REVISED WORK PLAN FOR SOIL ASSESSMENT
THE LEARNER COMPANY
768 46TH AVENUE
OAKLAND, CALIFORNIA

June 15, 1989

A Work Plan Prepared for:

The Learner Company
2711 Navy Drive
Stockton, California 95206

REVISED WORK PLAN FOR SOIL ASSESSMENT
THE LEARNER COMPANY
768 46TH AVENUE
OAKLAND, CALIFORNIA

Kleinfelder Job No. 24-2141-10

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1 BACKGROUND

The Learner site is located at 768 46th Avenue in Oakland, California (Plate 1). The site was purchased by Learner Company in the 1960s and was operated as a scrap metal bailing yard until 1982.

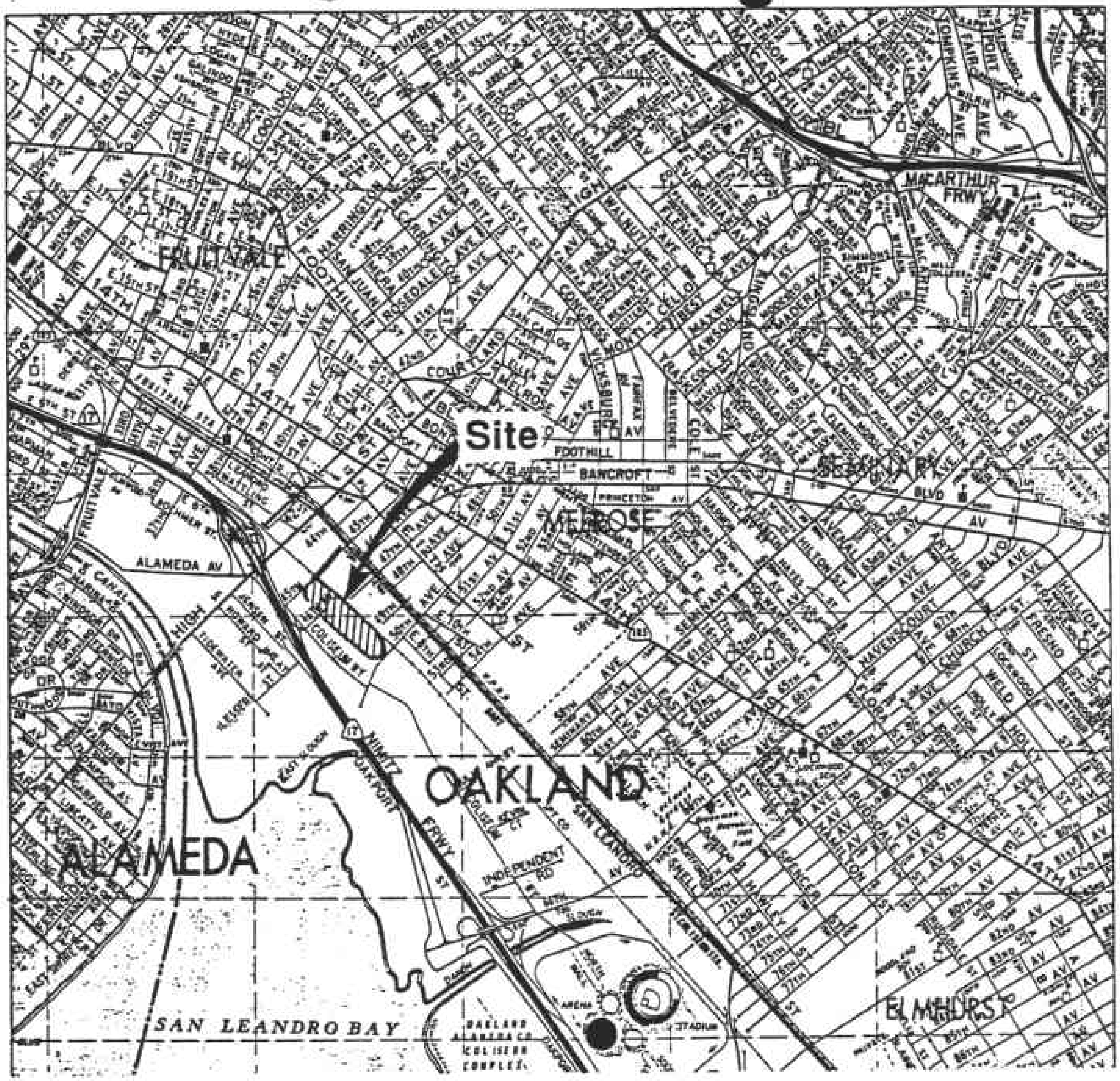
In 1988, Learner retained Dames & Moore to assess environmental concerns at the site. Dames & Moore, under guidance from the Alameda County Department of Health (ACDOH), investigated three areas of concern: the former bailer area, the narrow drive area, and the soil piles (Plate 2). Samples from these three areas were analyzed for total petroleum hydrocarbons (TPH) by EPA Method 418.1 and polychlorinated biphenyls (PCBs) by EPA Method 8080.

Dames & Moore reported that TPH concentrations in the bailer area were elevated in the shallow (depth = 2.5 feet) samples. Four of the 11 samples collected from a depth of 2.5 feet contained more than 1,000 mg/kg TPH. Only one of the four samples collected at a depth of 4.5 feet contained detectable concentrations of TPH (7.2 mg/kg, with a detection limit of 5.0 mg/kg). No PCBs were detected in the four samples analyzed by EPA Method 8080.

Along the narrow drive into the site, Dames & Moore collected and submitted three composite samples for analysis. Only one of the composite samples contained more than 1,000 mg/kg TPH. Low concentrations (.06 to .57 mg/kg) of PCBs were detected in two of the three composite samples.

In two composite soil samples collected from the soil piles, Dames & Moore reported TPH concentrations above 1,000 mg/kg and PCB concentrations of 25.2 and 19.9 mg/kg, respectively.

Based on the results presented in Dames & Moore's report,[1] the Learner Company contracted with Kleinfelder to further assess whether the onsite soils are hazardous under the criteria of Title 22 of the California Administrative Code (CAC) and to investigate disposal options for contaminated soil.



Reference: Thomas Bros. Maps

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SCALE

SITE LOCATION MAP
The Learner Company Property
768-46th Avenue
Oakland, California
Dames & Moore

KLEINFELDER	SITE LOCATION MAP LEARNER COMPANY OAKLAND, CALIFORNIA	PLATE 1
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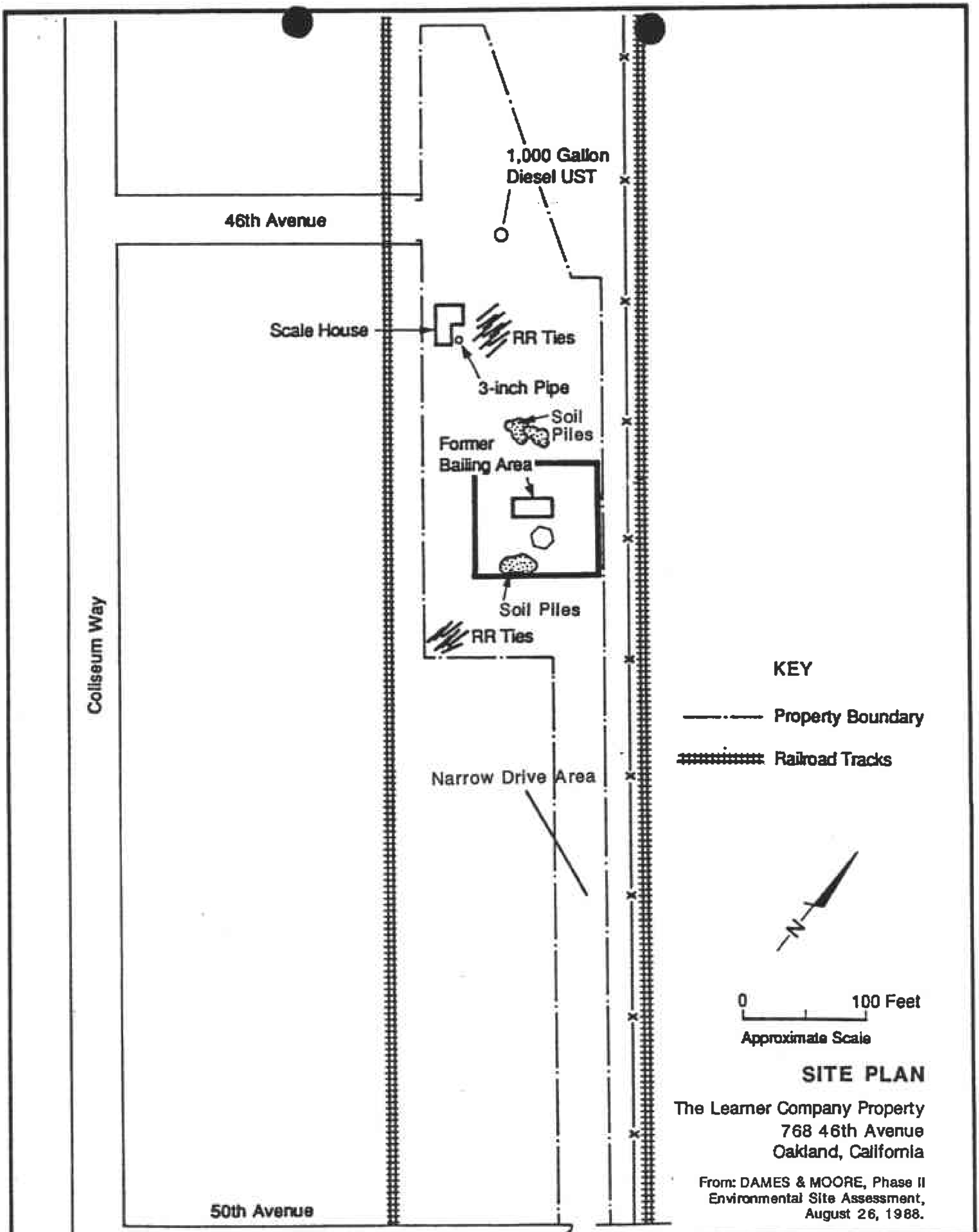

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SITE MAP

LEARNER COMPANY

OAKLAND, CALIFORNIA

PLATE 2

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2 SCOPE OF WORK

2.1 OBJECTIVE

The objective of this phase of work is to assess whether onsite soils at the Learner Company facility can be reclassified as nonhazardous under the criteria of Title 22, CAC. Based on the nature of the soil, disposal options will then be developed for the affected soil.

2.2 APPROACH

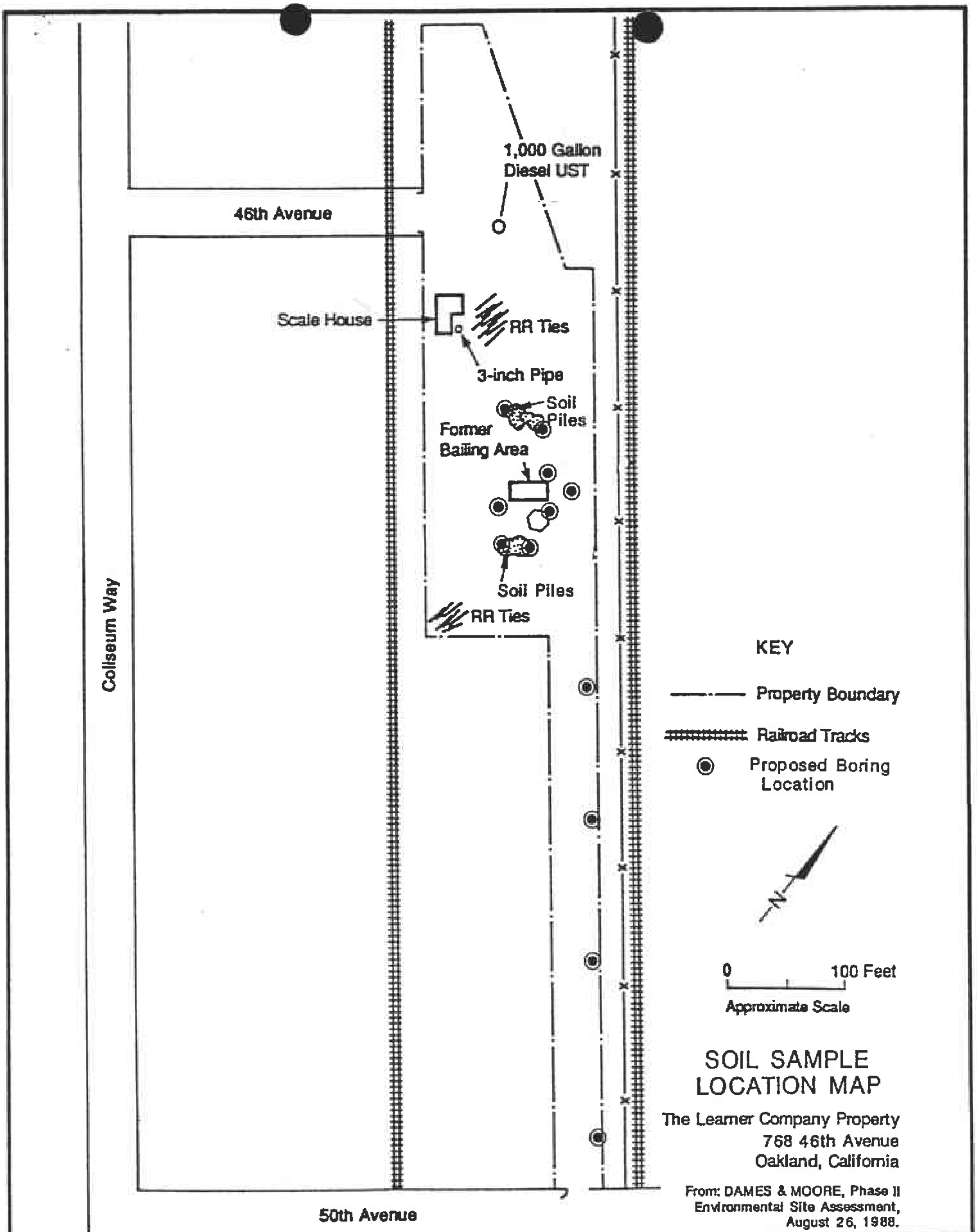
Chemical testing performed to date has indicated that PCB concentrations in soil piles and in-situ soils are less than the hazardous level of 50 mg/kg established in Title 22, CAC. TPH concentrations exceed 1,000 mg/kg in the soil piles and in shallow soils in many areas of the site. While 1,000 mg/kg is not a hazardous level established by Title 22 (TPH is not included in Title 22), many regulating agencies regard TPH levels in soil at 1,000 mg/kg and above as hazardous, based on its ignitability and potential to impact ground water.

To assess whether the soils at the facility are hazardous under Title 22, CAC, soil samples will be collected and analyzed for:

- corrosivity
- reactivity
- ignitability
- aquatic toxicity
- TPH

2.3 SOIL SAMPLING

Soil samples will be collected from 12 locations: four from the soil piles, four from the old bailer area, and four along the narrow drive. Soil sample locations are shown on Plate 3. Soil samples will be collected from a depth of approximately 1 foot using a clean trowel. Samples will be collected in sterile containers supplied by the analytical laboratory. After collection, each sample will be labeled with a unique six-digit sample identification number



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SOIL SAMPLE LOCATION MAP

LEARNER COMPANY
OAKLAND, CALIFORNIA

PLATE 3

and will be placed in a cold sample cooler. At the end of the day, samples will be transported to the analytical laboratory under chain-of-custody control. The 12 individual samples will be analyzed for:

- o Corrosivity (pH), Method 9045
- o Ignitability (closed cup), Method 1010
- o Reactivity (cyanide and sulfide), EPA/OSW
- o Aquatic toxicity (96-hour), EPA/ASTM
- o TPH (IR), EPA 418.1

The 12 samples will be collected from the following locations:

Sample Location	Location Description
1	soil piles
2	soil piles
3	soil piles
4	soil piles
5	bailer area
6	bailer area
7	bailer area
8	bailer area
9	narrow drive
10	narrow drive
11	narrow drive
12	narrow drive

Specific constituents and concentrations are not known for the total petroleum hydrocarbons detected at the site. LD_{50} concentrations and calculations are available for specific individual constituents. An acute toxicity cannot be calculated from available LD_{50} data because the individual constituents are not known.

2.4 CLASSIFICATION OF SOIL

If the soils do not appear to be hazardous under the criteria of Title 22, CAC, alternatives for remediating and/or disposing of soils will be evaluated.

If the soils at the Learner Company facility do appear to be hazardous by the corrosivity, ignitability, reactivity, or aquatic toxicity criteria of Title 22, CAC, stabilization, chemical oxidation, and bioremediation bench tests may be performed on the samples. To evaluate background TPH concentrations, the 10-gallon composite sample will be analyzed for TPH. Upon completion of the bench tests, one sample from each of the three experiments will be submitted for TPH analyses for comparison.

Solidification/Microencapsulation (Stabilization)

Solidification/microencapsulation technologies can provide an effective way to immobilize petroleum hydrocarbons present in soil. Some limitations include certain soil types and high concentrations of petroleum hydrocarbons which could cause interferences with the process. Therefore, the bench test is necessary to assess the success of the stabilization method. Generally, the contaminated soil is mixed with a material that will harden, such as concrete. Soil particles are trapped in the matrix of hardened material. The hardened matrix material stabilizes hydrocarbons and in the soil, enhancing resistance to the following conditions that tend to mobilize hydrocarbons.

- Erosion - the hard matrix enhances the soil strength and resistance to erosion.

- Infiltration - the permeability of the stabilized soil generally can be reduced below requirements for landfill liners (10^{-6} - 10^{-7} cm/sec). The potential for leaching of soil contaminants via rain water infiltration would be greatly reduced.

Matrix materials to be considered in this study include cement kiln dust-lime, flyash-lime, cement-slag-gypsum, and cement mixes.

Chemical Oxidation

Certain chemicals, oxidizing agents, can react with various contaminants to form end products that are much less hazardous than the original contaminant. Examples of oxidizing agents are hydrogen peroxide, ozone, and sodium hypochlorite. All of these chemicals are extensively used to detoxify contaminants in both solid and aqueous wastes including many forms of petroleum hydrocarbons. In some treatment schemes, once the soil is mixed with the oxidizing agent, it is exposed to ultraviolet (UV) light. UV light adds energy to the chemical reaction increasing effectiveness of the oxidizing agent. Variables that affect the effectiveness of the oxidation method include the content of organic material in the soil and permeability of the soil. These factors show up during the bench test and will help in assessment of its success. An analysis of TPH in the same soil before and after the chemical oxidation will give a good indication of the success of the oxidation technology on the type of contamination at the site.

Biodegradation

Native or specially adapted bacteria are used to break down contaminants into innocuous forms such as carbon dioxide or water. Bacteria have the capacity to degrade industrial surfactants, organic solvents, crude and refined petroleum products, pesticides and herbicides, polychlorinated biphenyls, polycyclic aromatic hydrocarbons, and other classes of organic compounds.[2] Nutrients and oxygen are added to the soil as with in-situ bioremediation, but since the soil is above ground and can be more easily mixed, there are fewer problems with nutrient distribution, and the progress of biodegradation can be closely controlled to maximize the speed and effectiveness of the remediation. Some contaminants can be toxic to bacteria and before biodegradation is selected, microbial toxicity tests should be run to find if biodegradation will be effective. This type of toxicity test involves adding a measured amount of nutrients and bacteria to a small measured sample of the contaminated soil. The soil is microscopically examined after specific time periods such as 7 days, then 14 days. If there are no bacteria present or their number is greatly reduced, it can be assumed that the contaminant is toxic to the bacteria, and another remediation method or bacteria should be used. If the bacteria thrive, then analyses of the contaminated soil will be taken before and after remediation to assess the success and speed of the bioremediation technology.

2.5 REPORTING

Upon completion of the soil sampling, chemical analysis, and bench testing, a report of findings will be prepared for client and agency review. The report will present our assessment of the analytical results and recommendations. The report will be submitted to the Learner Company.

3 REFERENCES

[1] Dames & Moore; August 26, 1988. "Phase II Environmental Site Assessment, Learner Investment Company Property, 768 46th Avenue, Oakland, California," Job No. 17212-001-043.

[2] EPA/504/2-88/003; September 1, 1988. "Assessment of Industrial Technologies for Superfund Applications."