: SB-6-0.5
AEN LAB NO: 9609146-18
AEN WORK ORDER: 9609146
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 09/24/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	280 *	3	mg/kg	09/18/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	09/17/96

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

SOMA CORPORATION

SAMPLE ID: SB-7-0.5
AEN LAB NO: 9609146-21
AEN WORK ORDER: 9609146
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 09/24/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	150 *	3	mg/kg	09/18/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	09/17/96

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

SOMA CORPORATION

SAMPLE ID: SB-8-0.5
AEN LAB NO: 9609146-24
AEN WORK ORDER: 9609146
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 09/24/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	16 *	3	mg/kg	09/18/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	09/17/96

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

SOMA CORPORATION

SAMPLE ID: SB-9-0.5
AEN LAB NO: 9609146-27
AEN WORK ORDER: 9609146
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 09/24/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	380 *	3	mg/kg	09/18/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	09/17/96

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

SOMA CORPORATION

SAMPLE ID: SB-10-0.5
AEN LAB NO: 9609146-30
AEN WORK ORDER: 9609146
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 09/24/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	5 *	3	mg/kg	09/18/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	09/17/96

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

SOMA CORPORATION

SAMPLE ID: SB-11-0.5
AEN LAB NO: 9609146-33
AEN WORK ORDER: 9609146
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 09/24/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	42 *	3	mg/kg	09/18/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	09/17/96

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

AEN (CALIFORNIA)
QUALITY CONTROL REPORT

AEN JOB NUMBER: 9609146
CLIENT PROJECT ID: 96-2088

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
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/kg
METHOD: EPA 7420

LAB ID: IFS_BLNK_X
PREPARED:
ANALYZED: 09/18/96

INSTR RUN: AA_V12\960918113800/1/
BATCH ID: IFS091796-X
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	ND		3						

METHOD SPIKE SAMPLES

SAMPLE TYPE: Spike-Method/Media blank
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/kg
METHOD: EPA 7420

LAB ID: IFS_MD_X
PREPARED:
ANALYZED: 09/18/96

INSTR RUN: AA_V12\960918113800/3/1
BATCH ID: IFS091796-X
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	54.3	ND	3	50.0	109	80	119		

SAMPLE TYPE: Spike-Method/Media blank
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/kg
METHOD: EPA 7420

LAB ID: IFS_MS_X
PREPARED:
ANALYZED: 09/18/96

INSTR RUN: AA_V12\960918113800/2/1
BATCH ID: IFS091796-X
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	52.9	ND	3	50.0	106	80	119		

METHOD SPIKE DUPLICATES

SAMPLE TYPE: Method Spike Sample Duplicate
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/kg
METHOD: EPA 7420

LAB ID: IFS_MR_X
PREPARED:
ANALYZED: 09/18/96

INSTR RUN: AA_V12\960918113800/4/2
BATCH ID: IFS091796-X
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	54.3	52.9	3					2.61	10.5

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

American Environmental Network

Certificate of Analysis

DOHS Certification: 1132 AIHA Accreditation: 11134

SOMA CORPORATION
1260B 45TH STREET
EMERYVILLE, CA 94608

ATTN: NORM AZAKI
CLIENT PROJ. ID: 96-2088

REPORT DATE: 09/24/96
DATE(S) SAMPLED: 09/13/96
DATE RECEIVED: 09/13/96
AEN WORK ORDER: 9609151

PROJECT SUMMARY:

On September 13, 1996, this laboratory received 4 water 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

SOMA CORPORATION

SAMPLE ID: TW-1
AEN LAB NO: 9609151-01
AEN WORK ORDER: 9609151
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/13/96
DATE RECEIVED: 09/13/96
REPORT DATE: 09/24/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	ND	0.1	mg/L	09/18/96
#Digestion, Metals ICP/AA	EPA 3010	-		Prep Date	09/18/96

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

SOMA CORPORATION

SAMPLE ID: TW-2
AEN LAB NO: 9609151-02
AEN WORK ORDER: 9609151
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/13/96
DATE RECEIVED: 09/13/96
REPORT DATE: 09/24/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	ND	0.1	mg/L	09/18/96
#Digestion, Metals ICP/AA	EPA 3010	-		Prep Date	09/18/96

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

SOMA CORPORATION

SAMPLE ID: SB-1
AEN LAB NO: 9609151-03
AEN WORK ORDER: 9609151
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/13/96
DATE RECEIVED: 09/13/96
REPORT DATE: 09/24/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
#Sample Filtration	0.45 um	-		Filtr Date	09/13/96
Lead	EPA 7420	ND	0.1	mg/L	09/18/96
#Digestion, Metals ICP/AA	EPA 3010	-		Prep Date	09/18/96

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

SOMA CORPORATION

SAMPLE ID: SB-2
AEN LAB NO: 9609151-04
AEN WORK ORDER: 9609151
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/13/96
DATE RECEIVED: 09/13/96
REPORT DATE: 09/24/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
#Sample Filtration	0.45 um	-		Filtr Date	09/13/96
Lead	EPA 7420	ND	0.1	mg/L	09/18/96
#Digestion, Metals ICP/AA	EPA 3010	-		Prep Date	09/18/96

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

AEN (CALIFORNIA)
QUALITY CONTROL REPORT

AEN JOB NUMBER: 9609151
CLIENT PROJECT ID: 96-2088

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: Water

METHOD BLANK SAMPLES

SAMPLE TYPE: Blank-Method/Media blank
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/L
METHOD: EPA 7420
LAB ID: IFW_BLNK_A
PREPARED:
ANALYZED: 09/18/96
INSTR RUN: AA V12\960918140200/1/
BATCH ID: IFW091896-A
DILUTION: 1.000000

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in Water by EPA 7420	ND		0.1						

METHOD SPIKE SAMPLES

SAMPLE TYPE: Spike-Method/Media blank
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/L
METHOD: EPA 7420
LAB ID: IFW_MD_A
PREPARED:
ANALYZED: 09/18/96
INSTR RUN: AA V12\960918140200/3/1
BATCH ID: IFW091896-A
DILUTION: 1.000000

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in Water by EPA 7420	0.560	ND	0.1	0.500	112	75	125		

SAMPLE TYPE: Spike-Method/Media blank
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/L
METHOD: EPA 7420
LAB ID: IFW_MS_A
PREPARED:
ANALYZED: 09/18/96
INSTR RUN: AA V12\960918140200/2/1
BATCH ID: IFW091896-A
DILUTION: 1.000000

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in Water by EPA 7420	0.526	ND	0.1	0.500	105	75	125		

METHOD SPIKE DUPLICATES

SAMPLE TYPE: Method Spike Sample Duplicate
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/L
METHOD: EPA 7420
LAB ID: IFW_MR_A
PREPARED:
ANALYZED: 09/18/96
INSTR RUN: AA V12\960918140200/4/2
BATCH ID: IFW091896-A
DILUTION: 1.000000

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in Water by EPA 7420	0.560	0.526	0.1					6.26	20

MATRIX SPIKE SAMPLES

SAMPLE TYPE: Spike-Sample/Matrix
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/L
METHOD: EPA 7420
LAB ID: MD09151-04A
PREPARED:
ANALYZED: 09/18/96
INSTR RUN: AA V12\960918140200/7/5
BATCH ID: IFW091896-A
DILUTION: 1.000000

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in Water by EPA 7420	0.531	ND	0.1	0.500	106	75	125		

SAMPLE TYPE: Spike-Sample/Matrix
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/L
METHOD: EPA 7420
LAB ID: MS09151-04A
PREPARED:
ANALYZED: 09/18/96
INSTR RUN: AA V12\960918140200/6/5
BATCH ID: IFW091896-A
DILUTION: 1.000000

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in Water by EPA 7420	0.517	ND	0.1	0.500	103	75	125		

ANALYSIS: Lead

MATRIX: Water

MATRIX SPIKE DUPLICATES

SAMPLE TYPE: Spiked Sample Duplicate
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/L
METHOD: EPA 7420

LAB ID: MR09151-04A
PREPARED:
ANALYZED: 09/18/96

INSTR RUN: AA V12\960918140200/8/6
BATCH ID: IFW091896-A
DILUTION: 1.000000

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in Water by EPA 7420	0.531	0.517	0.1					2.67	20

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

American Environmental Network
3440 Vincent Road, Pleasant Hill, CA 94523
Phone (510) 930-9090
FAX (510) 930-0256

AEN

REQUEST FOR ANALYSIS / CHAIN OF CUSTODY

1. Client: SOMA Inc
Address: 1260 B 45th Street
Emeryville, CA 94608
Contact: North Ozaki
Alt. Contact: Alix Spivack

Lab Job Number: 9609146
Lab Destination:
Date Samples Shipped:
Lab Contact:
Date Results Required:
Date Report Required:
Client Phone No.:
Client FAX No.:

Address Report To:
2. See #1.

Send Invoice To:
3. See #1

Send Report To: 1 or 2 (Circle one)

Client P.O. No.: Client Project I.D. No.: 96-2088

Sample Team Member (s) GTM

Lab Number	Client Sample Identification	~~Date~~ ~~Air Volume~~	~~Date~~ Time Collected	Sample Type*	Pres.	No. of Cont.	Type of Cont.	ANALYSIS: EPA 7420 TLC PB	Hold	Comments / Hazards
01A	SB-1-0.5	9/12/96	9:00	Soil	None	1	Jars	X		* Hold Sample for potential TTLC Pb and STLC (CAWET) Analysis
02A	SB-1-1.5	↓	9:15	↓	↓	↓	↓		X	
03A	SB-1-4.0	↓	9:20	↓	↓	↓	↓		X	
04A	SB-2-0.5	↓	11:15	↓	↓	↓	↓	X		
05A	SB-2-1.5	↓	11:20	↓	↓	↓	↓		X	
06A	SB-2-4.0	↓	11:40	↓	↓	↓	↓		X	
07A	SB-2-10.0	↓	1:30	↓	↓	↓	↓		X	
08A	SB-2-15.0	↓	1:50	↓	↓	↓	↓		X	
09A	SB-3-0.5	↓	2:10	↓	↓	↓	↓	X		
10A	SB-3-1.5	↓	2:20	↓	↓	↓	↓		X	
11A	SB-3-4.0	↓	2:25	↓	↓	↓	↓		X	
12A	SB-4-0.5	↓	2:30	↓	↓	↓	↓	X		
13A	SB-4-1.5	↓	2:35	↓	↓	↓	↓		X	
14A	SB-4-4.0	↓	2:40	↓	↓	↓	↓		X	

Relinquished by: (Signature)	DATE 9/13/96	TIME 10:00	Received by: (Signature)
Relinquished by: (Signature)	DATE 9-13-96	TIME 11:10	Received by: (Signature)
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature) Denise Harrington
Method of Shipment			Lab Comments

DATE 9-13-96 TIME 10:00
DATE 9/13/96 TIME 1110

*Sample type (Specify): 1) 37mm 0.8 µm MCEF 2) 25mm 0.8 µm MCEF 3) 25mm 0.4 µm polycarb. filter
4) PVC filter, diam. _____ pore size _____ 5) Charcoal tube 6) Silica gel tube 7) Water 8) Soil 9) Bulk Sample
10) Other _____ 11) Other _____

COPIES WHITE - JOB FILE YELLOW - PROJECT FILE PINK - CLIENT

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3440 Vincent Road, Pleasant Hill, CA 94523
Phone (510) 930-9090
FAX (510) 930-0256

REQUEST FOR ANALYSIS / CHAIN OF CUSTODY

1. Client: Soma Inc
Address: 1260 B 45th Street
Emeryville, CA 94608
Contact: Norm Ozaki
Alt. Contact: Alix Spivack

Lab Job Number: 9609146
Lab Destination:
Date Samples Shipped:
Lab Contact:
Date Results Required:
Date Report Required:
Client Phone No.:
Client FAX No.:

Address Report To:
2. See Above

Send Invoice To:
3. See #1

Send Report To: 1 or 2 (Circle one)

Client P.O. No.: ______ Client Project I.D. No.: 96-2088

Sample Team Member (s) GTM

Lab Number	Client Sample Identification	Date ~~Air Volume~~	~~Date/~~ Time Collected	Sample Type*	Pres.	No. of Cont.	Type of Cont.	EPA 7420 TTLC Pb									Hold*	Comments / Hazards
15A	SB-5-0.5	9/12/96	2:45	Soil	None	1	glass jar	X										* Hold sample for
16A	SB-5-1.5	↓	2:50	↓	↓	↓	↓										X	potential TTLC Pb
17A	SB-5-4.0		2:55														X	and STLC (CA WET)
18A	SB-6-0.5		3:00					X										analysis
19A	SB-6-1.5		3:05														X	
20A	SB-6-4.0		3:10														X	
21A	SB-7-0.5		3:30					X										
22A	SB-7-1.5		3:30														X	
23A	SB-7-4.0		3:35														X	
24A	SB-8-0.5		3:40					X										
25A	SB-8-1.5		3:45														X	
26A	SB-8-4.0		3:50														X	

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	DATE	TIME
(signature)	9/13/96	10:00	(signature)	9-13-96	10:00
(signature)	9/13/96	11:10			
			Denise Harrington	9/13/96	1110

Method of Shipment

Lab Comments

*Sample type (Specify): 1) 37mm 0.8 µm MCEF 2) 25mm 0.8 µm MCEF 3) 25mm 0.4 µm polycarb. filter
4) PVC filter, diam. ____ pore size ____ 5) Charcoal tube 6) Silica gel tube 7) Water 8) Soil 9) Bulk Sample
10) Other ______ 11) Other ______

COPIES: WHITE - JOB FILE YELLOW - PROJECT FILE PINK - CLIENT

American Environmental Network
3440 Vincent Road, Pleasant Hill, CA 94523
Phone (510) 930-9090
FAX (510) 930-0256

REQUEST FOR ANALYSIS / CHAIN OF CUSTODY

1. Client: SOMA Inc
Address: 1260 B 45th ST
Emeryville CA 94608
Contact: Norm Ozaki
Alt Contact: Alix Spivak

Address Report To:
2. See ABove

Send Invoice To:
3. Same #1

Lab Job Number:
Lab Destination:
Date Samples Shipped:
Lab Contact:
Date Results Required:
Date Report Required:
Client Phone No.:
Client FAX No.:

Send Report To: 1 or 2 (Circle one)

Client P.O. No.: _____ Client Project I.D. No.: 96-2088

Sample Team Member (s) _____

Lab Number	Client Sample Identification	~~Date~~ Air Volume	~~Date~~ Time Collected	Sample Type*	Pres.	No. of Cont.	Type of Cont.	ANALYSIS: EPA 7420 TPLC pb	ANALYSIS: Hold *	Comments / Hazards
27A	SB-9-0.5	9/12/96	4:05	Soil	—	1	2.5 oz	X		* Hold sample for potential TPLC pb and STLC (CA wet) analysis
28A	SB-9-1.5		4:10							
29A	SB-9-4.0		4:15							
30A	SB-10-0.5		4:20					X		
31A	SB-10-1.5		4:25							
32A	SB-10-4.0		4:30							
33A	SB-11-0.5		4:50					X		
34A	SB-11-1.5		4:55							
35A	SB-11-4.0		4:55							

Relinquished by: (Signature)	DATE 9/13/96	TIME 10:00	Received by: (Signature) DATE 9-13-96 TIME 10:00
Relinquished by: (Signature)	DATE 9-13-96	TIME 11:10	Received by: (Signature) DATE TIME
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature) Denise Harrington DATE 9/13/96 TIME 1110
Method of Shipment			Lab Comments

*Sample type (Specify): 1) 37mm 0.8 µm MCEF 2) 25mm 0.8 µm MCEF 3) 25mm 0.4 µm polycarb. filter
4) PVC filter, diam. ____ pore size ____ 5) Charcoal tube 6) Silica gel tube 7) Water 8) Soil 9) Bulk Sample
10) Other _____ 11) Other _____

COPIES: WHITE - JOB FILE YELLOW - PROJECT FILE PINK - CLIENT

American Environmental Network, Inc.
3440 Vincent Road, Pleasant Hill, CA 94523
Phone (510) 930-9090
FAX (510) 930-0256

AEN

Page ____ of ____

REQUEST FOR ANALYSIS / CHAIN OF CUSTODY

1. Client: Somu, Inc.
Address: 1260 B. 45th St
Emeryville CA 94608
Contact: Norm Ozaki
Alt. Contact: Alix Spivak

C-1, S-2

Address Report To:

2. See Above

Send Invoice To:

3. See Above

Lab Job Number: 9609151
Lab Destination:
Date Samples Shipped:
Lab Contact:
Date Results Required:
Date Report Required:
Client Phone No.:
Client FAX No.:

Send Report To: 1 or 2 (Circle one)

Client P.O. No.: _____ Client Project I.D. No.: 96-2088

Sample Team Member (s) _____

Lab Number	Client Sample Identification	~~DATE Air Volume~~	~~Date~~ Time Collected	Sample Type*	Pres.	No. of Cont.	Type of Cont.	ANALYSIS: EPA 7420 TLC Pb Filter & preserve									Comments / Hazards
01A	TW-1	9/13/96	10:35	water	HNO_3	1	1 Plastic	X									
02A	TW-2	9/13/96	10:50	water	HNO_3	1	1 Plastic	X									
03A	SB-1	9/13/96	11:35	water	NONE	1		X	X								
04A	SB-2	9/13/96	11:30	water	NONE	1		X	X								

Relinquished by: (Signature)	DATE 9/13/96	TIME 12:30	Received by: (Signature)
Relinquished by: (Signature)	DATE 9-13-96	TIME 13:22	Received by: (Signature)
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature) Denise Harrington DATE 9/13/96 TIME 1322
Method of Shipment			Lab Comments

*Sample type (Specify): 1) 37mm 0.8 µm MCEF 2) 25mm 0.8 µm MCEF 3) 25mm 0.4 µm polycarb. filter
4) PVC filter, diam. ____ pore size ____ 5) Charcoal tube 6) Silica gel tube 7) Water 8) Soil 9) Bulk Sample
10) Other _____ 11) Other _____

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American Environmental Network

Certificate of Analysis

DOHS Certification: 1172 AIHA Accreditation: 11134

SOMA CORPORATION
1260B 45TH STREET
EMERYVILLE, CA 94608

ATTN: NORM OZAKI/ALIX SPIVACK
CLIENT PROJ. ID: 96-2088

REPORT DATE: 10/09/96

DATE(S) SAMPLED: 09/12/96

DATE RECEIVED: 09/13/96

AEN WORK ORDER: 9609401

PROJECT SUMMARY:

On September 13, 1996, this laboratory received 15 soil sample(s).

On September 27, 1996, client requested sample(s) be analyzed for additional 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

SOMA CORPORATION

SAMPLE ID: SB-1-0.5
AEN LAB NO: 9609401-01
AEN WORK ORDER: 9609401
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 10/09/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
#CA Waste Extraction	CA Title 22	-		Extrn Date	10/04/96
Lead in WET Extract	EPA 7420	10 *	0.1	mg/L	10/07/96

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

SOMA CORPORATION

SAMPLE ID: SB-1-1.5
AEN LAB NO: 9609401-02
AEN WORK ORDER: 9609401
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 10/09/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	28 *	3	mg/kg	10/04/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	10/03/96

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

SOMA CORPORATION

SAMPLE ID: SB-1-4.0
AEN LAB NO: 9609401-03
AEN WORK ORDER: 9609401
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 10/09/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	17 *	3	mg/kg	10/04/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	10/03/96

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

SOMA CORPORATION

SAMPLE ID: SB-3-1.5
AEN LAB NO: 9609401-04
AEN WORK ORDER: 9609401
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 10/09/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	6 *	3	mg/kg	10/04/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	10/03/96

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

SOMA CORPORATION

SAMPLE ID: SB-3-4.0
AEN LAB NO: 9609401-05
AEN WORK ORDER: 9609401
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 10/09/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	6 *	3	mg/kg	10/04/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	10/03/96

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

SOMA CORPORATION

SAMPLE ID: SB-5-0.5
AEN LAB NO: 9609401-06
AEN WORK ORDER: 9609401
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 10/09/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
#CA Waste Extraction	CA Title 22	-		Extrn Date	10/04/96
Lead in WET Extract	EPA 7420	14 *	0.1	mg/L	10/07/96

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

SOMA CORPORATION

SAMPLE ID: SB-5-1.5
AEN LAB NO: 9609401-07
AEN WORK ORDER: 9609401
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 10/09/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	10 *	3	mg/kg	10/04/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	10/03/96

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

SOMA CORPORATION

SAMPLE ID: SB-5-4.0
AEN LAB NO: 9609401-08
AEN WORK ORDER: 9609401
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 10/09/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	5 *	3	mg/kg	10/04/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	10/03/96

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

SOMA CORPORATION

SAMPLE ID: SB-6-1.5
AEN LAB NO: 9609401-09
AEN WORK ORDER: 9609401
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 10/09/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	110 *	3	mg/kg	10/04/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	10/03/96

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

SOMA CORPORATION

SAMPLE ID: SB-6-4.0
AEN LAB NO: 9609401-10
AEN WORK ORDER: 9609401
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 10/09/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	6 *	3	mg/kg	10/04/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	10/03/96

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

SOMA CORPORATION

SAMPLE ID: SB-9-0.5
AEN LAB NO: 9609401-11
AEN WORK ORDER: 9609401
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 10/09/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
#CA Waste Extraction	CA Title 22	-		Extrn Date	10/04/96
Lead in WET Extract	EPA 7420	0.5 *	0.1	mg/L	10/07/96

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

SOMA CORPORATION

SAMPLE ID: SB-9-1.5
AEN LAB NO: 9609401-12
AEN WORK ORDER: 9609401
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 10/09/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	32 *	3	mg/kg	10/04/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	10/03/96

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

SOMA CORPORATION

SAMPLE ID: SB-9-4.0
AEN LAB NO: 9609401-13
AEN WORK ORDER: 9609401
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 10/09/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	9 *	3	mg/kg	10/04/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	10/03/96

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

SOMA CORPORATION

SAMPLE ID: SB-11-1.5
AEN LAB NO: 9609401-14
AEN WORK ORDER: 9609401
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 10/09/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	10 *	3	mg/kg	10/04/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	10/03/96

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

SOMA CORPORATION

SAMPLE ID: SB-11-4.0
AEN LAB NO: 9609401-15
AEN WORK ORDER: 9609401
CLIENT PROJ. ID: 96-2088

DATE SAMPLED: 09/12/96
DATE RECEIVED: 09/13/96
REPORT DATE: 10/09/96

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Lead	EPA 7420	12 *	3	mg/kg	10/04/96
#Digestion, Metals AA/ICP	EPA 3050	-		Prep Date	10/03/96

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

AEN (CALIFORNIA)
QUALITY CONTROL REPORT

AEN JOB NUMBER: 9609401
CLIENT PROJECT ID: 96-2088

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
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/kg
METHOD:
LAB ID: IFS_BLNK_0
PREPARED:
ANALYZED: 10/04/96
INSTR RUN: AA V12\961004131400/1/
BATCH ID: IFS100396-0
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	ND		3						

METHOD SPIKE SAMPLES

SAMPLE TYPE: Spike-Method/Media blank
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/kg
METHOD:
LAB ID: IFS_MD_0
PREPARED:
ANALYZED: 10/04/96
INSTR RUN: AA V12\961004131400/3/1
BATCH ID: IFS100396-0
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	55.5	ND	3	50.0	111	80	119		

SAMPLE TYPE: Spike-Method/Media blank
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/kg
METHOD:
LAB ID: IFS_MS_0
PREPARED:
ANALYZED: 10/04/96
INSTR RUN: AA V12\961004131400/2/1
BATCH ID: IFS100396-0
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	54.0	ND	3	50.0	108	80	119		

METHOD SPIKE DUPLICATES

SAMPLE TYPE: Method Spike Sample Duplicate
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/kg
METHOD:
LAB ID: IFS_MR_0
PREPARED:
ANALYZED: 10/04/96
INSTR RUN: AA V12\961004131400/4/2
BATCH ID: IFS100396-0
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	55.5	54.0	3					2.74	10.5

MATRIX SPIKE SAMPLES

SAMPLE TYPE: Spike-Sample/Matrix
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/kg
METHOD:
LAB ID: MD09401-15A
PREPARED:
ANALYZED: 10/04/96
INSTR RUN: AA V12\961004131400/13/11
BATCH ID: IFS100396-0
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	60.4	12.4	3	50.0	96.0	21	178		

SAMPLE TYPE: Spike-Sample/Matrix
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/kg
METHOD:
LAB ID: MS09401-15A
PREPARED:
ANALYZED: 10/04/96
INSTR RUN: AA V12\961004131400/12/11
BATCH ID: IFS100396-0
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	61.8	12.4	3	50.0	98.8	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: MR09401-15A
PREPARED:
ANALYZED: 10/04/96

INSTR RUN: AA V12\961004131400/14/12
BATCH ID: IFS100396-0
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	60.4	61.8	3	50.0				2.29	23

ANALYSIS: Lead in WET Extract

MATRIX: WET Extract

METHOD BLANK SAMPLES

SAMPLE TYPE: Blank-Method/Media blank
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/L
METHOD:

LAB ID: WET_BLNK
PREPARED:
ANALYZED: 10/07/96

INSTR RUN: AA V12\961007110800/1/
BATCH ID: WET100496
DILUTION: 1.000000

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in WET Extract	ND		0.1						

MATRIX SPIKE SAMPLES

SAMPLE TYPE: Spike-Sample/Matrix
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/L
METHOD:

LAB ID: MD09401-01B
PREPARED:
ANALYZED: 10/07/96

INSTR RUN: AA V12\961007110800/4/2
BATCH ID: WET100496
DILUTION: 1.000000

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in WET Extract	14.2	9.96	0.1	4.00	106				

SAMPLE TYPE: Spike-Sample/Matrix
INSTRUMENT: Video 12 aa spectrometer
UNITS: mg/L
METHOD:

LAB ID: MS09401-01B
PREPARED:
ANALYZED: 10/07/96

INSTR RUN: AA V12\961007110800/3/2
BATCH ID: WET100496
DILUTION: 1.000000

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in WET Extract	14.1	9.96	0.1	4.00	104				

MATRIX SPIKE DUPLICATES

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

LAB ID: MR09401-01B
PREPARED:
ANALYZED: 10/07/96

INSTR RUN: AA V12\961007110800/5/3
BATCH ID: WET100496
DILUTION: 1.000000

ANALYTE	RESULT	REF RESULT	REPORTING LIMIT	SPIKE VALUE	RECOVERY (%)	REC LIMITS (%) LOW	REC LIMITS (%) HIGH	RPD (%)	RPD LIMIT (%)
Lead in WET Extract	14.2	14.1	0.1					0.707	

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

Reporting Information

1. Client: Soma Inc
Address: 1260 B 45th Street
Emeryville, CA 94608
Contact: Norm Ozaki
Alt. Contact: Alix Spivack

2. Address Report To: See #1.

3. Send Invoice To: See #1

Send Report To: 1 or 2 (Circle one)

Client P.O. No.: _____ Client Project I.D. No.: 96-7098

Sample Team Member(s): GTM

American Environmental Network

3440 Vincent Road, Pleasant Hill, CA 94523
Phone (510) 930-9090
FAX (510) 930-0256

AEN

Page 1 of 3

REQUEST FOR ANALYSIS / CHAIN OF CUSTODY

Lab Job Number: 9609401 ~~9609446~~
Lab Destination: RO 9/27/96
Date Samples Shipped:
Lab Contact:
Date Results Required:
Date Report Required:
Client Phone No.:
Client FAX No.:

Lab Number	Client Sample Identification		~~Date~~ Air Volume	~~Date~~ Time Collected	Sample Type*	Pres.	No. of Cont.	Type of Cont.	ANALYSIS: EPA 7420 TTLC Pb	EPA 7420 TTLC Pb	STLC (CAM17)				Hold	Comments / Hazards
01A	SB-1-0.5	01A	9/12/96	9:00	Soil	None	1	9 jars	X		X					* Hold sample for potential TTLC Pb and STLC (CAM17) analysis
02A	SB-1-1.5	02A	↓	9:15	↓	↓	↓	↓		X					X	
03A	SB-1-4.0	03A	↓	9:20	↓	↓	↓	↓		X					X	
04A	SB-2-0.5		↓	11:15	↓	↓	↓	↓	X						X	
05A	SB-2-1.5		↓	11:20	↓	↓	↓	↓							X	
06A	SB-2-4.0		↓	11:40	↓	↓	↓	↓							X	
07A	SB-2-10.0		↓	1:30	↓	↓	↓	↓							X	9/27/96
08A	SB-2-15.0		↓	1:50	↓	↓	↓	↓							X	Hold analysis
09A	SB-3-0.5		↓	2:10	↓	↓	↓	↓	X							Standard TAT
10A	SB-3-1.5	04A	↓	2:20	↓	↓	↓	↓		X					X	B. Ryan
11A	SB-3-4.0	05A	↓	2:25	↓	↓	↓	↓		X					X	
12A	SB-4-0.5		↓	2:30	↓	↓	↓	↓	X							
13A	SB-4-1.5		↓	2:35	↓	↓	↓	↓							X	
14A	SB-4-4.0		↓	2:40	↓	↓	↓	↓							X	

		DATE	TIME			DATE	TIME
Relinquished by: (Signature)		9/12/96	10:00	Received by: (Signature)		9-13-96	10:00
Relinquished by: (Signature)		9-13-96	11:10	Received by: (Signature)		DATE	TIME
Relinquished by: (Signature)		DATE	TIME	Received by: (Signature)	Denise Harrington	9/13/96	1110
Method of Shipment				Lab Comments			

*Sample type (Specify): 1) 37mm 0.8 µm MCEF 2) 25mm 0.8 µm MCEF 3) 25mm 0.4 µm polycarb. filter
4) PVC filter, diam. ____ pore size ____ 5) Charcoal tube 6) Silica gel tube 7) Water 8) Soil 9) Bulk Sample
10) Other ____ 11) Other ____

COPIES: WHITE - JOB FILE YELLOW - PROJECT FILE PINK - CLIENT

Reporting Information:

1. Client: Soma Inc
Address: 1260 B 45th Street
Emeryville, CA 94608
Contact: Mitch Ozaki
Alt. Contact: Alix Spivack

American Environmental Network AEN
3440 Vincent Road, Pleasant Hill, CA 94523
Phone (510) 930-9090
FAX (510) 930-0256

Page 1 of 1

REQUEST FOR ANALYSIS / CHAIN OF CUSTODY

Lab Job Number: 9609401 9609746 9/24
Lab Destination:
Date Samples Shipped:
Lab Contact:
Date Results Required:
Date Report Required:
Client Phone No.:
Client FAX No.:

Address Report To:
2. See Above

Send Invoice To:
3. Sec #1

Send Report To: 1 or 2 (Circle one)

Client P.O. No.: Client Project I.D. No.: 96-2088

Sample Team Member (s): GTM

Lab Number	Client Sample Identification		Date / Air Volume	Date/ Time Collected	Sample Type*	Pres.	No. of Cont.	Type of Cont.	EPA 7420 TLC Pb	EPA 7420 TLC Pb	STLC (CA W.E.T.)				Hold *	Comments / Hazards
									ANALYSIS							
15A	SB-5-0.5	06A	9/13/96	2:45	Soil	None	1	9oz Jar	X		X					* Hold Sample for Potential TTLC Pb and STLC (CA WET) analysis
16A	SB-5-1.5	07A		2:50						X					X	
17A	SB-5-4.0	08A		2:55						X					X	
18A	SB-6-0.5			3:00					X							
19A	SB-6-1.5	09A		3:05						X					X	
20A	SB-6-4.0	10A		3:10						X					X	
21A	SB-7-0.5			3:30					X							9-27-96
22A	SB-7-1.5			3:30											X	Add'l analysis
23A	SB-7-4.0			3:35											X	Standard TAT
24A	SB-8-0.5			3:40					X							K. By
25A	SB-8-1.5			3:45											X	
26A	SB-8-4.0			3:50											X	

Relinquished by: (Signature)	DATE 9/13/96	TIME 10:00	Received by: (Signature)
Relinquished by: (Signature)	DATE 9/13/96	TIME 11:00	Received by: (Signature)
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature) Denise Harrington
Method of Shipment			Lab Comments

DATE 9/13/96 TIME 1110

*Sample type (Specify): 1) 37mm 0.8 µm MCEF 2) 25mm 0.8 µm MCEF 3) 25mm 0.4 µm polycarb. filter
4) PVC filter, diam. ____ pore size ____ 5) Charcoal tube 6) Silica gel tube 7) Water 8) Soil 9) Bulk Sample
10) Other ____ 11) Other ____

COPIES: WHITE - JOB FILE YELLOW - PROJECT FILE PINK - CLIENT

Reporting Information:

1. Client: SOMA Tax
Address: 1260 B 45th ST
Emeryville CA. 94608
Contact: Adam Abaki
Alt. Contact: Alix Spivak

American Environmental Network AEN
3440 Vincent Road, Pleasant Hill, CA 94523
Phone (510) 930-9090
FAX (510) 938-0256

REQUEST FOR ANALYSIS / CHAIN OF CUSTODY

Lab Job Number: 9609401
Lab Destination:
Date Samples Shipped:
Lab Contact
Date Results Required:
Date Report Required:
Client Phone No.:
Client FAX No.:

Address Report To:
2. See ABove

Send Invoice To:
3. See #1

Send Report To: 1 or 2 (Circle one)

Client P.O. No.: Client Project I.D. No.: 96-2088

Sample Team Member (s)

Lab Number	Client Sample Identification		Air Volume	Date/Time Collected	Sample Type*	Pres.	No. of Cont.	Type of Cont.	EPA 7420 TTLC pb	EPA 7420 TTLC pb	STLC (CA W.E.T.)				Hold *	Comments / Hazards
27A	SB-9-0.5	11A	9/12/96	4:05	Soil	—	1	250	X		X					* Hold sample for potential TTLC pb and STLC (CA WET) analysis
28A	SB-9-1.5	12A		4:10						X						
29A	SB-9-4.0	13A		4:15						X						
30A	SB-10-0.5			4:20					X							
31A	SB-10-1.5			4:25												
32A	SB-10-4.0			4:30												
33A	SB-11-0.5			4:50					X							9-20-96
34A	SB-11-1.5	14A		4:55						X						Added Analysis
35A	SB-11-4.0	15A		4:55						X						Standard TAT
																R. Bys

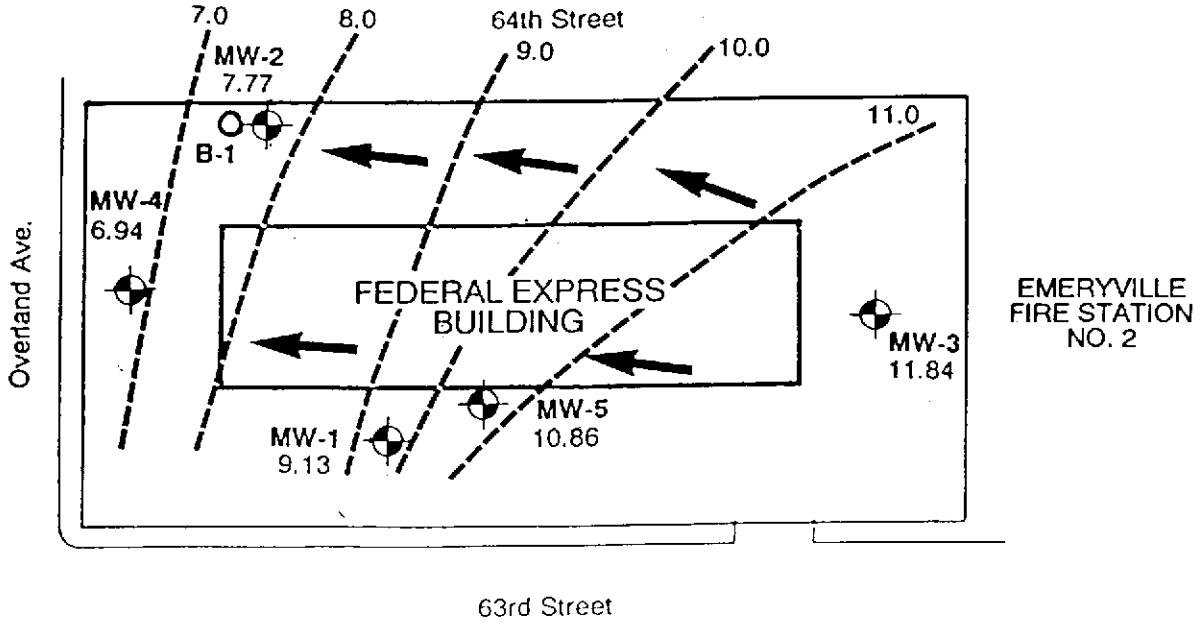
Relinquished by: (Signature)	DATE 9/13/96	TIME 10:00	Received by: (Signature)
Relinquished by: (Signature)	DATE 9-16-96	TIME 11:10	Received by: (Signature)
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature) Denise Harrington DATE 9/13/96 TIME 1110
Method of Shipment			Lab Comments

*Sample type (Specify): 1) 37mm 0.6 µm MCEF 2) 25mm 0.8 µm MCEF 3) 25mm 0.4 µm polycarb. filter
4) PVC filter, diam. ____ pore size ____ 5) Charcoal tube 6) Silica gel tube 7) Water 8) Soil 9) Bulk Sample
10) Other ____ 11) Other ____

COPIES: WHITE - JOB FILE YELLOW - PROJECT FILE PINK - CLIENT

APPENDIX E

GROUND-WATER FLOW MAPS FROM NEARBY SITES



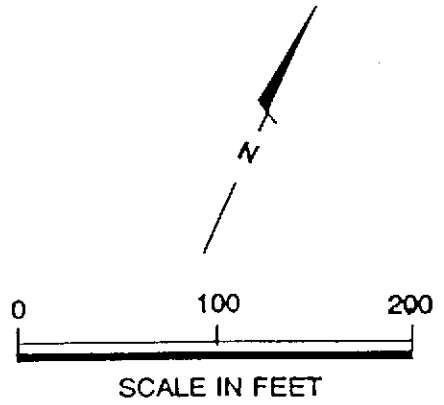
EXPLANATION

MW-1 9.13 Monitoring Well
Water Level 8/3/89

B-1 Boring (abandoned)

Ground-Water Flow Direction

10.0 Water-Level Contour
(relative to mean sea level)

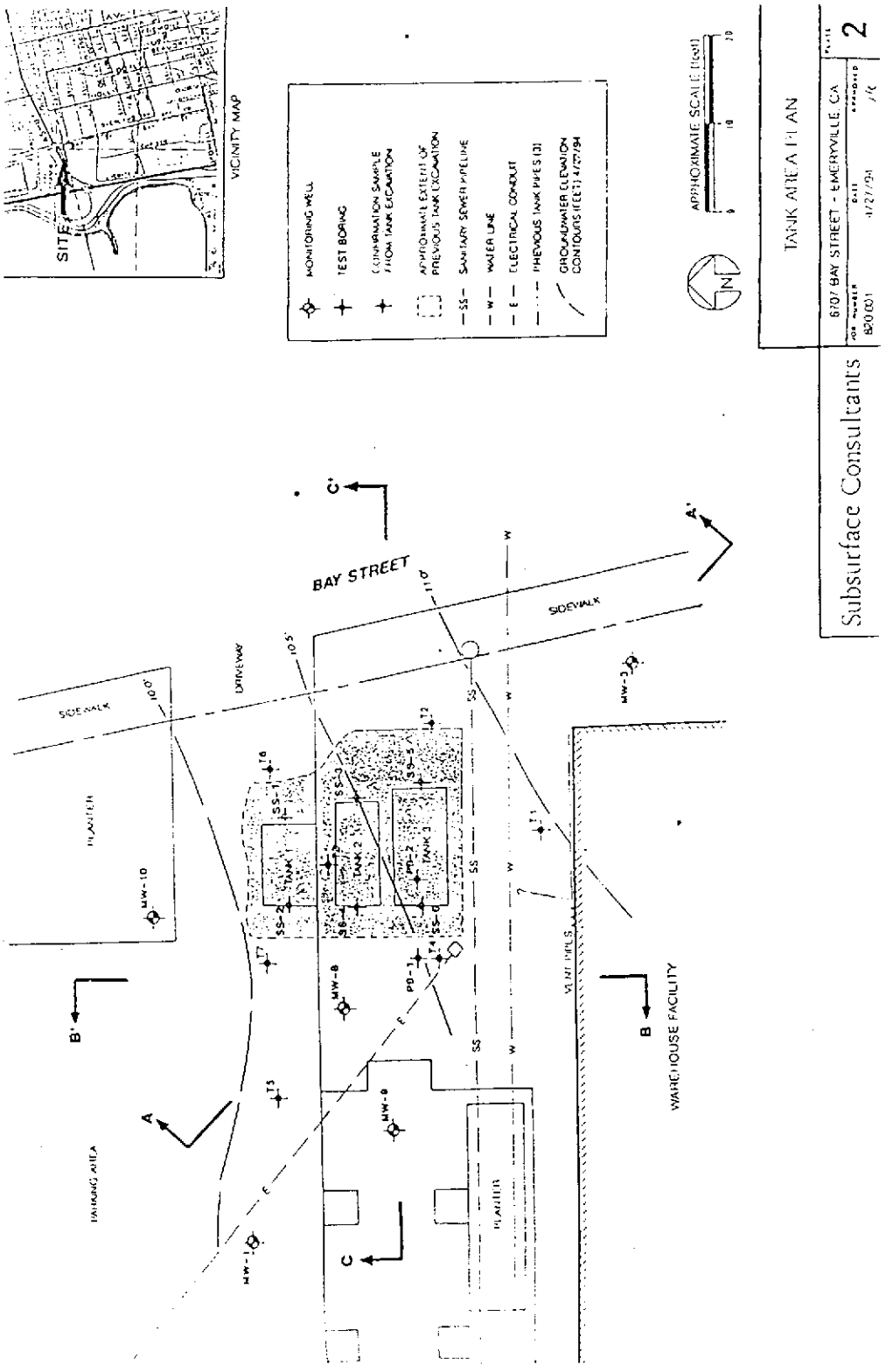


Source: HLA 1989.

SOMA CORPORATION

Ground-Water Flow Direction Map
1600 63rd Street • Emeryville, California

Project. No. 96-2088	October 1996	**Figure E-1**



Source: Subsurface Consultants, Inc. 1994.

SOMA CORPORATION

Ground-Water Flow Direction Map
6707 Bay Street • Emeryville, California

Project. No. 96-2088	October 1996	**Figure E-2**

APPENDIX F

DOCUMENTATION OF PRELIMINARY REMEDIATION GOALS

TABLE OF CONTENTS

APPENDIX F

DOCUMENTATION OF TARGET CLEANUP GOALS FOR LEAD IN SOIL

F-1.0 INTRODUCTION

Blood lead is used as the criterion for evaluating lead toxicity and calculating TCGs for lead due to the unique toxicological characteristics of lead. The Lead Risk Assessment Spreadsheet (LeadSpread) model, version Pb6 (hereafter referred to as "Pb6") developed by Cal EPA's Department of Toxic Substances Control (DTSC) has been used for the calculation of target cleanup goals (TCGs). The method and procedures used in the development of the TCGs are consistent with Cal EPA and U.S. EPA guidelines.[1]

The Pb6 model is a versatile one-compartment biouptake model that is used to evaluate the significance of lead concentrations in soil. Lead soil concentration is an input parameter to the model. When various other exposure parameters are input into the model, the model will calculate an equivalent blood lead concentration that is predicted to result from multimedia exposures based on the lead soil concentration input parameter. The modeling can be performed in reverse to backcalculate acceptable soil concentrations based on a regulatory approved blood lead concentration criterion. A criterion of 10 µg/dL blood lead that is protective of human health has been identified by both U.S. EPA and Cal EPA. The Pb6 model is based on blood lead concentrations because of the extensive human epidemiological data supporting the relationship between blood lead concentrations and adverse health effects.

F-2.0 PB6 MODEL INPUT PARAMETERS AND VALUES

TCGs have been calculated based upon 2 residential exposure scenarios: a child residential scenario and an adult residential scenario. Under residential exposure scenarios, child residents are presumed to reside at the Site for a period of 6 years. Adults are presumed to reside at the Site for a period of 24 years. Through a series of algorithms, the Pb6 model quantifies residential exposures to lead as a

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1 Cal EPA, DTSC 1992; U.S. EPA 1989.

function of day-to-day physical contact with lead-affected environmental media. Exposure is quantified independently for the child and adult resident based upon the following site-related and background source exposure points:

- Lead in ambient air
- Lead in drinking water
- Lead in soil
- Lead in the general diet
- Lead in home-grown produce

The Pb6 model quantifies exposure based upon the above exposure points in association with the following routes of exposure:

- Inhalation of lead-affected particulate matter
- Ingestion of lead-affected drinking water
- Incidental ingestion of lead-affected soils
- Direct dermal contact with lead-affected soils
- Ingestion of lead in the general diet
- Ingestion of lead-affected home-grown produce

In general, the input parameter values used to quantify residential exposures in this evaluation are default values used by DTSC. In some instances, site-specific data is used to develop more appropriate values for input parameters to the Pb6 model. Input parameter values which deviate from DTSC default values are identified and discussed below in Section F-2.1 through F-2.5. The use of both the default and site-specific values is consistent with lead exposure assessment guidance set forth by DTSC.[2] Table F-1 presents a complete copy of the Pb6 spreadsheet used in the calculation of the TCGs for lead in soil and provides the input parameters and associated values used for this application of the Pb6 model.

F-2.1 Lead Levels in Ambient Air

The ambient lead concentration in air used in the Pb6 model is based upon air monitoring data obtained from the Bay Area Air Quality Management District (BAAQMD). BAAQMD indicates that the annual average ambient air concentration of lead during 1995 monitoring period was 0.01 $\mu g/m^3$. This average is based on air data collected at the nearest sampling station to the Site, which is located at 1144 13th Street in Richmond, California (latitude 37:57:00; longitude 122:21:22).[3] The annual average ambient air concentration of lead during the 1994 monitoring period was also 0.01 $\mu g/m^3$. Thus, an ambient airborne lead concentration of 0.01 $\mu g/m^3$ was used to

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2 Cal EPA, DTSC 1992.

3 BAAQMD 1995b.

represent the ambient air concentration of lead input parameter.

F-2.2 Lead Levels in Soil

The lead concentration in soil parameter in the Pb6 model was set to unity (i.e., 1 µg/g). The model calculates the TCG independently of the concentration value identified for the lead in soil input parameter.

F-2.3 Lead Levels in Tap Water

In selecting a value to represent the concentration of lead in drinking water for use in Pb6, several alternatives were considered. Although the current California Drinking Water Standard for lead is 50 µg/L, the more conservative federal drinking water criterion for lead is used in California. The federal drinking water standard is an action level of 15 µg/L at the tap. Based on the federal criterion, a concentration of 15 µg/L was a potential candidate for the drinking water input parameter value.

Site-specific information about the water quality at a Site is preferrable since it is indicative of potential exposures. Two tap water samples (TW-1 and TW-2) were collected from the kitchen sink faucet from a vacant residence adjacent to the Site at 1265 Ocean Avenue on September 13, 1996. The residence was newly built and the water fixtures were new. The conditions under which the water samples were collected approximate those that are anticipated to be found in the three planned residences at the Site. The samples were collected according to federal regulations found in 40 CFR 141.86. TW-1 is the first draw sample. It was taken after the water in the plumbing system was allowed to stand motionless for at least 24 hours prior to any use. The second sample, TW-2 was taken after allowing the water run for 15 minutes to flush the residential pipes of standing water. Analytical results associated with TW-1 indicated a lead concentration of 11 ug/L or 11 parts per billion. Results from sample TW-2 indicated that the lead concentration in the tap water was not detectable (i.e. less than the detection limit of 1 µg/L). Table 3 following the main text of the CAP summarizes the analytical results associated with TW-1 and TW-2 and Appendix C contains the laboratory certificates and chain-of-custody forms associated with the samples.

Both drinking water samples were collected directly from the kitchen sink tap into laboratory prepared 1-liter sample bottles containing nitric acid. The first sample was obtained immediately after turning on the tap. The second sample was obtained after the pipe from the tap to the lead service line had been flushed of 1-volume of water. The tap water was allowed to flow for 15 minutes before the second sample was obtained. The preserved samples were delivered to the American Environmental Network (AEN) laboratory the same day they were collected. This Site-background

drinking water data corresponds with municipal water quality data that SOMA has collected from various cities in the Bay Area indicating that lead concentrations in drinking water at the source are typically less than 5 µg/L. A lead concentration of 11 µg/L is used as the lead concentration in drinking water in the Pb6 model.

F-2.4 Lead Uptake by Plants and Ingestion of Homegrown Crops

An evaluation of lead uptake by plants and ingestion of homegrown crops is a model option. The TCG evaluation was performed to include the potential exposures from ingestion of homegrown crops. Following the default settings of Pb6 and U.S. EPA guidance, the model assumes that 5.5% of the diet consists of homegrown produce; lead concentration in homegrown produce is calculated as 0.045% of that in the soil.

F-2.5 Airborne Dust Levels

In selecting a value to be used for the airborne dust level input parameter, several alternative values were considered.

The current National Ambient Air Quality Standards for PM10 (i.e., suspended particulate matter) are an annual average of 50 µg/m^3 and a 24-hour average of 150 µg/m^3.[4] PM10 is a description of the fraction of dust particles equal to or less than 10 microns in diameter and is believed to represent the respirable fraction of particulate matter. Both the annual average and the 24-hour average standards reflect arithmetic means. The federal standards require that monitoring station PM10 annual data be averaged based upon a normal distribution and represented by an arithmetic mean, as opposed to a geometric mean.

More conservative standards for PM10 are used in California since they are more stringent than the federal standards. The California annual average and 24-hour average PM10 standards are 30 µg/m^3 and 50 µg/m^3, respectively, and both standards reflect geometric means. The California standards require that monitoring station PM10 data be averaged based upon a lognormal distribution and represented by a geometric mean. In general, geometric means are lower than arithmetic averages because they lessen the weight given to extreme values.[5] Based on the federal and California annual average standards, airborne dust levels of 50 µg/m^3 and 30 µg/m^3 were possible alternative values for the airborne dust level input parameter.

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4 BAAQMD 1995b.
5 BAAQMD 1995b.

PM10 annual arithmetic averages (calculated in accordance with federal rules) and annual geometric means (calculated in accordance with California state rules) based upon air monitoring data obtained from the BAAQMD represent 2 other possible alternative values for the airborne dust level input parameter. BAAQMD indicates that the PM10 annual average and the PM10 annual geometric mean during the measuring period of 1995 were 21.6 μg/ m^3 and 19.3 μg/ m^3, respectively. These annual averages are based on air data collected at the nearest sampling station to the Site, which is located at 1144 13th Street in Richmond, California (latitude 37:57:00; longitude 122:21:22).[6] Both PM10 annual averages are below the respective federal and California state standards. Furthermore, the California annual geometric mean standard of 30 μg/ m^3, the more difficult of the standards to meet, has not been exceeded by the Richmond monitoring station for the fourth time since 1991.[7] In consideration of the Richmond monitoring station's consistent compliance with the federal and state PM10 standards and the California standards regarding the calculation of geometric means, the 19.3 μg/ m^3 value was used for the airborne dust level input parameter within Pb6.

F-3.0 PB6 MODEL OUTPUTS AND TARGET CLEANUP GOALS (TCGs)

Based upon the input parameters which quantify exposure and the health-protective target blood lead level of 10 μg/dL, the Pb6 model generates 4 relevant concentrations of lead in soil as outputs (Table F-1, bolded values). Each of the 4 concentrations of lead in soil are associated with 1 of the 2 exposure scenarios considered in the model (i.e., child or adult resident) and with 1 of the 2 statistical confidence levels considered in the calculations (i.e., 95 percent upper confidence level [UCL] or 99 percent UCL). All 4 values represent possible concentrations of lead in soil that can be adopted as TCGs.

Based upon the application of the Pb6 model, the 95 percent UCL on the concentration of lead in soil deemed health-protective under the child residential exposure scenario is 320 mg/kg (ppm). Under the adult residential exposure scenario, the 95 percent UCL on the concentration of lead in soil that is protective of human health are 1463 mg/kg (ppm). In accordance with Cal EPA and U.S. EPA guidance pertaining to acceptable statistical confidence levels and conservatism, the 95 percent UCL concentration of lead in soil under the child residential scenario represents the most appropriate value for a TCG at the Site. Consequently, the TCG for lead in Site soils that represents the 95 percent UCL concentration is 320 mg Pb / kg soil.

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6 BAAQMD 1995b.
7 BAAQMD 1995b.

F-4.0 REFERENCES

Bay Area Air Quality Management District (BAAQMD). 1995b. Contaminant & Weather Summary: December 1995. Technical Services Division. December.

California Environmental Protection Agency, Department of Toxic Substances Control (Cal EPA, DTSC). 1992. Supplemental Guidance for Human Health Multimedia Risk Assessment for Hazardous Waste Sites and Permitted Facilities. Office of the Science Advisor. July.

U.S. Environmental Protection Agency (U.S. EPA). 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). Office of Emergency and Remedial Response. Interim Final. EPA/540/1-89/002.

Table F-1. Lead Risk Assessment Spreadsheet
California Department of Toxic Substances Control

INPUT		OUTPUT							
MEDIUM	LEVEL		percentiles					PRG-99	PRG-95
			50th	90th	95th	98th	99th	(ug/g)	(ug/g)
LEAD IN AIR (ug/m^3)	0.01								
LEAD IN SOIL (ug/g)	1.0	BLOOD Pb, ADULT (ug/dl)	1.5	2.3	2.6	3.0	3.3	**1038.1**	**1463.1**
LEAD IN WATER (ug/l)	11	BLOOD Pb, CHILD (ug/dl)	2.7	4.2	4.8	5.5	6.1	**187.8**	**319.2**
PLANT UPTAKE? 1=YES 0=NO	1	BLOOD Pb, PICA CHILD (ug/dl)	2.7	4.3	4.9	5.7	6.2	28.4	48.2
RESPIRABLE DUST (ug/m^3)	19.3	BLOOD Pb, INDUSTRIAL (ug/dl)	1.5	2.4	2.7	3.1	3.4	5236.7	7412.9

EXPOSURE PARAMETERS

		residential			industrial
General	units	adults	children	children with pica	adults
Days per week	days/wk	7	7	7	5
Dermal Contact					
Skin area	cm^2	3700	2800	2800	5800
Soil adherence	mg/cm^2	0.5	0.5	0.5	0.5
Route-specific constant	(ug/dl)/(ug/day)	0.00011	0.00011	0.00011	0.00011
Soil ingestion					
Soil ingestion	mg/day	25	55	790	25
Route-specific constant	(ug/dl)/(ug/day)	0.0176	0.0704	0.0704	0.0176
Inhalation					
Breathing rate	m^3/day	20	10	10	20
Route-specific constant	(ug/dl)/(ug/day)	0.082	0.192	0.192	0.082
Water ingestion					
Water ingestion	l/day	1.4	0.4	0.4	1.4
Route-specific constant	(ug/dl)/(ug/day)	0.04	0.16	0.16	0.04
Food ingestion					
Food ingestion	kg/day	2.2	1.3	1.3	2.2
Route-specific constant	(ug/dl)/(ug/day)	0.04	0.16	0.16	0.04
Dietary concentration	ug/kg	9.5	9.5	9.5	10.0
Lead in produce	ug/kg	0.5	0.5	0.5	

PATHWAYS, ADULTS

	Residential		Industrial			
Pathway	Blood Pb ug/dl	percent of total	Blood Pb ug/dl	percent of total	Concentration in medium	
SOIL CONTACT:	0.00	0%	0.00	0%	1	ug/g
SOIL INGESTION:	0.00	0%	0.00	0%	1	ug/g
INHALATION:	0.02	1%	0.01	1%	0.01	ug/m^3
WATER INGESTION:	0.62	42%	0.62	41%	11	ug/l
FOOD INGESTION:	0.83	57%	0.88	58%	9.5	ug Pb/kg diet

PATHWAYS, CHILDREN

	Typical		with pica			
Pathway	Blood Pb ug/dl	percent of total	Blood Pb ug/dl	percent of total	concentration in medium	
SOIL CONTACT:	0.00	0%	0.00	0%	1	ug/g
SOIL INGESTION:	0.00	0%	0.06	2%	1	ug/g
INHALATION:	0.02	1%	0.02	1%	0.01	ug/m^3
WATER INGESTION:	0.70	26%	0.70	26%	11	ug/l
FOOD INGESTION:	1.97	73%	1.97	72%	9.5	ug Pb/kg diet