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United States Government **Department of Energy**

memorandum

Date: March 6, 2000

Subject: Time-Critical Removal Action at the East Traffic Circle

From: Hannibal Joma, LEPD

To: James T. Davis, AMEN

Thru: Dan Nakahara, LEPD

1. Purpose

The purpose of this Action Memorandum is to obtain your approval to close a time-critical removal action in the East Traffic Circle (ETC) at Lawrence Livermore National Laboratory (LLNL) (Figs. 1 and 2). The removal consisted of about 110 cubic yards of soil containing polychlorinated biphenyls (PCBs) from the ETC at LLNL as performed under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

2. Site Conditions and Background

The removal action was conducted in response to environmental and safety concerns related to PCB-contaminated soils identified in the ETC. The ETC is located on LLNL property, a CERCLA (Superfund) site (CERCLIS ID# CA2890012584). The Livermore Site is owned by the Department of Energy (DOE) and operated by the University of California. The waste subject to this removal action was discovered during routine maintenance operations in the center of the ETC to improve drainage, and was removed under the oversight of the CERCLA Remedial Project Managers (RPMs). The RPMs consist of the DOE, U.S. Environmental Protection Agency (EPA), California Department of Toxic Substances Control (DTSC), and the Regional Water Quality Control Board-San Francisco Bay Region (RWQCB). EPA guidance was used in preparing this document (EPA, 1990a).

2.1. Site Description

The Livermore Site description, history, contaminant distribution, and characterization are presented in the Remedial Investigation report (Thorpe et al., 1990), the Feasibility Study (Isherwood et al., 1990), and the Record of Decision (DOE, 1992). The LLNL Livermore Site is a research and development facility owned by DOE and operated by the University of California, located approximately 45 miles east of San Francisco, and three miles east of downtown Livermore, California (Fig. 1). The Livermore Site occupies approximately 800 acres.

Hills of the Diablo Range flank the site to the south and east. The site is underlain by several hundred feet of interbedded alluvial and lacustrine sediments. Ground water beneath the site varies from about 130 ft in the southeast corner to about 25 ft in the northwest corner. Ground water about two miles west of the site is used for some of the municipal supply of downtown Livermore. Ground water south and west of the site is used for domestic and agricultural irrigation. Two intermittent streams, Arroyo Seco and Arroyo Las Positas, traverse the area and recharge the ground water during wet periods.

The Livermore Site was converted from agricultural use by the U.S. Navy in 1942. The Navy used the site until 1946 as a flight training base and for aircraft assembly, repair, and overhaul. Solvents, paints, and degreasers were routinely used during this period. Between 1946 and 1950, the Navy housed the Reserve Training Command at the site. In 1950, the Navy allowed occupation of the site by the Atomic Energy Commission (AEC), which formally received transfer of the property in 1951. Under the AEC, the site became a weapons design and basic physics research laboratory. In 1952, the site was established as a separate part of the University of California Radiation Laboratory. Responsibility for the site was transferred to the Energy, Research, and Development Administration in 1975. In 1977, responsibility for LLNL was transferred to the DOE, which is currently responsible for the site.

The Livermore Site was placed on the EPA National Priorities List (Superfund) in 1987 following discovery of solvent contamination in ground water. Contamination from solvents, gasoline, chromium, and tritium exists in the soil and ground water.

The first ground water was treated at the site as part of a treatability study. The Record of Decision (DOE, 1992) was signed in August 1992 and describes technologies and cleanup levels to be used for cleanup. Ground water pump and treat and soil vapor extraction were selected to remediate the water and soil, respectively. The submittal of treatment system designs started in 1992, and was completed in 1998. Currently operating are 18 ground water treatment facilities and two soil vapor extraction facilities.

Technologies used at the site have included pump and treat (air stripping, ultraviolet light/oxidation, catalytic reductive dehalogenation) for volatile organic compounds in ground water, ion exchange for metals in ground water, soil vapor extraction for volatile organic compounds in soils, and dynamic underground steam stripping for gasoline in ground water and soil.

The waste subject to this Action Memorandum consists of soil containing PCBs, suspected to be residual contamination left over from the East Traffic Circle Landfill excavation in 1984 (McConachie et al., 1986). The residual contaminated soil was systematically removed and the remaining surface soil sampled until the concentrations met the cleanup levels agreed upon by the

RPMs. After receiving regulatory approval that the soil removal was completed, the area was covered with clean fill and regraded.

2.1.1. Removal Site Evaluation

About 300 cubic yards of soil containing PCBs was excavated in the center of the ETC in October 1998 while conducting routine drainage maintenance operations (Fig. 2). The removed soil was stockpiled and two routine soil samples were collected to determine proper disposition. On December 18, 1998, analytical results indicated that the soil contained PCBs (Aroclor 1254) at 98 and 120 ppm. The appropriate regulatory agencies were notified. Other chemical constituents of concern (volatile organic compounds, metals, and radionuclides) were not detected above background levels. During the week of January 4, 1999, all the stockpiled PCB-contaminated soil was loaded on trucks and sent to EnviroSafe, Inc., in Idaho, which is an EPA-approved waste disposal facility. Sampling was conducted to verify that no residual PCB contamination remained where the soil was stored and where the material was loaded for offsite shipment. All equipment was decontaminated and sampled for residual PCBs. The loading area and equipment were released for normal use once all analytical results verified that they were free of PCBs.

To further assess the extent of residual PCB soil contamination, a subsurface investigation was conducted in the ETC between March 15 and March 18, 1999. Seven boreholes, SIB-NIF-201 through SIB-NIF-207, were drilled to 20-ft depth in the ETC (Fig. 3). The seven ETC borehole locations were arranged in a tightly spaced pattern in and around the area of the ETC where the drainage improvement project was conducted. Soil samples were collected at the surface and at 2.5-, 5.0-, 7.5-, 10.0-, 15.0-, and 20.0-ft depths for PCB analyses. PCB concentrations in surface soil collected from these boreholes ranged from <1 to 133 ppm (Fig. 4a). The type of PCBs detected was limited to Aroclor 1254. At the April 6, 1999 RPM meeting, the RPMs agreed to a cleanup level of 18 ppm, as discussed further in Section 2.1.4. All three samples with PCBs exceeding 18 ppm were surface samples. No samples collected at 2.5-ft-depth or greater contained PCBs at or above 18 ppm.

On May 5, 1999, the soil around the three locations with PCBs over the 18 ppm (boreholes SIB-NIF-203, SIB–NIF-205, and SIB-NIF-207) was removed to a depth of six inches to one foot and disposed of at EnviroSafe, Inc. Approximately 35 cubic yards of soil was removed. After removing the soil, four surface soil samples were collected. The four confirmatory samples indicated that more soil needed to be removed around three sampling locations that had concentrations of 39 ppm, 120 ppm, and 34 ppm (Fig. 4b). The fourth location had a concentration of 8.4 ppm.

On June 7, 1999 an additional six inches to one foot of soil was removed from the ETC in the area where concentrations were still above 18 ppm. About 60 cubic yards of soil were removed. Three surface soil samples were collected on June 8, 1999, to confirm that the remaining surface soil was subsequently below 18 ppm. Three confirmatory samples indicated that one location was still above the cleanup level with a concentration of 100 ppm. The other two locations had surface soil concentrations of 17 ppm and 2 ppm (Fig. 4c).

On July 8, 1999, an additional 15 cubic yards of soil were removed from the one location in the ETC where the surface soil concentration was still above the cleanup level. A surface soil sample was collected on July 9, 1999. Results indicated that the surface soil concentration was 16 ppm (Fig. 4d). Verbal approval was given by the regulatory agencies that soil removal was completed

and that the area could be covered with clean fill and regraded. On July 20, 1999, 10 cubic yards of clean fill was used in the ETC to bring the area back to grade for drainage.

2.1.2. Physical Location

The ETC is located in the northeastern portion of the Livermore Site (Fig. 2). Land immediately north of the Livermore Site is zoned for industrial use. To the west, the land is zoned for high-density urban use. Sandia National Laboratories, California is located south of the site in an area zoned for industrial development. The area east of LLNL is zoned for agriculture and is currently used as pasture land. Federal- or state-listed endangered or protected species found at the Livermore Site include the red-legged frog and the white-tailed kite. Wetlands are very limited at the Livermore Site and are confined to Arroyo Las Positas along the northern perimeter of the site.

2.1.3. Site Characteristics

The ETC consists of an open circular area of dirt between the connection of Eastgate Drive, North Inner Loop Road, and South Inner Loop Road (Fig. 2). The area is normally covered with naturally occurring vegetation. The ETC is not designed for pedestrian use. When the PCB-contaminated soil was excavated, the ETC was being regraded to improve surface water run off during rain events. Depth to ground water in the vicinity of the ETC is about 75 ft. Construction debris (concrete, rebar, etc.) from prior dumping was anticipated to be found in this area based on previous findings, although soil containing high concentrations of PCBs was thought to have been completely removed during the 1984 East Traffic Circle Landfill excavation. PCBs are a hazardous substance per CERCLA 101 (14).

2.1.4. Release or Threatened Release of Hazardous Substances, Pollutants, or Contaminants

The soil containing PCBs is suspected to be residual contamination left over from the East Traffic Circle Landfill excavation in 1984 (McConachie et al., 1986). After the initial soil removal from routine maintenance operations, soil samples indicated that the elevated concentrations of PCBs were only in the near surface soil and were exclusively Aroclor 1254. The PCB soil contamination did not extend beyond the 2.5-ft depth.

PCBs are known to be hazardous to human health and the environment because they decompose very slowly and are characterized by bioaccumulation and biomagnification (EPA, 1980). PCBs can enter the body through the lungs, the gastrointestinal tract, and the skin. Tests on laboratory animals have shown reproductive failures, birth defects, gastric disorders, skin lesions, swollen limbs, cancers, tumors, and eye and liver disorders (EPA, 1980). Although there is limited human contact with the soil at the ETC, due to the potential hazards associated with PCBs, this removal action was implemented.

At the April 16, 1999 RPM meeting, the RPMs reviewed the EPA Region 9 industrial Preliminary Remediation Goal (PRG) for Aroclor 1254 against the surface soil concentrations in the ETC. If the soil concentrations exceeded the PRG, then the RPMs would need to determine if an additional action should be taken. EPA's PRG table listed a cancer PRG of 1.3 for the class of PCBs, and a noncancer PRG of 18 ppm for Aroclor 1254 specifically. It was not recognized at that time that the Aroclor 1254 PRG was a noncancer PRG. Based on only having Aroclor 1254 in the

soil, the RPMs chose 18 ppm as the cleanup level. After the completion of the removal, EPA issued a revised and updated PRG table that more clearly indicated that the 18 ppm PRG was a noncancer level, and that the cancer level PRG was now reduced from 1.3 to 1 ppm. Regardless of the misinterpretation of the PRG data, the regulatory agencies concur that the 18 ppm cleanup level was still protective because it:

- Does not exceed the non-cancer concentration.
- Translates to a cancer risk of 2E-05, which is still within the CERCLA cancer risk range.
- Falls within the action level range of 10-25 ppm for sites in industrial areas (EPA, 1990b; Federal Register, 1994).

In addition, human exposure at the ETC is very limited, yet the PRG is based on an exposure parameter of 250 days/year for 25 years. Thus the chosen cleanup level is consistent with the limited land use and potential risks to human exposure.

After the removal action, clean fill was used to bring the area back to grade. Remaining soil containing concentrations of PCBs below the cleanup level was covered with clean fill, and therefore is protected by wind or surface water dispersion. Because of PCB immobility, the residual low concentrations of PCBs do not represent a threat to the ground water, which is about 75 ft below ground surface. No PCBs have been detected in ground water in nearby wells, nor any wells on the Livermore Site.

2.1.5. National Priorities List Status

The Livermore Site was placed on the National Priorities List in July 1987. A Federal Facility Agreement (FFA) for remediation of the Livermore Site was signed by DOE, EPA, DTSC, and RWQCB in November 1988, and a Record of Decision was signed by DOE and EPA in August 1992. Current activities include remediation at 18 ground water treatment facilities and two soil vapor treatment facilities. Six design documents have been submitted to the regulatory agencies, as well as a Compliance Monitoring Plan and Contingency Plan. The first Five-Year Review for the project found cleanup years ahead of schedule. All planned remedial actions have commenced, with the exception of additional portable treatment units and source area remediation.

2.1.6. Maps, Pictures, and Other Graphic Representations

The ETC, the location of the seven boreholes, and PCB concentrations in surface soil samples are presented in Figures 2 through 4.

2.2. Other Actions to Date

2.2.1. Previous Actions

Previous source investigation work in and near the area included excavations, exploratory boreholes, soil vapor surveys, geophysical surveys, document research, aerial photograph review, and personnel interviews. The East Traffic Circle Landfill removal was previously conducted in and adjacent to the ETC (McConachie et al., 1986) where unsaturated zone contamination posed a threat to ground water.

Aerial photographs and previous excavations in the general area (e.g., for rerouting pipelines) identified construction (concrete and rebar) and gardening debris. None of the debris was anticipated to be hazardous, toxic, or radioactive.

2.2.2. Current Actions

Soil excavation and disposal has been completed. About 10 cubic yards of clean soil was placed over the excavation, and the area was regraded for proper drainage. Natural vegetation is anticipated to grow over this area with time. Ground water monitoring in the area is ongoing to assess if there are unknown sources that impact ground water quality.

2.3. State and Local Authorities' Roles

2.3.1. State and Local Actions to Date

Environmental investigation activities at the Livermore Site are performed under the FFA and CERCLA. The State regulatory agencies, DTSC and RWQCB, as well as the EPA are part of the RPM team that oversees investigations and cleanup activities performed at the Livermore Site. As discussed in Section 2.1.1, the RPMs were notified of the discovery, and then met to establish a cleanup level at the April 16, 1999 RPM meeting. Progress was continuously reported at RPM meetings (Bainer and Littlejohn, 1999a,b,c; Bainer and Joma 1999, 2000), in the National Ignition Facility quarterly reports (DOE, 1999a,b,c), and at Technical Assistance Grant meetings.

2.3.2. Potential for Continued State/Local Response

No State or local response actions are anticipated other than continued oversight of site cleanup activities under CERCLA. DOE will provide the necessary funding and support for the removal action and remediation of the Livermore Site under its responsibility.

3. Threats to Public Health or Welfare or the Environment

In accordance with the National Contingency Plan (NCP) (40 CFR, Section 300.415), the following criteria must be considered in determining the appropriateness of a removal action in addressing threats to public health or welfare or the environment:

(i)* Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants.

(ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems.

(iii) Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release.

(iv)* High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate.

(v)* Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released.

(vi) Threat of fire or explosion.

(vii) Other situations or factors that may pose threats to public health or welfare or the environment.

Criteria indicated with an asterisk (*) are relevant and were considered in determining the appropriateness of this removal action for protection of public health and welfare and the environment, and are discussed in Sections 3.1 and 3.2.

3.1. Threats to Public Health or Welfare

Subsections (i), (iv), and (v) in Section 3 apply to this removal action. As discussed in Section 2.1.4, PCBs are known to be hazardous to human health and the environment. Because the ETC is an isolated location with limited human exposure, there is a minimal risk to employees or the public. Workers involved in the cleanup action were protected from air-borne PCB exposure through safe working practices. Public inhalation impacts were evaluated in the National Ignition Facility Draft Supplemental Environmental Impact Statement to the Stockpile Stewardship and Management Programmatic Environmental Impact Statement (DOE, 1999d). The evaluation concluded that the excess cancer risks and the noncancer risks were below levels of concern. As discussed in Section 2.1.4, the regulatory agencies agree that the remaining soil concentrations are protective.

3.2. Threats to the Environment

Due to low mobility of PCBs in soil, there is no significant threat to ground water, which is approximately 75-ft deep at this locality. The potential threat of release is relevant to Subsection (iv), and the threat of airborne migration is relevant to Subsection (v) of the criteria for determining the appropriateness of a removal action, as discussed in Section 3.

4. Endangerment Determination

Once the PCB-contaminated soil was discovered, it was determined that the soil should be removed to a protective cleanup level for public health and welfare, and the environment. Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

5. Removal Action Description and Estimated Costs

5.1. Description of Action

The PCB-contaminated soil was removed and disposed in accordance with all applicable environmental regulations. This action addressed the potential exposure to nearby human populations, animals, or the food chain from PCBs.

5.1.1. Removal Action Components

Excavation, removal, and disposal of the PCB-contaminated soil at a regulatory-approved facility mitigated the public health threat posed by direct human contact and inhalation and ingestion of PCBs. The removal of PCB contaminants provided a timely response and best possible protection for public health and welfare, and the environment. After the removal action was completed, based on certified analytical results, the site was covered with clean fill, thus mitigating airborne resuspension of the remaining soil containing low concentrations of PCBs. All contaminated soil was shipped offsite to an EPA-approved CERCLA waste disposal facility in Grandview, Idaho, in accordance with the Offsite Rule (Section 300.440 of the NCP).

5.1.2. Contribution to Remedial Performance

The removal action is consistent with the overall objectives of the Livermore Site restoration project. The removal of PCB contaminated soil to the specified cleanup level completes the cleanup of the ETC. No PCBs have been detected in ground water.

5.1.3. Description of Alternative Technologies

Because of a possible threat to human health and the environment, once the PCB-contaminated soil was discovered, excavation, removal, and offsite disposal of the PCB-contaminated materials was determined by DOE, LLNL, and all concerned regulatory agencies to be the best alternative. Therefore, no alternative technologies were considered for this action.

5.1.4. Applicable or Relevant and Appropriate Requirements

The Applicable or Relevant and Appropriate Requirements (ARARs) for this removal action are the cleanup objectives as determined by the regulatory agencies (Section 2.1.4), and disposal requirements (40 CFR 761.60, and Section 300.440 of the NCP). All ARARs were met in the implementation of this removal action. The removal action and timely response is consistent with the overall objectives of the Livermore Site cleanup.

5.1.5. Project Schedule

The excavation, removal, packaging, and offsite shipment of the contaminated waste began with the initial soil removal during October 7-12, 1998, and the identification of PCB-contaminated soil on December 18, 1998. The PCB-contaminated soil was removed during various short-term removal actions that were completed on July 8, 1999.

5.2. Estimated Cost

The cost for the removal action was about $200,000. This includes manpower, transportation and disposal of contaminated soil, sampling and analyses, and equipment rental.

6. Expected Change in the Situation Should Action been Delayed or not Taken

If the soil removal had not been conducted, the PCB-contaminated soil could have possibly resulted in a risk to public health or the environment.

7. Outstanding Policy Issues

None.

8. Recommendation

In accordance with CERCLA and the NCP, this decision document represents the selected removal action of the PCB-contaminated soil in the ETC, and final closure of this action. No additional actions are planned for this area.

The undersigned approves closure of this removal action.

James T. Davis
Assistant Manager for Environmental and National Security
Oakland Operations Office
U.S. Department of Energy

3/09/00
Date

9. References

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10. Acknowledgments

The authors would like to recognize the contributions to this report of the following people:

B. Bainer, Livermore Site Project Leader, organized and supervised the removal action.

L. Berg, Assistant Livermore Site Project Leader, contributed significantly to the preparation of this document.

A. Lamarre, Environmental Restoration Program/Division Leader, and J. Steenhoven, Environmental Restoration Deputy Program/Division Leader provided overall direction and technical guidance.

H. Barnes of LLNL provided document support.

K. Heyward of LLNL prepared the graphics.

K. Rauhut of LLNL provided information on regulations.

J. Woods of LLNL conducted sampling, and provided analytical and sample location data.

C. Fish of LLNL provided environmental oversight.

D. Cullen of LLNL provided oversight for Hazardous Waste Management.

J. Greci of LLNL provided technical oversight of the excavation.

G. Santucci and D. Bento of LLNL conducted the soil excavation.

J. Ulrech of LLNL provided drilling coordination.

J. Shaw of P.C. Exploration, and B. Pierskalla of Weiss Associates drilled and collected soil samples in the ETC.

S. Chamberlain provided analytical data.

Figures

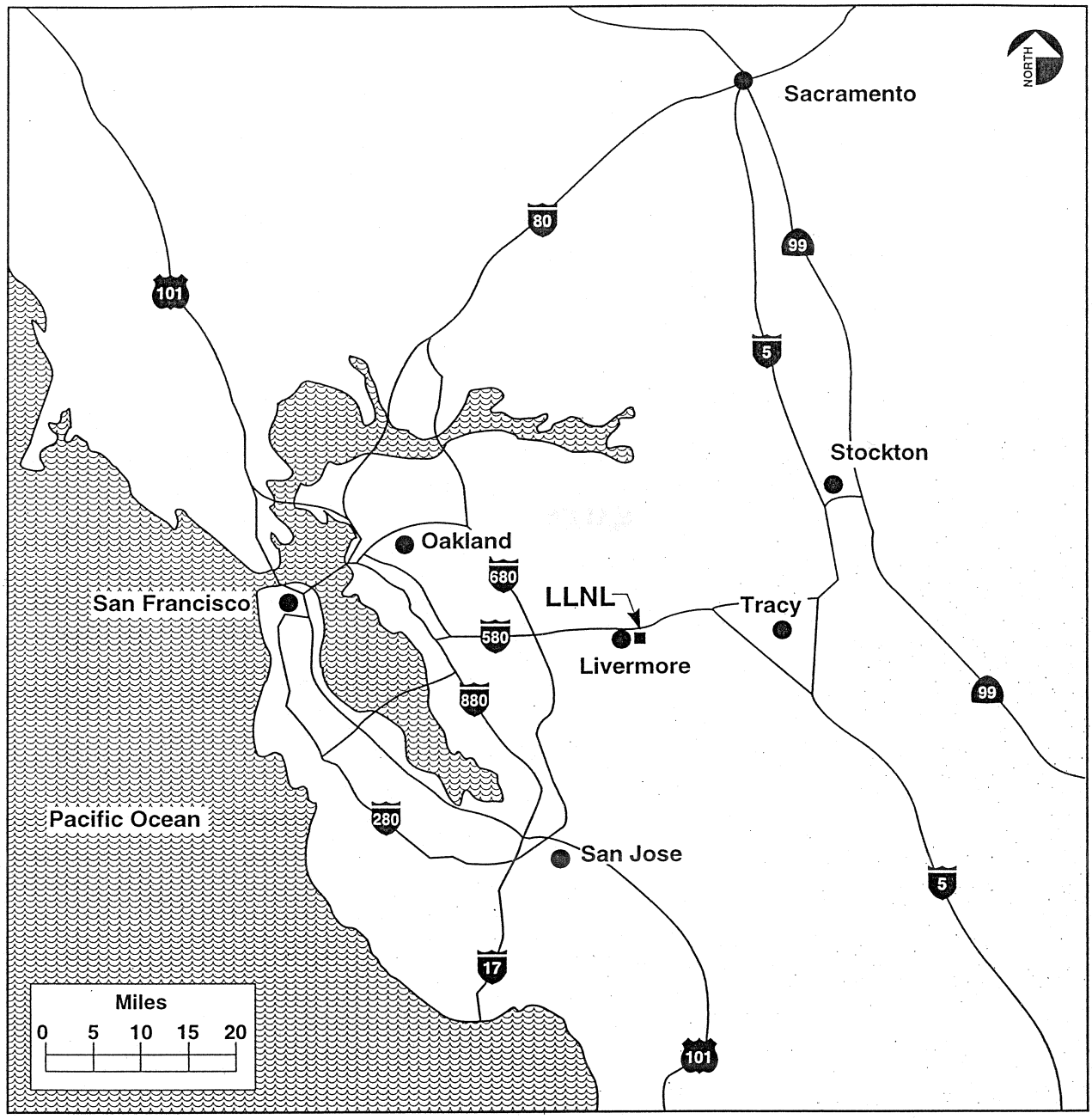

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Figure 1. Location of the LLNL Livermore Site.

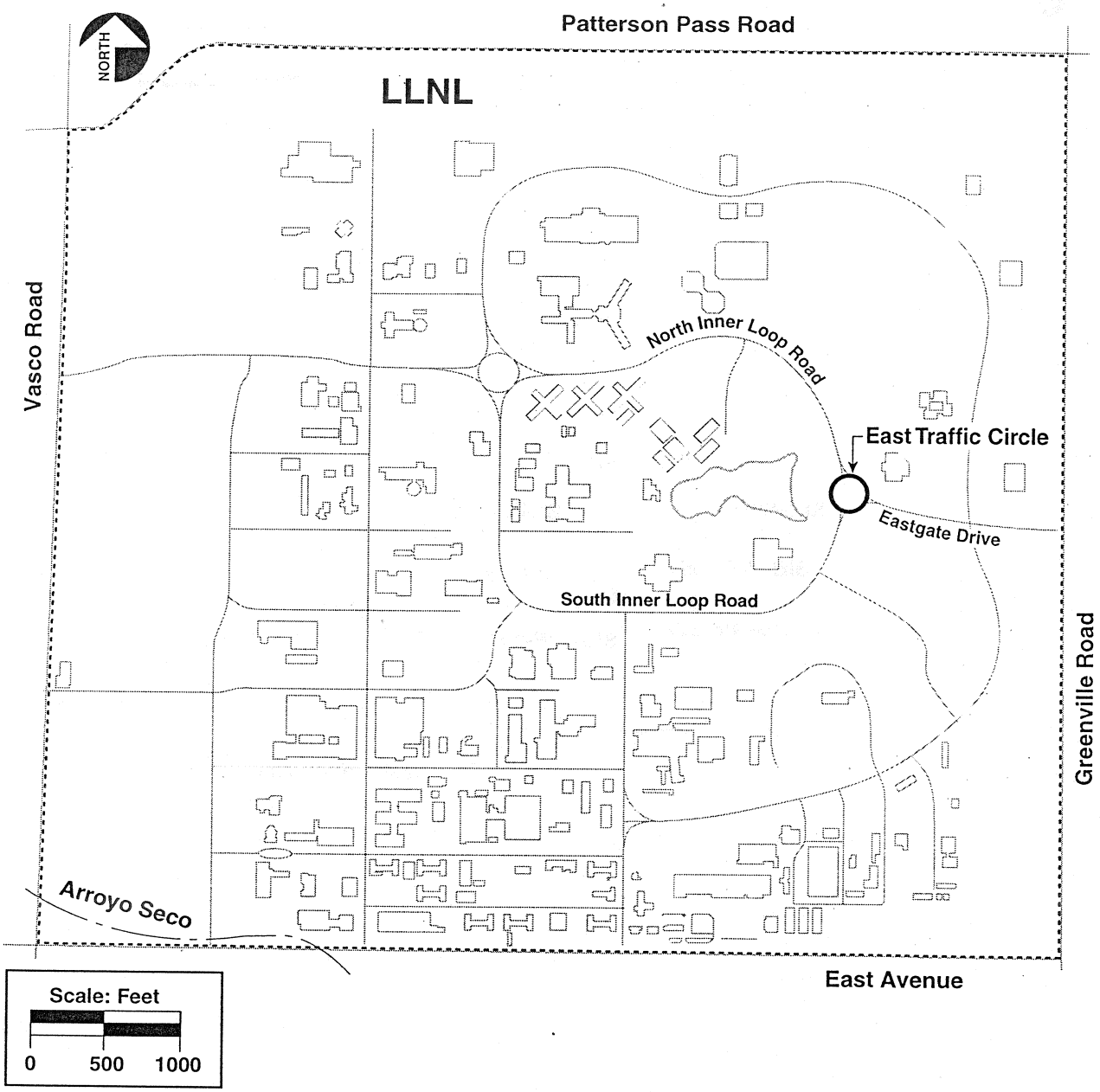

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Figure 2. Location of the East Traffic Circle at the LLNL Livermore Site.

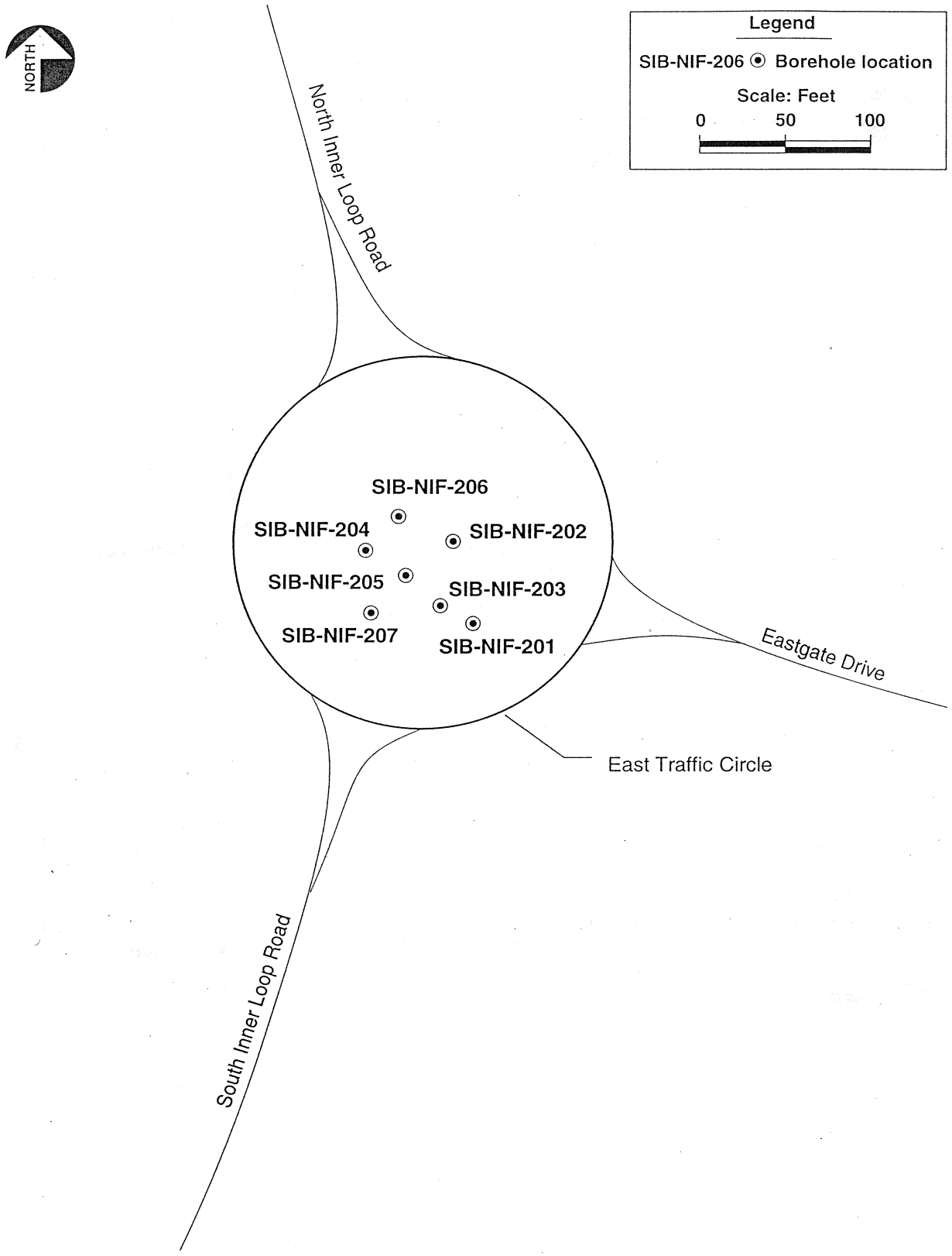

Figure 3. Boreholes drilled in the East Traffic Circle in March 1999.

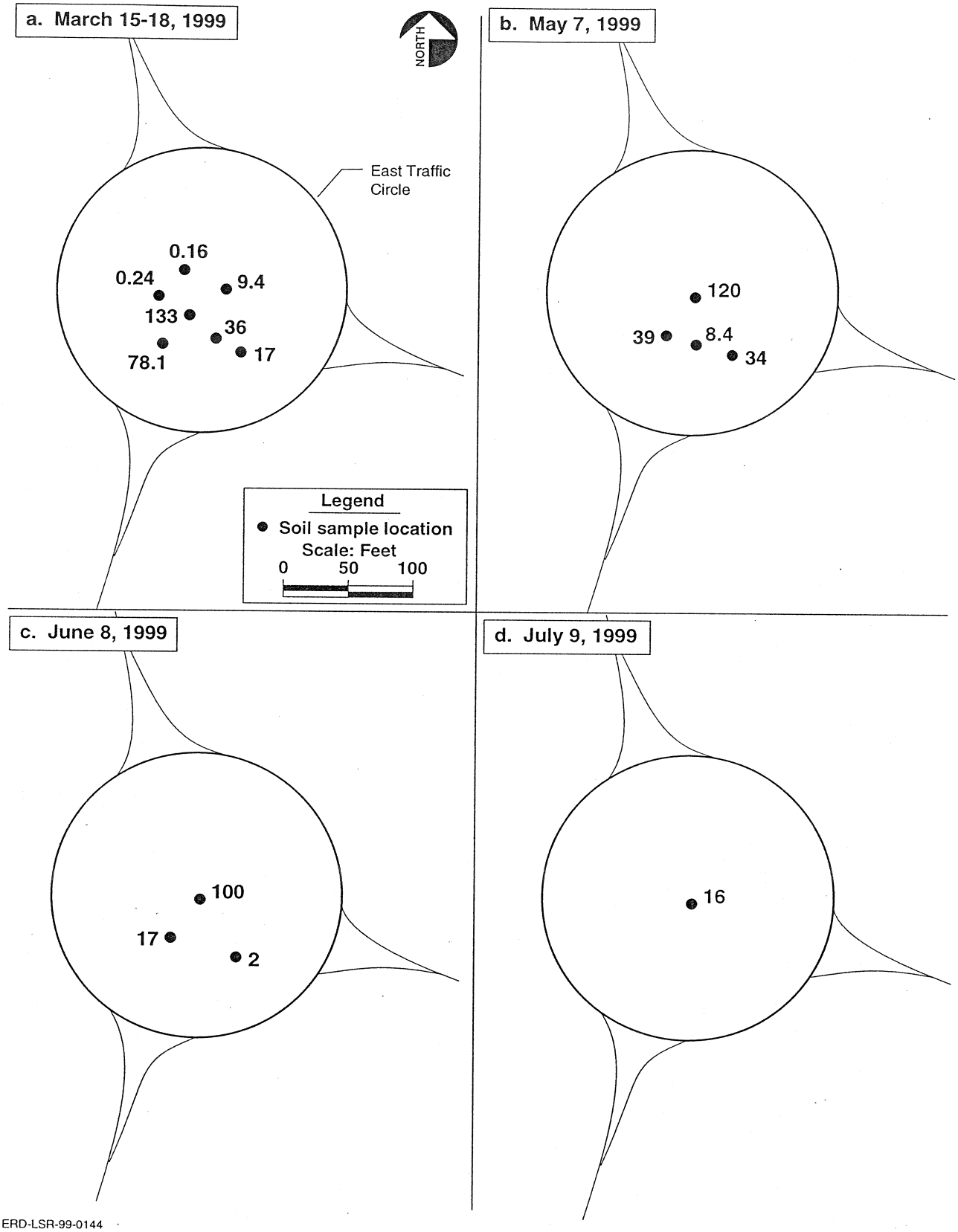

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Figure 4. PCB (Aroclor 1254) analytical results in ppm from surface soil sampling in the East Traffic Circle.