WEISS ASSOCIATES

REMEDIAL ACTION PLAN

for the

Learner Property
768-46th Avenue
Oakland, California

prepared by

Weiss Associates
5500 Shellmound Street
Emeryville, California 94608

WA Job #84-486-00

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We certify that Weiss Associates's work on the Learner Company's Project was conducted under our supervision. To the best of our knowledge the data contained herein are true and accurate and satisfy the specified scope of work for this project.

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REMEDIAL ACTION PLAN

for the

Learner Property
768-46th Avenue
Oakland, California 94601

Aug 21, 1991

prepared for

Learner Investment Company
2711 Navy Drive
Stockton, California 95206

August 21, 1991

A Division of AguaTierra Associates Incorporated

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SUMMARY

Weiss Associates reviewed site historical data and environmental investigations at the Learner Investment Company property at 768-46th Avenue in Oakland, California. These data indicate that total petroleum hydrocarbons (TPHs) concentrations exceed 1,000 part per million (ppm) in several locations. However, the affected soils have negative corrosivity, reactivity, ignitability and aquatic toxicity characteristics. Site historical information suggests that the TPHs are hydraulic fluids and oils which are relatively insoluble and of low toxicity. Data also indicate that lead and zinc concentrations exceed State criteria for defining hazardous waste. The average lead concentration is 1,568 ppm, based on 11 analyses. While elevated, this concentration is only 27 percent higher than the average soil lead concentration in residential yards in the same region as Learner's property based on a recent State study. Consequently, a significant overall risk reduction for lead can be achieved only by a regional remedial plan which addresses all heavy metals sources and provides a common technical approach to the problem.

Several approaches to mitigate the contaminants of concern in soil were screened and evaluated using criteria established by the U.S. Environmental Protection Agency (EPA). The three approaches evaluated in detail are:

1. *Excavation and Off-Site Disposal.* This alternative achieves only a very small overall reduction in public health and environmental risks at a very high monetary cost. Approximately 86 percent of the total cost is due to disposal fees and Federal, State and local taxes. Excavation and land disposal would not be appropriate for regional lead contamination, since the disposal costs are staggering. In addition, this technique does not meet State and Federal on-site cleanup goals.

2. *Stabilization and Capping.* This alternative achieves reduction in public health and environmental risks at relatively low cost compared other viable methods. Stabilization relies on chemical reactions to fix metals in a matrix that reduces their solubility and mobility. Lead and zinc form low solubility complexes with the major anions of natural environmental systems. Capping of the site with asphalt will curtail the infiltration of meteoric water and entrained soluble hydrocarbons, if present. Since the TPHs present are suspected to exhibit very low volatility, vapor phase diffusion of hydrocarbons to ground water is expected to be negligible.

3. *Solidification and Stabilization.* This alternative may achieve a moderate reduction in public health and environmental risks at moderate cost compared other viable methods. The objective of solidification and stabilization technologies is to achieve physical and chemical immobilization of contaminants. Chemical constituents are mechanically locked within a solidified matrix to form a monolithic structure similar to concrete. Although solidification may improve the physical characteristics of the soil, it has limited effect on the chemistry of the waste; solubility and mobility reduction are achieved by stabilization, the same chemical reaction used in Alternative 2. This technology increases the treated soil volume and requires off-site disposal of excess volumes and as such, does not meet State and Federal on-site cleanup goals. Also, TPH in soil may interfere with the setting

process, and as such, requires additional bench and field testing to ensure its effectiveness at the site.

The preferred remedial action plan is Alternative 2. Stabilization and capping provides overall protection of human health and the environment, reduction of contaminant toxicity and mobility, and worker and community protection during remedial actions. The alternative is technically and economically implementable at site and on a regional scale.

1. INTRODUCTION

Weiss Associates (WA) reviewed site investigation data and remedial action alternatives for the Learner Investment Company property ("the Property") located at 768 46th Avenue, Oakland, California. This report summarizes WA's review of site and regional background data, screens remedial alternatives in accordance with U.S. Environmental Protection Agency (EPA) and State criteria, and presents a proposed site mitigation plan.

1.1 BACKGROUND

The Learner Investment Company, of Stockton, California, owns the property located at 768-46th Avenue in Oakland, California (Figure 1). Currently the Property is used as a storage yard for mechanical equipment. From the 1960's to 1982 a scrap-metal baling plant was operated on the Property. After plant closure, Learner Company representatives reported that vandals had caused a spill of up to 200 gallons of hydraulic fluid at the baler (Weiss Associates, 1991a). Subsequent to this spill, the Learner Company dismantled the baler, removed the onsite railroad spur and graded both the baling area and the former spur area, placing the soil in two piles on either side of the baling area, (Weiss Associates, 1991b). WA was retained by the Learner Company to review site investigation data collected by Dames and Moore, (Dames and Moore, 1988) and Kleinfelder, Inc., (Kleinfelder, 1989), and to prepare a remedial action plan.

Both site investigations focused on three main areas: the access drive, the former baling area and the soil piles (Plates 2 and 3, Appendix A). In June 1990, both piles were consolidated into a single pile.

During the Dames and Moore investigation, fifteen discrete depth soil samples and five composite soil samples were collected. The samples were analyzed for Total Petroleum Hydrocarbons (TPHs) by EPA Method 418.1 and for polychlorinated biphenyls (PCBs) by EPA Method 8080. Analytical results are shown in Table 1, Appendix A. Sampling locations are shown in Plates 2 and 3, Appendix A.

Ten shallow soil samples were collected in the former baling area. Four (2S, 3S, 6S, 11S) contained TPH concentrations over 1,000 parts per million (ppm); TPH concentrations were less than 16 ppm in the other six. TPHs were not detected in three of the four deeper (4.5 ft depth) soils samples, and were slightly above the detection limit in the fourth sample.

Three composite soil samples were collected in the vicinity of the access drive, and two composites were collected from the soil piles. One access drive sample (composite R3 and R4) and both soil pile samples (composites P1A and P1B; P2A and P2B) contained TPH above 1,000 ppm. Two access drive (composites R1 and R2; R3 and R4) and the two soil pile samples contained PCBs above detection limits. One sample contained 25.2 ppm total PCBs, exceeding Federal PCB cleanup requirements (CFR, 1988) for restricted access areas by 0.8 percent (composite P1A and P1B).

Kleinfelder, Inc. collected eleven surface soil samples in June 1989. Most samples contained debris including metal scraps, glass and wood. All samples were analyzed for TPH (by EPA Method 418.1), lead, chromium, cadmium, nickel and zinc, corrosivity, reactivity, ignitability and aquatic toxicity; one sample was analyzed for the 17 California Code of Regulations (CCR) Title 22 metals and three samples were analyzed by Waste Extraction Test (WET) procedures (CCR, 1984a). Analytical results and methods are summarized in Table 2, Appendix A. Sampling locations are indicated in Plate 4, Appendix A. Analytical reports and chain-of-custody documentation from the Kleinfelder report are included as Appendix B. Four samples each were collected from the former baling area and the soil pile; three samples were collected from the access drive area.

which one?

Two samples from the former baling area (B-07 and B-09) contained TPH concentrations above 1,000 ppm. The average TPH concentration for the four samples was 1,130 mg/kg. Lead concentrations at the baling area are below regional background levels. Soil pH varies from neutral to strongly alkaline. These pHs reduce heavy metal solubility and mobility.

TPH concentrations from all three samples collected along the paved access drive were over 1,000 ppm. Lead exceeded its Total Threshold Limit Concentration (TTLC) level (CCR, 1984b) in one sample. Two samples have slightly alkaline pH; the third is slightly acidic; lead concentration in this slightly acidic sample is well below regional background levels.

Three of the four TPH results from the soil pile reported by Kleinfelder (Table 2) are one order of magnitude higher than those for the *in-situ* composite samples collected by Dames and Moore (B-06, B-11 and B-12). Because the soil pile consists of graded surface materials, this elevated TPH concentrations may have resulted from the application of hydrocarbon products for dust and runoff control. Lead and zinc were detected above their respective Soluble Threshold Limit Concentrations (STLC) and TTLCs in samples from the soil pile. Hazardous waste identification analyses included corrosivity, reactivity, ignitability and aquatic toxicity. Results for these analyses were below detection limits for all 11 samples (Table 2). The samples' lack of ignitability and site background suggest that hydraulic fluids, and possibly other oils are the predominant hydrocarbons in soil.

1.2 REGIONAL BACKGROUND

WA reviewed the interim report prepared by the California Department of Health Services (CDHS) as part of the Childhood Lead Poisoning Prevention Program (CLPPP) (DHS, 1989). WA also reviewed cases on file at the Regional Water Quality Control Board (RWQCB) on toxics and underground tank leaks for the 0.4 square mile area bounded by 46th Avenue and 57th Avenue, the Nimitz Freeway and East 14th Street (Figure 1).

CDHS studies indicate that background soil lead levels in the Oakland neighborhoods in the vicinity of the Learner site are high, exceeding State and Federal environmental standards in most cases. The average lead concentration in soil was 1,232 ppm, based on 531 samples collected from residential yards in East Oakland. Lead concentrations ranged from 400 to 4,600 ppm. The study attributed lead in soil to industrial and automobile emissions and lead-based paints. The CDHS report recommended a 500 ppm lead abatement goal for residential areas, based on background levels in urban soils and CLPPP studies.

The RWQCB files contain twenty-two cases located in the study area. Twelve files are toxic cases and ten are underground fuel leak cases. Toxic case files indicate that lead, zinc, PCBs, and chlorinated solvents are present in soils and ground water at several locations.

1.3 CHEMICALS OF CONCERN

TPHs, consisting of predominantly hydraulic fluid and other oils, are present in concentrations greater than 1,000 ppm in the access drive, the soil pile, and in the area surrounding the former baler. Although TPH concentrations in excess of 1,000 ppm are often classified as being materials of concern by State and local agencies, available data indicate that soil on the Property has negative corrosivity, reactivity, ignitability and aquatic toxicity characteristics. Site historical information suggests that the TPHs present are mainly hydraulic fluids and oils which are relatively insoluble and of low toxicity.

Available data indicate that lead and zinc are the only metals of concern at the site. Since lead was detected in concentrations exceeding its TTLCs and STLCs in the soil piles and the access drive, the soil from these areas is classified as hazardous waste. The average lead concentration is 1,568 ppm, based on 11 analyses. While elevated, this concentration is only 27 percent higher than the average soil lead concentration in residential yards near the Property. Consequently, a significant overall risk reduction and lead ARARs compliance can be achieved only by a regional remedial plan which addresses all heavy metals sources and provides a common technical approach to the problem. Total zinc concentrations exceeds the TTLC in the soil piles only.

Based on existing data, the overall affected soil area is approximately 3,800 square yards (1,725 sq. yds. in the baling area and 2,075 sq. yds. in the access road area). The total volume of affected soil, assuming an average depth of about 1.7 ft, is approximately 2,150 cubic yards.

1200 ppm Background Pb in Oakland
Interim Rpt to CA State Legislature June 89
Childhood lead poisoning in CA causes & prevention
Clifford Allenby Sec of H & W Agency
Kenneth Kizer - Dir DHS (at that time)

2. REMEDIAL ALTERNATIVES

2.1 SCREENING OF REMEDIAL ALTERNATIVES

WA reviewed the following alternatives to remedy soil affected by lead and zinc, and hydraulic fluid and other oils:

1. Excavation and off-site disposal
2. Stabilization and capping
3. Solidification and stabilization
4. Reuse and recycle
5. Biotreatment

These alternatives are briefly described below. Alternatives 1, 2 and 3 were retained for detailed analysis. Additional definition of areal and vertical extent of contamination may be advisable and/or required for these alternatives. Alternatives 4 and 5 were discarded by the screening process.

2.1.1 Excavation and Off-Site Disposal

This alternative consists of excavating affected soils to approved cleanup levels. Soil are disposed of at an approved Class I facility. After verification sampling, the excavation is filled with clean imported soils, if necessary. This alternative transfers risk and is not consistent with State and Federal on-site cleanup goals.

2.1.2 Stabilization and Capping

This alternative consists of chemically stabilizing metals via adsorption and chemical fixation. The soil is treated with lime to a pH level consistent with remediation goals. The site is capped with asphaltic pavement. A deed restriction is placed on the property. The asphaltic cap is inspected yearly for integrity.

2.1.3 Solidification and Stabilization

This alternative consists of solidifying and stabilizing affected soils with a cement mixture, immobilizing both hydrocarbons and metals. The soils are excavated and treated on-site. After treatment, the soils are placed on a lined pit on-site and excessive volumes are disposed off-site. This alternative transfers risk and is inconsistent with State and Federal on-site cleanup goals.

2.1.4 Reuse and Recycle

This alternative consists of recycling metal scrap by screening. After metal removal, soils containing TPH are reused by a permitted asphalt processing plant. WA collected and analyzed one metal scrap sample from the site. This sample did not contain lead or zinc particulates. Unless additional sampling substantiates an opposite conclusion, this technology probably will not reduce heavy metals concentration to a level acceptable to the asphalt processing plant. In addition, only 2 of the 25 asphalt plants contacted in California are authorized to process soils containing TPH.

2.1.5 Biotreatment

This alternative consists in landfarming the soils containing TPH with or without nutrients and bacterial addition. This alternative will reduce TPH content, but it will not remove lead and zinc. Therefore, this method is not evaluated further.

2.2 DETAILED ANALYSIS OF SELECTED ALTERNATIVES

Three alternatives remain for more detailed analysis. Table 3 compares the three selected remedial alternatives according to the nine EPA assessment factors (U.S. EPA, 1988). Table 4 presents a cost comparison of the alternatives.

All three alternatives are technically feasible and provide overall protection of human health and the environment, reduction of contaminants toxicity and mobility, and worker and community protection during remedial actions.

2.2.1 Excavation and Off-Site Disposal

This alternative would achieve only a very small overall reduction in public health and environmental risks at a very high monetary cost. Approximately 86 percent of the total cost is due to disposal fees and Federal, State and local taxes. Excavation and land disposal would not be appropriate at the regional level, since the disposal costs of large volumes are staggering. Furthermore, among the negative environmental impacts associated with this remediation alternative are transfer of risk, air emissions caused by approximately 140-400 mile truck trips, dust emissions, and use of landfill space that may be better put toward other waste disposal. In addition, this alternative is inconsistent with State and Federal on-site treatment goals.

2.2.2 Stabilization and Capping

Lead and zinc form low solubility complexes with the major anions of natural environmental systems. Equilibrium solubility is a function of soil pH, redox potential and soil chemistry. Stabilization relies on chemical reactions to fix metals in a matrix that reduces their solubility and mobility. Research data indicate that most lead and zinc compounds are virtually insoluble at pH 10 (Dragun, 1988).

Stabilization and capping, used together, can effectively reduce risks to public health and the environment at this site. Human health risks are minimized by reducing air-borne metal and hydrocarbon emissions; risk to ground water becomes negligible by reducing metal solubility. Capping of the site with asphalt will curtail the infiltration of meteoric water and entrained soluble hydrocarbons, if present. Since the majority of hydrocarbons present are

suspected to exhibit very low vapor pressures, vapor phase diffusion of hydrocarbons to ground water is expected to be negligible.

Long term effectiveness of this alternative can be predicted from chemical reaction rates and solubility data from literature, and from conducting a field-scale pilot study. This alternative is technically and economically feasible at regional level, and consequently, it deserves maximum consideration.

2.2.3 Solidification and Stabilization

The objective of solidification and stabilization technologies is to achieve physical and chemical immobilization of contaminants. Chemical constituents are mechanically locked within a solidified matrix to form a monolithic structure similar to concrete. Although solidification may improve the physical characteristics of the soil, it has limited effect on the chemistry of the waste; solubility and mobility reduction are achieved by stabilization, the same chemical reaction used in Alternative 2.

This technology increases the treated soil volume and requires off-site disposal of excess volumes. Also TPH in soil may interfere with the setting process and as such, requires additional bench and field scale pilot testing to verify the site-specific effectiveness of this alternative.

3. SITE MITIGATION PLAN

The preferred remedial alternative is stabilization and capping. The proposed site mitigation provides overall protection of human health and the environment, reduction of contaminant toxicity and mobility, and worker and community protection during remedial actions. The alternative is technically and economically implementable at site and regional levels.

The proposed site mitigation plan consists of two phases. In the first phase, evaluation, the soil lime requirement is estimated by a buffer or titration curve. Soil samples are treated by lime addition and tested for metal and hydrocarbon leaching potential by a test method approved by the regulatory agency.

In the second phase, implementation, the soil is graded and treated by lime addition to a uniform depth in the affected areas, and to deeper levels and high pH in selected hot spots. Air particulate emissions are kept below EPA standards by applying water and other engineering controls. Dust concentrations are monitored continuously during remediation work. A gravel base and an asphalt cap are placed over the site. A deed restriction prohibiting cap removal is placed on the property.

REFERENCES

California Code of Regulations, 1984a, Title 22, Chapter 30, Article 11, Section 66700.

California Code of Regulations, 1984b, Title 22, Chapter 30, Article 11, Section 66699 (a) (1) through (2), (b).

California Department of Health Services, 1989, *Childhood Lead Poisoning in California, Causes and Prevention*, Interim Report to the State Legislature, June 1989.

Code of Federal Regulations, Title 40, Part 761, Paragraph 125, (c) (3) (i) through (v).

Dames and Moore, 1988, *Phase II Environmental Site Assessment*, Learner Investment Company Property, Job no. 17212-001-043, August 1988.

Dragun, J., 1988, *The Soil Chemistry of Hazardous Materials*, Hazardous Materials Control Research Institute, Silver Spring, Maryland; 458 p.

Kleinfelder, Inc., 1990, *Site Assessment Findings, Bench Test Results, and Remedial Action Plan*, prepared for the Learner Company, Job No. 24-214100-1300, February 1990.

United States Environmental Protection Agency (U.S. EPA), Office of Emergency Response, 1988, *Guidance in Remedial Actions for Contaminated Sites*, EPA/540/G-88/003.

Weiss Associates, 1991a, Personal Communication; telephone conversation between Jack Hecht of the Learner Company and Judy Gaitnes-Arneson of Weiss Associates February 6, 1991 concerning a spill of hydraulic fluid at the Learner Company, Oakland, California.

Weiss Associates, 1991b, Personal communication; telephone conversation between Jack Hecht of the Learner Company and Judy Gaitens-Arneson of Weiss Associates February 5, 1991 concerning site activities at the Learner Company, Oakland, California.

PROJECT PERSONNEL

The following Weiss Associates personnel worked on this project:

Name and Position	Responsibilities
Richard B. Weiss, Principal Hydrogeologist	Technical guidance, report quality assurance.
Fatima Lelic, Principal Engineer	Technical guidance, project management, data review and synthesis.
Robert O. Devany, Project Hydrogeologist	Project management, data review and synthesis, report writing and editing.
Robert Riddell, Senior Staff Engineer	Data compilation and synthesis, report writing.
Judy Gaitens-Arneson, Staff Geologist	Data compilation and synthesis, report writing.
Teresa McClish, Technical Assistant	Data compilation, report preparation.

TABLE 1
SUMMARY OF ANALYTICAL RESULTS
DAMES AND MOORE PHASE II ENVIRONMENTAL SITE ASSESSMENT

Location	Sample ID	Sample Depth feet	Concentration, mg/kg TPH	Total PCBs
FORMER BAILING AREA				
1	1S	2.5	7.9	ND[1]
1	1D	4.5	ND	NA
2	2S	2.5	3770	NA
3	3S	2.5	3430	ND
3	3D	4.5	ND	NA
4	4S	2.5	ND	ND
4	4D	4.5	ND	NA
5	5S	2.5	15.3	ND
5	5D	4.5	7.2	NA
6	6S	2.5	2860	NA
7	7S	2.5	ND	NA
8	8S	2.5	ND	NA
9	9S	2.5	ND	NA
10	10S	2.5	ND	NA
11	11S	2.5	2290	NA
ACCESS DRIVE				
Composite	R1&R2	1.5-2.0	645	0.6
Composite	R3&R4	1.5-2.0	1830	0.57
Composite	R5&R6	1.5-2.0	247	ND
SOIL PILES				
Composite	P1A&P1B		3610	25.2
Composite	P2A&P2B		3920	19.9

1. ND - Not detected (5 mg/kg for TPH and 0.01 mg/kg for PCBs); NA - Not analyzed.

TABLE 2
SURFACE SOIL SAMPLING
ANALYTICAL RESULTS SUMMARY
LEARNER COMPANY
OAKLAND, CALIFORNIA

	B-02	B-03	B-04	B-05	B-06	B-07				
Date Sampled	06/22/89	06/22/89	06/22/89	06/22/89	06/22/89	06/22/89				
Sample ID #	35142	35141	35140	35139	35138	35137				
Laboratory ID #	47854-01	47854-02	47854-03	47854-08	47854-10	47854-09				
Analyzing Lab	Enseco	Enseco	Enseco	Enseco	Enseco	Enseco				
Sample Locations	Drive	Drive	Drive	N. Pile	N. Pile	Bailing Area				
Petroleum Hydrocarbons	Results	Results	Results	Results	Results	Results	TTLC	STLC	Limit	Units
TPH by IR	28000	3500	7700	5400	22000	1800	NA	NA	*	mg/Kg
Metals Analysis										
Cadmium	4.7	19	8.7	30	43	ND	100	1.0	0.5	mg/Kg
Chromium	39	218	44	75	178	ND	500	5.0	1	mg/Kg
Lead	322	5150	624	1940	1810	218	1000	5.0	5	mg/Kg
Nickel	44	698	61	149	265	ND	2000	20	4	mg/Kg
Zinc	849	3900	1530	6600	8820	531	5000	250	1	mg/Kg
Other Analysis										
Cyanide Reactive	ND	ND	ND	ND	ND	ND			0.1	mg/Kg
Sulfide Reactive	ND	ND	ND	ND	ND	ND			0.5	mg/Kg
pH	6.5	7.4	7.5	7.6	7.6	8.9			0.01	
Ignitability	ND	ND	ND	ND	ND	ND			140.	^{o}F
Bioassay	>750	>750	>750	>750	>750	>750				mg/L

Notes:

ND - Not detected above laboratory reporting limit.
* - The detection limit was raised due to high level of analyte present in the sample.
TTLC - Toxic Threshold Limit & Concentration, mg/kg.
STLC - Soluble Threshold Limit Concentration, mg/l.

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TABLE 2 (continued)
SURFACE SOIL SAMPLING
ANALYTICAL RESULTS SUMMARY
LEARNER COMPANY
OAKLAND, CALIFORNIA

not sure where to plot these data

	B-08	B-09	B-10	B-11	B-12	Composite				
Date Sampled	06/22/89	06/22/89	06/22/89	06/22/89	06/22/89	06/22/89				
Sample ID #	35136	35147	35146	35145	35144	35135				
Laboratory ID #	47854-11	47854-07	47854-06	47854-05	47854-04	47854-12				
Analyzing Lab	Enseco	Enseco	Enseco	Enseco	Enseco	Enseco				
Sample Locations	Bailing Area	Bailing Area	Bailing Area	S. Pile	S. Pile	Bench Test Soil				
Petroleum Hydrocarbons	Results	Results	Results	Results	Results	Results	TTLC	STLC	Limit	Units
TPH by IR	780	1200	740	28000	25000	11000	NA	NA	*	mg/Kg
Metals Analysis										
Cadmium	3.8	9.7	16	42	16		100	1.0	0.5	mg/Kg
Chromium	50	60	88	131	238		500	5.0	1	mg/Kg
Lead (Total, Soluable)	209, 9.6	433	551	5230, 83.5	1210,102	998, 127	1000	5.0	5	mg/Kg,mg/L
Nickel	54	69	203	181	129		2000	20.0	4	mg/Kg
Zinc (Total, Soluable)	779, 68.4	1760	2500	8180, 379	2090, 240	3830, 448	5000	250.0	1	mg/Kg, mg/l
Other Analysis										
CyanideND	ND	ND	ND	ND					0.1	mg/Kg
Sulfide ND	ND	ND	ND	ND					0.5	mg/Kg
pH	8.0	7.6	7.2	7.1	7.4				0.01	
IgnitabilityND	ND	ND	ND	ND					140	^{o}F
Bioassay>750	>750	>750	>750	>750						mg/L

Notes:
ND - Not detected above laboratory reporting limit.
* - The detection limit was raised due to high level of analyte present in the sample.
TTLC - Toxic Threshold Limit & Concentration, mg/kg.
STLC - Soluble Threshold Limit Concentration, mg/l.

1ET90-3

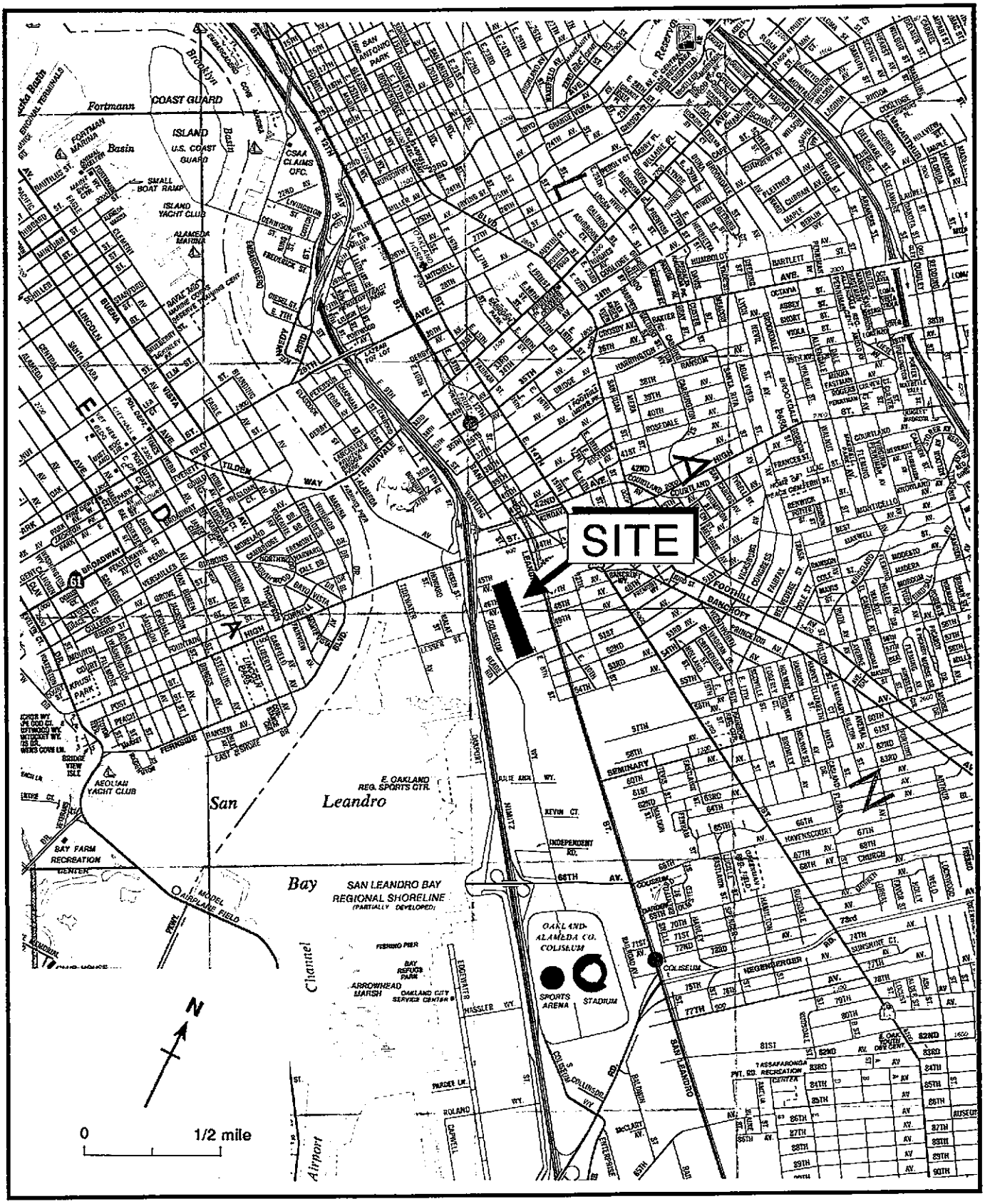
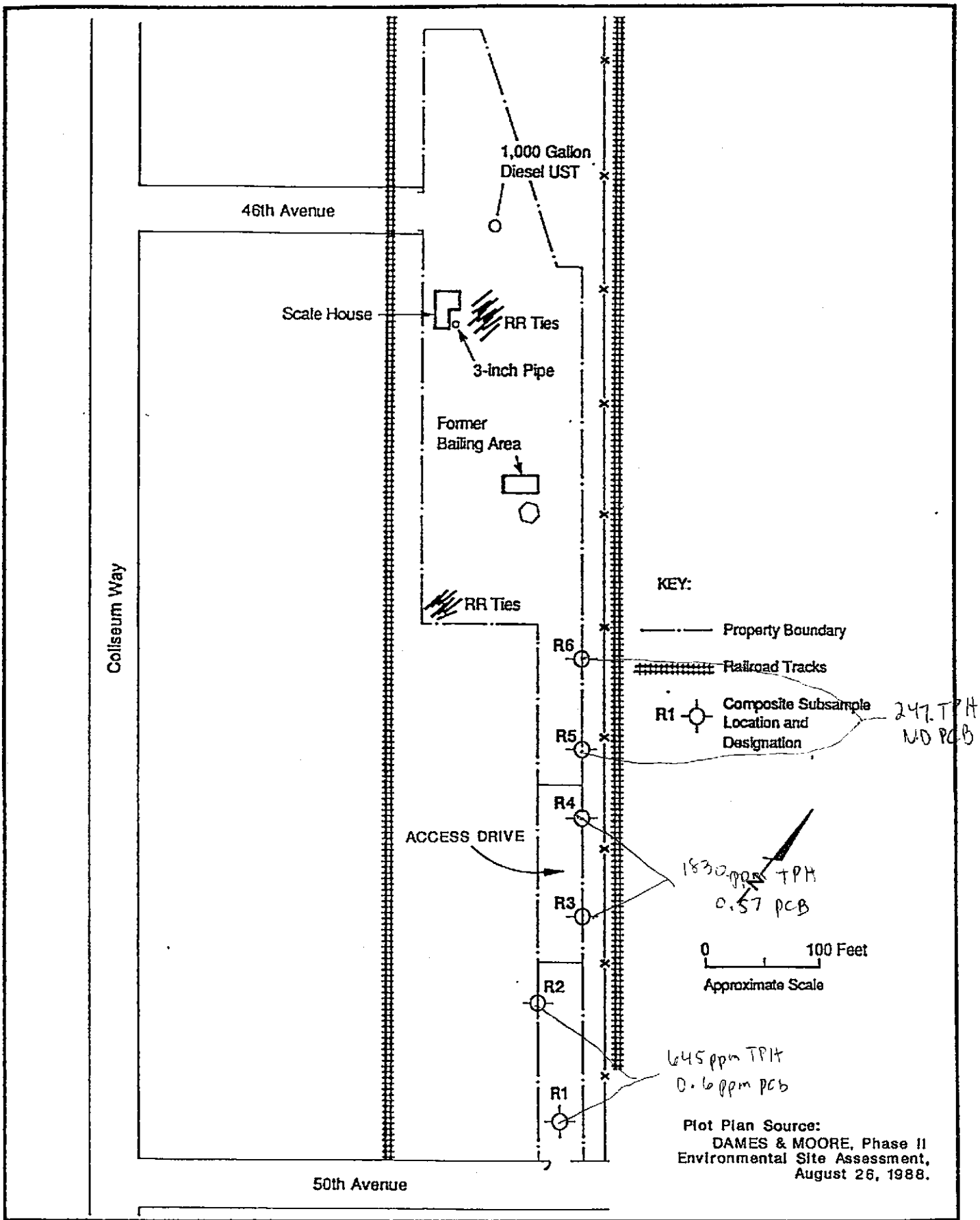


Figure 1. Site Location Map - The Learner Company, 768 46th Avenue, Oakland, California

10/19/90

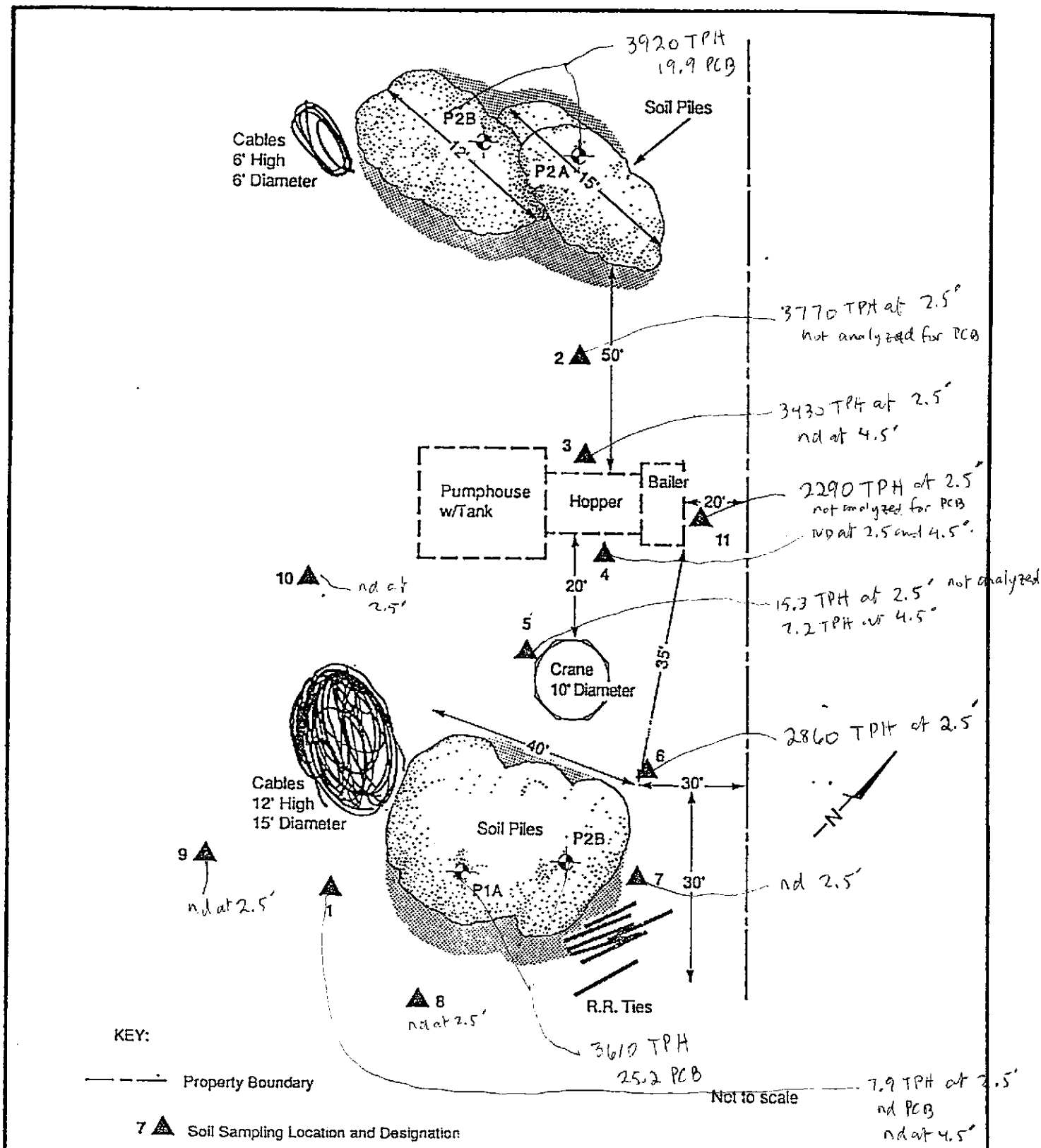


KLEINFELDER

PROJECT NO. 24-214100-B00

SAMPLING LOCATION MAP
ACCESS DRIVE
LEARNER COMPANY
OAKLAND, CALIFORNIA

PLATE
2



Plot Plan Source:
DAMES & MOORE, Phase II
Environmental Site Assessment,
August 26, 1988.

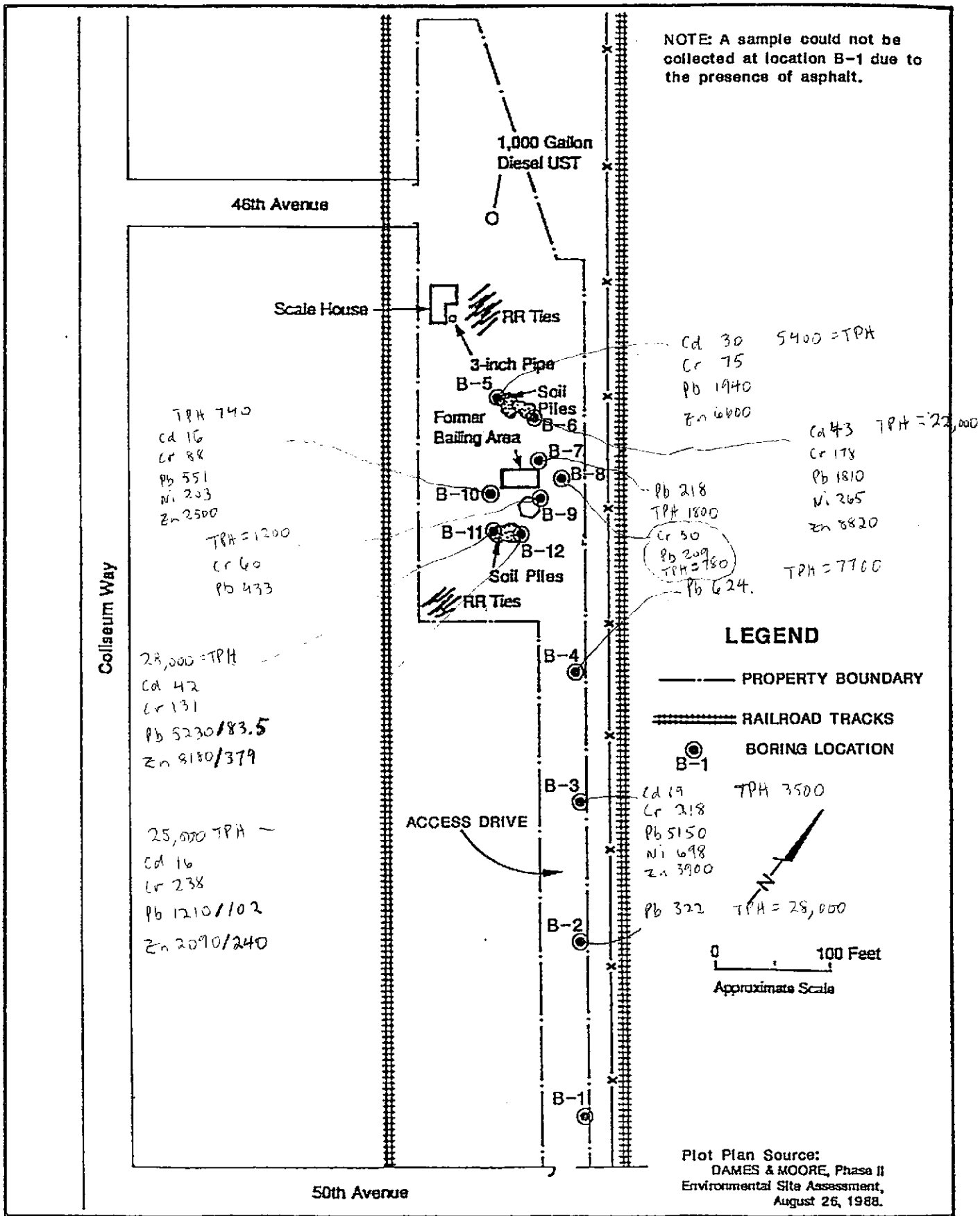
KLEINFELDER

PROJECT NO. 24-214100-B00

SAMPLING LOCATION MAP
FORMER BAILER AREA & SOIL PILES
LEARNER COMPANY
OAKLAND, CALIFORNIA

PLATE 3

M-6



Plot Plan Source:
DAMES & MOORE, Phase II
Environmental Site Assessment,
August 26, 1988.

KLEINFELDER

PROJECT NO. 24-214100-B00

SOIL SAMPLE LOCATION MAP

LEARNER COMPANY
OAKLAND, CALIFORNIA

PLATE 4

Table 3. Summary of Remedial Action Alternatives

ASSESSMENT FACTORS	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
	Excavation and off-site disposal.	Stabilization and capping.	Solidification and stabilization.
1. Overall protection of Human Health and the Environment			
How risks are eliminated, reduced or controlled	Risk to human health & the environment from the site is substantially reduced. Effect on regional risk to human health and the environment are slightly reduced.	Risk to human health & the environment from the site is substantially reduced. Effect on regional risk to human health and the environment are slightly reduced.	Risk to human health & the environment from the site is substantially reduced. Effect on regional risk to human health and the environment are slightly reduced.
Transfer of risk	Yes	No	Yes
2. Compliance with ARARs/TBCS (to-be-considered criteria)			
Compliance with ARARs	Lead air ARARs may not be met at site due to regional problems.	Lead air ARARs may not be met due to regional problems.	Lead air ARARs may not be met due to regional problems.
Appropriateness of waivers	Not required	To be determined	To be determined
Compliance with criteria, advisories and guidance	Complies most with State and local criteria and federal advisories. Inconsistent with State and Federal on-site cleanup goals.	Subject to approval from State and local authorities.	Subject to approval from State and local authorities. Partial off-site disposal inconsistent with State and Federal on-site cleanup goals.
3. Long-Term Effectiveness and Permanence			
Magnitude of residual risk	Negligible	Negligible - A risk estimate will be prepared prior to implementation.	Negligible
Adequacy of controls	Excavation effectively removes TPH and heavy metals	Stabilization is a proven technology; cap is accessible for integrity monitoring at all times. A deed restriction prohibiting cap removal is required.	Although solidification is a proven technology, effectiveness at this site is uncertain due to the TPH content. A deed restriction prohibiting further excavation is required.

-- Table 3 continues on next page --

Table 3. Summary of Remedial Action Alternatives (continued)

ASSESSMENT FACTORS	ALERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
4. Reliability of controls	Reliability remedy since soil is removed.	Reliable remedy since chemical fixation and asphalt cap will provide effective mitigation controls.	Reliable remedy since solidification and chemical fixation will provide effective mitigation controls.
5. Reduction of Toxicity, Mobility or Volume	Toxicity, mobility & volume of TPH and metals in soil reduced to negligible levels.	Mobility of TPH and metals in soil are reduced to negligible levels.	Mobility of TPH and metals in soils are reduced to negligible levels.
6. Short-Term Effectiveness			
Time until protection is achieved	Cost may delay implementation indefinitely.	Short-term implementation is feasible, pending regulatory approval.	Short-term implementation is feasible, pending regulatory approval.
Protection of community during remedial actions	Dust will be controlled if necessary.	Dust will be controlled if necessary.	Dust will be controlled if necessary.
Protection of workers during remedial actions	Air monitoring and personal protective equipment required.	Air monitoring and personal protective equipment required.	Air monitoring and personal protective equipment required.
Environmental impacts	Potential for air emissions during soil transportation - will generate TPH, NO_x, and dust emissions. Uses valuable landfill space.	Only if cap integrity is breached.	Only if integrity of flexible membrane liner is breached.
7. Implementability			
Technical feasibility	Technically feasible	Technically feasible	Technically feasible
Administrative feasibility	Permits required but should be readily obtainable.	Permits required, but should be readily obtainable.	Permits required, but should be readily obtainable.
8. Cost			
Initial cost	$1,543,000	$125,000	$244,000
9. State acceptance	To be addressed.	To be addressed.	To be addressed.
10. Community acceptance	To be addressed jointly with regional remedy.	To be addressed jointly with regional remedy.	To be addressed jointly with regional remedy.

Table 4. Cost Comparison of Remedial Action Alternatives

ALTERNATIVE 1 Excavation and Disposal		**ALTERNATIVE 2** Stabilization and Capping		**ALTERNATIVE 3** Stabilization and Solidification	
Class I Disposal (Kettleman Hills Facility)	862	Site Grading and Excavation	25	Excavation	40
Federal, State and Local Taxes	461	Lime Application	28	Flexible Membrane Liner	10
Transportation	140	Asphalt Cap	42	Solidification	141
Excavation and Backfill	60	Deed Restrictions	10	Deed Restrictions	40
Laboratory, Engineering & Safety	20	Laboratory, Engineering & Safety	20	Laboratory, Engineering & Safety	44
Cost, $1,000	1,543	Cost, $1,000	125	Cost, $1,000	244
Basis: 2,150 Bank Cubic Yards 2,500 Loose Cubic Yards		Basis: 3,800 Square Yards 1 ft liming depth pH goal 10		Basis: 2,150 Bank Cubic Yards 3,800 Square Yards	

APPENDIX B

ANALYTICAL REPORTS & CHAIN-OF-CUSTODY DOCUMENTATION

Enseco

July 20, 1989
Lab ID: 047854

Eric Findlay
Kleinfelder, Inc.
9795 Business Park Dr.
Suite D
Sacramento, CA 95827

Dear Mr. Findlay:

Enclosed is the report for the twelve soil samples for your Project #24-214100, P.O. #P2057 which were received at Enseco-Cal Lab on 22 June 1989.

The report consists of the following sections:

I Sample Description
II Analysis Request
III Quality Control Report
IV Analysis Results

The analysis for Reactivity was performed at Enseco-RMAL and the Aquatic Toxicity analysis was performed at Enseco-Ventura. The results for both analyses are enclosed.

Due to contamination of the method blank for the Total Petroleum Hydrocarbon analysis, the samples were re-extracted. Sample 35138 was not re-extracted due to loss of the sample during aliquoting for shipment to RMAL and Ventura. Re-extraction was performed within the recommended holding times.

If you have any questions, please feel free to call.

Sincerely,

Karen A. Verrue

Karen A. Verrue
Program Administrator

td

Enseco Incorporated
2544 Industrial Boulevard
West Sacramento, California 95691

I Sample Description

See the attached Sample Description Information.

The samples were received under chain-of-custody.

II Analysis Request

The following analytical tests were requested.

Lab ID	Analysis Description
047854-1 thru 12	Total Petroleum Hydrocarbons
-1 thru 11	Corrosivity Ignitability Selected Metals Cyanide, Reactive Sulfide, Reacitve Aquatic Toxicity
-9	CAC Metals

III Quality Control

A. Project Specific QC. No project specific QC (i.e., spikes and/or duplicates) was requested.

B. Method Blank Results. A method blank is a laboratory-generated sample which assesses the degree to which laboratory operations and procedures cause false-positive analytical results for your samples.

No target parameters were detected in the method blanks associated with your samples at the reporting limit levels noted on the data sheets in the Analytical Results section.

C. Laboratory Control Samples - The LCS Program

Duplicate Control Samples. A DCS is a well-characterized matrix (blank water, sand or celite) which is spiked with certain target parameters and analyzed at approximately 10% of the sample load in order to establish method-specific control limits. The DCS results associated with your samples are on the attached Duplicate Control Sample Report.

Accuracy is measured by Percent Recovery as in:

$$\% \text{ recovery} = \frac{(\text{measured concentration})}{(\text{actual concentration})} \times 100$$

Precision is measured using duplicate tests by Relative Percent Difference (RPD) as in:

$$\text{RPD} = \frac{(\% \text{ recovery test 1} - \% \text{ recovery test 2})}{(\% \text{ recovery test 1} + \% \text{ recovery test 2})/2} \times 100$$

Control limits for accuracy (percent recovery) are based on the average, historical percent recovery +/-3 standard deviation units. Control limits for precision (relative percent difference) range from 0 (identical duplicate DCS results) to the average, historical relative percent difference + 3 standard deviation units. In cases where there is not enough historical data, EPA limits or advisory limits are set, with the approval of the Quality Assurance department.

IV Analysis Results

Test methods may include minor modifications of published EPA Methods such as reporting limits or parameter lists. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis; i.e., no correction is made for moisture content.

Results are on the attached data sheets.

Enseco

SAMPLE DESCRIPTION INFORMATION
for
Kleinfelder, Inc.

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
047854-0001-SA	35142	SOIL	22 JUN 89		22 JUN 89
047854-0002-SA	35141	SOIL	22 JUN 89		22 JUN 89
047854-0003-SA	35140	SOIL	22 JUN 89		22 JUN 89
047854-0004-SA	35144	SOIL	22 JUN 89		22 JUN 89
047854-0005-SA	35145	SOIL	22 JUN 89		22 JUN 89
047854-0006-SA	35146	SOIL	22 JUN 89		22 JUN 89
047854-0007-SA	35147	SOIL	22 JUN 89		22 JUN 89
047854-0008-SA	35139	SOIL	22 JUN 89		22 JUN 89
047854-0009-SA	35137	SOIL	22 JUN 89		22 JUN 89
047854-0010-SA	35138	SOIL	22 JUN 89		22 JUN 89
047854-0011-SA	35136	SOIL	22 JUN 89		22 JUN 89
047854-0012-SA	35135	SOIL	22 JUN 89		22 JUN 89

Enseco

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
047854-0001-SA	SOIL	TPH-IR-S	05 JUL 89-A	-
047854-0002-SA	SOIL	TPH-IR-S	05 JUL 89-A	-
047854-0003-SA	SOIL	TPH-IR-S	05 JUL 89-A	-
047854-0004-SA	SOIL	TPH-IR-S	05 JUL 89-A	-
047854-0005-SA	SOIL	TPH-IR-S	05 JUL 89-A	-
047854-0006-SA	SOIL	TPH-IR-S	05 JUL 89-A	-
047854-0007-SA	SOIL	TPH-IR-S	05 JUL 89-A	-
047854-0008-SA	SOIL	TPH-IR-S	05 JUL 89-A	-
047854-0009-SA	SOIL	TPH-IR-S	05 JUL 89-A	-
047854-0010-SA	SOIL	TPH-IR-S	05 JUL 89-A	-
047854-0011-SA	SOIL	TPH-IR-S	05 JUL 89-A	-
047854-0012-SA	SOIL	TPH-IR-S	05 JUL 89-A	-

Enseco

DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: TPH-IR-S								
Matrix: SOIL								
QC Lot: 05 JUL 89-A								
Concentration Units: ug/kg								
Total Petroleum Hydrocarbons	200000	202000	208000	205000	103	76-115	2.9	13

Calculations are performed before rounding to avoid round-off errors in calculated results.

QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
047854-0001-SA	SOIL	ICP-S	27 JUN 89-A	27 JUN 89-B
047854-0002-SA	SOIL	ICP-S	27 JUN 89-A	27 JUN 89-B
047854-0003-SA	SOIL	ICP-S	27 JUN 89-A	27 JUN 89-B
047854-0004-SA	SOIL	ICP-S	27 JUN 89-A	27 JUN 89-B
047854-0005-SA	SOIL	ICP-S	27 JUN 89-A	27 JUN 89-B
047854-0006-SA	SOIL	ICP-S	27 JUN 89-A	27 JUN 89-B
047854-0007-SA	SOIL	ICP-S	27 JUN 89-A	27 JUN 89-B
047854-0008-SA	SOIL	ICP-S	27 JUN 89-A	27 JUN 89-B
047854-0009-SA	SOIL	ICP-S	27 JUN 89-A	27 JUN 89-B
047854-0009-SA	SOIL	HG-CVAA-S	27 JUN 89-A	27 JUN 89-A
047854-0010-SA	SOIL	ICP-S	27 JUN 89-A	27 JUN 89-B
047854-0011-SA	SOIL	ICP-S	27 JUN 89-A	27 JUN 89-B

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: ICP-S Matrix: SOIL QC Lot: 27 JUN 89-A Concentration Units: mg/kg								
Aluminum	200	199	202	200	100	84-115	1.5	11
Antimony	50	48.8	49.4	49.1	98	81-115	1.2	10
Arsenic	200	201	189	195	98	82-115	6.2	10
Barium	200	207	209	208	104	85-115	1.0	10
Beryllium	5.0	5.24	5.27	5.26	105	70-106	0.6	10
Boron	100	102	99.7	101	101	85-115	2.3	10
Cadmium	5.0	4.59	4.85	4.72	94	72-108	5.5	15
Calcium	10000	9890	9980	9940	99	85-115	0.9	10
Chromium	20	19.8	19.8	19.8	99	84-115	0.0	17
Cobalt	50	50.9	48.8	49.8	100	80-115	4.2	10
Copper	25	25.5	25.5	25.5	102	81-115	0.0	10
Iron	100	99.0	100	99.5	100	85-115	1.0	14
Lead	50	43.6	48.8	46.2	92	80-115	11	11
Lithium	20.0	21.3	21.3	21.3	107	85-115	0.0	10
Magnesium	5000	4970	5030	5000	100	85-115	1.2	10
Manganese	50.0	49.0	49.3	49.2	98	80-115	0.6	10
Molybdenum	20.0	19.5	20.1	19.8	99	85-115	3.0	10
Nickel	50.0	50.0	45.6	47.8	96	80-115	9.2	10
Potassium	5000	4720	4800	4760	95	82-115	1.7	10
Selenium	200.0	204	205	204	102	84-115	0.5	10
Silver	5.0	4.67	4.73	4.70	94	62-115	1.3	10
Sodium	10000	10200	10300	10200	102	85-115	1.4	10
Thallium	200.0	209	210	210	105	68-102	0.5	10
Tin	40.0	40.6	40.6	40.6	101	80-120	0.0	10
Titanium	20.0	21.5	21.6	21.6	108	85-115	0.5	10
Vanadium	50.0	48.1	48.4	48.2	97	85-115	0.6	10
Zinc	50	45.8	46.1	46.0	92	82-115	0.6	10
Category: HG-CVAA-S Matrix: SOIL QC Lot: 27 JUN 89-A Concentration Units: mg/kg								
Mercury	0.50	0.497	0.497	0.497	99	84-126	0.0	30

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco

Total Petroleum Hydrocarbons (TPH), IR

EPA 418.1

Client Name: Kleinfelder, Inc
Client ID: Method Blank 1
Lab ID: 047854-MB 1 Enseco ID: NA
Matrix: SOIL Sampled: NA Received: NA
Authorized: NA Prepared: 27 JUN 89 Analyzed: 05 JUL 89

Parameter	Result	Units	Reporting Limit
Total Petroleum Hydrocarbons	ND	mg/kg	20

ND=Not Detected
NA=Not Applicable

Reported by: Jim Chernobieff Approved by: Karla Saavedra

The cover letter is an integral part of this report.
Rev 280987

Enseco

Total Petroleum Hydrocarbons (TPH), IR

EPA 418.1

Client Name: Kleinfelder, Inc
Client ID: Method Blank 2
Lab ID: 047854-MB 2 Enseco ID: NA
Matrix: SOIL Sampled: NA Received: NA
Authorized: NA Prepared: 27 JUN 89 Analyzed: 05 JUL 89

Parameter	Result	Units	Reporting Limit
Total Petroleum Hydrocarbons	27	mg/kg	20

ND=Not Detected
NA=Not Applicable

Reported by: Jim Chernobieff Approved by: Karla Saavedra

The cover letter is an integral part of this report.
Rev 280987

Enseco

CRL Environmental - Ventura
2810 Bunsen Avenue • Ventura, CA 93003
(805) 650-0546 • (800) LAB-1-CRL
FAX: (805) 648-2755

RECEIVED
JUL 14 1989
Ans'd.....

Cal Analytical
2544 Industrial Blvd.
West Sacramento, CA 95691
FAX 916/372-1059

07/09/89

Attn: Karen Verrue
916/372/1059

Project: Kleinfelder

Sample #: 9179145601 Collector: Client
Received: 06/28/89 Sampling Date & Time: 06/22/89, ****
Type: Soil Method: Not Specified

I.D.: 47854-001

CONSTITUENT	METHOD	RESULT	UNIT	MDL
-CCR Bioassay- Fathead Minnow	22 CCR 66696	>750	mg/L =96Hr.LC50	

Sample #: 9179145602 Collector: Client
Received: 06/28/89 Sampling Date & Time: 06/22/89, ****
Type: Soil Method: Not Specified

I.D.: 47854-002

-CCR Bioassay- Fathead Minnow	22 CCR 66696	>750	mg/L =96Hr.LC50	

Sample #: 9179145603 Collector: Client
Received: 06/28/89 Sampling Date & Time: 06/22/89, ****
Type: Soil Method: Not Specified

I.D.: 47854-003

-CCR Bioassay- Fathead Minnow	22 CCR 66696	>750	mg/L =96Hr.LC50	

Sample #: 9179145604 Collector: Client
Received: 06/28/89 Sampling Date & Time: 06/22/89, ****
Type: Soil Method: Not Specified

I.D.: 47854-004

-CCR Bioassay- Fathead Minnow	22 CCR 66696	>750	mg/L =96Hr.LC50	

[ND = None Detected; (G) = Grab; MDL = Minimum Detection Limit]

CRL Environmental - Ventura
2810 Bunsen Avenue • Ventura, CA 93003
(805) 650-0546 • (800) LAB-1-CRL
FAX: (805) 648-2755

Enseco

RECEIVED
JUL 14 1989
Ans'd.....

07/09/89

Cal Analytical
2544 Industrial Blvd.
West Sacramento, CA 95691
FAX 916/372-1059

Attn: Karen Verrue
916/372/1059

Project: Kleinfelder

Sample #: 9179145601
Received: 06/28/89
Type: Soil

Collector: Client
Sampling Date & Time: 06/22/89, ****
Method: Not Specified

I.D.: 47854-001

CONSTITUENT	METHOD	RESULT	UNIT	MDL
-CCR Bioassay- Fathead Minnow	22 CCR 66696	>750	mg/L	=96Hr.LC50

Sample #: 9179145602
Received: 06/28/89
Type: Soil

Collector: Client
Sampling Date & Time: 06/22/89, ****
Method: Not Specified

I.D.: 47854-002

-CCR Bioassay- Fathead Minnow 22 CCR 66696 >750 mg/L =96Hr.LC50

Sample #: 9179145603
Received: 06/28/89
Type: Soil

Collector: Client
Sampling Date & Time: 06/22/89, ****
Method: Not Specified

I.D.: 47854-003

-CCR Bioassay- Fathead Minnow 22 CCR 66696 >750 mg/L =96Hr.LC50

Sample #: 9179145604
Received: 06/28/89
Type: Soil

Collector: Client
Sampling Date & Time: 06/22/89, ****
Method: Not Specified

I.D.: 47854-004

-CCR Bioassay- Fathead Minnow 22 CCR 66696 >750 mg/L =96Hr.LC50

[ND = None Detected; (G) = Grab; MDL = Minimum Detection Limit]

Enseco

CRL Environmental - Ventura
2810 Bunsen Avenue • Ventura, CA 93003
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RECEIVED
JUL 14 1989
Ans'd.....

Cal Analytical
2544 Industrial Blvd.
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FAX 916/372-1059

07/09/89

Attn: Karen Verrue
916/372/1059

Project: Kleinfelder

Sample #: 9179145601 Collector: Client
Received: 06/28/89 Sampling Date & Time: 06/22/89, ****
Type: Soil Method: Not Specified

I.D.: 47854-001

CONSTITUENT	METHOD	RESULT	UNIT	MDL
-CCR Bioassay- Fathead Minnow	22 CCR 66696	>750	mg/L =96Hr.LC50	

Sample #: 9179145602 Collector: Client
Received: 06/28/89 Sampling Date & Time: 06/22/89, ****
Type: Soil Method: Not Specified

I.D.: 47854-002

-CCR Bioassay- Fathead Minnow	22 CCR 66696	>750	mg/L =96Hr.LC50	

Sample #: 9179145603 Collector: Client
Received: 06/28/89 Sampling Date & Time: 06/22/89, ****
Type: Soil Method: Not Specified

I.D.: 47854-003

-CCR Bioassay- Fathead Minnow	22 CCR 66696	>750	mg/L =96Hr.LC50	

Sample #: 9179145604 Collector: Client
Received: 06/28/89 Sampling Date & Time: 06/22/89, ****
Type: Soil Method: Not Specified

I.D.: 47854-004

-CCR Bioassay- Fathead Minnow	22 CCR 66696	>750	mg/L =96Hr.LC50	

[ND = None Detected; (G) = Grab; MDL = Minimum Detection Limit]

CRL Environmental - Ventura
2810 Bunsen Avenue • Ventura, CA 93003
(805) 650-0546 • (800) LAB-1-CRL
FAX: (805) 648-2755

Sample #: 9179145605 Collector: Client
Received: 06/28/89 Sampling Date & Time: 06/22/89, ****
Type: Soil Method: Not Specified

I.D.: 47854-005

CONSTITUENT	METHOD	RESULT	UNIT	MDL
-CCR Bioassay- Fathead Minnow	22 CCR 66696	>750	mg/L	=96Hr.LC50

Sample #: 9179145606 Collector: Client
Received: 06/28/89 Sampling Date & Time: 06/22/89, ****
Type: Soil Method: Not Specified

I.D.: 47854-006

-CCR Bioassay- Fathead Minnow	22 CCR 66696	>750	mg/L	=96Hr.LC50

Sample #: 9179145607 Collector: Client
Received: 06/28/89 Sampling Date & Time: 06/22/89, ****
Type: Soil Method: Not Specified

I.D.: 47854-007

-CCR Bioassay- Fathead Minnow	22 CCR 66696	>750	mg/L	=96Hr.LC50

Sample #: 9179145608 Collector: Client
Received: 06/28/89 Sampling Date & Time: 06/22/89, ****
Type: Soil Method: Not Specified

I.D.: 47854-008

-CCR Bioassay- Fathead Minnow	22 CCR 66696	>750	mg/L	=96Hr.LC50

 [ND = None Detected; (G) = Grab; MDL = Minimum Detection Limit]

CRL Environmental - Ventura
2810 Bunsen Avenue • Ventura, CA 93003
(805) 650-0546 • (800) LAB-I-CRL
FAX: (805) 648-2755

Sample #: 9179145609 Collector: Client
Received: 06/28/89 Sampling Date & Time: 06/22/89, ****
Type: Soil Method: Not Specified

I.D.: 47854-009

CONSTITUENT	METHOD	RESULT	UNIT	MDL
-CCR Bioassay- Fathead Minnow	22 CCR 66696	>750	mg/L	=96Hr.LC50

Sample #: 9179145610 Collector: Client
Received: 06/28/89 Sampling Date & Time: 06/22/89, ****
Type: Soil Method: Not Specified

I.D.: *47854-010*

-CCR Bioassay- Fathead Minnow	22 CCR 66696	>750	mg/L	=96Hr.LC50

Sample #: 9179145611 Collector: Client
Received: 06/28/89 Sampling Date & Time: 06/22/89, ****
Type: Soil Method: Not Specified

I.D.: 47854-011

-CCR Bioassay- Fathead Minnow	22 CCR 66696	>750	mg/L	=96Hr.LC50

Reviewed

Approved

[ND = None Detected; (G) = Grab; MDL = Minimum Detection Limit]

Enseco

Total Petroleum Hydrocarbons (TPH), IR

EPA 418.1

Client Name: Kleinfelder, Inc.
Matrix: SOIL
Units: mg/kg

Received: 22 JUN 89
Authorized: 23 JUN 89

Lab ID	Client ID	Result	Reporting Limit	Date Prepared	Date Analyzed	
047854-0001-SA	35142	28000	1000	05 JUL 89	06 JUL 89	o
047854-0002-SA	35141	3500	400	05 JUL 89	06 JUL 89	o
047854-0003-SA	35140	7700	400	05 JUL 89	06 JUL 89	o
047854-0004-SA	35144	25000	1000	05 JUL 89	06 JUL 89	o
047854-0005-SA	35145	28000	1000	05 JUL 89	06 JUL 89	o
047854-0006-SA	35146	740	100	05 JUL 89	06 JUL 89	o
047854-0007-SA	35147	1200	200	05 JUL 89	06 JUL 89	o
047854-0008-SA	35139	5400	400	05 JUL 89	06 JUL 89	o
047854-0009-SA	35137	1800	100	05 JUL 89	06 JUL 89	o
047854-0010-SA	35138	22000	2000	27 JUN 89	06 JUL 89	o
047854-0011-SA	35136	780	100	05 JUL 89	06 JUL 89	o
047854-0012-SA	35135	11000	2000	05 JUL 89	06 JUL 89	o

Note o : Reporting Limit raised due to high level of analyte present in sample.

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Jim Chernobieff

Approved By: Ben Gulizia

The cover letter is an integral part of this report.
Rev 230787

Enseco

Corrosivity, pH

Method 9040

Client Name: Kleinfelder, Inc.
Matrix: SOIL
Units: units

Received: 22 JUN 89
Authorized: 23 JUN 89

Lab ID	Client ID	Result	Reporting Limit	Date Prepared	Date Analyzed
047854-0001-SA	35142	6.5	0.01	NA	28 JUN 89
047854-0002-SA	35141	7.4	0.01	NA	28 JUN 89
047854-0003-SA	35140	7.5	0.01	NA	28 JUN 89
047854-0004-SA	35144	7.4	0.01	NA	28 JUN 89
047854-0005-SA	35145	7.1	0.01	NA	28 JUN 89
047854-0006-SA	35146	7.2	0.01	NA	28 JUN 89
047854-0007-SA	35147	7.6	0.01	NA	28 JUN 89
047854-0008-SA	35139	7.6	0.01	NA	28 JUN 89
047854-0009-SA	35137	8.9	0.01	NA	28 JUN 89
047854-0010-SA	35138	7.6	0.01	NA	28 JUN 89
047854-0011-SA	35136	8.0	0.01	NA	28 JUN 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Bill Pinos

Approved By: Candy Williams

The cover letter is an integral part of this report.
Rev 230787

Enseco

Ignitability, Closed Cup

Method 1010

Client Name: Kleinfelder, Inc.
Matrix: SOIL
Units: degrees F

Received: 22 JUN 89
Authorized: 23 JUN 89

Lab ID	Client ID	Result	Reporting Limit	Date Prepared	Date Analyzed
047854-0001-SA	35142	ND	140	NA	10 JUL 89
047854-0002-SA	35141	ND	140	NA	10 JUL 89
047854-0003-SA	35140	ND	140	NA	10 JUL 89
047854-0004-SA	35144	ND	140	NA	10 JUL 89
047854-0005-SA	35145	ND	140	NA	10 JUL 89
047854-0006-SA	35146	ND	140	NA	10 JUL 89
047854-0007-SA	35147	ND	140	NA	10 JUL 89
047854-0008-SA	35139	ND	140	NA	10 JUL 89
047854-0009-SA	35137	ND	140	NA	10 JUL 89
047854-0010-SA	35138	ND	140	NA	10 JUL 89
047854-0011-SA	35136	ND	140	NA	10 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Bill Pinos

Approved By: Candy Williams

The cover letter is an integral part of this report.
Rev 230787

Enseco

METALS

(Soil/Solid - Total)

Client Name: Kleinfelder, Inc.
Client ID: 35142
Lab ID: 047854-0001-SA Enseco ID: 107628
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 23 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cadmium	4.7	mg/kg	0.5	Method 6010	27 JUN 89	05 JUL 89
Chromium	39	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89
Lead	322	mg/kg	5	Method 6010	27 JUN 89	05 JUL 89
Nickel	44	mg/kg	4	Method 6010	27 JUN 89	05 JUL 89
Zinc	849	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Grace Chang Approved By: Jeanne Flaig

The cover letter is an integral part of this report.
Rev 230787

Enseco

METALS

(Soil/Solid - Total)

Client Name: Kleinfelder, Inc.
Client ID: 35141
Lab ID: 047854-0002-SA Enseco ID: 107629
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 23 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cadmium	19	mg/kg	0.5	Method 6010	27 JUN 89	05 JUL 89
Chromium	218	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89
Lead	5150	mg/kg	5	Method 6010	27 JUN 89	05 JUL 89
Nickel	698	mg/kg	4	Method 6010	27 JUN 89	05 JUL 89
Zinc	3900	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Grace Chang Approved By: Jeanne Flaig

The cover letter is an integral part of this report.
Rev 230787

Enseco

METALS

(Soil/Solid - Total)

Client Name: Kleinfelder, Inc.
Client ID: 35140
Lab ID: 047854-0003-SA Enseco ID: 107630
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 23 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cadmium	8.7	mg/kg	0.5	Method 6010	27 JUN 89	05 JUL 89
Chromium	44	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89
Lead	624	mg/kg	5	Method 6010	27 JUN 89	05 JUL 89
Nickel	61	mg/kg	4	Method 6010	27 JUN 89	05 JUL 89
Zinc	1530	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Grace Chang Approved By: Jeanne Flaig

The cover letter is an integral part of this report.
Rev 230787

Enseco

METALS

(Soil/Solid - Total)

Client Name: Kleinfelder, Inc.
Client ID: 35144
Lab ID: 047854-0004-SA Enseco ID: 107631
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 23 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cadmium	16	mg/kg	0.5	Method 6010	27 JUN 89	05 JUL 89
Chromium	238	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89
Lead	1210	mg/kg	5	Method 6010	27 JUN 89	05 JUL 89
Nickel	129	mg/kg	4	Method 6010	27 JUN 89	05 JUL 89
Zinc	2090	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Grace Chang Approved By: Jeanne Flaig

The cover letter is an integral part of this report.
Rev 230787

Enseco

METALS

(Soil/Solid - Total)

Client Name: Kleinfelder, Inc.
Client ID: 35145
Lab ID: 047854-0005-SA Enseco ID: 107632
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 23 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cadmium	42	mg/kg	0.5	Method 6010	27 JUN 89	05 JUL 89
Chromium	131	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89
Lead	5230	mg/kg	5	Method 6010	27 JUN 89	05 JUL 89
Nickel	181	mg/kg	4	Method 6010	27 JUN 89	05 JUL 89
Zinc	8180	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Grace Chang Approved By: Jeanne Flaig

The cover letter is an integral part of this report.
Rev 230787

Enseco

METALS

(Soil/Solid - Total)

Client Name: Kleinfelder, Inc.
Client ID: 35146
Lab ID: 047854-0006-SA Enseco ID: 107633
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 23 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cadmium	16	mg/kg	0.5	Method 6010	27 JUN 89	05 JUL 89
Chromium	88	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89
Lead	551	mg/kg	5	Method 6010	27 JUN 89	05 JUL 89
Nickel	203	mg/kg	4	Method 6010	27 JUN 89	05 JUL 89
Zinc	2500	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Grace Chang Approved By: Jeanne Flaig

The cover letter is an integral part of this report.
Rev 230787

Enseco

METALS

(Soil/Solid - Total)

Client Name: Kleinfelder, Inc.
Client ID: 35147
Lab ID: 047854-0007-SA Enseco ID: 107634
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 23 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cadmium	9.7	mg/kg	0.5	Method 6010	27 JUN 89	05 JUL 89
Chromium	60	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89
Lead	433	mg/kg	5	Method 6010	27 JUN 89	05 JUL 89
Nickel	69	mg/kg	4	Method 6010	27 JUN 89	05 JUL 89
Zinc	1760	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Grace Chang Approved By: Jeanne Flaig

The cover letter is an integral part of this report.
Rev 230787

Enseco

METALS

(Soil/Solid - Total)

Client Name: Kleinfelder, Inc.
Client ID: 35139
Lab ID: 047854-0008-SA Enseco ID: 107635
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 23 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cadmium	30	mg/kg	0.5	Method 6010	27 JUN 89	05 JUL 89
Chromium	75	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89
Lead	1940	mg/kg	5	Method 6010	27 JUN 89	05 JUL 89
Nickel	149	mg/kg	4	Method 6010	27 JUN 89	05 JUL 89
Zinc	6600	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Grace Chang Approved By: Jeanne Flaig

The cover letter is an integral part of this report.
Rev 230787

Enseco

METALS

(Soil/Solid - Total)

Client Name: Kleinfelder, Inc.
Client ID: 35137
Lab ID: 047854-0009-SA Enseco ID: 107636
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 23 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Antimony	ND	mg/kg	50.0	Method 6010	27 JUN 89	05 JUL 89
Arsenic	ND	mg/kg	50.0	Method 6010	27 JUN 89	05 JUL 89
Barium	ND	mg/kg	1000	Method 6010	27 JUN 89	05 JUL 89
Beryllium	ND	mg/kg	5.0	Method 6010	27 JUN 89	05 JUL 89
Cadmium	ND	mg/kg	5.0	Method 6010	27 JUN 89	05 JUL 89
Chromium	ND	mg/kg	50.0	Method 6010	27 JUN 89	05 JUL 89
Cobalt	ND	mg/kg	500	Method 6010	27 JUN 89	05 JUL 89
Copper	ND	mg/kg	200	Method 6010	27 JUN 89	05 JUL 89
Lead	218	mg/kg	50.0	Method 6010	27 JUN 89	05 JUL 89
Molybdenum	ND	mg/kg	300	Method 6010	27 JUN 89	05 JUL 89
Nickel	ND	mg/kg	200	Method 6010	27 JUN 89	05 JUL 89
Selenium	ND	mg/kg	5.0	Method 6010	27 JUN 89	05 JUL 89
Silver	ND	mg/kg	50.0	Method 6010	27 JUN 89	05 JUL 89
Thallium	ND	mg/kg	100	Method 6010	27 JUN 89	05 JUL 89
Vanadium	ND	mg/kg	200	Method 6010	27 JUN 89	05 JUL 89
Zinc	531	mg/kg	500	Method 6010	27 JUN 89	05 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Grace Chang Approved By: Jeanne Flaig

The cover letter is an integral part of this report.

Enseco

C.A.C METALS
California Title 22 (Title 26) Protocol
TTLC (Total) Data Sheet

Client Name: Kleinfelder, Inc.
Client ID: 35137
Lab ID: 047854-0009-SA Enseco ID: 107636
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 23 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Mercury	ND	mg/kg	2.0	Method 7471	27 JUN 89	27 JUN 89
Selenium	ND	mg/kg	5.0	Method 7740	27 JUN 89	28 JUN 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Ron Hubbartt Approved By: Jeanne Flaig

The cover letter is an integral part of this report.
Rev 230787

Enseco

METALS

(Soil/Solid - Total)

Client Name: Kleinfelder, Inc.
Client ID: 35138
Lab ID: 047854-0010-SA Enseco ID: 107638
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 23 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cadmium	43	mg/kg	0.5	Method 6010	27 JUN 89	05 JUL 89
Chromium	178	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89
Lead	1810	mg/kg	5	Method 6010	27 JUN 89	05 JUL 89
Nickel	265	mg/kg	4	Method 6010	27 JUN 89	05 JUL 89
Zinc	8820	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Grace Chang Approved By: Jeanne Flaig

The cover letter is an integral part of this report.
Rev 230787

Enseco

METALS

(Soil/Solid - Total)

Client Name: Kleinfelder, Inc.
Client ID: 35136
Lab ID: 047854-0011-SA Enseco ID: 107639
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 23 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cadmium	3.8	mg/kg	0.5	Method 6010	27 JUN 89	05 JUL 89
Chromium	50	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89
Lead	209	mg/kg	5	Method 6010	27 JUN 89	05 JUL 89
Nickel	54	mg/kg	4	Method 6010	27 JUN 89	05 JUL 89
Zinc	779	mg/kg	1	Method 6010	27 JUN 89	05 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Grace Chang Approved By: Jeanne Flaig

The cover letter is an integral part of this report.
Rev 230787

Enseco

General Inorganics

Client Name: Kleinfelder
Client ID: 35142
Lab ID: 005509-0001-SA Enseco ID: 1043159
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 27 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Reactive	ND	mg/kg	0.1	EPA/OSW	NA	09 JUL 89
Sulfide, Reactive	ND	mg/kg	0.5	EPA/OSW	NA	08 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Mike Settell Approved By: Toni Lusk

Enseco

General Inorganics

Client Name: Kleinfelder
Client ID: 35141
Lab ID: 005509-0002-SA Enseco ID: 1043160
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 27 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Reactive	ND	mg/kg	0.1	EPA/OSW	NA	09 JUL 89
Sulfide, Reactive	ND	mg/kg	0.5	EPA/OSW	NA	08 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Mike Settell Approved By: Toni Lusk

Enseco

General Inorganics

Client Name: Kleinfelder
Client ID: 35140
Lab ID: 005509-0003-SA Enseco ID: 1043161
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 27 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Reactive	ND	mg/kg	0.1	EPA/OSW	NA	09 JUL 89
Sulfide, Reactive	ND	mg/kg	0.5	EPA/OSW	NA	08 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Mike Settell Approved By: Toni Lusk

Enseco

General Inorganics

Client Name: Kleinfelder
Client ID: 35144
Lab ID: 005509-0004-SA Enseco ID: 1043162
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 27 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Reactive	ND	mg/kg	0.1	EPA/OSW	NA	09 JUL 89
Sulfide, Reactive	ND	mg/kg	0.5	EPA/OSW	NA	08 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Mike Settell Approved By: Toni Lusk

Enseco

General Inorganics

Client Name: Kleinfelder
Client ID: 35145
Lab ID: 005509-0005-SA
Enseco ID: 1043163
Matrix: SOIL
Sampled: 22 JUN 89
Received: 22 JUN 89
Authorized: 27 JUN 89
Prepared: See Below
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Reactive	ND	mg/kg	0.1	EPA/OSW	NA	09 JUL 89
Sulfide, Reactive	ND	mg/kg	0.5	EPA/OSW	NA	08 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Mike Settell

Approved By: Toni Lusk

Enseco

General Inorganics

Client Name: Kleinfelder
Client ID: 35146
Lab ID: 005509-0006-SA Enseco ID: 1043164
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 27 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Reactive	ND	mg/kg	0.1	EPA/OSW	NA	09 JUL 89
Sulfide, Reactive	ND	mg/kg	0.5	EPA/OSW	NA	08 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Mike Settell Approved By: Toni Lusk

Enseco

General Inorganics

Client Name: Kleinfelder
Client ID: 35147
Lab ID: 005509-0007-SA
Enseco ID: 1043165
Matrix: SOIL
Sampled: 22 JUN 89
Received: 22 JUN 89
Authorized: 27 JUN 89
Prepared: See Below
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Reactive	ND	mg/kg	0.1	EPA/OSW	NA	09 JUL 89
Sulfide, Reactive	ND	mg/kg	0.5	EPA/OSW	NA	08 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Mike Settell

Approved By: Toni Lusk

Enseco

General Inorganics

Client Name: Kleinfelder
Client ID: 35139
Lab ID: 005509-0008-SA
Enseco ID: 1043166
Matrix: SOIL
Sampled: 22 JUN 89
Received: 22 JUN 89
Authorized: 27 JUN 89
Prepared: See Below
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Reactive	ND	mg/kg	0.1	EPA/OSW	NA	09 JUL 89
Sulfide, Reactive	ND	mg/kg	0.5	EPA/OSW	NA	08 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Mike Settell

Approved By: Toni Lusk

Enseco

General Inorganics

Client Name: Kleinfelder
Client ID: 35137
Lab ID: 005509-0009-SA Enseco ID: 1043167
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 27 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Reactive	ND	mg/kg	0.1	EPA/OSW	NA	09 JUL 89
Sulfide, Reactive	ND	mg/kg	0.5	EPA/OSW	NA	08 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Mike Settell Approved By: Toni Lusk

Enseco

General Inorganics

Client Name: Kleinfelder
Client ID: 35138
Lab ID: 005509-0010-SA Enseco ID: 1043168
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 27 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Reactive	ND	mg/kg	0.1	EPA/OSW	NA	09 JUL 89
Sulfide, Reactive	ND	mg/kg	0.5	EPA/OSW	NA	08 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Mike Settell Approved By: Toni Lusk

Enseco

General Inorganics

Client Name: Kleinfelder
Client ID: 35136
Lab ID: 005509-0011-SA Enseco ID: 1043169
Matrix: SOIL Sampled: 22 JUN 89 Received: 22 JUN 89
Authorized: 27 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Reactive	ND	mg/kg	0.1	EPA/OSW	NA	09 JUL 89
Sulfide, Reactive	ND	mg/kg	0.5	EPA/OSW	NA	08 JUL 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Mike Settell

Approved By: Toni Lusk

KLEINFELDER

OJ. NO.	PROJECT NAME	NO. OF CON-TAINERS	ANALYSIS: Corrosivity	Reactivity	Ignitability	Aquatic Toxicity	TPH	CAM Metals	Pb, Cr, Cd, Ni, Zn	REMARKS
4190-600										
.P. NO. O. NO.) 57	SAMPLERS (Signature/Number) 1029									
TE DD/YY	SAMPLE I.D. TIME HH:MM:SS — SAMPLE I.D.									
2/89	0815 — 35142 (B-2)	1	X	X	X	X	X		X	
	0855 — 35141 (B-3)	1	X	X	X	X	X		X	
	0905 — 35140 (B-4)	1	X	X	X	X	X		X	
	0935 — 35144 (B-12)	1	X	X	X	X	X		X	(glass soil jars)
	0945 — 35145 (B-11)	1	X	X	X	X	X		X	
	1015 — 35146 (B-10)	1	X	X	X	X	X		X	
	1023 — 35147 (B-9)	1	X	X	X	X	X		X	
	1030 — 35139 (B-5)	1	X	X	X	X	X		X	
	1035 — 35137 (B-7)	1	X	X	X	X	X	X		
	1040 — 35138 (B-6)	1	X	X	X	X	X		X	
	1045 — 35136 (B-8)	1	X	X	X	X	X		X	
	1115 — 35135 (Comp.)	1					X			

	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	6/22 1430	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	6/22 5:10	Received for Laboratory by: (Signature)

Remarks: Regular Turn-Around

Send Results To:
KLEINFELDER
9795 BUSINESS PARK DRIVE
SUITE D
SACRAMENTO, CALIFORNIA 95827
(916) 366-1701
ERIC FINDLAY

No. 1782

White - Sampler | Canary - Return Copy To Shipper | Pink - Lab Copy

Enseco

September 11, 1989
Lab ID: 048860

Eric Findlay
Kleinfelder, Inc.
9795 Business Park Drive
Suite D
Sacramento, CA 95827

Dear Mr. Findlay:

Enclosed is the report for the four samples that were resubmitted for your Project ID #24-214100, under Purchase Order #P2197 which were received at Enseco-Cal Lab on 23 August 1989.

The report consists of the following sections:

I	Sample Description
II	Analysis Request
III	Quality Control Report
IV	Analysis Results

If you have any questions, please feel free to call.

Sincerely,

Karen A. Verrue

Karen A. Verrue
Program Administrator

jo

I Sample Description

See the attached Sample Description Information.

The samples were originally received under chain-of-custody.

II Analysis Request

The following analytical tests were requested.

Lab ID	Analysis Description
048860-1,2,3,4	C.C.R. Lead, Zinc STLC
-4	C.C.R. Lead, Zinc TTLC

III Quality Control

A. Project Specific QC. No project specific QC (i.e., spikes and/or duplicates) was requested.

B. Method Blank Results. A method blank is a laboratory-generated sample which assesses the degree to which laboratory operations and procedures cause false-positive analytical results for your samples.

No target parameters were detected in the method blanks associated with your samples at the reporting limit levels noted on the attached Method Blank Report.

C. Laboratory Control Samples - The LCS Program

Duplicate Control Samples. A DCS is a well-characterized matrix (blank water, sand or celite) which is spiked with certain target parameters and analyzed at approximately 10% of the sample load in order to establish method-specific control limits. The DCS results associated with your samples are on the attached Duplicate Control Sample Report.

Accuracy is measured by Percent Recovery as in:

$$\% \text{ recovery} = \frac{\text{(measured concentration)}}{\text{(actual concentration)}} \times 100$$

Precision is measured using duplicate tests by Relative Percent Difference (RPD) as in:

$$\text{RPD} = \frac{\text{(\% recovery test 1 - \% recovery test 2)}}{\text{(\% recovery test 1 + \% recovery test 2)/2}} \times 100$$

Control limits for accuracy (percent recovery) are based on the average, historical percent recovery +/-3 standard deviation units. Control limits for precision (relative percent difference) range from 0 (identical duplicate DCS results) to the average, historical relative percent difference + 3 standard deviation units. In cases where there is not enough historical data, EPA limits or advisory limits are set, with the approval of the Quality Assurance department.

IV Analysis Results

Test methods may include minor modifications of published EPA Methods such as reporting limits or parameter lists. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e., no correction is made for moisture content, unless the method requires or the client requests that such correction be made.

Results are on the attached data sheets.

SAMPLE DESCRIPTION INFORMATION
for
Kleinfelder, Inc.

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
048860-0001-SA	35136	SOIL	22 JUN 89	10:30	23 AUG 89
048860-0002-SA	35144	SOIL	22 JUN 89	09:45	23 AUG 89
048860-0003-SA	35145	SOIL	22 JUN 89	09:45	23 AUG 89
048860-0004-SA	35135	SOIL	22 JUN 89	11:30	23 AUG 89

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QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
048860-0004-SA	SOIL	ICP-S	25 AUG 89-A	29 AUG 89-A

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METHOD BLANK REPORT
Metals Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: ICP-CAMT-S			
Matrix: SOIL			
QC Lot: 25 AUG 89-A QC Run: 29 AUG 89-A			
Lead	ND	mg/kg	50
Zinc	ND	mg/kg	500

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DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: ICP-S								
Matrix: SOIL								
QC Lot: 25 AUG 89-A								
Concentration Units: mg/kg								
Aluminum	200	205	195	200	100	84-115	5.0	11
Antimony	50	52.2	48.4	50.3	101	81-115	7.6	10
Arsenic	200	202	189	196	98	82-115	6.6	10
Barium	200	209	207	208	104	85-115	1.0	10
Beryllium	5.0	4.79	5.13	4.96	99	70-106	6.9	10
Boron	100	97.2	99.2	98.2	98	85-115	2.0	10
Cadmium	5.0	5.95	5.17	5.56	111	72-108	14	15
Calcium	10000	10900	10300	10600	106	85-115	5.7	10
Chromium	20	20.2	20.0	20.1	101	84-115	1.0	17
Cobalt	50	52.2	50.1	51.2	102	80-115	4.1	10
Copper	25	28.3	29.1	28.7	115	81-115	2.8	10
Iron	100	103	100	102	102	85-115	3.0	14
Lead	50	52.5	47.8	50.2	100	80-115	9.4	11
Lithium	20.0	20.6	20.5	20.6	103	85-115	0.5	10
Magnesium	5000	5110	4780	4940	99	85-115	6.7	10
Manganese	50.0	51.3	49.1	50.2	100	80-115	4.4	10
Molybdenum	20.0	19.9	19.8	19.8	99	85-115	0.5	10
Nickel	50.0	50.7	49.2	50.0	100	80-115	3.0	10
Potassium	5000	5190	4920	5060	101	82-115	5.3	10
Selenium	200.0	209	199	204	102	84-115	4.9	10
Silver	5.0	5.33	4.92	5.12	103	62-115	8.0	10
Sodium	10000	10500	10100	10300	103	85-115	3.9	10
Thallium	200.0	201	197	199	100	68-102	2.0	10
Tin	40.0	32.9	32.4	32.6	82	80-120	1.5	10
Titanium	20.0	20.3	21.3	20.8	104	85-115	4.8	10
Vanadium	50.0	50.8	48.3	49.6	99	85-115	5.0	10
Zinc	50	53.3	48.0	50.6	101	82-115	10	10

Calculations are performed before rounding to avoid round-off errors in calculated results.

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C.C.R. METALS
California Title 22 (Title 26) Protocol
STLC Data Sheet (Citrate Buffer Leachate)

Client Name: Kleinfelder, Inc.
Client ID: 35136
Lab ID: 048860-0001-SA Enseco ID: 116162
Matrix: SOIL Sampled: 22 JUN 89 Received: 23 AUG 89
Authorized: 24 AUG 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	9.6	mg/L	0.50	Method 200.7	31 AUG 89	07 SEP 89
Zinc	68.4	mg/L	20.0	Method 200.7	31 AUG 89	07 SEP 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Keith Varvell Approved By: Barry Votaw

The cover letter is an integral part of this report.
Rev 230787

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C.C.R. METALS
California Title 22 (Title 26) Protocol
STLC Data Sheet (Citrate Buffer Leachate)

Client Name: Kleinfelder, Inc.
Client ID: 35144
Lab ID: 048860-0002-SA Enseco ID: 116163
Matrix: SOIL Sampled: 22 JUN 89 Received: 23 AUG 89
Authorized: 24 AUG 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	102	mg/L	0.50	Method 200.7	31 AUG 89	07 SEP 89
Zinc	240	mg/L	20.0	Method 200.7	31 AUG 89	07 SEP 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Keith Varvell Approved By: Barry Votaw

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Rev 230787

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C.C.R. METALS
California Title 22 (Title 26) Protocol
STLC Data Sheet (Citrate Buffer Leachate)

Client Name: Kleinfelder, Inc.
Client ID: 35145
Lab ID: 048860-0003-SA Enseco ID: 116164
Matrix: SOIL Sampled: 22 JUN 89 Received: 23 AUG 89
Authorized: 24 AUG 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	83.5	mg/L	0.50	Method 200.7	31 AUG 89	07 SEP 89
Zinc	379	mg/L	20.0	Method 200.7	31 AUG 89	07 SEP 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Keith Varvell Approved By: Barry Votaw

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C.C.R. METALS
California Title 22 (Title 26) Protocol
STLC Data Sheet (Citrate Buffer Leachate)

Client Name: Kleinfelder, Inc.
Client ID: 35135
Lab ID: 048860-0004-SA Enseco ID: 116165
Matrix: SOIL Sampled: 22 JUN 89 Received: 23 AUG 89
Authorized: 24 AUG 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	127	mg/L	0.50	Method 200.7	31 AUG 89	07 SEP 89
Zinc	448	mg/L	20.0	Method 200.7	31 AUG 89	07 SEP 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Keith Varvell Approved By: Barry Votaw

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C.C.R. METALS
California Title 22 (Title 26) Protocol
TTLC (Total) Data Sheet

Client Name: Kleinfelder, Inc.
Client ID: 35135
Lab ID: 048860-0004-SA Enseco ID: 116165
Matrix: SOIL Sampled: 22 JUN 89 Received: 23 AUG 89
Authorized: 24 AUG 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Wet wt. Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Lead	998	mg/kg	50.0	Method 6010	29 AUG 89	30 AUG 89
Zinc	3830	mg/kg	500	Method 6010	29 AUG 89	30 AUG 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Grace Chang Approved By: Barry Votaw

The cover letter is an integral part of this report.
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