Francis Plating Assessment and Removal Report

Oakland, California

Volume I

TDD No.: 09-9902-0017
PAN No.:0397-FPRS-XX
Contract No.: 68-W6-0100

April 2000

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1 Introduction

On December 14, 1998, the United States Environmental Protection Agency (EPA) On-Scene Coordinator (OSC), Kathryn Lawrence, directed the Superfund Technical Assessment and Response Team (START), to conduct a Time Critical assessment at the Francis Plating facility in Oakland, California. OSC Lawrence initiated the response at the request of the Oakland City Fire Department (OFD) after an inspection of the site revealed numerous violations in the form of improperly contained hazardous materials. The START 's response/investigation and removal activities were conducted in three phases. The following summarizes the three phases of the removal/assessment.

Phase I – Initial Assessment and Removal Effort

- Inventoried all on-site containers;
- Collected samples from all inventoried containers and determined the hazard class;
- Conduct air monitoring to ensure the health and safety of on-site workers;
- Stabilized containers which appeared to be in danger of rupturing;
- Created maps detailing the site layout; and
- Assisted with the removal of on-site material designated for disposal.

Phase II – Subsurface Investigation

- Collected soil samples from the surface to four feet below ground surface (bgs) to characterize on-site soil; and

- Based on sample results, identified contaminated areas and volume of impacted soil.

Phase III – Subsurface Removal Effort

- Conducted verification sampling and analysis. Assisted the Emergency and Rapid Response Services (ERRS) contractor with identification of contaminated soil and sediment affected by constituents of concern (cadmium, chromium, nickel, and lead) at levels above EPA Industrial Preliminary Remediation Goals (PRG-Ind); and

- Conducted air monitoring to determine if airborne metals of concern (cadmium, chromium, nickel, and lead) were migrating off site at concentrations above the established levels of concern.

2 Background

2.1 Site Description

The site has an approximate area of 22,000 ft^2 and is located at the NW corner of 7th and Brush Street in Oakland, California. The site is approximately 1/8 mile north of Highway 880 and is directly across from the Acorn Plaza shopping area. Several restaurants are located directly across the street from the site. Additionally, a heavily populated residential area is located approximately two blocks west. A map detailing the site location is included as Figure 1.

In December 1998, the Francis Plating site consisted of:

a) A Front Yard, that included two office trailers, a paint room, an abandoned water treatment system, eight tanks that ranged in size from 200 gallons to over 3,000 gallons, a large rectangular concrete lined collection pond known as the Frog Pond, which was 68 feet long, 15 feet wide, and 3.5 feet deep.

b) A Rear Yard containing several hundred 55-gallon drums and small containers, one 3,500-gallon polyethylene tank, one 5,000-gallon polyethylene tank, two 1,100-gallon vats, and one large green tower which had been used to clean filter bags. Also present were two shipping container trailers, each of which housed hundreds of smaller containers.

c) A boiler room located in the center of the site housing the apparatus to heat water.

d) An electrical room.

e) An enclosed primary plating room housing approximately 40 plating vats. Also within the primary plating room was a concrete lined containment basin (commonly known as the Vault), which was 74 feet long, 25 feet wide and six feet deep. The majority of the plating vats were located within the Vault.

Figure 2-1a, 2-1b and 2-1c shows the site layout.

2.2 Site History

According to Manuel Ramirez Bustos, a former employee of Francis Plating, the facility began plating operations in 1957. Until 1992, Francis Plating specialized in nickel plating, cadmium plating, aluminum anodizing, and chromic acid passivation for stainless steel parts.

Prior to 1992, nickel electroplating, aluminum anodizing, water treatment and acid storage areas were located in the east section of the facility. Electroless nickel and cadmium, and chromium electroplating took place in the southwest section of the facility. Offices, drying ovens, and a paint shed were located in the northwest section of the facility. The boiler room was located in the center of the facility.

On November 18, 1992, a drying oven malfunctioned and caused a fire that severely damaged the facility. In addition to causing extensive structural damage, the fire resulted in the release of high pH liquids laden with chromium and other metals to the nearby San Francisco Bay through storm water drainage.

After the fire, Mr. Francis, the owner of Francis Plating contracted with EARTHCO Environmental Services to remove/mitigate the environmental and physical hazards resulting from the fire. During the cleanup operation, Mr. Francis experienced financial difficulties. In lieu of payment, Mr. Francis offered Sean McDougall ownership of the Francis Plating Facility. Plating operations were moved to the western portion of the site after the 1992 fire.

After 1992, Francis Plating used the Frog Pond in the southwest section of the facility as a repository for liquids spilled during on site treatment. During the initial investigation in 1998, the START found what appeared to be charred bricks and other miscellaneous charred debris beneath the liquid in the Frog Pond. The START suspected the charred debris was residual waste from the fire that was disposed of in the Frog Pond.

Prior to 1996, the East Bay Municipal Utility District (EBMUD) permitted Francis Plating to discharge treated wastewater to the municipal sewer. In 1996, the EBMUD served the facility with two notices of violation for discharging wastewater with elevated levels of nickel. In the fourth quarter of 1996, EMUD ordered the facility to cease and desist discharging wastewater above allowable

limits. As a result of the cease and desist order, the facility discontinued discharging wastewater to the sewer and sealed the on-site sewer connection with cement.

After 1996, the facility treated wastewater on site. Francis Plating workers used the Vault in the northeast section of the facility as a catch basin for spilled plating liquids and rinse liquids. The first step of the on site treatment process involved elevating the pH of the liquid in the Vault with magnesium oxide pellets. The increase in pH forced metals out of solution as precipitate material. Workers then pumped excess liquid from the Vault into a 5,000-gallon Baker Tank stored adjacent to the Frog Pond. The pH of the liquid in the Baker Tank was elevated and directed to a boiler where it was evaporated. The resulting precipitate was collected and solidified with a filter press (Photograph 15).

It is not known how the filter cake and other precipitates were disposed. At the time of the START response in 1998, a significant amount of filter cake had accumulated on site. A phase I report prepared by Hillmann Environmental Company, Inc. (Hillmann) on July 8, 1997, indicated that no material had been removed from the Frog Pond, Vault, or from the Baker Tank since the initial post fire cleanup in 1992.

After receiving ownership of Francis Plating, Sean McDougal began storing a portion of the wastes that EARTHCO Environmental removed from other sites at the Francis Plating facility. Inspections by Hillmann in 1997, and by Michael Crawford of the OFD in 1998, revealed that many of these materials were stored in unlabeled drums and containers, which had not been properly sealed.

In 1997, Sean McDougall experienced financial difficulty. On May 8, 1997, the facility was placed under the receivership of Wells Fargo Bank. On January 23, 1998, Wells Fargo voluntarily relinquished receivership and Sean McDougal resumed management of the Francis Plating facility. On June 29, 1998, Sean McDougal, acting on behalf of Francis Plating, filed for protection from creditors under Chapter 11 of the United States Bankruptcy Code.

In August 1998, an EBMUD employee informed Mike Crawford of the OFD that Francis Plating had ceased operations. An inspection by Crawford revealed large amounts of improperly contained hazardous wastes including filter cake, cyanide solution, and metal

bearing plating solutions. As a result of these findings, the City of Oakland requested assistance from the EPA's Office of Emergency Response (ERO).

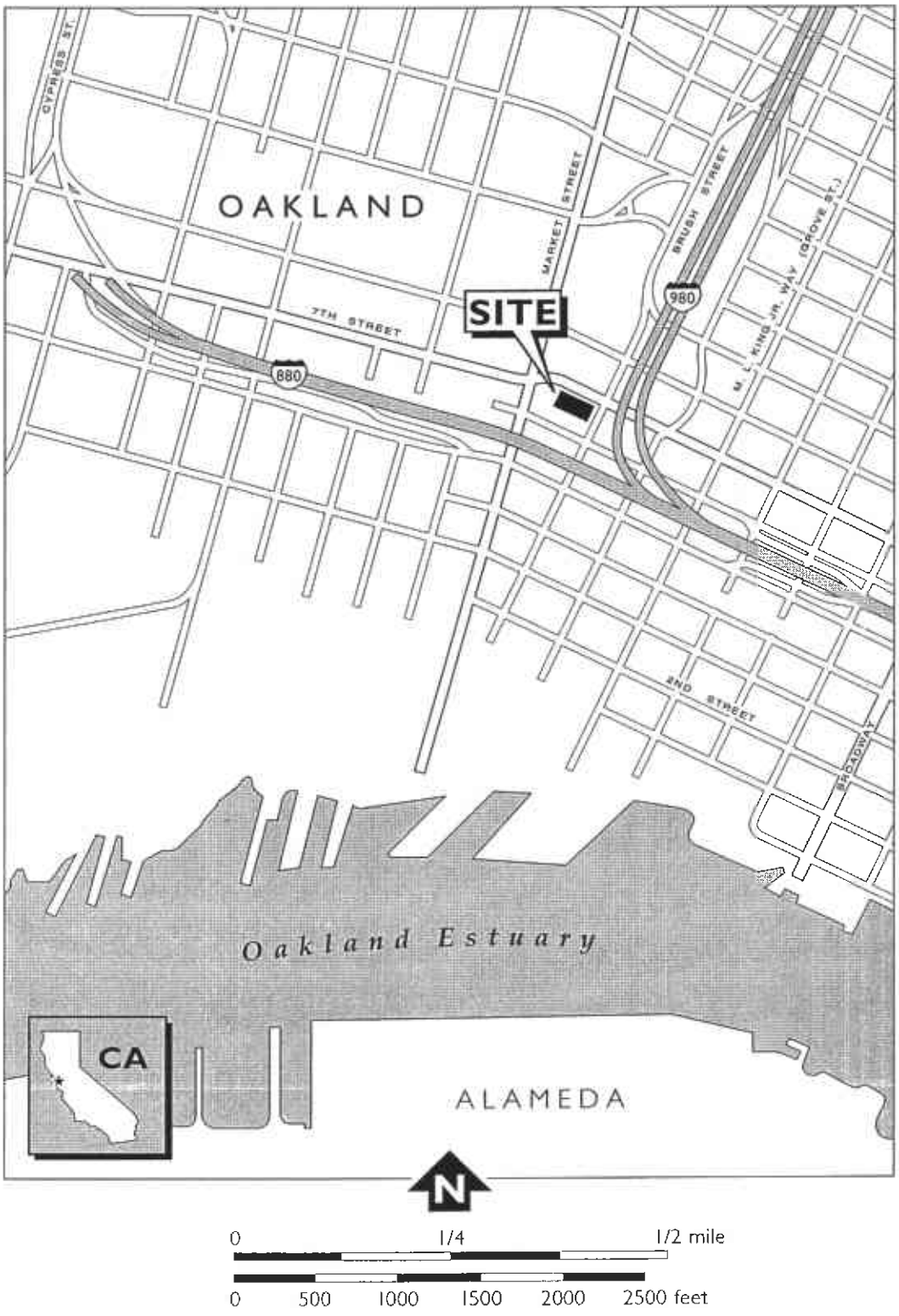

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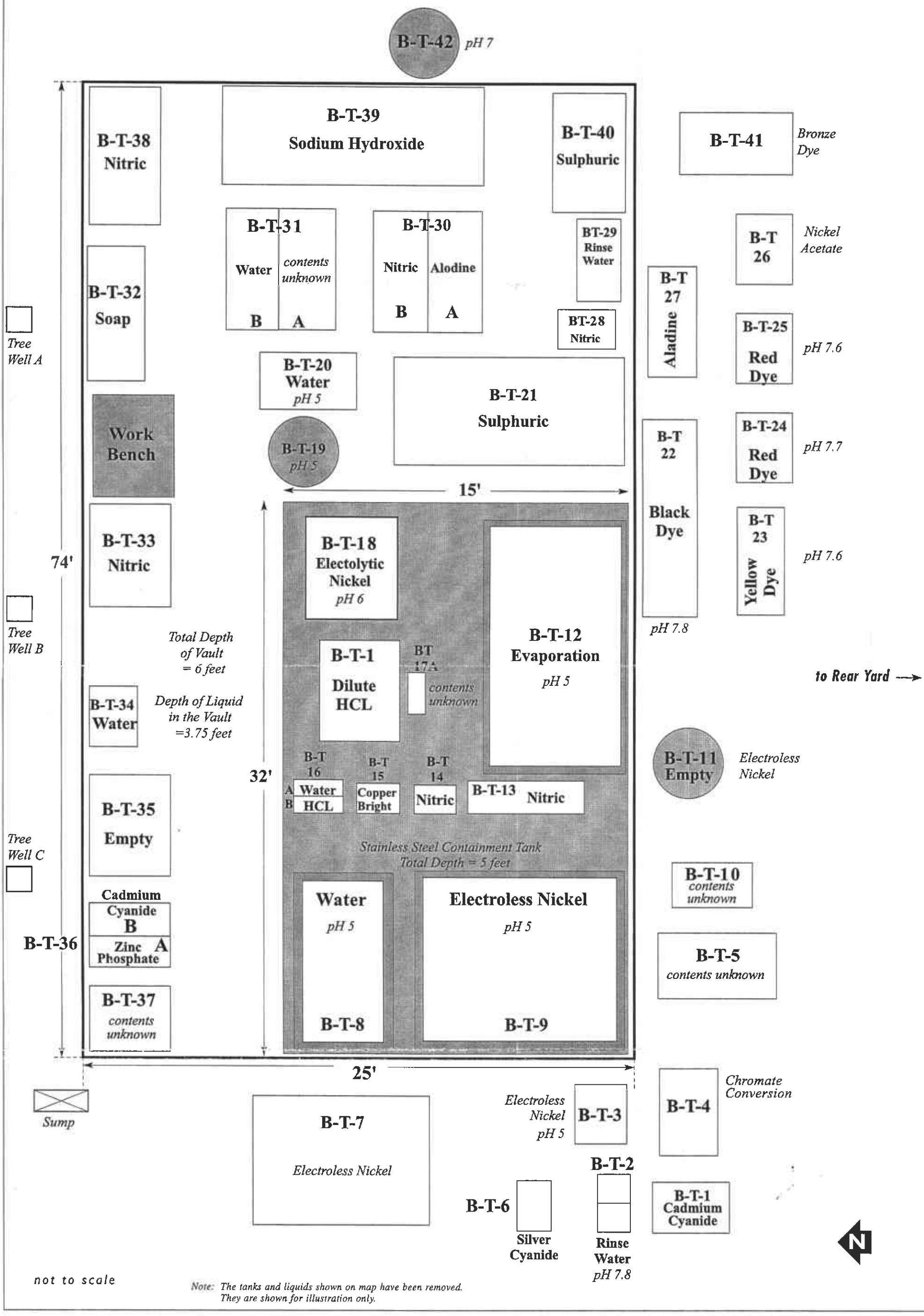
Figure 1

Site Location Map

Francis Plating Shop

Oakland, California



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NE corner site

Figure 2-1a

Plating Building

INITIAL ASSESSMENT – DECEMBER 1998

Francis Plating Shop, Oakland, California

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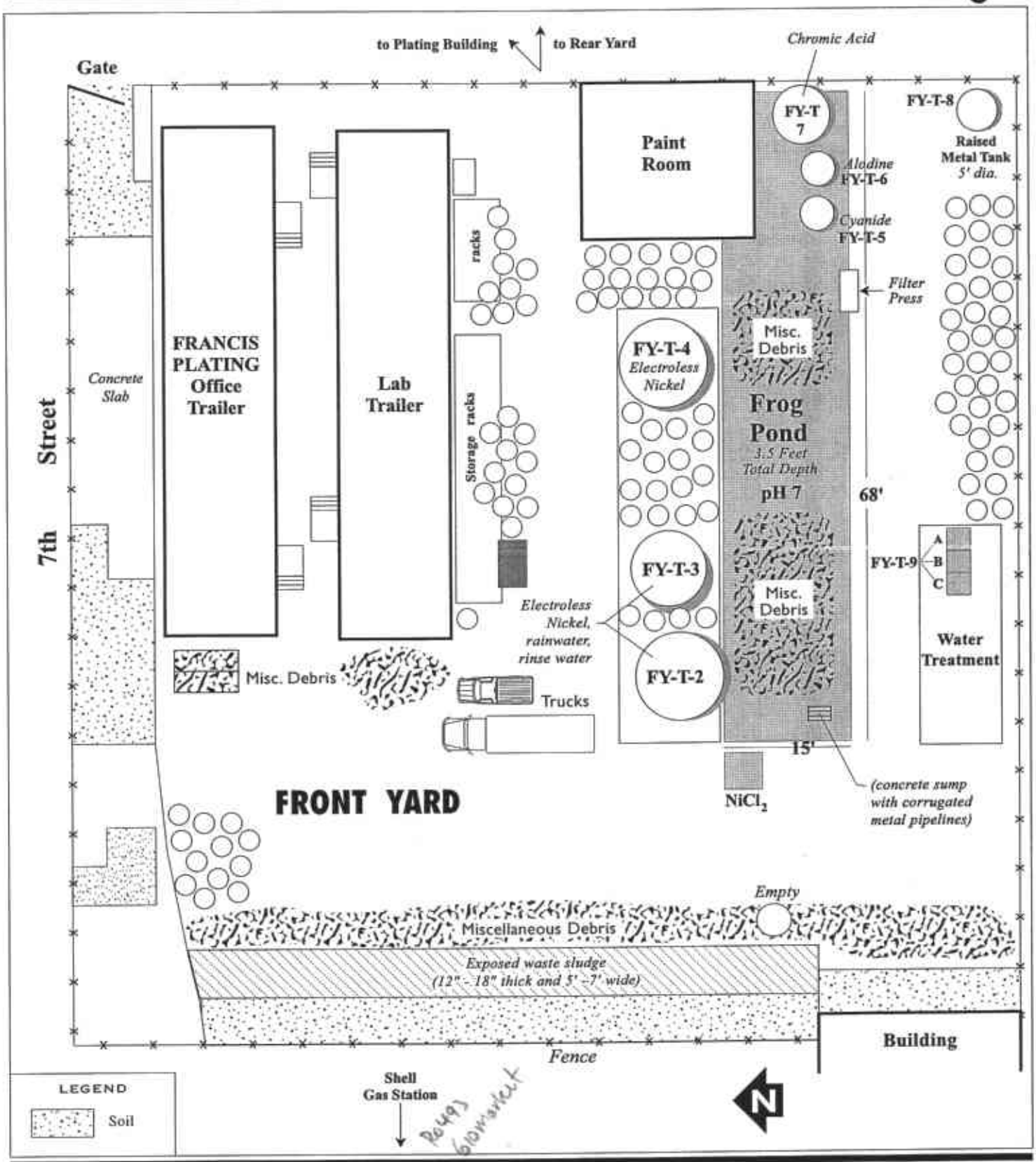

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Figure 2-1b

Front Yard (W)

INITIAL ASSESSMENT – DECEMBER 1998

Francis Plating Shop, Oakland, California

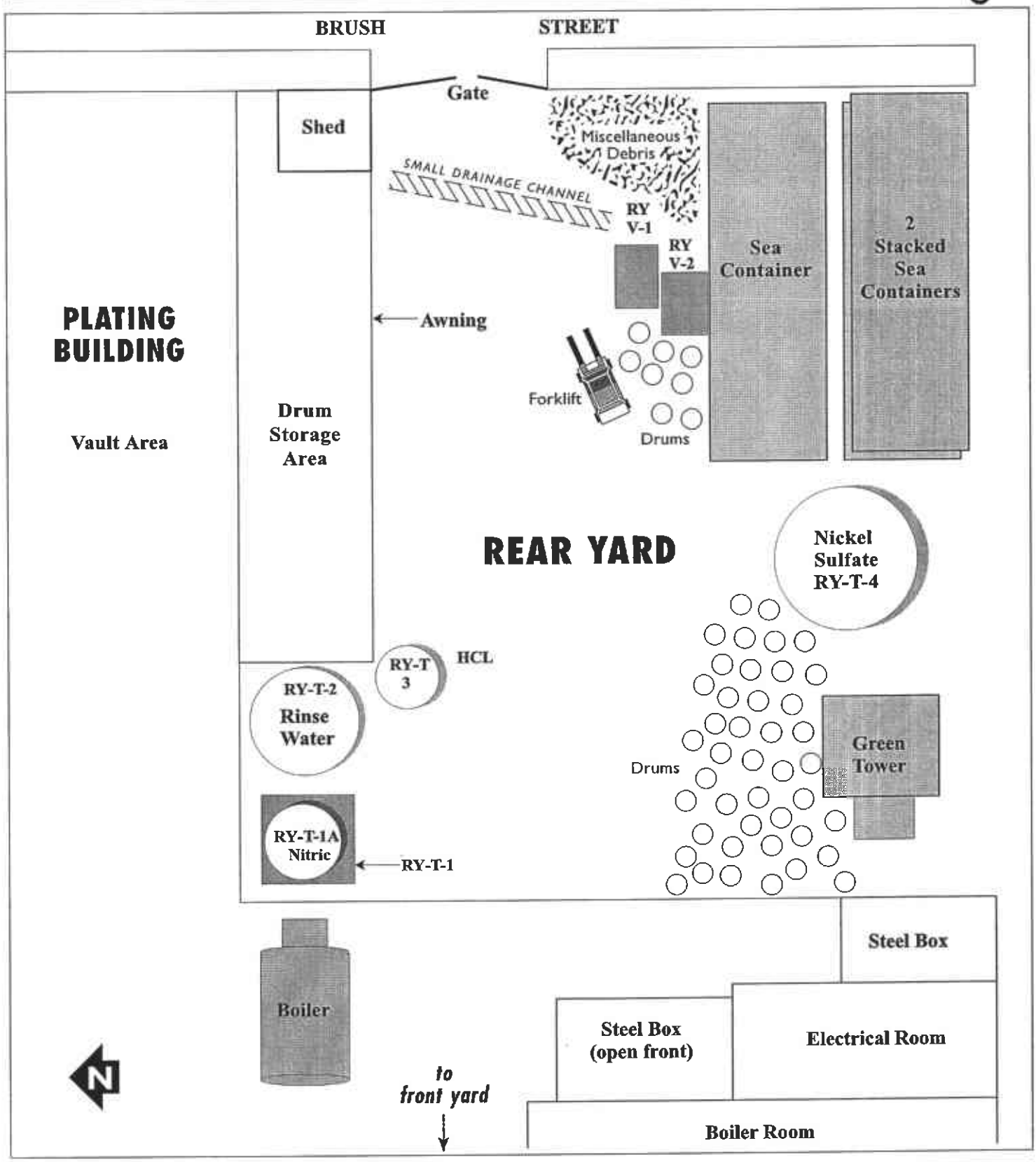

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Figure 2-1c

Rear Yard SE Corner

INITIAL ASSESSMENT – DECEMBER 1998

Francis Plating Shop, Oakland, California

3 Phase I Removal Activities

On December 14, 1998, the START, as directed by the EPA, began inventorying and collecting samples from all on-site containers. Because the on-site hazardous material and waste storage containers were in poor condition, OSC Lawrence decided to conduct removal and assessment activities concurrently. OSC Lawrence directed the ERRS contractor and the United States Coast Guard to stabilize and remove the on-site wastes. The START's scope of work was broadened to include providing hazard categorization support and air monitoring and air sampling to ensure the health and safety of on-site workers and the nearby community. Additionally, the START created maps detailing the layout of the site.

The following items were inventoried:

- Over 300 drums that contained various acids, bases, cyanide, and other hazardous materials;
- Over 400 small containers that ranged in size from five grams to five gallons, many of which were labeled as being poisonous or toxic;
- Fifty-nine vats and tanks that contained dyes, acids, caustics, cyanides, solutions, and waste water;
- A plating Vault that contained approximately 3.75 feet of liquid, of which 2 feet was sludge; and
- A Frog Pond that contained approximately 3 feet of liquid and sludge.

A complete inventory of the materials identified during the assessment is included as Appendix G.

3.1 Removal/Stabilization of Hazardous Materials/Wastes

With the onset of winter rains in January of 1999, OSC Lawrence prioritized the evacuation of liquid from the Frog Pond to insure that sufficient freeboard existed to prevent overflow of liquid from the Frog Pond to the surrounding site. Excess liquid from the Frog Pond was pumped into on-site Baker Tanks™ for temporary storage. Additionally, containers in danger of rupturing were overpacked and secured. During these activities, site maps detailing permanent physical structures as well as the objects located at temporary locations such as drums and small containers were compiled.

In early January of 1999, plans were made to move the large items stored at the facility such as the trucks, forklifts, and storage containers to an empty lot owned by the California Department of Transportation (Caltrans) directly across from the Brush Street side of the Francis Plating facility. Before storing the equipment on the empty lot, soil samples were collected to document existing levels of metals and cyanide.

In late January 1999, equipment from Francis Plating was relocated to the Caltrans lot and the first group of on-site liquids were bulked together for off site disposal. After drums containing hazardous wastes were removed, liquids and sludge were evacuated from the Frog Pond. The Frog Pond was then scrubbed and rinsed to remove remaining residue.

Finally, liquid in the tanks and sludge in the Vault were evacuated with a Super Sucker®. The tanks were then lifted from the Vault with a stationary crane, placed into an empty stainless steel containment tank, cut with a plasma torch and rinsed. The majority of the vats were shipped off site for disposal. Finally, the Vault was scrubbed and rinsed to remove the remaining residue.

3.2 Health and Safety Monitoring

Air monitoring and air sampling activities were conducted to insure the health and safety of on-site workers and the surrounding community. On February 1, 1999, prior to initiating bulking operations, the START collected air samples to document baseline concentrations of analytes of concern. Air samples were submitted to Columbia Analytical Services, Inc. in Kelso Washington. Analytes of concern for the air sampling effort included hydrobromic acid, hydrochloric acid, hydrofluoric acid, nitric acid, and sulfuric acid. Sample Results are summarized in Table 3-1.

During bulking operations, air monitoring with long term colorimetric Drager tubes was conducted in conjunction with air sampling. Long term Drager tubes were used to determine if conditions warranted submission of the collected air samples for definitive analysis. If analytes of concern were detected by the Drager tubes, then samples were to be submitted to a laboratory. No analytes of concern were detected by the long term Drager tubes, therefore no additional analytical samples were submitted.

Air monitoring was also conducted adjacent to the exhaust section of the vacuum and Super Sucker™ trucks and adjacent to pumping operations. Monitoring was conducted using Bayer Monitox™ units for hydrogen cyanide and hydrogen sulfide. Short-term colorimetric Drager tubes were used to monitor levels of acid gases, hydrogen cyanide, cyanide, hydrogen sulfide, carbon monoxide, and cyanogen chloride. In addition, a Passport™ multi-gas analyzer was used to monitor carbon dioxide and hydrogen sulfide levels.

Cyanide was detected several times by the Monitox™ units during pumping operations. All cyanide detects occurred within four feet of the vacuum trucks exhaust system. Cyanide was never detected at points greater than four feet from the pumping exhaust system. In order to minimize the release of hydrogen cyanide to the atmosphere, the vacuum trucks exhaust system was routed through a scrubber unit.

Dust monitoring was conducted when generation and spreading of metal contaminated particulates posed a potential threat to the health and safety of on-site workers and the surrounding community. Dust monitoring was conducted using Personal Data Ram (PDR) aerosol monitors. Using chromium as the constituent of concern, an action level of 5.0 mg/m^3 was established. Action levels were based on the permissible exposure limits (PELs) established by the Occupational Safety and Health Administration (OSHA) under the General Industry Air Contaminants Standard (29 CFR 1910.1000). Action levels were adjusted to account for the concentration of cadmium in particulates found in on-site sediment using the following equation:

$$\text{Adjusted Action Level} = \frac{\text{PEL}}{\text{maximum metal concentration} * 2}$$

Sample calculation:

$$5\ mg/m^3 = \frac{0.005\ mg/m^3}{500\ mg/kg * 2}$$

- The maximum cadmium concentration was obtained using an X-ray fluorencence (XRF) instrument to screen sediment impacted by cadmium.

Results from the PDRs indicated that site activities did not generate particulates at levels above the PEL for chromium or other metals of concern.

3.3 Sampling

The START collected three sets of samples during the assessment and removal effort. All samples were collected in accordance with the Quality Assurance Sampling Plan (QASP) postdated March 1, 1999 which is included as Attachment E. All analytical results were validated by a START chemist in accordance with guidelines in EPA document *Quality Assurance/ Quality Control Guidance For Removal Activities* 540/G-90/004. Liquid and sludge enforcement and characterization samples were collected from the vault and from on-site tanks and drums. Soil samples were collected from a lot owned by Caltrans which faced the Brush Street side of the facility. Sample locations are displayed in Figure 3-1a and 3-1b. The following sections describe the sampling activities and the sample results.

3.3.1 Characterization Samples

On December 18-19, 1999, the START collected samples to characterize contamination levles of on-site materials. Samples were submitted to Columbia Analytical Services, Inc. in Kelso, Washington for definitive analysis for total cyanide (EPA Method 335.2), cyanide amenable to chlorination (EPA Method 335.1), pH (EPA Method 150.1), total sulfide (EPA Method 9030M), reactive sulfide (Section 7.3 of the EPA's Test Manual for evaluating Solid Waste), and Total Analyte List Metals (EPA Method 9010B).

The following liquid and sludge characterization samples were collected from tanks, drums, and sections of the Vault and Frog Pond suspected to have been severely affected by constituents of concern:

- FY-T-5 in the Front Yard, a suspected cadmium cyanide tank;
- FY-T-2 in the Front Yard, suspected to contain cadmium and other metals;
- A-B from the bottom of the North East section of the Vault;

- A-U from the upper section of the North East section of the Vault;
- C-B from the bottom of the South East section of the Vault;
- C-U from the upper level of the South East section of the Vault;
- D-B from the bottom level of the middle section of the Vault; and
- D-A from the upper level of the middle section of the Vault.

Liquid sample FY-T-5, collected from one of the Front Yard Baker Tank™s contained cyanide at an estimated concentration of 55,800 milligrams per liter (mg/L). Liquid samples FY-T-5 and B-T-36 were corrosive hazardous waste as specified in 262.22 (a) of title 40 of the Code of Federal Regulations (40 CFR). The remaining samples were affected by cadmium, copper, nickel, zinc, and in some cases lead. Sample results are displayed in Table 3-2. Sludge samples were collected for the Toxic Characteristic Leachate Procedure (TCLP) extraction and analysis for samples FY-T-2, A-B, C-B, D-B, FP-A-C, however, after settling of the sediment during shipping to the lab, insufficient volume remained to conduct the extraction.

3.3.2 Enforcement Sampling

On January 28, 1999, the START collected enforcement samples from areas suspected to contain nitric acid or cyanide. Samples were submitted to Columbia Analytical Services, Inc. in Kelso, Washington for definitive analysis for total cyanide (EPA Method 335.2), cyanide amenable to chlorination (EPA Method 335.1), anions (EPA Method 300.0), pH (EPA Method 150), and total chromium (EPA Method 6010B). One TCLP extraction was performed and the extract was analyzed for metals (EPA Method 6010B).

The START collected the following liquid and sludge enforcement samples from on-site tanks, drums, and sections of the Vault suspected to have been severely affected by constituents of concern:

- B-V from the bottom of the middle section of the Vault;
- B-T-4-CRO4 from a suspected chromic acid tank;

- B-T-14-NO3 from a suspected nitric acid tank; and
- B-T-36-CN from a suspected cyanide tank

B-V, the bottom Vault sludge sample, contained low levels of cyanide indicating that at least some cyanide liquids had escaped from the vats during the plating process. Liquid sample B-T-4-CRO4, collected from a tank suspected to contain chromic acid and liquid sample B-T-14-NO3, collected from a tank suspected to contain nitric acid were corrosive hazardous wastes as specified in 261.22 (a) of the 40 CFR. Due to matrix interference, the concentration of cyanide in sample B-T-36-CN could not be determined. It appeared likely, however, that B-T-36-CN was more than 3 % cyanide. Sample results are summarized in Table 3-3.

3.3.3 Caltrans Sampling

On January 8, 1999, the START collected three composite surface samples from sections of the Caltrans lot on which the equipment from the Francis Plating facility was to be stored. Soil samples were collected to document existing conditions prior to the arrival of equipment from Francis Plating. Samples were submitted to the contracted laboratory of Columbia Analytical Services, Inc. in Kelso, Washington for definitive analysis for metals (EPA Method 6010B), total cyanide (EPA Method 335.2), and cyanide amenable to chlorination (EPA Method 335.1).

Analytical results for the soil samples collected from the California Transit yard were not compared against PRG-Ind. levels. The analytical results were used to document existing conditions at the yard only. Results did, however, indicate that samples contained only low levels of metals of concern. Analytical results are summarized in Table 3-4.

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Figure 3-1a

Sampling Location Map – Plating Building

CHARACTERIZATION & ENFORCEMENT SAMPLING – DEC. 1998/JAN. 1999

Francis Plating Shop, Oakland, California

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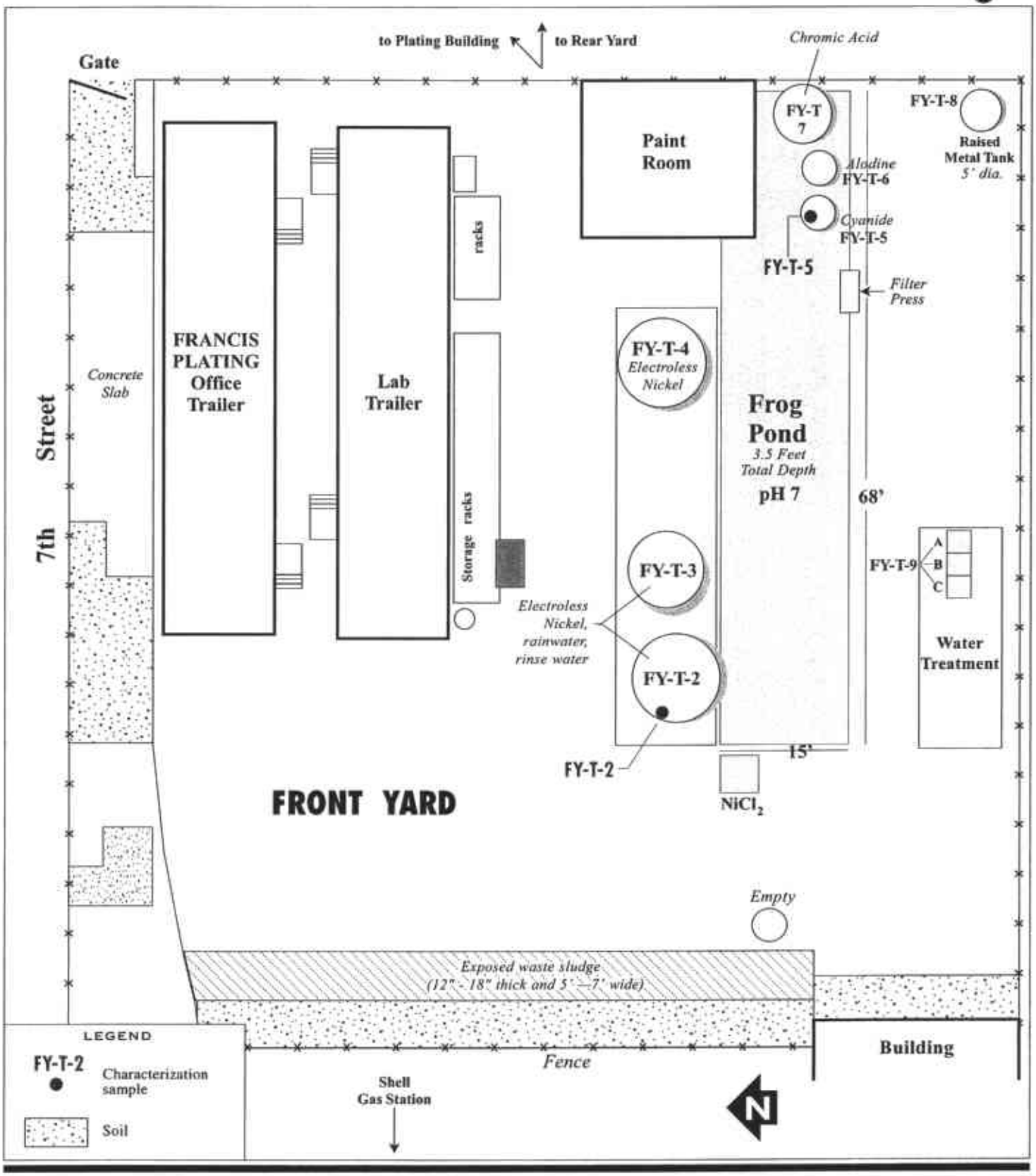

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Figure 3-1b

Front Yard

CHARACTERIZATION & ENFORCEMENT SAMPLING – DEC. 1998/JAN. 1999

Francis Plating Shop, Oakland, California

4 Subsurface Investigation

On July 12, 1999, the EPA directed the START to conduct a subsurface investigation at the Francis Plating site. The START was directed to characterize on site soils affected by analytes of concern from the surface to four feet bgs. Analytes of concern included total and amenable cyanide, total metals, and total and reactive sulfides. Figures 4-1a, 4-1b and 4-1c indicate sample locations.

The investigation began on July12, 1999 and ended on July 19, 1999. The START conducted soil sampling, and on site field screening analysis to assess metal contamination in exposed, near-surface soils (surface to two feet) and in subsurface soils (greater than two feet) beneath concrete, buildings, and storage tanks which were used to store hazardous materials for plating operations. A combination of Geoprobe™ direct-push probing, conducted by the U.S. Coast Guard, and hand auguring was used to collect samples in the Rear yard, Front yard, and plating building shown on Figure 4-1. Ninety-five samples were screened in the field by XRF to determine the concentrations of the metals of concern (arsenic, cadmium, total chromium, copper, lead, silver, nickel, and zinc). More than ten percent of the field-screened samples were submitted to Curtis & Tompkins, Ltd. in Berkeley, California for definitive laboratory analysis of the metals of concern, cyanide, and hexavalent chromium. XRF results are summarized in Table 4-1. Laboratory results are summarized in Table 4-2. Laboratory analytical results and the corresponding XRF results are summarized in Table 4-3.

4.1 Data Evaluation

All analytical results were validated by a START chemist in accordance with guidelines in EPA document title 540/G-90/004. The data were classified as acceptable for use with some qualifications. Screening data (XRF) were then correlated with the validated, definitive data (laboratory) for cadmium, (total) chromium, copper, lead, nickel, and zinc using regression analysis. No correlation was

performed for arsenic or silver, because XRF results for these metals were below detection limits. No correlation was performed for hexavalent chromium or cyanide, because XRF does not measure the concentrations of these constituents. Regression analysis statistics are summarized in Table 4-3 and in Figures 4-2, 4-3, 4-4, 4-5, 4-6, and 4-7.

As stated in the QASP dated July 8, 1999, the data for an analyte must meet two of the following criteria to qualify for use as Screening Plus 10% Definitive Category Data:

I. Correlation coefficient (R^2) greater than 0.70 and slope greater than 0.70 and less than 1.30;

II. Relative percent difference (RPD) between each screening-definitive data pair is less than or equal to 40 for 90% of the data pairs for the analyte; and

III. Both values of the data pair are greater than or less than the level of concern for 90% of the data pairs for the analyte.

Because at least two of the criteria were satisfied for the cadmium, copper, lead, nickel, and zinc correlations, all the XRF and lab data for these metals qualified for use as Screening Plus 10% Definitive Category Data. As a result of the strong correlation between XRF and laboratory data , all non-definitive and definitive analytical data for these metals were considered when making project decisions.

Regression analysis showed a weak correlation between XRF and laboratory data for total chromium, and only the first criterion was satisfied. The weak correlation may have been due to interferences from other metals and/or matrix effects. However, the correlation indicated that definitive laboratory chromium concentrations were significantly less than XRF concentrations. Although the correlation was weak, no corrective action was necessary since the XRF results were conservative measurements and thus protective of human health and the environment.

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Figure 4-1a

Sampling Location Map – Plating Building

SUBSURFACE INVESTIGATION – JULY 1999

Francis Plating Shop, Oakland, California

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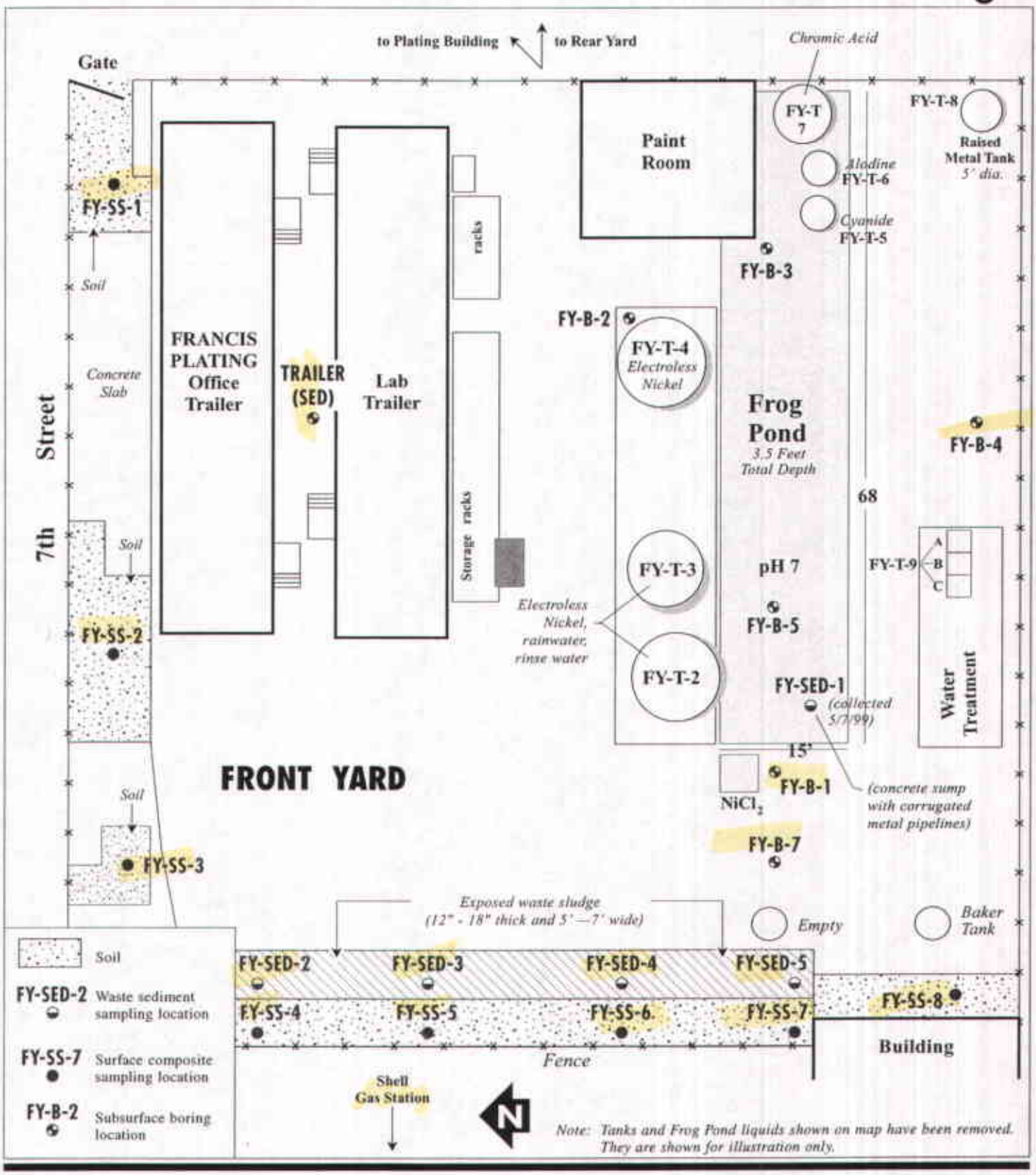

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Figure 4-1b

Sampling Location Map – Front Yard

SUBSURFACE INVESTIGATION – JULY 1999

Francis Plating Shop, Oakland, California

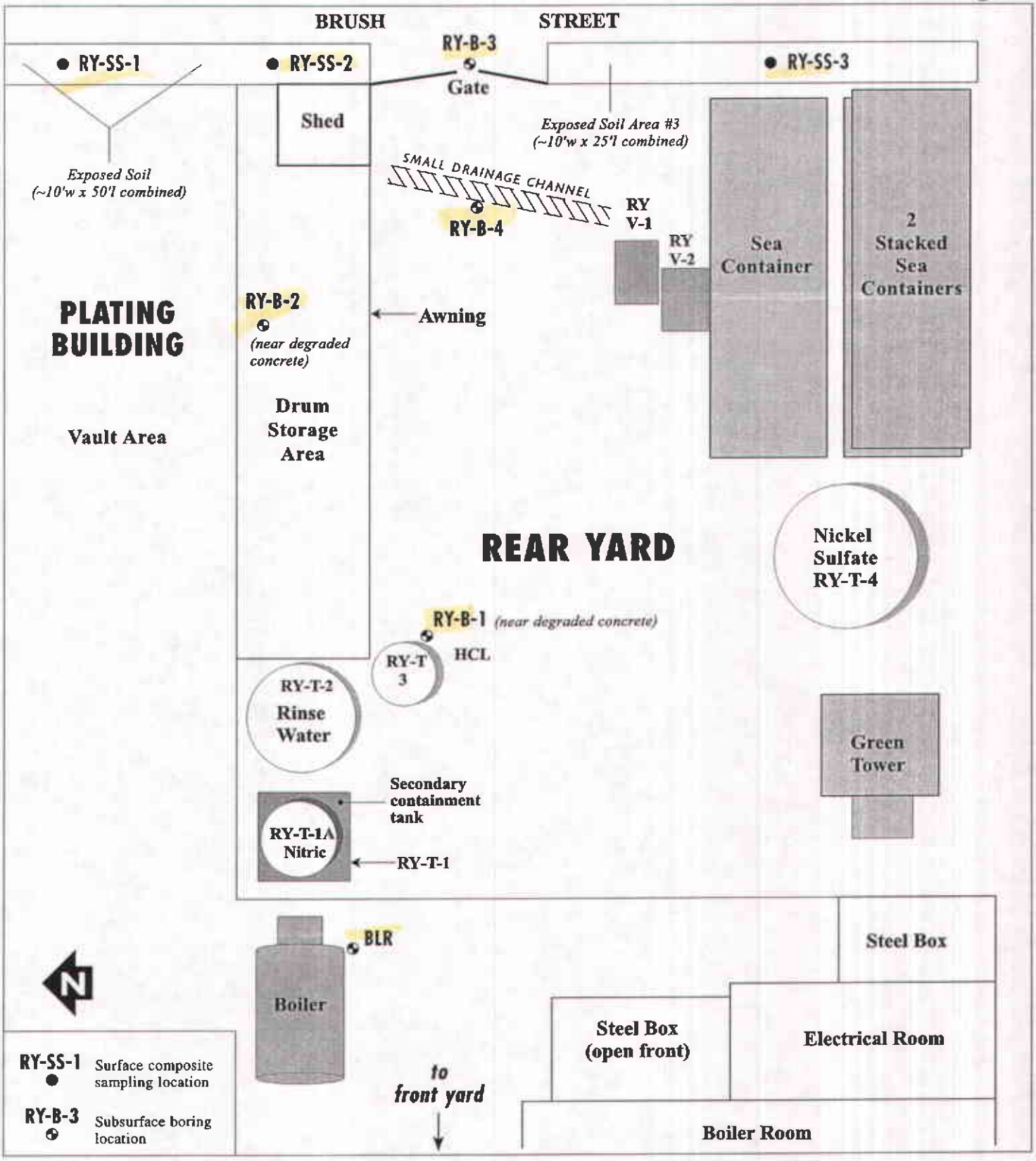

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Figure 4-1c

Sampling Location Map – Rear Yard

SUBSURFACE INVESTIGATION – JULY 1999

Francis Plating Shop, Oakland, California

5 Subsurface Removal Activities

On October 4, 1999, OSC Lawrence directed the START to assist in the final stage of EPA removal activities at the Francis Plating site. Specifically, the START was directed to:

- Prepare a plan describing the verification sampling and laboratory analysis to be performed during the removal activities;
- Prepare a plan describing the air monitoring to be conducted during removal activities;
- Conduct verification sampling and analysis, and work with the ERRS contractor during removal activities to insure the removal of soil or sediment affected by constituents of concern (cadmium, chromium, nickel, and lead) above EPA PRG-Ind levels; and
- Conduct air monitoring during removal activities to ensure that airborne metals of concern (cadmium, chromium, nickel, and lead) did not migrate off site at concentrations above the established levels of concern listed in Section 5.3 of this report.

During the course of the removal effort soil and sediment was removed from the following areas:

- Exposed surface soil along Brush Street to a depth of one foot bgs, encompassing the sampling locations RY-SS-1, RY-SS-2, and RY-SS-3;
- Exposed surface soil at the back of the Front yard to a depth of one foot bgs, encompassing the sampling locations FY-SS-1, FY-SS-4, FY-SS-5, FY-SS-6, and FY-SS-8;

- Exposed sediment on concrete at the back of the Front yard, encompassing the sampling locations FY-SED-2, FY-SED-3, FY-SED-4, and FY-SED-5;
- Soil on the concrete in Tree Well B to a depth of six inches;
- Dried solids on the floor of the plating building at the base of vat B-T-9;
- Wet solids on the bottom of the plating building Vault at the base of, and inside of, vat B-T-12;
- Solid material on the floor of the plating building under the stacked grating;
- Sediment in the Front yard on the concrete slab between the trailers; and SED
- Solid material in the Rear yard on the concrete slab near the boiler. RLR

Removal locations are detailed in Figure 5-1 and Figures 4-1a, 4-1b, and 4-1c.

5.1 Sample Collection

Following soil removal by the ERRS contractor, the START collected confirmation samples from soil along Brush Street at a depth of one foot bgs, near sampling locations RY-SS-1, RY-SS-2, and RY-SS-3; and along the back of the Front Yard at a depth of one foot, encompassing the former sampling locations FY-SS-1, FY-SS-4, FY-SS-5, FY-SS-6, and FY-SS-8. Twenty confirmation samples were collected from the surface to six inches bgs. Excavation samples were also planned for exposed soil at Tree Well B following excavation to six inches; however, concrete was encountered at this location after three inches which eliminated the need for confirmation data.

Confirmation samples were analyzed on site using an XRF instrument to determine concentrations of metals of concern. Results are included in Table 5-1. At locations where the XRF results indicated that soil samples contained chromium at a concentration exceeding the PRG-Ind, an additional six inches of soil were excavated; this was necessary along ~~Brush~~ Street near former sample location FY-SS-3. In order to minimize the volume of material required for disposal, the area was subdivided into five

parts and XRF data were obtained for each of the five sub-areas. Of the five sub-areas, three areas had total chromium levels above the PRG-Ind and were excavated for an additional six inches of excavation. A total of twelve samples were submitted to Curtis and Tompkins, Ltd. in Berkeley, California for definitive analysis of metals on the EPA's Priority Pollutant list. Results are included as Table 5-2.

5.2 XRF Analysis and Data Evaluation

All analytical results were validated by a START chemist in accordance with guidelines in EPA document *Quality Assurance/ Quality Control Guidance For Removal Activities* 540/G-90/004. Results were used to determine if the soil remaining on the site was affected by constituents of concern at levels above the EPA's PRG-Ind levels and to gauge the effectiveness of the XRF at characterizing the site. None of the samples were affected by constituents of concern. XRF results are summarized in Table 5-1. Analytical results are summarized in Table 5-2. Laboratory results and the corresponding XRF results are summarized in Table 5-3. Sample results and data validation reports are included as Attachment G.

In order to ensure that soil and sediment affected by chromium above EPA PRG-Ind levels was removed; the level of concern was adjusted to account for the precision of the XRF spectrophotometer. The relative standard deviation value calculated for chromium (29.1 mg/kg) was multiplied by the PRG-Ind (450 mg/kg) for chromium, and the resultant value was subtracted from the PRG value to yield the adjusted, more conservative, level of concern. The adjusted value was calculated as follows:

Adjusted Value = PRG Value - (PRG Value * RSD/100)

The actual adjusted value was calculated to be 319 mg/kg.

In order to evaluate the XRF data for use, twelve soil samples screened using the XRF were submitted to Curtis & Tompkins, Ltd. in Berkeley, California for confirmation analysis.

Because at least two of the criteria in Section 4.1 of this report were not satisfied for the metals of concern, the XRF data did not qualify as Screening Plus 10% Definitive Category Data. The weak correlation between the laboratory and XRF data may have been due to interferences from other metals and/or matrix effects. As during the subsurface investigation, evaluation of the data consistently indicated laboratory chromium concentrations to be biased

lower than XRF concentrations. Regression analysis statistics are summarized in Table 5-3 and in Figures 5-2, 5-3, and 5-4.

5.3 Air Monitoring

Air monitoring was conducted to determine if constituents of concern were migrating off site due to on-site activities initiated during the removal effort. The constituents of concern included cadmium, chromium, and particulates not otherwise classified (PNOCs). Lead, nickel, silver, and zinc were also documented in on site soil and sediment, however none of the metals were present at concentrations above EPA PRG-Ind concentrations.

In the Front Yard, where airborne soil and sediment affected by cadmium was of primary concern, the START established an action level for particulates of 5.0 mg/m^3. In the Rear Yard, where airborne soil affected by chromium was of primary concern, the START established an action level of 15 mg/m^3.

Particulate concentrations were determined using PDRs. In the Front Yard, PDRs were stationed on the fence adjacent to the Shell Station, the fence adjacent to Seventh Street, and the fence near the freeway offramp. In the Rear Yard, PDRs were attached to fences and utility poles along Seventh Street and Brush Street. The time weighted average for each day of excavation was well below the adjusted action level in each area. Action levels were established using the criteria in Section 3.2 of this report.

Ecology and Environment, Inc.

Figure 5-1

Plating Building

SUBSURFACE REMOVAL EFFORT – OCTOBER 1999

Francis Plating Shop, Oakland, California

Dr. No: 0397.FPRS.XX.c
TDD: 09-9902-0017
PAN: 0397-FPRS-XX
Date: 04/24/00
File: Z-47

6 Summary of Transport and Disposal

The ERRS contractor arranged for shipment and disposal of all on-site wastes and contaminated soil and sediment. Approximately 28,000 gallons of acidic liquid, 4,250 gallons of caustic liquid, 2,355 gallons of cyanide liquid, 11,400 gallons of nickel plating solution and over 40,000 gallons of miscellaneous liquids were shipped off site. Approximately 380 cubic yards of hazardous solids, 225 cubic yards of sludge from the Vault, 5,850 pounds of cyanide, 2,000 pounds of chromic acid, and 1,700 pounds of non-RCRA solids were shipped off site for disposal and treatment. A partial summary of wastes is included in Table 6-1. A full description of wastes is included as Appendix H. Wastes were shipped to US Ecology in Nevada, Safety Kleen in San Jose and Button Willow in California, 21st Century EMI in Fernley, Nevada, and Burlington Environmental in Kent, Washington.

Table 6-1: Summary of Wastes Removed from the Francis Plating Site

Waste	Amount
Bulk Solids	22 yd3
Vault Sludge	225 yd3
Waste Water	39,304 gal
Acid Liquids	27,790 gal
Electroless Nickel	11,400 gal
Paint (liquid)	30 gal
Paint (Solid)	80 lbs.
Flammable Liquids	930 gal
Activated Carbon	5200 lbs.
Caustic Liquids	4,250 gal
Cyanide Solutions	2,355 gal
Cyanide Solids	5,850 lbs.
Flammable Solids	125 lbs.
Miscellaneous RCRA Debris	242 yd3
Hazardous non-RCRA Debris	138 yd3
Tar	300 lbs.
Fire Retardant	100 lbs.
Sodium Hydroxide	800 lbs.
Chromic Acid (solid)	2000 lbs.
Sodium Nitrate	30 gal
Soap Solution	180
Miscellaneous Solids (RCRA)	450 lbs
Non-RCRA Solids	1,700 lbs

7

Conclusion

The concerted effort by the EPA, the START, the ERRS contractor, and the US Coast Guard allowed for a successful removal of the wastes at the Francis Plating facility. The ERRS contractor physically removed the wastes from the site. The START inventoried on-site containers and categorized them with respect to their waste characteristics, evaluated and validated analytical results, assisted in placing wastes into appropriate hazard categories, provided air monitoring support and analytical services, and assisted with technical input and research into optimal methods of removing the on-site wastes. The US Coast Guard assisted by providing health and safety monitoring support, hazardous categorization support, and by assisting with the inventory effort.

A

Tables and Figures for the Initial Assessment and Removal Effort

Table 3-1

Sample Results for the February 1999 Health and Safety Baseline Air Sample Collection Effort

PAN#: 0397-FPRS-XX
TDD#:09-99020017
Francis Plating
Oakland, CA

Sample ID	Hydrobromic Acid	Hydrochloric Acid	Hydrofluoric Acid	Nitric Acid	Sulfuric Acid
	milligrams per cubic meter				
FP1-AG-0201	ND	0.0128	ND	ND	0.0277
FP2-AG-0201	ND	0.0123	ND	0.0045	0.0405
FP3-AG-0201	ND	ND	ND	0.0047	0.0208
FP4-AG-0201	ND	0.0143	ND	0.0048	0.0185
OSHA TWA	10	7	3	5	1

Key:
ND Analyte not detected
OSHA Occupational Safety and Health Administration
TWA Time Weighted Average

Table 3-2

PAN#: 0397-FPRS-XX
TDD#:09-99020017
Francis Plating
Oakland, CA

Summary of Analytical Sample Results for the December 1998 Characterization Sample Collection Effort

Sample ID	Arsenic	Cadmium	Copper	Lead	Nickel	Silver	Cyanide, Amen.	Cyanide, Total	Zinc	Sulfide, Total	pH
	micrograms per liter						milligrams per liter				
FY-T-5	615	110,000 J	16,700 J	ND	6,810	ND	55,800 J	56,200 J	45100000 J	230 J	13.03
FY-T-2	ND	56,600 J	9,280 J	1,910	1,750,000	4,340	ND UJ	2.2 J	61,200 J	13.2 J	7.65
A-B	345	265,000 J	148,000 J	21,900	2,910,000	2,510	ND UJ	1.1 J	894,000 J	0.21 J	6.7
A-U	ND	7,000 J	3,250 J	1,070	102,000	109	35.7 J	4.3 J	11,700 J	1.21 J	3.87
C-B	170	53,900 J	78,700 J	17,100	1,410,000	582	3.5 J	6.9 J	105,000 J	NA	9.2
C-U	ND	4,610 J	1,750 J	ND	96,700	ND	34.7 J	40.2 J	9,680 J	334 J	4.41
D-B	405	634,000 J	38,2000 J	62,200	9,360,000	18,400	65.6 J	90.6 J	234,000 J	ND R	2.68
D-U	ND	51,200 J	6,390 J	1,710	1,740,000	ND	ND UJ	3.6 J	61,100 J	NA	2.18
B-T-36-CN	155	19,800,000J	76,100 J	ND	73,600	ND	892,000 J	894,000 J	417000 J	NA	12.9
FP-A-U	ND	2,840 J	489J	484	502,000	ND	ND UJ	ND	11,900 J	NA	7.42
FP-A-L	525	80,9000 J	556,000 J	140,000	7,320,000	5,260	46.8 J	57.5J	571,000	334	6.71

Key:
ND Analyte not detected
J Estimated detected result
UJ Estimated non-detected result
NA Sample result not available for this analyte

* The Characterization Samples were collected for characterization purposes only. Results were not compared against any regulatory values.

Table 3-3

Analytical Results for the January 1999 Enforcement Sample Collection Effort

PAN#: 0397-FPRS-XX
TDD#:09-99020017
Francis Plating
Oakland, CA

Sample ID	Cyanide, Amenable	Cyanide, total	Total Chromium	pH
	milligrams per liter		micrograms per liter	
BV	78 J	127 J	NA	8.52
B-T-4-CR04	NA	NA	5460000 J	NA
B-T-36-CN	38,100 J	36,900 J	NA	NA
'Regulatory Limit Regulatory Limit (40 CFR Section 261.2)	Not Applicable	Not Applicable	Not Applicable	pH below 2 or above 12.5

Sample ID	pH	Bromide	Chloride	Fluoride	Nitrate as Nitrogen	Nitrite as Nitrogen	Sulfate
			milligrams per liter				
B-T-4-CR04	1.67	ND	4160	43.9	1890	ND	893 J
B-T-14-NO3	<1	ND	ND	ND	199,000	ND	225 J
'Regulatory Limit (40 CFR Section 261.2)	pH below 2 or above 12.5	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Key:
ND Analyte not detected
J Estimate detected result
NA Sample result not available for this analyte
Bold Indicates result is above regulatory limits
CFR Code of Federal Regulations

Table 3-4

PAN#: 0397-FPRS-XX
TDD#:09-99020017
Francis Plating
Oakland, CA

Analytical Sample Results for the January 1999 Caltrans Sampling Effort (BG)

Sample ID	Arsenic	Cadmium	Chromium	Copper	Cyanide, Amenable	Cyanide, Total	Lead	Nickel	Silver	Zinc
	milligrams per kilogram									
SL-1	3	2	48	24	ND	ND	80	38	ND	151
SL-2	3	1	40	22	ND	ND	70	33	ND	66
SL-3	3	1	42	23	ND	1.3	71	32	ND	73

Key:
ND Analyte not detected
* The Caltrans Samples were collected for documentation purposes only. Results were not compared against any regulatory values.

B

Tables and Figures for the Subsurface Investigation

TABLE 4-1
Summary XRF Results for the July 1999 Initial Subsurface Investigation

TDD No: 09-9902-0017
PAN: 0397-FPRS-XX
Francis Plating
Oakland, CA

SAMPLE NAME	DATE COLLECTED	XRF ANALYTICAL RESULT (mg/Kg)															
		Cr	DL	Ni	DL	Cu	DL	Zn	DL	As	DL	Pb	DL	Cd	DL	Ag	DL
REAR YARD																	
RY-SS-1 (0-6")[1]	13-Jul-99	**920**	306	380	345	ND	147.9	320	179.7	ND	147.3	350	111.3	ND	165.03	ND	97.2
RY-SS-1 (0-6")[1]	13-Jul-99	**1,770**	375	470	369	ND	148.2	222	167.7	ND	184.2	591	143.4	ND	173.1	ND	100.2
RY-SS-1 (1'-2')[1]	15-Jul-99	273	237.3	ND	197.4	ND	117.9	ND	102.6	ND	76.5	ND	45.6	ND	150.3	ND	85.5
RY-SS-2 (0-6")[1]	14-Jul-99	**920**	312	ND	354	252	201.6	231	179.4	ND	128.7	ND	39.3	ND	176.4	ND	105.6
RY-SS-2 (0-6")[1]	15-Jul-99	382	271.8	400	345	ND	164.4	ND	146.1	ND	115.8	190	88.2	ND	165.9	ND	97.5
RY-SS-2 (1'-2')[1]	15-Jul-99	ND	238.2	ND	210	ND	134.7	ND	97.2	ND	87	ND	57.9	ND	152.52	ND	85.8
RY-SS-3 (0-6")	13-Jul-99	**597**	286.5	ND	327	ND	143.1	156	156	ND	111.6	113	76.8	ND	173.7	ND	101.7
RY-SS-3 (0-6")	15-Jul-99	**649**	283.2	520	360	ND	152.7	196	156.9	ND	126	239	94.2	ND	160.2	ND	94.5
RY-SS-3 (1'-2')	16-Jul-99	322	237.3	ND	279.3	ND	121.2	ND	110.4	ND	72.3	ND	37.8	ND	146.4	ND	85.5
RY-SS-3 (1'-2')	16-Jul-99	ND	256.2	ND	299.4	ND	117.9	ND	121.5	ND	75.3	60	55.2	ND	146.1	ND	84.6
RY-B-1 (0-4")[1]	15-Jul-99	**1,100**	336	13,310	1437	340	303	534	233.1	ND	281.1	**1393**	226.2	ND	179.1	ND	107.4
RY-B-1 (4"-2')	14-Jul-99	368	249.9	1,350	477	ND	141.6	ND	114.2	ND	78.3	ND	45.9	ND	147.9	ND	84.6
RY-B-1 (2'-4')	14-Jul-99	333	228.9	ND	208.5	ND	114.3	ND	93.6	ND	64.2	ND	50.7	ND	150.6	ND	86.4
RY-B-2 (0-4")	13-Jul-99	314	281.1	ND	210.6	ND	145.5	335	182.1	ND	185.6	588	139.5	ND	171.3	ND	99.3
RY-B-2 (4"-2')	14-Jul-99	ND	248.7	ND	226.5	ND	109.5	179	148.8	ND	154.8	394	112.5	ND	158.1	ND	89.1
RY-B-2 (2'-4')	15-Jul-99	266	244.5	ND	178.8	ND	117.6	ND	108.3	ND	11.73	ND	43.53	ND	155.7	ND	89.7
RY-B-3 (0-4")	13-Jul-99	363	267	1,090	450	ND	149.4	ND	134.1	ND	127.5	215	90.9	ND	164.7	ND	94.8
RY-B-3 (4"-2')	16-Jul-99	ND	266.4	ND	259.2	ND	116	ND	113.4	ND	72.9	ND	45.3	ND	159	ND	91.8
RY-B-3 (2'-4')	15-Jul-99	278	266.1	ND	234.9	ND	109.2	ND	109.5	ND	74.7	ND	47.7	ND	162.3	ND	93.9
RY-B-4 (0-4")[1]	13-Jul-99	**15,800**	861	4,630	912	578	297.9	785	267.3	ND	258.3	**1070**	204.3	267	194.4	ND	107.4
RY-B-4 (4"-2')	14-Jul-99	**2,280**	375	1,200	456	ND	165.6	175	149.4	ND	77.4	ND	52.2	ND	159	ND	90.9
RY-B-4 (2'-4')	14-Jul-99	**533**	273.3	430	336	328	201.3	ND	141	ND	77.1	ND	48.36	ND	163.2	ND	92.1
EPA PRG-Ind		450		37,000		70,000		100,000		460[2]		1,000		930		9,400	
TTLC		2,500		2,000		2,500		5,000		500		1,000		100		500	

TABLE 4-1
Summary XRF Results for the July 1999 Initial Subsurface Investigation

TDD No: 09-9902-0017
PAN: 0397-FPRS-XX
Francis Plating
Oakland, CA

SAMPLE NAME	DATE COLLECTED	XRF ANALYTICAL RESULT (mg/Kg)															
		Cr	DL	Ni	DL	Cu	DL	Zn	DL	As	DL	Pb	DL	Cd	DL	Ag	DL
FRONT YARD																	
FY-SS-1 (0-6")	14-Jul-99	**459**	284.7	756	414	ND	143.4	176	159.9	ND	102.9	ND	67.2	205	179.4	ND	103.2
FY-SS-1 (0-6")	13-Jul-99	411	277.2	340	336	ND	147.6	ND	148.5	ND	98.4	ND	65.7	ND	175.5	ND	98.4
FY-SS-1 (1'-2')	16-Jul-99	312	227.7	ND	255.3	ND	112.2	ND	115.2	ND	75.6	ND	47.1	ND	146.7	ND	85.5
FY-SS-2 (0-6")[1]	13-Jul-99	391	253.5	ND	269.1	ND	127.2	ND	122.7	ND	86.7	68	63	ND	156.03	ND	90.12
FY-SS-2 (1'-2')	13-Jul-99	ND	234	ND	194.1	ND	98.1	ND	105.9	ND	84.6	ND	50.4	ND	150	ND	86.85
FY-SS-3 (0-6")	13-Jul-99	258	105	ND	250.2	ND	154.8	ND	142.2	ND	99.9	105	69	ND	163.8	ND	92.97
FY-SS-3 (1'-2')	13-Jul-99	355	253.2	ND	193.8	ND	114.9	ND	116.1	ND	74.4	ND	47.7	ND	148.5	ND	85.8
FY-SS-3 (1'-2')	13-Jul-99	297	242.1	ND	167.4	ND	110.4	ND	113.4	ND	68.1	ND	40.38	ND	145.5	ND	85.2
FY-SS-4 (0-6")	13-Jul-99	**501**	280.5	ND	242.7	ND	159.6	202	159.6	ND	106.8	139	79.5	ND	157.8	ND	90.3
FY-SS-4 (1'-2')	15-Jul-99	ND	267	ND	324	ND	150.9	ND	147.3	ND	87.6	ND	57	ND	153.6	ND	87.6
FY-SS-5 (0-6")	15-Jul-99	**571**	288	1,500	52.8	ND	164.1	491	207	ND	101.9	96	71.1	ND	162	ND	94.2
FY-SS-5 (1'-2')	15-Jul-99	417	278.4	760	408	ND	133.2	ND	136.8	ND	110.4	130	76.8	ND	164.4	ND	92.1
FY-SS-6 (0-6")	13-Jul-99	448	275.4	670	390	ND	141.9	237	166.5	ND	77.4	ND	48.6	ND	164.1	ND	96.6
FY-SS-6 (0-6")	13-Jul-99	**491**	273	530	363	ND	135	ND	141	ND	86.4	ND	58.2	ND	163.5	ND	90.9
FY-SS-6 (1'-2')	15-Jul-99	398	272.7	ND	300	ND	123	239	163.2	ND	151.2	398	116.1	ND	162.3	ND	93.3
FY-SS-7 (0-6")	13-Jul-99	309	272.1	480	348	ND	149.1	237	163.5	ND	120.3	227	90.6	ND	159.9	ND	93
FY-SS-7 (1'-2')	15-Jul-99	269	264.3	510	348	ND	146.1	ND	135.3	ND	93	109	71.4	ND	154.5	ND	89.7
FY-SS-8 (0-6")	13-Jul-99	**526**	295.5	1,220	492	ND	162.9	ND	150	ND	90.3	ND	57.6	ND	152.7	ND	91.5
FY-SS-8 (0-6")	15-Jul-99	ND	262.8	330	318	ND	129.3	ND	112.8	ND	81.6	ND	50.4	ND	140.4	ND	81.9
FY-SS-8 (1'-2')	15-Jul-99	406	275.4	ND	203.4	ND	146.1	438	196.2	ND	149.1	316	108	ND	157.8	ND	91.2
FY-B-1 (0-4")	13-Jul-99	333	273	ND	222	ND	130.5	ND	119.4	ND	101.1	110	72.6	ND	163.8	ND	90.6
FY-B-1 (1'-2')	15-Jul-99	**556**	285.3	2,440	621	ND	167.4	ND	132.9	ND	106	118	74.7	ND	164.7	ND	95.4
FY-B-1 (2'-4')	15-Jul-99	**655**	294.6	3,270	720	ND	178.8	ND	144.6	ND	79.2	ND	46.5	ND	168	ND	99
FY-B-1 (4'-8')	15-Jul-99	ND	277.2	1,510	528	ND	147.3	ND	115.8	ND	81.3	ND	48.3	ND	167.1	ND	96
FY-B-1 (8'-12')	15-Jul-99	265	258.9	480	360	ND	116.7	ND	119.4	ND	80.1	ND	40.2	ND	165	ND	93.42
FY-B-2 (0-4")	13-Jul-99	2,610	399	ND	248.1	ND	133.8	ND	133.8	ND	133.4	267	98.1	ND	158.7	ND	91.2
FY-B-2 (4"-2')	14-Jul-99	**861**	286.5	ND	209.4	ND	104.1	ND	106.8	ND	65.7	ND	39.3	ND	151.2	ND	85.5
FY-B-2 (2'-4')	14-Jul-99	**530**	258.6	ND	213	ND	128.7	ND	110.3	ND	64.5	ND	37.5	ND	148.2	ND	85.2
FY-B-3 (0-4")	15-Jul-99	ND	242.1	ND	210.3	ND	119.4	ND	130.8	ND	78.3	ND	44.4	ND	158.7	ND	89.67
FY-B-3 (4"-2')	16-Jul-99	ND	249.3	ND	219	ND	112.2	ND	108.3	ND	79.8	ND	49.8	ND	156.3	ND	90
FY-B-3 (2'-4')	15-Jul-99	279	276.3	ND	275.4	ND	129.9	ND	96.6	ND	84.3	ND	50.4	ND	162	ND	96.3
EPA PRG-Ind		450		37,000		70,000		100,000		480[3]		1,000		930		9,400	
TTLC		2,500		2,000		2,500		5,000		500		1,000		100		500	

TABLE 4-1
Summary XRF Results for the July 1999 Initial Subsurface Investigation

TDD No: 09-9902-0017
PAN: 0397-FPRS-XX
Francis Plating
Oakland, CA

SAMPLE NAME	DATE COLLECTED	XRF ANALYTICAL RESULT (mg/Kg)															
		Cr	DL	Ni	DL	Cu	DL	Zn	DL	As	DL	Pb	DL	Cd	DL	Ag	DL
FRONT YARD																	
FY-B-4 (0-4")	13-Jul-99	ND	273.3	ND	189.3	213	175.8	433	195.9	ND	179	550	135.9	ND	162.3	ND	93.3
FY-B-4 (4"-2')	15-Jul-99	319	233.1	ND	232.8	ND	125.7	ND	116.7	ND	95.7	128	72.6	ND	145.5	ND	81.9
FY-B-4 (2'-4')	15-Jul-99	305	231.9	ND	182.1	ND	96	ND	105.2	ND	67.5	ND	40.5	ND	147.3	ND	85.2
FY-B-4 (2'-4')	15-Jul-99	252	245.4	ND	204.9	ND	109.4	ND	108.6	ND	75.54	ND	48	ND	142.5	ND	84.6
FY-B-4 (4'-6')	16-Jul-99	ND	246.6	ND	238.5	ND	110.8	ND	121.5	ND	80.1	ND	48.3	ND	158.1	ND	87.9
FY-B-4 (6+)	16-Jul-99	314	272.7	ND	273.9	ND	136.2	ND	128.4	ND	83.1	ND	45.15	ND	171.6	ND	98.1
FY-B-5 (0-4")[2]	15-Jul-99	**589**	277.2	ND	244.8	ND	129.6	ND	128.7	ND	71.4	ND	48.3	ND	153.9	ND	89.7
FY-B-7 (0-4")	13-Jul-99	395	270.9	ND	212.1	ND	150.6	262	168.3	ND	136.2	249	95.7	ND	159	ND	92.7
FY-B-7 (4"-2')	14-Jul-99	391	267.6	ND	298.2	ND	126	145	144.9	ND	97.8	112	72	ND	153.3	ND	91.2
FY-B-7 (2'-4')	15-Jul-99	**611**	266.1	370	309	ND	145.5	ND	103.2	ND	69.6	ND	42.3	ND	153.6	ND	88.8
FY-B-7 (4+)	14-Jul-99	**1,240**	321	2,070	570	ND	157.5	ND	105	ND	75.6	ND	45	ND	166.2	ND	95.7
FY-SED-1[1,5]	07-May-99	**61,560**	1884	20,990	2532	5,060	1014	4,270	768	ND	954	**8890**	825	**2,430**	369	ND	156.9
FY-SED-2 (0-6")	13-Jul-99	**874**	298.5	660	396	234	189.6	ND	141.9	ND	101.7	124	74.1	ND	172.8	ND	101.1
FY-SED-2 (1'-2')[3]	14-Jul-99	**525**	266.1	ND	297.3	ND	135	ND	137.4	ND	90.9	ND	54.3	ND	168.3	ND	96.3
FY-SED-3 (0-6")[3]	*13-Jul-99*	***7,900***	*621*	*8,960*	*1236*	*610*	*327*	*515*	*236.4*	ND	*175.2*	*430*	*137.4*	*460*	*213.6*	*ND*	*115.8*
FY-SED-4 (0-6")[3]	13-Jul-99	**769**	274.2	790	411	ND	159.9	174	155.1	ND	93.3	ND	60.3	ND	171.3	ND	100.2
FY-SED-5 (0-6")[3]	13-Jul-99	**1,400**	336	3,620	771	226	215.1	288	183.6	ND	102.9	113	75.6	ND	180.3	ND	102
TRAILER (SED)	14-Jul-99	**1,020**	336	2,840	771	1,080	375	7,610	723	ND	243	849	191.7	267	170.4	ND	94.2
EPA PRG-Ind		450		37,000		70,000		100,000		460[4]		1,000		930		9,400	
TTLC		2,500		2,000		2,500		5,000		500		1,000		100		500	

TABLE 4-1
Summary XRF Results for the July 1999 Initial Subsurface Investigation

TDD No: 09-9902-0017
PAN: 0397-FPRS-XX
Francis Plating
Oakland, CA

SAMPLE NAME	DATE COLLECTED	XRF ANALYTICAL RESULT (mg/Kg)															
		Cr	DL	Ni	DL	Cu	DL	Zn	DL	As	DL	Pb	DL	Cd	DL	Ag	DL
PLATING BUILDING																	
PB-SS-1 (0-6")	13-Jul-99	**620**	303	1,390	564	353	237	1,670	357	ND	171.3	412	130.5	ND	179.1	ND	105.6
PB-B-1 (0-4")[1]	15-Jul-99	ND	277.8	ND	312	ND	141.6	249	175.5	ND	96.3	87	69.6	**1,206**	212.4	ND	105
PB-B-9 (4'-8')[1,4]	15-Jul-99	ND	292.8	ND	330	ND	149.1	172	156.9	ND	96.3	69	65.7	**1,213**	200.4	ND	94.68
PB-B-1 (4"-2')	15-Jul-99	290	269.1	ND	282.9	186	171.9	ND	127.5	ND	70.8	ND	46.8	ND	156	ND	92.4
PB-B-1 (2'-4')	15-Jul-99	ND	256.8	ND	282.9	ND	128.4	ND	116.7	ND	75	ND	45.3	ND	160.5	ND	95.1
PB-B-3 (0-4")	15-Jul-99	412	272.4	ND	243.9	195	171.3	152	149.4	ND	100.8	90	67.5	ND	158.7	ND	92.4
PB-B-3 (4"-2')	15-Jul-99	ND	256.2	ND	240.3	ND	143.1	ND	147.3	ND	155.7	383	114.6	ND	162.6	ND	94.2
PB-B-3 (2'-4')	15-Jul-99	297	261.3	ND	228.3	ND	143.1	ND	136.8	ND	126	183	89.1	ND	163.5	ND	95.1
PB-B-4 (0-4")	15-Jul-99	ND	279.6	ND	242.4	ND	158.7	163	154.2	ND	138.3	257	98.1	ND	160.5	ND	93.3
PB-B-4 (4"-2')	15-Jul-99	ND	249.3	ND	232.8	ND	154.5	ND	111	ND	69	ND	42.9	ND	149.7	ND	90
PB-B-4 (2'-4')	15-Jul-99	ND	254.1	ND	234.3	ND	136.8	ND	122.4	ND	71.1	ND	31.8	ND	153	ND	89.7
PB-B-6 (0-4")	13-Jul-99	ND	221.7	ND	169.5	ND	113.1	ND	108.6	ND	73.8	ND	36.9	ND	158.7	ND	90.6
PB-B-6 (0-4")	13-Jul-99	ND	229.2	ND	234.5	ND	109.5	ND	106.8	ND	84	ND	48.6	ND	167.1	ND	98.1
PB-B-6 (4"-2')	15-Jul-99	407	267	ND	252	ND	143.1	233	164.4	ND	194.7	696	150.9	ND	156.6	ND	88.8
PB-B-7 (0-4")	13-Jul-99	ND	249	ND	199.5	ND	137.4	ND	132.3	ND	104.7	164	84.9	ND	168.9	ND	96.6
PB-B-7 (4"-2')	15-Jul-99	ND	235.8	ND	237.6	ND	128.7	ND	143.4	ND	122.7	191	85.8	ND	154.8	ND	87.6
PB-B-7 (2'-4')	16-Jul-99	356	235.8	ND	203.4	ND	121.8	ND	139.5	ND	133.5	290	99.9	ND	156	ND	90.9
PB-B-8 (0-4")	13-Jul-99	**1,230**	327	2,810	684	ND	167.7	225	168.6	ND	210.9	843	167.7	ND	162	ND	94.8
PB-B-8 (4"-2')	15-Jul-99	**475**	265.8	480	345	ND	141.6	184	153.9	ND	133.5	271	99.6	ND	159	ND	91.5
PB-B-8 (2'-4')	16-Jul-99	310	260.7	ND	266.7	ND	105.3	ND	98.7	ND	76.5	ND	42.9	ND	161.1	ND	88.5
B-T-9	15-Jul-99	**2,170**	378	33,940	2484	760	474	1,140	351	ND	145.2	242	114.6	375	190.8	294	120
B-T-12	15-Jul-99	363	189.3	1,050	429	ND	114.6	ND	123.3	ND	70.2	40	48.3	ND	101.7	ND	54
GRATE (CAKE)	14-Jul-99	**2,930**	429	**94,000**	4710	1,520	810	4,900	807	ND	232.2	356	168	**4,020**	393	216	156.3
BLR	16-Jul-99	**1,630**	372	8,870	1419	1,080	459	16,820	1275	ND	225.3	454	168	674	237.9	ND	119.7
EPA PRG-Ind		450		37,000		70,000		100,000		480[3]		1,000		930		9,400	
TTLC		2,500		2,000		2,500		5,000		500		1,000		100		500	

TABLE 4-1
Summary XRF Results for the July 1999 Initial Subsurface Investigation

TDD No: 09-9902-0017
PAN: 0397-FPRS-XX
Francis Plating
Oakland, CA

Notes:

[0]Non-cancer endpoint.

[1]Definitive laboratory anaytical results are listed in Table 2.

[2]Refusal encountered at a depth of 4 inches (below concrete); no samples collected from 4"-2' and 2'-4'.

[3]Concrete encountered at a depth of approximately 6 inches; no samples collected from 1'-2'.

[4]Fictitious name for duplicate of sample PB-B-1 (0-4").

[5]Sample collected from Frog Pond Sump by the ERRS Contractor before cleanup of the sump.

Underlined, non-bold values are less than the PRG and greater than the TTLC.

Underlined, bold values are greater than the PRG and the TTLC.

Bold values are greater than the PRG and less than the TTLC.

Where:

J = Estimated
ND = Not Detected
PRG-Ind = U.S. EPA Industrial Preliminary Remediation Goal
TTLC = Total Threshold Limit Concentration
As = Arsenic
Cd = Cadmium
Cr = Chromium
Cu = Copper
Pb = Lead
Ni = Nickel
Ag = Silver
Zn = Zinc
DL = Detection Limit

Table 4-2

Analytical Results for the July 1999 Subsurface Investigation

PAN#: 0397-FPRS-XX
TDD#:09-99020017
Francis Plating
Oakland, CA

Sample ID	Arsenic	Cadmium	Copper	Cyanide, amenable	Cyanide, Total	Lead	Nickel	Silver	Zinc	Chromium	Chromium, Hexavalent
	milligrams per kilogram										
RY-B-4 (0-4")	4.8	130	230	NA	4.4	700	2000	1.4	660		0.32 J
FY-SED-3 (0-6")	3	180	280	NA	11	220	2400	0.82	340		ND UJ
RY-SS-1(0-6")	4.9	3	72 J	NA	ND	680 J	100	0.92	250 J	730	ND UJ
RY-SS-1(1-2")	1.9	0.32	6.4 J	NA	ND	4.7 J	17	ND	20 J	31	NA
PB-B-1(0-4")	3.6	570	5.5 J	NA	440	68 J	130	ND	81J	44	NA
PB-B-9(4-8") *	3.7	620	4.8 J	NA	380	95 J	130	ND	93 J	44	NA
RY-SS-2(0-6")	**6.2**	**15**	**93 J**	**NA**	**7.7 J**	**220 J**	**250**	**1.8**	200 J	390	NA
RY-SS-2(1-2")	2.4	0.41	9.6J	NA	ND	41 J	18	ND	45 J	29	NA
RY-B-1(0-4")	4.7	13	220J	NA	1.5J	1600 J	7200	1	630 J	410	NA
FY-SS-2(0-6")	**3.2**	**9.4**	**52**	**NA**	**ND UJ**	**58**	**140**	**ND**	110	72	NA
Frog Pond Sump	26	2100	4000J	NA	58 J	26000	15000	2.8	4800 J	84000	NA
EPA PRG-Ind	480	930	70,000	250	2100*	1,000	37,000	9,400	100,000	450	64

Key:
EPA PRG-Ind U.S. EPA Industrial Preliminary Remediation Goal
ND Analyte not detected
J Estimate detected result
UJ Estimated non-detected result
NA Sample result not available for this analyte
* Free Cyanide
** Reactive Cyanide

TABLE 4-3
Comparison between XRF and Analytical Data for the Subsurface Investigaton

TDD No: 09-9902-0017
PAN: 0397-FPRS-XX
Francis Plating
Oakland, CA

Underlined, bold values are greater than the PRG and the TTLC.
Bold values are greater than the PRG and less than the TTLC.

S = Slope Of Best-Fit Line (Regression Analysis)

TABLE 4-3
Comparison between XRF and Analytical Data for the Subsurface Investigaton

TDD No: 09-9902-0017
PAN: 0397-FPRS-XX
Francis Plating
Oakland, CA

All results are in milligrams per kilogram

	As		Cd			Cr			Cr^{+6}	Cu			Pb			Ni			Ag		Zn			CN
SAMPLE NAME	LAB	XRF	LAB	XRF	RPD	LAB	XRF	RPD	LAB	LAB	XRF	RPD	LAB	XRF	RPD	LAB	XRF	RPD	LAB	XRF	LAB	XRF	RPD	LAB
RY-SS-1 (0-6")	4.9	ND	3.0	ND	---	730	920	23	ND	72	ND	---	680	350	64	100	380	117	0.92	ND	250J	320	---	ND
RY-SS-1 (0-6")[0]	4.9	ND	3.0	ND	---	730	1,770	83	ND	72	ND	---	680	591	14	100	470	130	0.92	ND	250J	222	---	ND
RY-SS-1 (1'-2')	1.9	ND	0.32	ND	---	31	273	159	---	6	ND	---	5	ND	---	17	ND	---	ND	ND	20J	ND	---	ND
RY-SS-2 (0-6")	6.2	ND	15	ND	---	390	920	81	---	93	252	92	220	ND	---	250	ND	---	1.8	ND	200J	231	---	7.7J
RY-SS-2 (0-6")[0]	6.2	ND	15	ND	---	390	382	2	---	93	ND	---	220	190	15	250	400	46	1.8	ND	200J	ND	---	7.7J
RY-SS-2 (1'-2')	2.4	ND	0.41	ND	---	29	ND	---	---	10	ND	---	41	ND	---	18	ND	---	ND	ND	45J	ND	---	ND
RY-B-1 (0-4")	4.7	ND	13	ND	---	410	1,100	91	---	220	340	43	1,600	1,393	14	7,200	13,310	60	1.0	ND	630J	534	---	ND
RY-B-4 (0-4")	4.8	ND	130	267	69	6,700	15,800	81	0.32J	230	578	86	700	1,070	42	2,000	4,630	79	1.4	ND	660	785	17	4.4
FY-SS-2 (0-6")	3.2	ND	9.4	ND	---	72	391	138	---	52	ND	---	58	68	16	140	ND	---	ND	ND	110	ND	---	ND
FY-SS-5 (0-6")	3.7	ND	49	ND	---	160	571	112	---	50	ND	---	92	96	4	650	1,500	79	0.90	ND	520	491	6	---
FY-SED-1[1]	26	ND	2,100	2,430	15	8,400	61,550	152	---	4,000	5,060	23	26,000	8,890	98	15,000	20,990	33	2.8	ND	4,800	4,270	12	58J
FY-SED-3 (0-6")	3.0	ND	180	460	88	1,700	7,900	129	ND	280	610	74	220	430	65	2,400	8,960	115	0.82	ND	340	515	41	11
PB-B-1 (0-4")	3.6	ND	570	1,206	72	44	ND	---	---	6	ND	---	68	87	25	130	ND	---	ND	ND	81J	249	---	440
PB-B-9 (4'-8')	3.7	ND	620	1,213	65	44	ND	---	---	5	ND	---	95	69	32	130	ND	---	ND	ND	93J	172	---	380
Action Levels																								
EPA PRG-Ind	480[2]	480[2]	930	930		450	450		64	70,000	70,000		1,000	1,000		37,000	37,000		9,400	9,400	100,000	100,000		2,100[3]
TTLC	500	500	100	100		2,500	2,500		500	2,500	2,500		1,000	1,000		2,000	2,000		500	500	5,000	5,000		250[4]
no. pairs +/- PRG		0		2			2				0			1			0			0		0		
Regression Stats																								
R				0.969			0.889				0.998			0.993			0.964					0.998		
S				0.91			0.14				0.82			0.97			0.69					1.15		

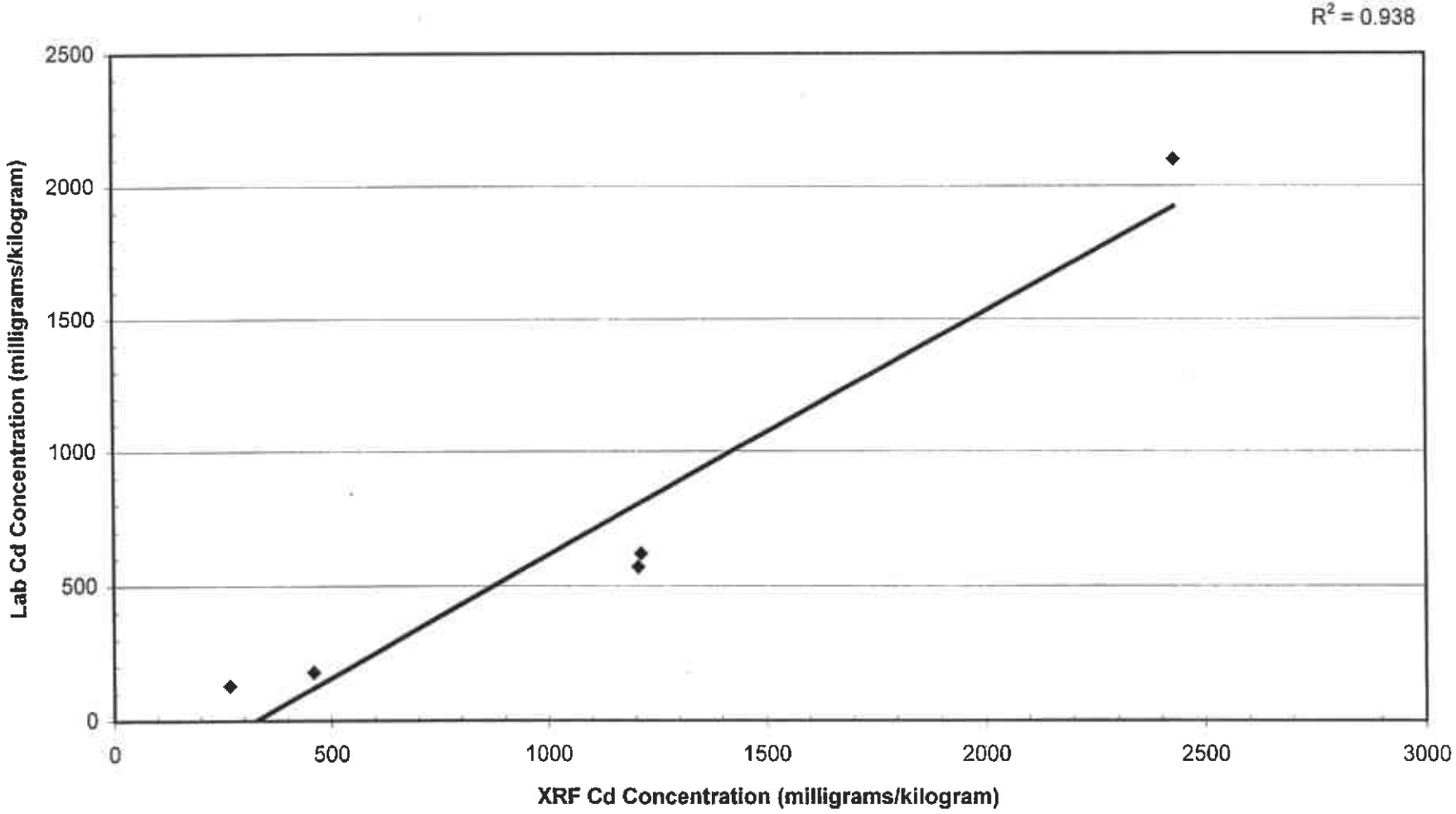
where:

J = Estimated
ND = Not Detected
PRG-Ind = U.S. EPA Industrial Preliminary Remediation Goal
TTLC = Total Threshold Limit Concentration
[0]XRF Replicate
[1]Sample collected by CET from Frog Pond Sump before cleanup of sump.
[2]Non-Cancer Endpoint
[3]Free Cyanide
[4]Reactive Cyanide
[5]Number of data pairs where one value is greater than the PRG and the other is less than the PRG (see also p. 3).
Underlined, non-bold values are less than the PRG and greater than the TTLC.

RPD = Relative Percent Difference
As = Arsenic
Cd = Cadmium
Cr = Chromium/Cr^{+6} = Hexavalent Chromium
Cu = Copper
Pb = Lead
Ni = Nickel
Ag = Silver
Zn = Zinc
CN = Cyanide
R = Correlation Coefficient (Regression Analysis)

Figure 4-2

Relationship between XRF and laboratory data for cadmium (Cd) for the Subsurface Investigation.



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Francis Plating
Oakland, CA

Figure 4-3

Relationship between XRF and laboratory data for total chromium (Cr) for the Subsurface Investigation.

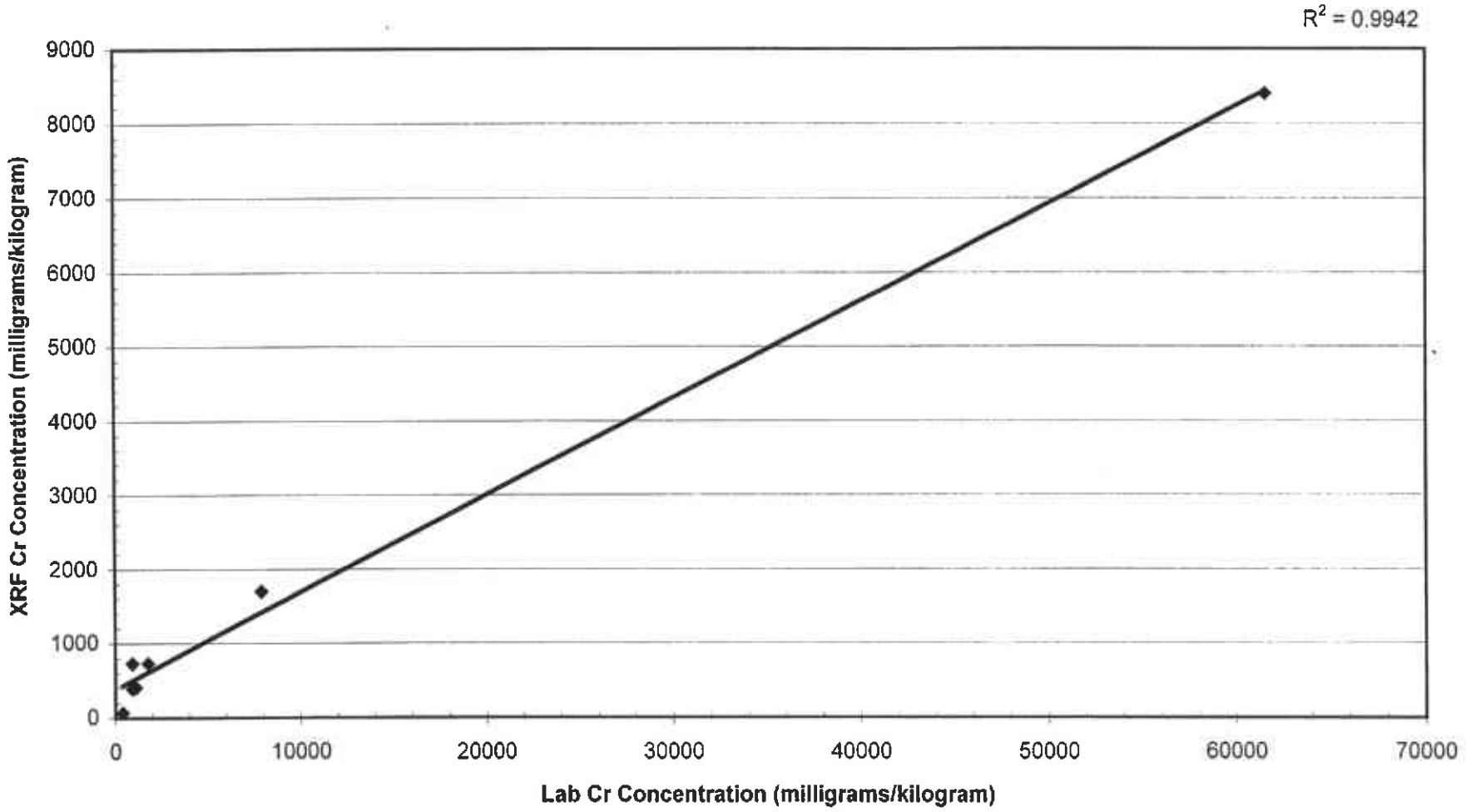

Figure 4-4

Relationship between XRF and laboratory data for copper (Cu) for the Subsurface Investigation.

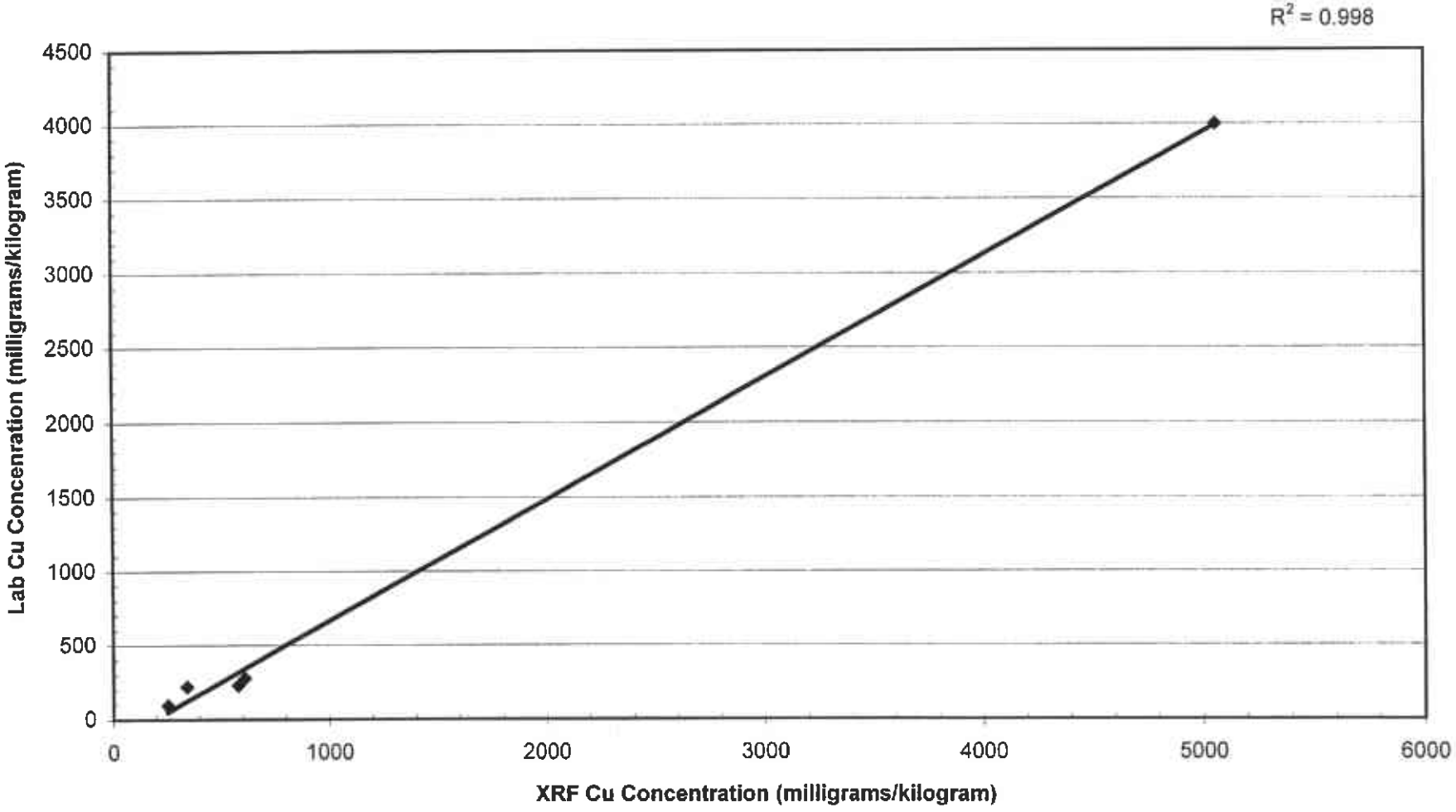

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Figure 4-5

Relationship between XRF and laboratory data for zinc (Zn) for the Subsurface Investigation.

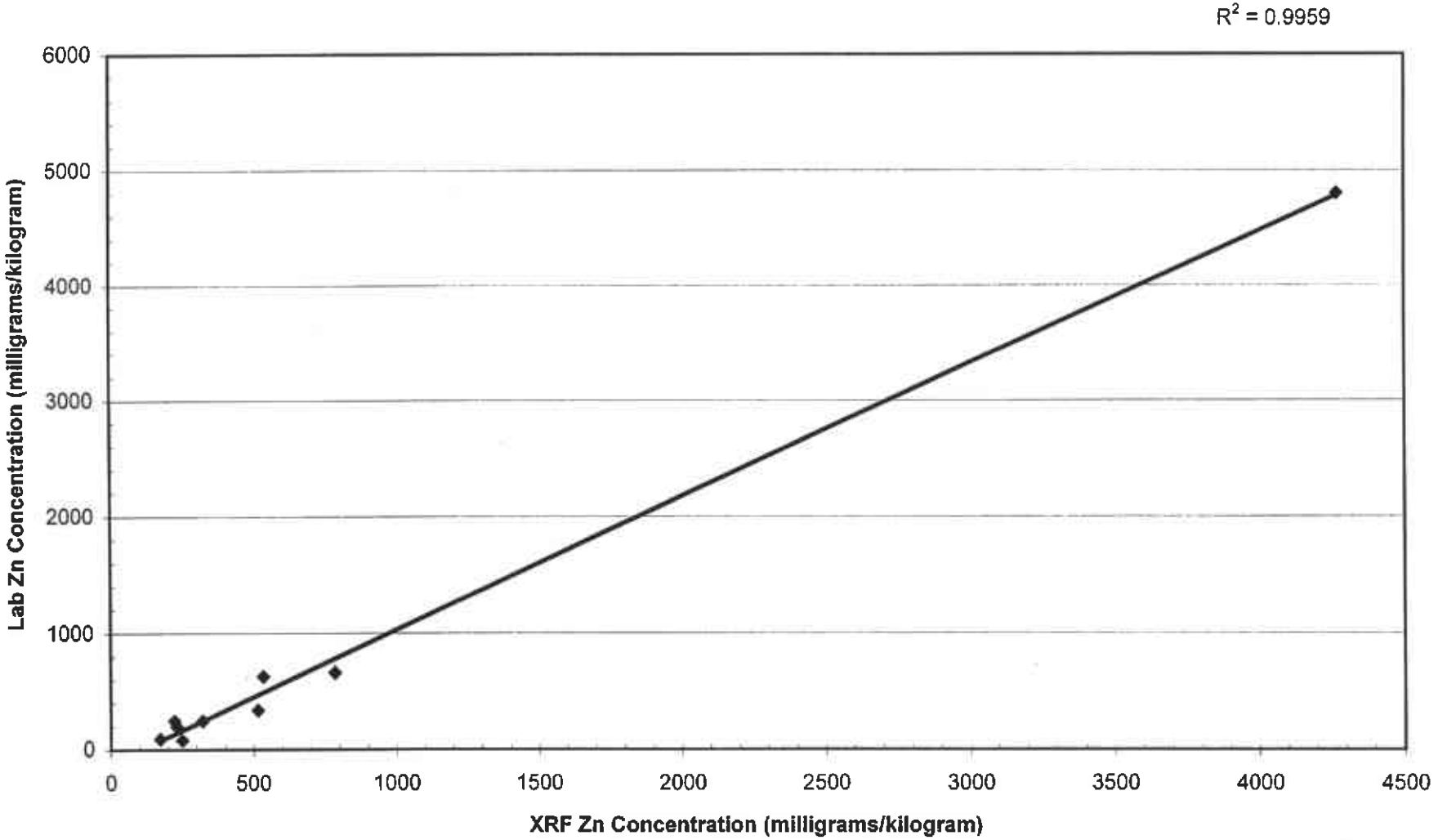

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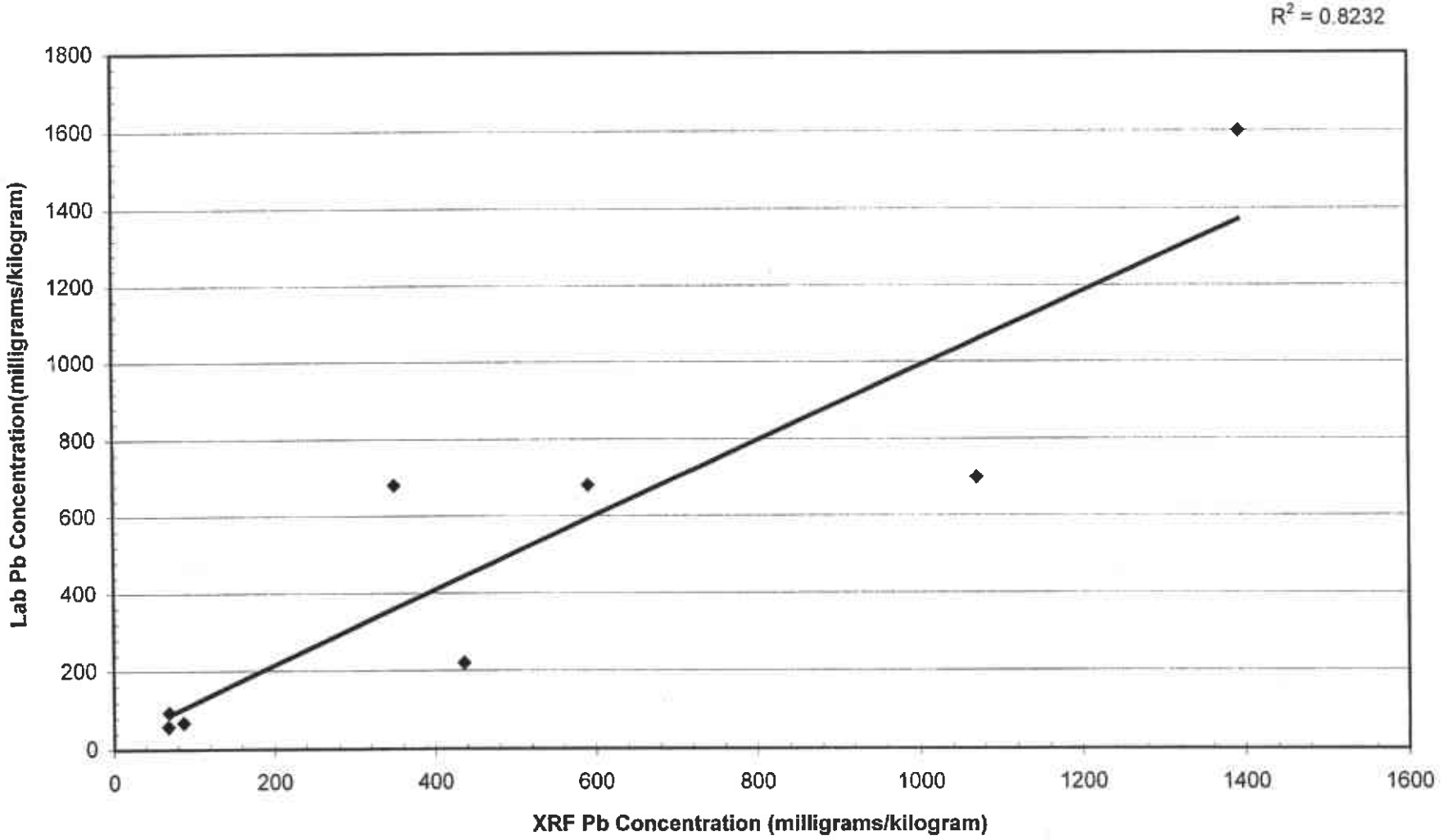
Figure 4-6

Relationship between XRF and laboratory data for lead (Pb) for the Subsurface Investigation.



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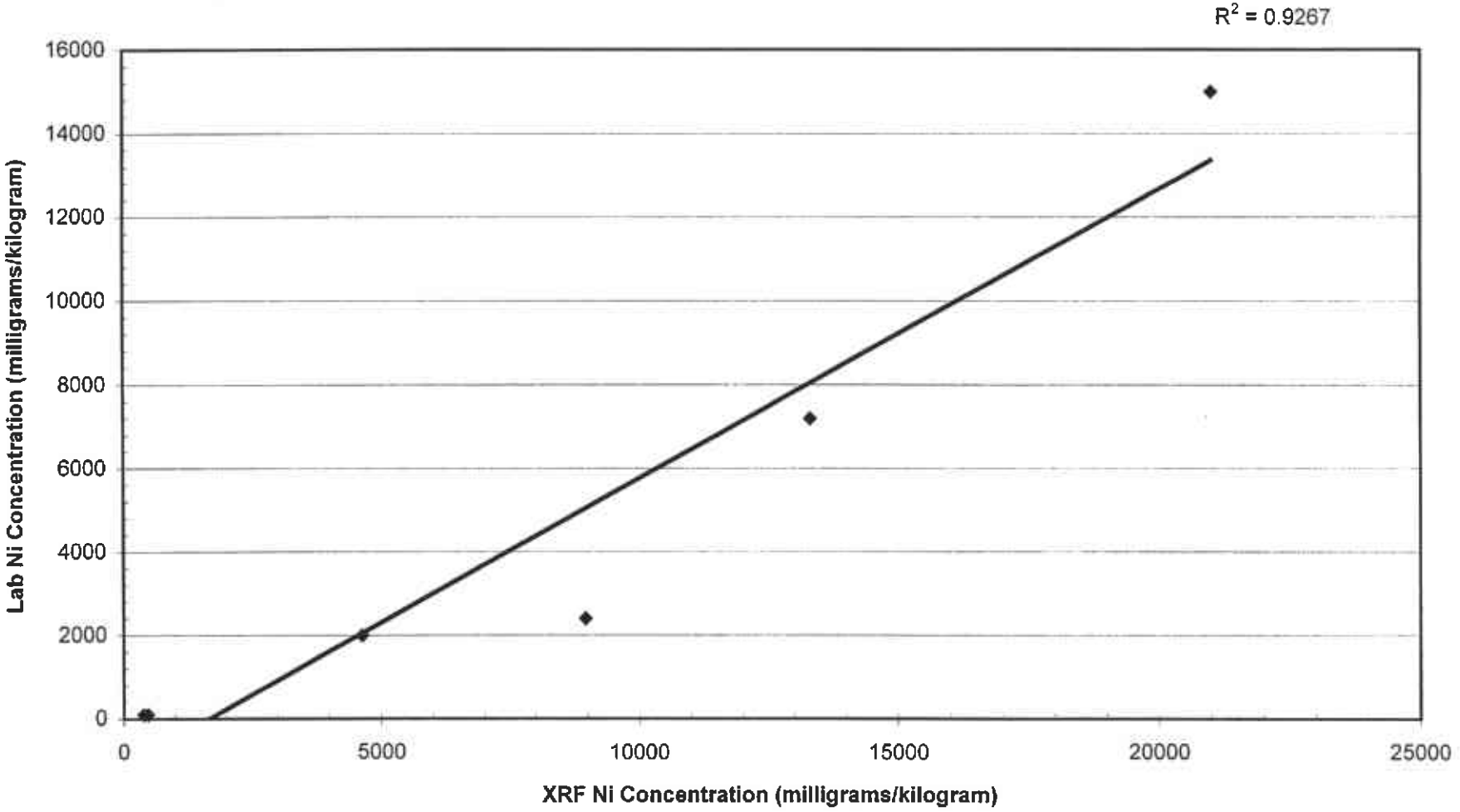
Francis Plating
Oakland, CA

Figure 4-7

Relationship between XRF and laboratory data for nickel (Ni) for the Subsurface Investigation.



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Tables and Figures for the Subsurface Removal Effort

Table 5-1

TDD No: 09-9902-0017
PAN: 0397-FPRS-XX
Francis Plating
Oakland, CA

Summary XRF Results for the October 1999 Subsurface Removal Effort

SAMPLE NAME	DATE COLLECTED	XRF Analytical Results in milligrams/kilogram															
		Cr	DL	Ni	DL	Cu	DL	Zn	DL	As	DL	Pb	DL	Cd	DL	Ag	DL
FY-SS-9R	06-Oct-99	430	306	1,100	504	ND	167.4	558	225.9	ND	139.2	196	99.3	ND	169.8	ND	98.4
FY-SS-8R	06-Oct-99	ND	230.1	330	315	21	125.4	163	141	ND	975	56	59.7	ND	144.9	ND	88.8
FY-SS-1AR	07-Oct-99	156	27.3	303	224.1	149	120.6	518	147.9	75	23.04*	88	49.2	ND	165.9	ND	93.75
FY-SS-1R	07-Oct-99	ND	248.4	ND	160.5	ND	93	ND	92.7	ND	56.4	ND	36	ND	142.2	ND	80.7
FY-SS-9R-1"	07-Oct-99	ND	255	ND	174.3	109	106.2	ND	87.9	ND	84	193	63	ND	142.2	ND	80.7
FY-SS-6R	07-Oct-99	304	270	658	264.9	ND	103.2	ND	92.1	ND	71.1	83	45.9	ND	141	ND	80.4
FY-SS-5R	07-Oct-99	ND	236	ND	173.1	ND	99.3	124	93.3	ND	61.5	59	42.3	ND	125.4	ND	73.5
FY-SS-5R-D	07-Oct-99	ND	236.7	341	213	ND	103.5	132	94.8	ND	63.9	54	40.5	ND	126.3	ND	74.1
FY-SS-4R	07-Oct-99	ND	261.9	ND	251.4	ND	140.1	ND	132.3	ND	103.5	99	71.4	ND	144	ND	82.2
FY-SS-4R-D	07-Oct-99	ND	250.5	ND	259.8	ND	125.7	260	161.4	ND	93.9	77	63.6	ND	144.3	ND	81
RY-SS-1R	11-Oct-99	ND	267	ND	300	ND	138.9	191	150.3	ND	114.6	171	86.4	ND	158.4	ND	89.7
RY-SS-2R	11-Oct-99	278	253.5	ND	254.4	ND	122.4	243	153.9	ND	108	173	82.2	ND	135.3	ND	78.9
RY-SS-3R	11-Oct-99	1,430	342	307	297.9	236	186	229	156.3	NA	NA	313	107.4	NA	NA	NA	NA
RY-SS-3R rerun	11-Oct-99	439	273.6	410	318	ND	137.1	223	152.7	ND	129	285	102.6	ND	139.2	ND	81.6
RY-SS-3A	11-Oct-99	623	270	ND	303	ND	141	197	144.9	ND	118.5	185	90	ND	139.5	ND	82.5
RY-SS-3D	11-Oct-99	610	270	410	351	ND	161.4	267	159.3	ND	125.7	175	87.6	ND	151.8	ND	88.2
RY-SS-3E	11-Oct-99	553	258	460	369	ND	144	308	166.8	ND	134.4	249	102	ND	141.9	ND	81.3
RY-SS-3C	11-Oct-99	539	255	ND	264.3	71	16.8	180	141.9	ND	105	83	71.1	ND	150	ND	90
RY-SS-3B	11-Oct-99	728	280.8	ND	291.9	228	182.1	236	152.7	ND	132	228	95.1	ND	139.5	ND	81.6
RY-SS-3D	11-Oct-99	306	258	390	312	ND	150.9	ND	285	ND	81	ND	52.2	ND	132	ND	75
RY-SS-3A	11-Oct-99	300	240	ND	235.8	ND	108.3	ND	122.7	ND	83.4	ND	49.8	ND	123.3	ND	70.5
RY-SS-3B	11-Oct-99	412	273.6	ND	213	ND	135.9	ND	132.6	ND	88.8	ND	47.1	ND	141.3	ND	80.1
EPA PRG-Ind		450		37,000		70,000		100,000		460[a]		1,000		930		9,400	
TTLC		2,500		2,000		2,500		5,000		500		1,000		100		500	

Key:

Pb = Lead
Ni = Nickel
Ag = Silver
Zn = Zinc
DL = Detection Limit
NA = Due to electrical problems a result for this analyte was not recorded

Table 5-2

Analytical Results for the October 1999 Subsurface Removal Effort

PAN#: 0397-FPRS-XX
TDD#:09-99020017
Francis Plating
Oakland, CA

Sample ID	Arsenic	Cadmium	Copper	Lead	Nickel	Silver	Zinc	Chromium Total
	milligrams per kilogram							
FY-SS-8R	4.1	4.4	26	88	210	ND	130	54
FY-SS-1R	1.4	1.3	9.7	25	37	ND	150	26
FY-SS-1AR	7.4	20	56	70	340	ND	390	92
FY-SS-9R (1')	3.5	2.1	22	220	73	ND	80	43
FY-SS-6R	2.6	4.5	50	68	370	ND	85	140
FY-SS-5R	4.1	6.2	19	43	130	ND	92	46
FY-SS-4R	2.5	3.1	21	89	41	ND	140	33
RY-SS-1R	2.8	7.4	110	250	300	ND	200	210
RY-SS-2R	1.8	0.7	24	150	70	ND	99	68
RY-SS-3R	2.3	7.5	120	260	350	ND	190	220
RY-SS-3A	1.2	12	100	22	53	ND	58	13
RY-SS-3B	2.7	7.4	140	450	370	ND	280	300
PRG-Ind	480	930	70,000	1,000	37,000	9,400	100,000	450

ESL Res

Key:
ND Analyte not detected

Table 5-3

Comparison of Laboratory Laboratory and XRF Data for the Subsurface Removal Effort

	XRF and Labortory Results in milligrams/kilogram								
	Cr			Pb			Ni		
SAMPLE NAME	LAB	XRF	RPD	LAB	XRF	RPD	LAB	XRF	RPD
RY-SS-1R	210	ND	---	250	171	0.38	300	ND	---
RY-SS-2R	68	278	1.21	150	173	0.14	70	ND	---
RY-SS-3R	220	439	0.66	260	285	---	350	307	---
RY-SS-3A	100	623	1.45	22	185	---	53	ND	---
RY-SS-3B	300	728	0.83	450	228	0.65	370	ND	---
RY-SS-8R	54	ND	---	88	ND	---	210	330	---
RY-SS-1R	26	ND	---	25	ND	---	37	ND	---
RY-SS-1A	92	156	0.52	70	88	0.23	340	303	0.12
RY-SS-9R	43	430	1.64	220	196	0.12	73	1,100	---
RY-SS-6R	140	304	0.74	68	83	0.20	370	658	0.56
RY-SS-5R	46	ND	---	43	59	0.31	130	ND	---
RY-SS-4R	33	ND	---	89	99	0.11	41	ND	---
Action Levels									
EPA PRG-Ind	450	450		1,000	1,000		37,000	37,000	
TTLC	2,500	2,500		1,000	1,000		2,000	2,000	
no. pairs +/- PRG		1			0			0	
Regression Statistics									
Correlation Coefficient		0.345			0.500			0.478	

key:

J = Estimated Detected Result

ND = Not Detected

PRG-Ind = U.S. EPA Industrial Preliminary Remediation Goal

TTLC = Total Threshold Limit Concentration

Bold values are greater than the PRG and less than the TTLC.

TDD No: 09-9902-0017
PAN: 0397-FPRS-XX
Francis Plating
Oakland, CA

Figure 5-2

Relationship between XRF and laboratory data for chromium (Cr) for the Subsurface Removal Effort.

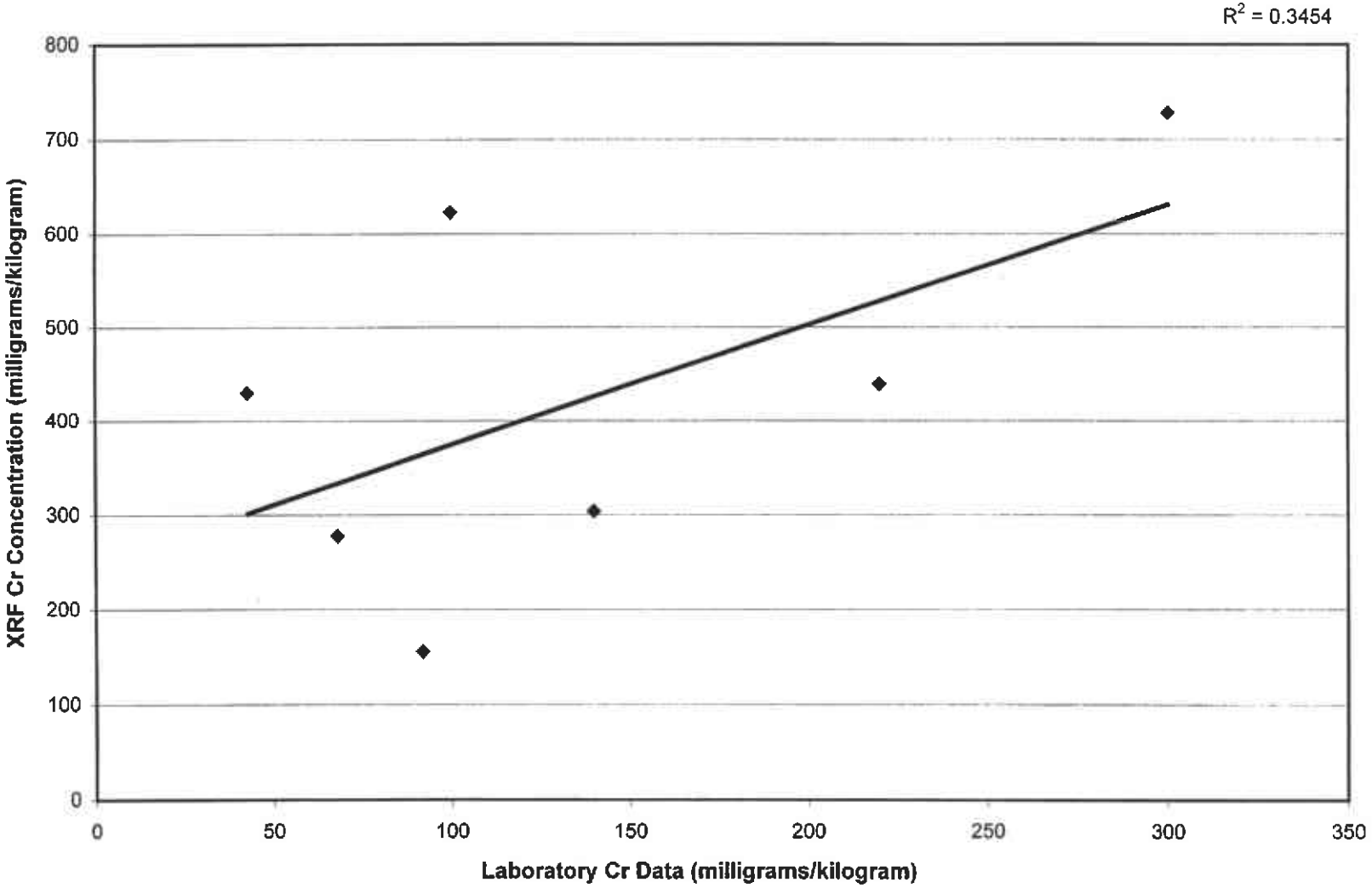


Figure 5-3

Relationship between XRF and laboratory data for nickel (Ni) for the Subsurface Removal Effort

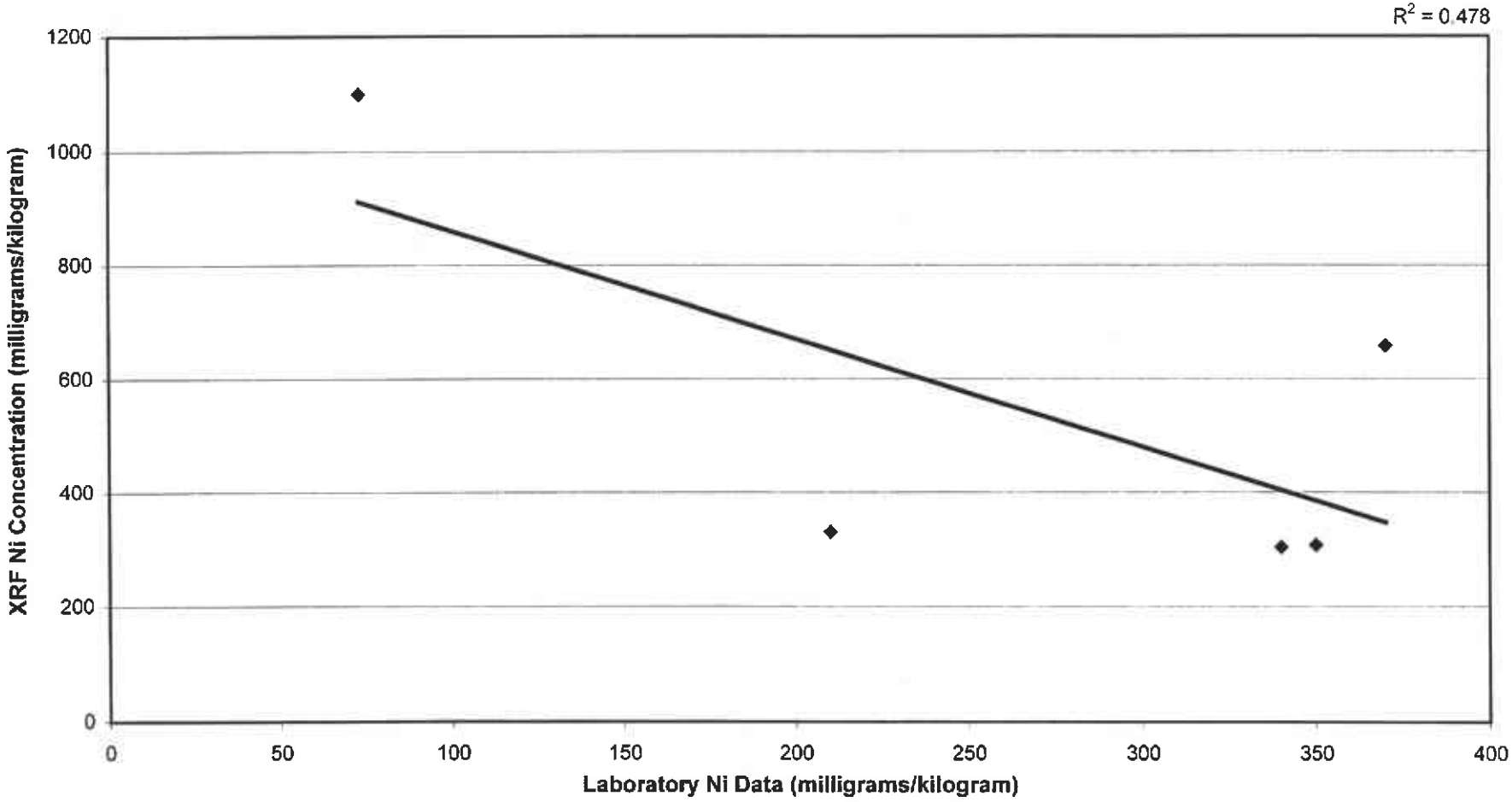
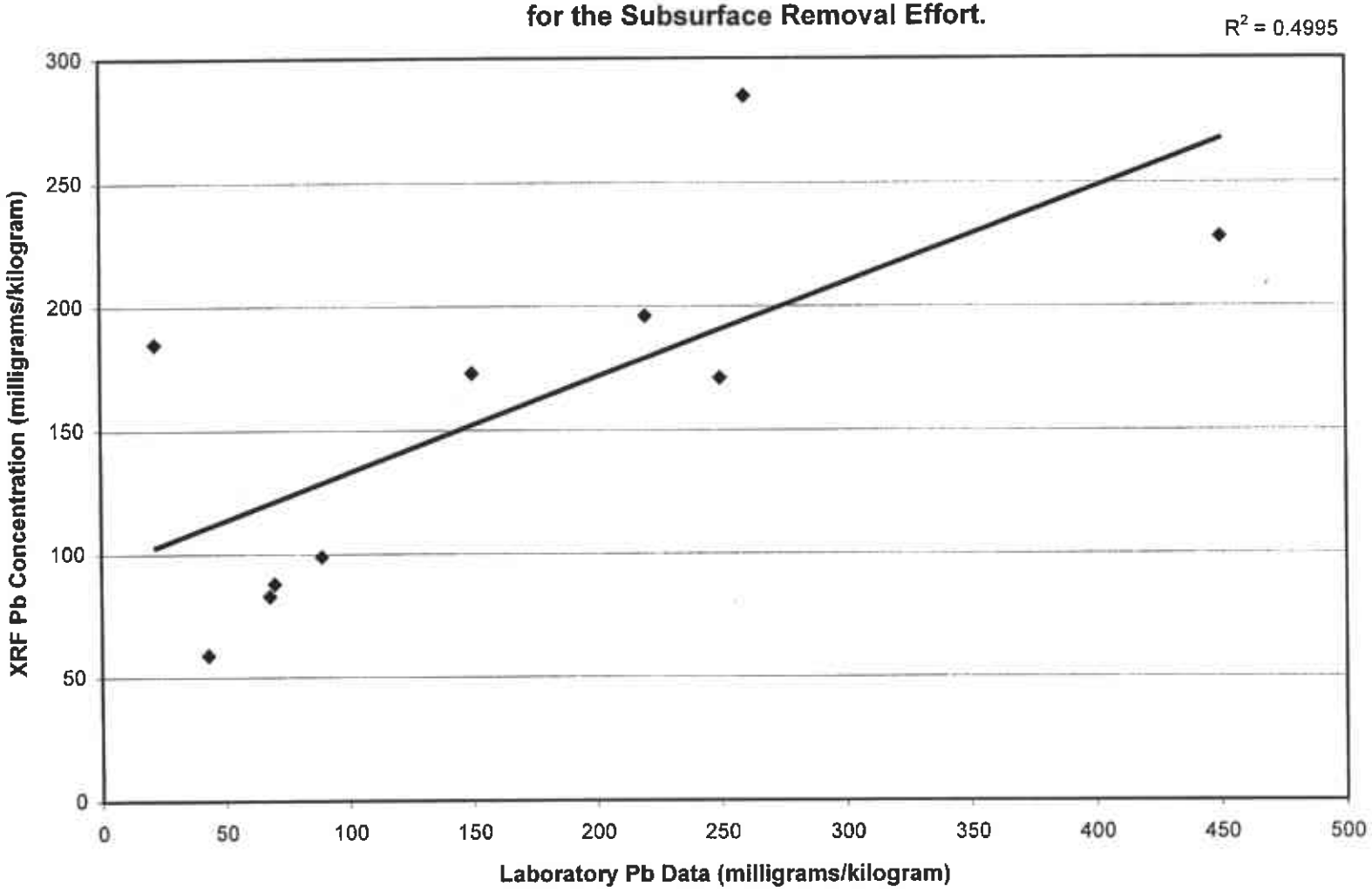


Figure 5-4

Relationship between XRF and laboratory data for lead (Pb) for the Subsurface Removal Effort.



D

Site Photographs

Ecology & Environment
Superfund Technical Assesment and Respone Team

Francis Plating Site
PAN#:0397-FPRS-XX
TDD#:09-9902-0017

Photo Number:
1

Subject:
View of the Francis Plating site from the intersection of 7th Street and Brush Street..

Photographer:
START member Cheong Eng

Date:
12/15/98

Direction:
West

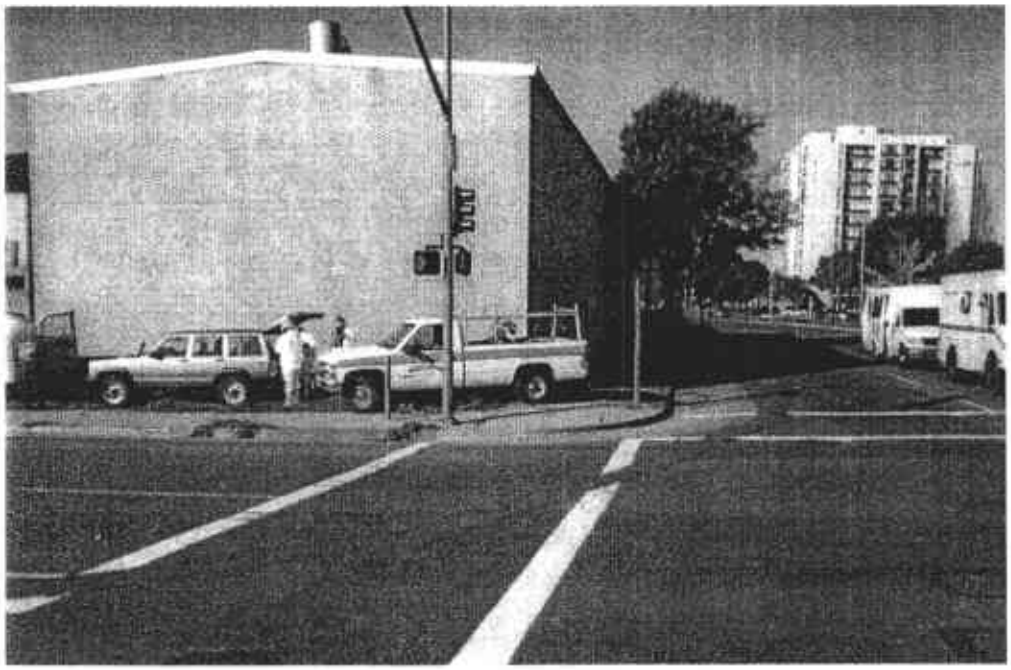


Photo Number:
2

Subject:
View of the Brush Street side of the Francis Plating site.

Photographer:
START member Tim Colen

Date:
12/15/998

Direction:
Southwest

Ecology & Environment
Superfund Technical Assesment
and Respone Team

Francis Plating Site
PAN#:0397-FPRS-XX
TDD#:09-9902-0017

Photo Number:
3

Subject:
START member and US Coast Guard member sampling assorted containers in the Rear Yard.

Photographer:
START member Cheong Eng

Date:
1/14/99

Direction:
West

Photo Number:
4

Subject:
Debris in the Form Yard before the initiation of the removal effort.

Photographer:
START member Tim Colen

Date:
1/5/99

Direction:
North

Ecology & Environment
Superfund Technical Assesment
and Respone Team

Francis Plating Site
PAN#:0397-FPRS-XX
TDD#:09-9902-0017

Photo Number:
5

Subject:
Fiber drums in danger of rupturing in the Rear Yard.

Photographer:
START member Cheong Eng

Date:
1/5/99

Direction:
Northeast

Photo Number:
6

Subject:
START member investigating the interior of the norther Sealand container.

Photographer:
START member Cheong Eng

Date:
1/18/99

Direction:
East

Ecology & Environment
Superfund Technical Assesment
and Respone Team

Francis Plating Site
PAN#:0397-FPRS-XX
TDD#:09-9902-0017

Photo Number:
7

Subject:
Stacked drums and debris in the Front Yard.

Photographer:
START member Cheong Eng

Date:
1/5/99

Direction:
Northwest

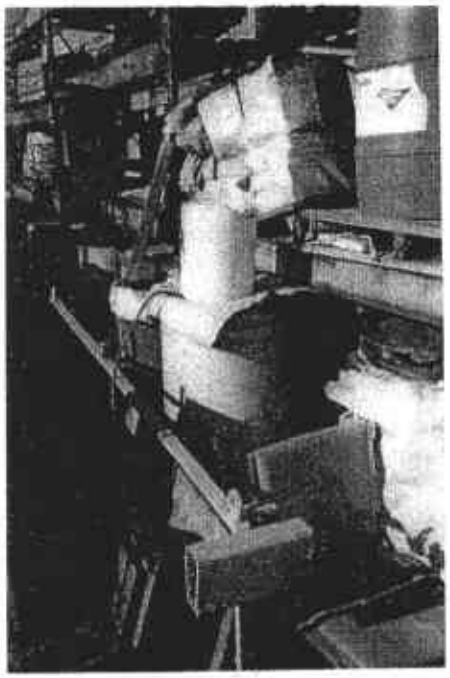


Photo Number:
8

Subject:
Concrete affected by leakage from overhead HCL tank (pH label on tank was incorrect).

Photographer:
START member Cheong Eng

Date:
1/18/99

Direction:
Northeast

Ecology & Environment
Superfund Technical Assesment
and Respone Team

Francis Plating Site
PAN#:0397-FPRS-XX
TDD#:09-9902-0017

Photo Number:
9

Subject:
Drums and debris in the
Front Yard.

Photographer:
START member Tim Colen

Date:
1/19/99

Direction:
South

Photo Number:
10

Subject:
Miscellaneous debris and drums
on the grating over the
Frog Pond in the Rear Yard.

Photographer:
START member Cheong Eng

Date:
1/19/99

Direction:
East

Ecology & Environment
Superfund Technical Assesment
and Respone Team

Francis Plating Site
PAN#:0397-FPRS-XX
TDD#:09-9902-0017

Photo Number:
11

Subject:
Office trailer and miscellaneous debris in the Front Yard.

Photographer:
START member John Walter

Date:
1/25/99

Direction:
Northwest

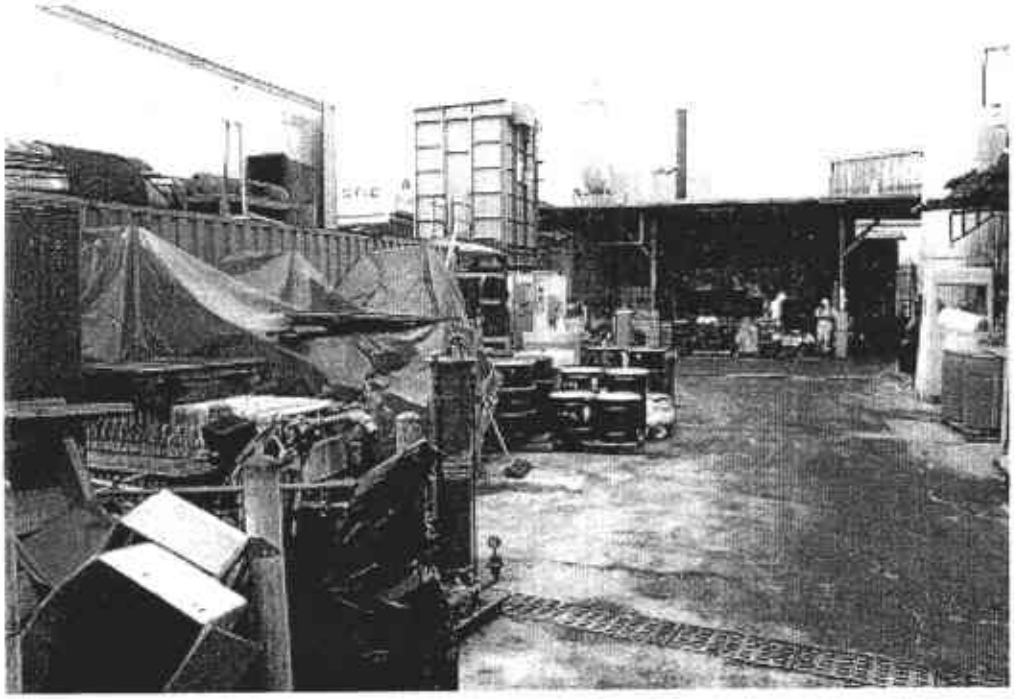
Photo Number:
12

Subject:
Full view of the Rear Yard after partial removal of drums and debris.

Photographer:
START member John Walter

Date:
1/25/99

Direction:
West



Ecology & Environment
Superfund Technical Assesment
and Respone Team

Francis Plating Site
PAN#:0397-FPRS-XX
TDD#:09-9902-0017

Photo Number:
25

Subject:
The START, US Coast Guard, and the ERRS contractor removing sludge from the Frog Pond.

Photographer:
START member Cheong Eng

Date:
2/12/99

Direction:
Southwest

Photo Number:
26

Subject:
START member determining the hazard category of onsite materials.

Photographer:
START member Cheong Eng

Date:
9/29/98

Direction:
East

Ecology & Environment
Superfund Technical Assesment
and Respone Team

Francis Plating Site
PAN#:0397-FPRS-XX
TDD#:09-9902-0017

Photo Number:
15

Subject:
Filter press used to collect metal precipitates from wastewater in the boiler unit

Photographer:
START member Cheong Eng

Date:
1/14/99

Direction:
Southeast

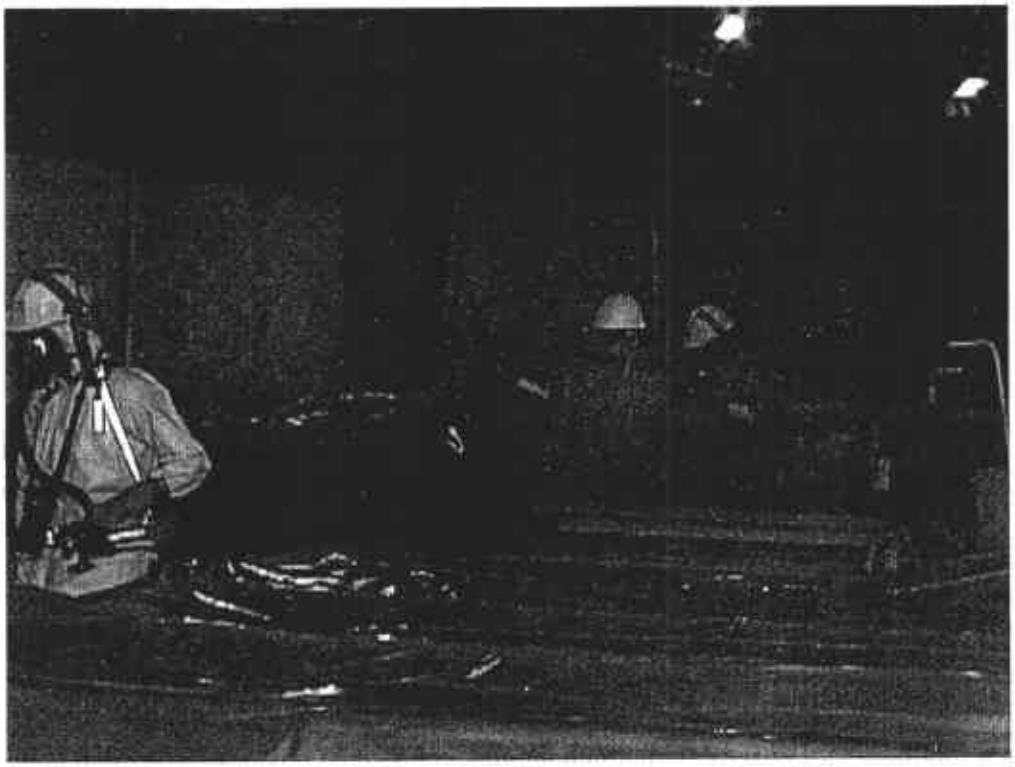
Photo Number:
16

Subject:
US Coast Guard and ERRS contractor in the Bault area.

Photographer:
US Coast Guard member

Date:
1/15/99

Direction:
Northeast



Ecology & Environment
Superfund Technical Assessment
and Respone Team

Francis Plating Site
PAN#:0397-FPRS-XX
TDD#:09-9902-0017

Photo Number:
17

Subject:
Precipitate material removed from the boiler unit.

Photographer:
START member Jeff White

Date:
1/14/99

Direction:
East

Photo Number:
18

Subject:
START member collecting enforcement sample B-T-36CN during the enforcement samping effort.

Photographer:
START member Cheong Eng

Date:
1/28/99

Direction:
East

Photo Number:
19

Subject:
ERRs contractor removing sludge from the Vault.

Photographer:
START member Cheong Eng

Date:
March 1999

Direction:
Northeast

Photo Number:
20

Subject:
ERRS contractor removing sludge from the Vault.

Photographer:
Unknown

Date:
March 1999

Direction:
East

Ecology & Environment
Superfund Technical Assessment
and Respone Team

Francis Plating Site
PAN#:0397-FPRS-XX
TDD#:09-9902-0017

Photo Number:
21

Subject:
ERRS contractor removing tanks from the Vault

Photographer:
START member Cheong Eng

Date:
April 1999

Direction:
Northeast

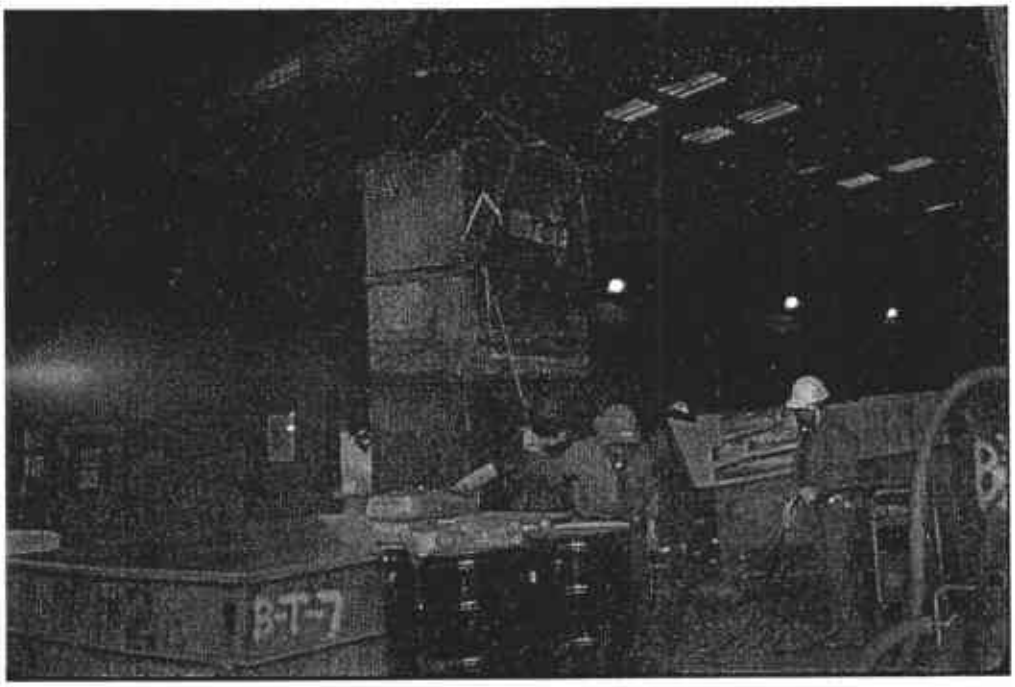


Photo Number:
22

Subject:
ERRS contractor removing tanks from the Vault.

Photographer:
START member Cheong Eng

Date:
April 1999

Direction:
West

Ecology & Environment
Superfund Technical Assesment
and Respone Team

Francis Plating Site
PAN#:0397-FPRS-XX
TDD#:09-9902-0017

Photo Number:
23

Subject:
US Coast Guard member monitoring the scrubber to ensure the health and safety of onsite workers and the surrounding community.

Photographer:
START member Cheong Eng

Date:
4/19/99

Direction:
North

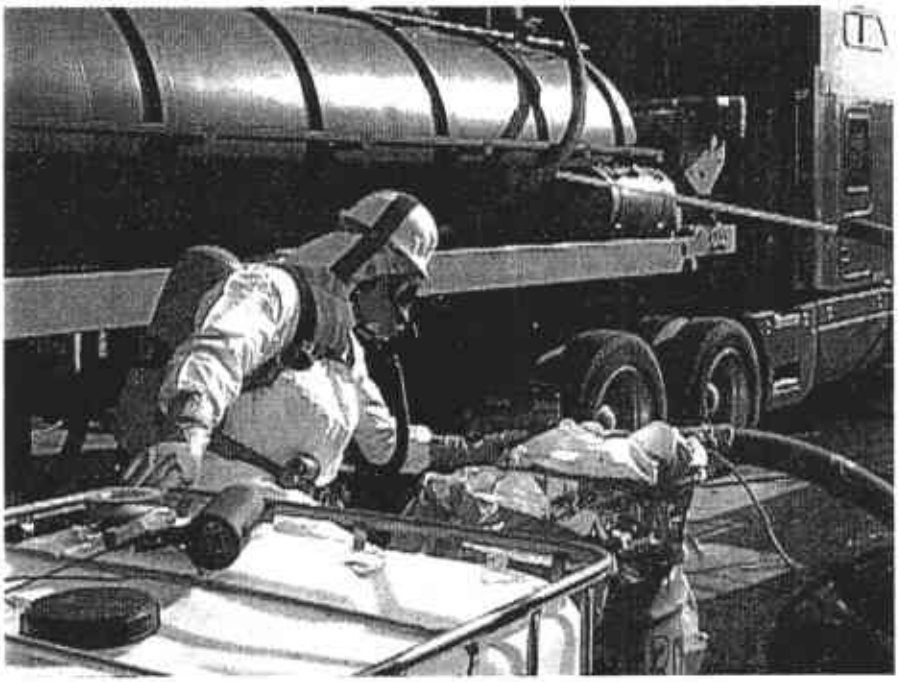


Photo Number:
24

Subject:
ERRS contractor cutting tank in preparation for disposal.

Photographer:
START member Cheong Eng

Date:
April 1999

Direction:
West

Photo Number:
13

Subject:
View of the Rear Yard from the top of the Baker Tank.

Photographer:
START member Cheong Eng

Date:
1/14/99
Direction:
North

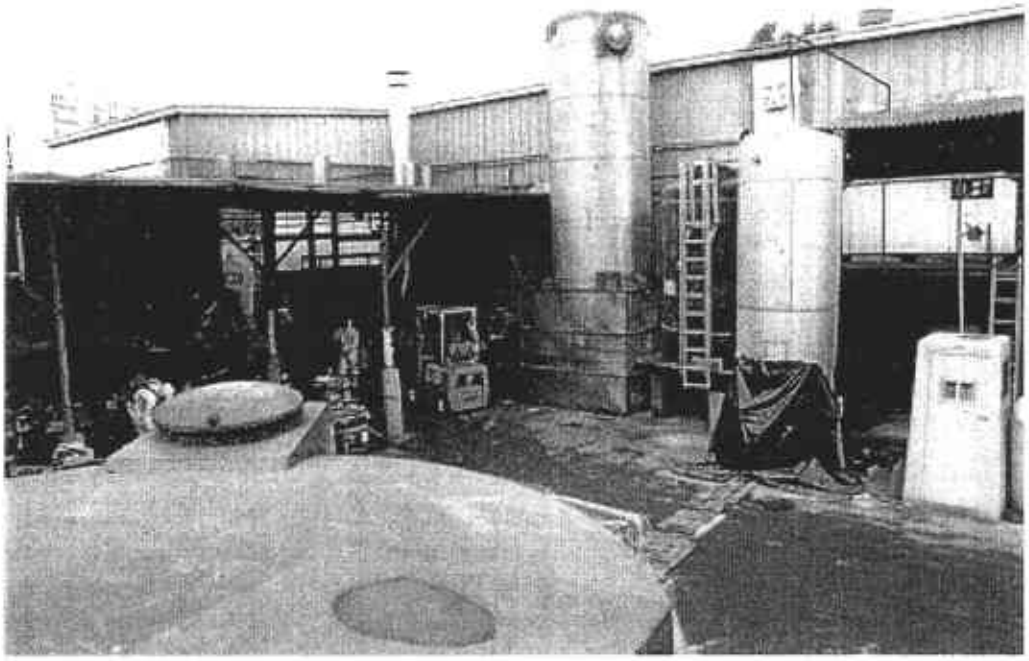


Photo Number:
14

Subject:
Assorted small containers segregated by hazard class.

Photographer:
START member Cheong Eng

Date:
1/14/99

Direction:
West