**CLEAN**

Contract No. N62474-88-D-5086

Contract Task Order 0258

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# NAVAL AIR STATION, ALAMEDA
# ALAMEDA, CALIFORNIA

# REMOVAL ACTION
# SITE 15 BUILDINGS 301 AND 389
# TRANSFORMER STORAGE AREA

# FIELD INVESTIGATION WORK PLAN
# FINAL

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**REMOVAL ACTION**
**SITE 15 BUILDINGS 301 AND 389**
**TRANSFORMER STORAGE AREA**

**FIELD INVESTIGATION WORK PLAN**
**FINAL**

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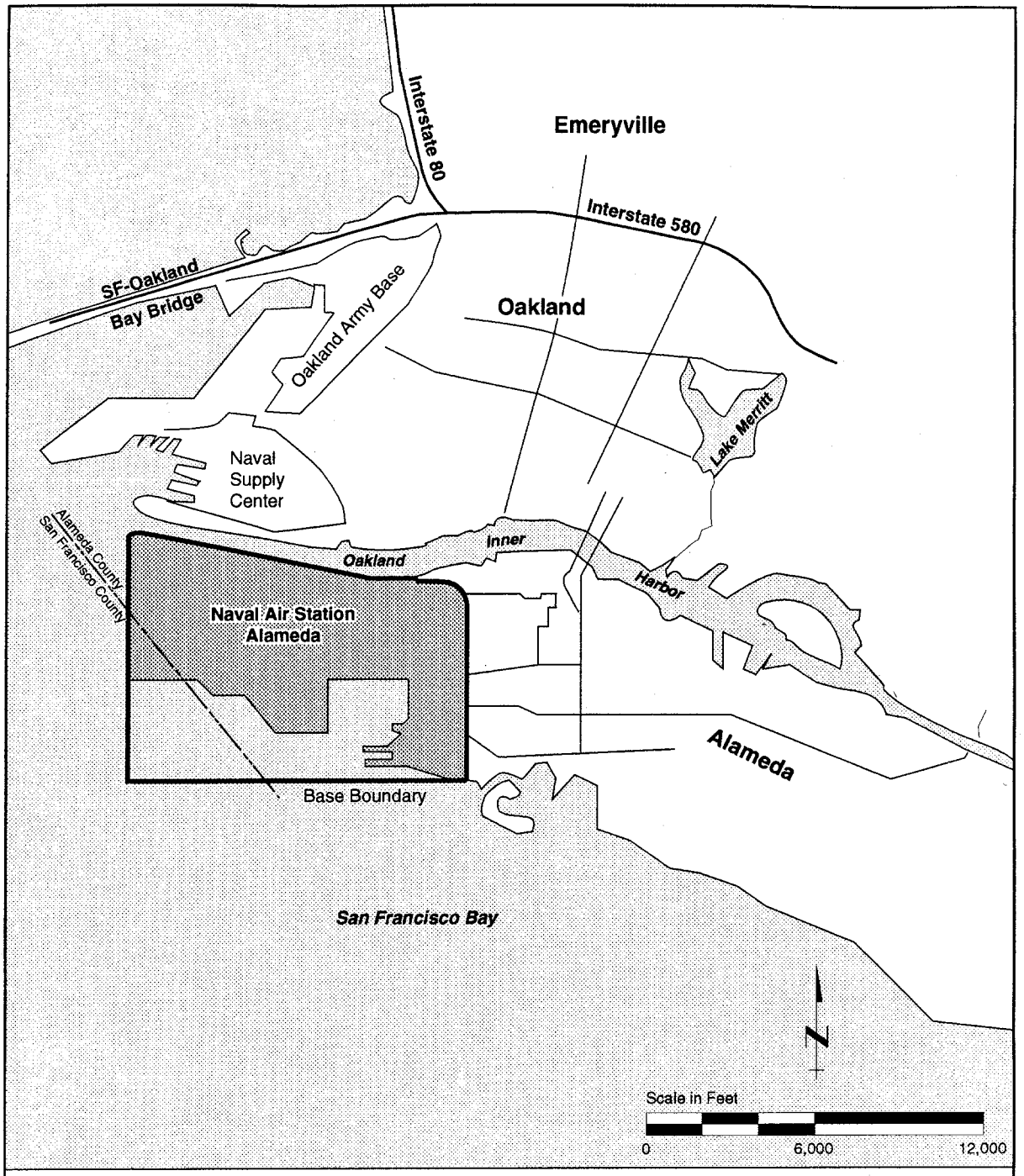
# 1.0 INTRODUCTION

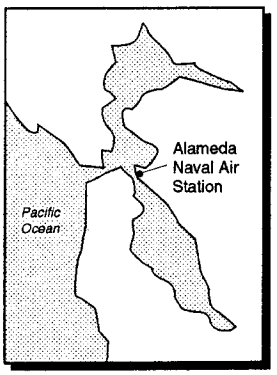
PRC Environmental Management, Inc. (PRC) received Contract Task Order No. (CTO) 0258 from the Department of the Navy, Western Division, Naval Facilities Engineering Command (WESTDIV), under Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract No. N62474-88-D-5086. CTO No. 0258 calls for PRC to perform the following seven tasks at Site 15 of the Installation Restoration (IR) program at the Naval Air Station (NAS) Alameda in California (Figures 1 and 2). These tasks are part of the removal action for polychlorinated biphenyls (PCB) and lead in surface soils at Site 15 and include the following: (1) prepare a field investigation work plan; (2) conduct sampling and analysis; (3) develop and evaluate potential disposal/treatment alternatives; (4) prepare an engineering and cost analysis (EE/CA) report; (5) prepare public notice; (6) manage and dispose of investigation-derived wastes (IDW); and (7) conduct project management and attend meetings.

PRC and its CLEAN team subcontractor, Montgomery Watson (hereafter referred together as the PRC team), prepared this field investigation work plan based on the draft final field sampling plan prepared for the follow-on work at the Phase 2B and 3 sites (PRC/Montgomery Watson 1993a). Site 15 is one of the Phases 2B and 3 sites. The field investigation work plan describes the protocol for conducting field sampling and analyses to characterize the extent of PCBs and lead in surface soil at Site 15. Other sampling activities as described in the follow-on field sampling plan for this site (i.e., cone penetrometer tests [CPTs], deep well installation, non-point source sampling, and quarterly monitoring well sampling) will be conducted under another CTO.

## 1.1 PHYSICAL DESCRIPTION AND SITE HISTORY

Site 15 consists of Buildings 283, 301, and 389. The initial assessment study (IAS) site reference number previously used for this site was IAS-5. The site is located north of Runway 7-25 and Perimeter Road, approximately 250 feet south of the Oakland Inner Harbor (Figure 3). During the early 1900s, a railroad spur was constructed over and through this site for loading and off-loading ships.




Source: Modified from CA State Automobile Assoc. map, Oakland/Berkeley/Alameda. Copyright 1980, revised 1989.

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NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
**SITE LOCATION MAP**

FIGURE 1

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
**RI SITES LOCATION MAP**

FIGURE 2

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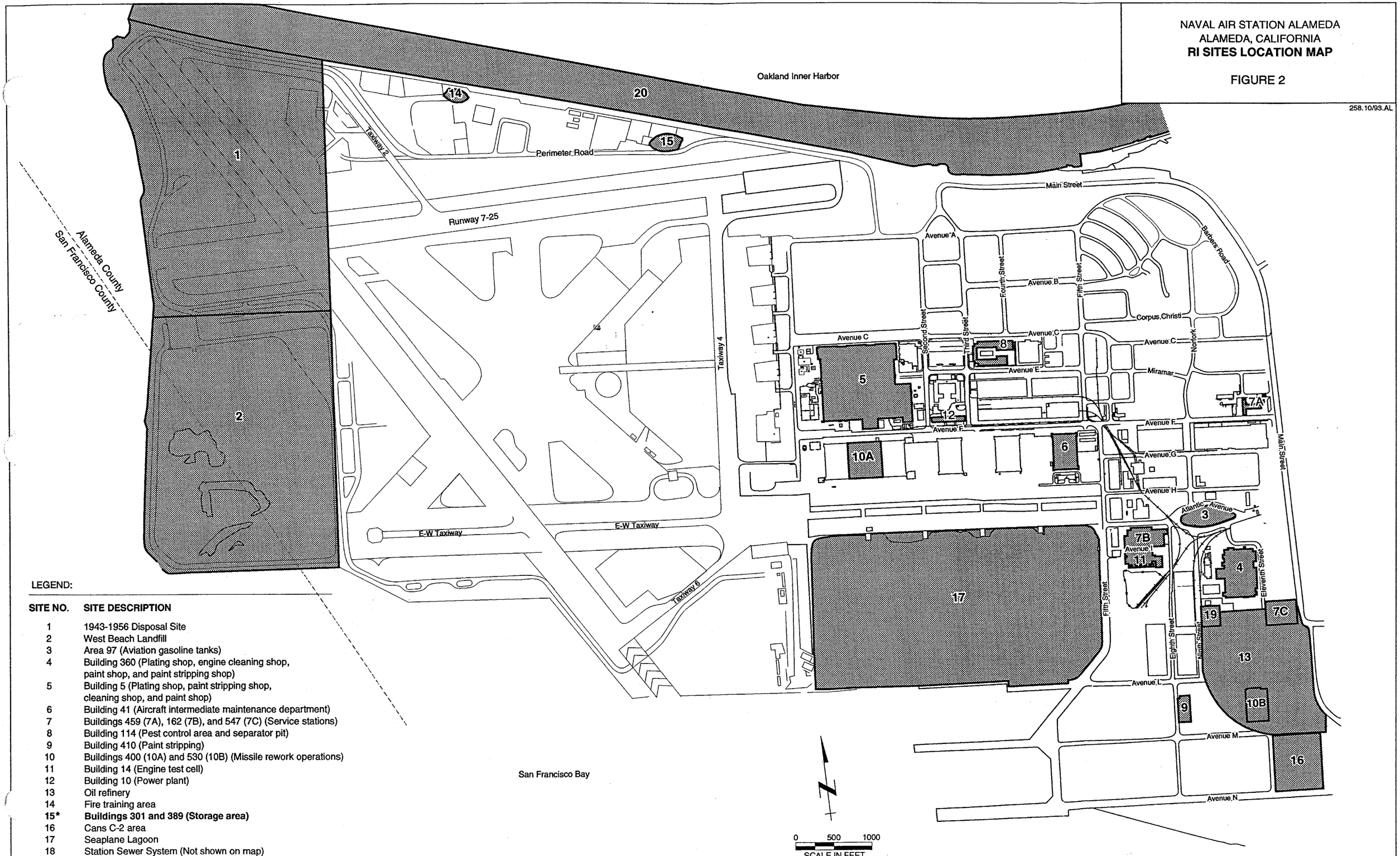
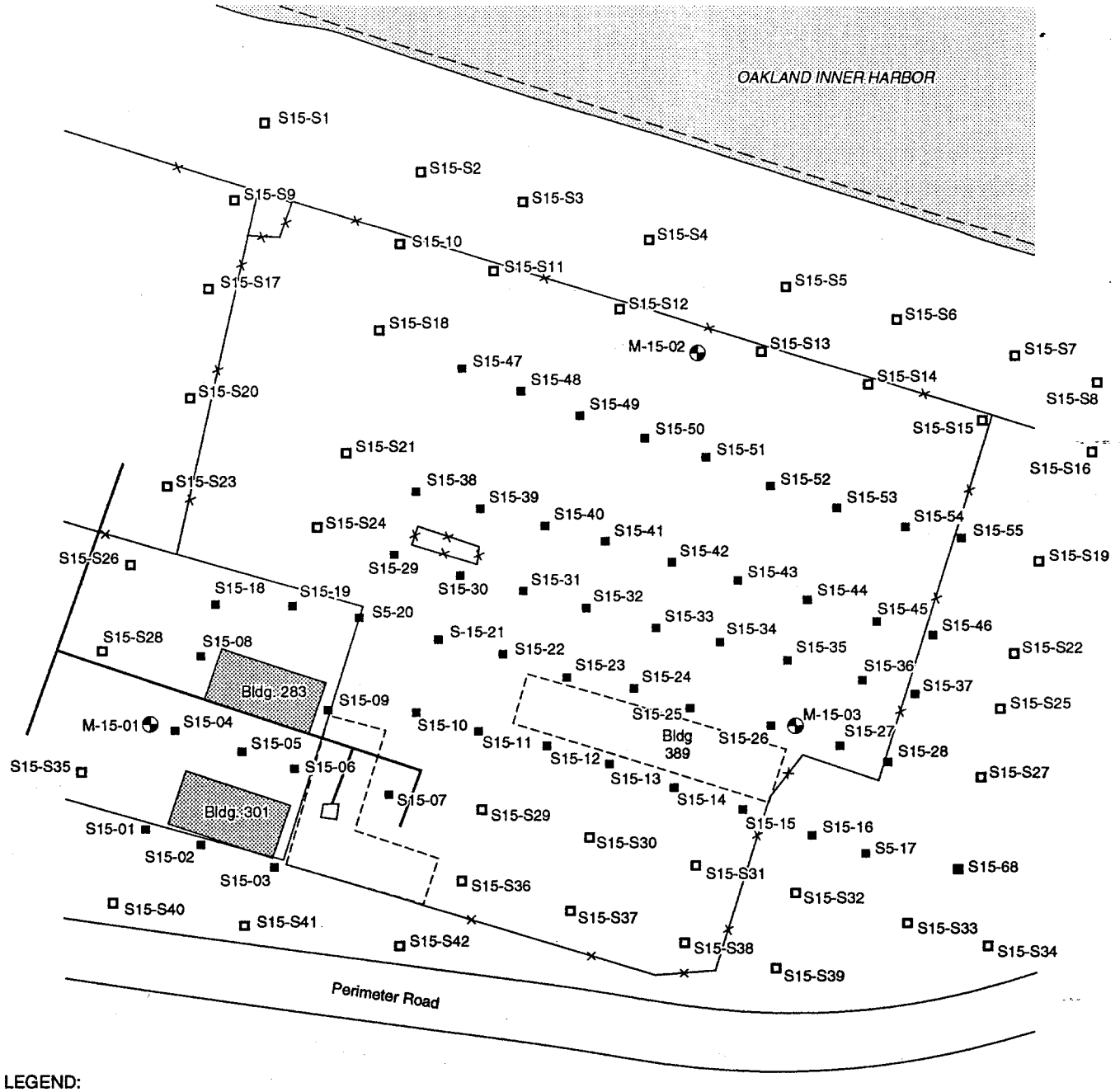



LEGEND:

| SITE NO. | SITE DESCRIPTION |
|---|---|
| 1 | 1943-1956 Disposal Site |
| 2 | West Beach Landfill |
| 3 | Area 97 (Aviation gasoline tanks) |
| 4 | Building 360 (Plating shop, engine cleaning shop, paint shop, and paint stripping shop) |
| 5 | Building 5 (Plating shop, paint stripping shop, cleaning shop, and paint shop) |
| 6 | Building 41 (Aircraft intermediate maintenance department) |
| 7 | Buildings 459 (7A), 162 (7B), and 547 (7C) (Service stations) |
| 8 | Building 114 (Pest control area and separator pit) |
| 9 | Building 410 (Paint stripping) |
| 10 | Buildings 400 (10A) and 530 (10B) (Missile rework operations) |
| 11 | Building 14 (Engine test cell) |
| 12 | Building 10 (Power plant) |
| 13 | Oil refinery |
| 14 | Fire training area |
| **15*** | **Buildings 301 and 389 (Storage area)** |
| 16 | Cans C-2 area |
| 17 | Seaplane Lagoon |
| 18 | Station Sewer System (Not shown on map) |
| 19 | Yard D-13 (Hazardous waste solvents) |
| 20 | Estuary (Oakland Inner Harbor) |

*** Site presented in the Field Investigation Work Plan**




LEGEND:

- Monitoring Well Location
- Surface Soil Sample Location
- Proposed Field Screening Surface Soil Sample Location
- Catch Basin
- Storm Sewer Line
- Structure
- Former Structure
- Fence

Notes:
1) Soil boring locations surveyed by Nolte & Associates, Walnut Creek, California in October, 1991 relative to California Coordinate System, Zone 3, NAD 27.
2) Base map CAD File provided by NAS Alameda.

0 30 60
SCALE IN FEET

10/93.AL

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
**SITE 15**
**SITE MAP AND PROPOSED FIELD SCREENING SAMPLE LOCATIONS**

FIGURE 3

The Navy constructed buildings at the site in the 1950s. Former Buildings 283 and 301 were used for storage of electrical equipment, oil-filled transformers, and old, unused machinery. Before Building 389 was torn down (the concrete slab is still in place), it was also used for storage of transformers (Canonie Environmental 1990). During a site visit conducted in March 1988, Canonie Environmental personnel reported that several 55-gallon drums of hydraulic fluid were stored in Building 301 and surface soils around Building 301 were discolored.

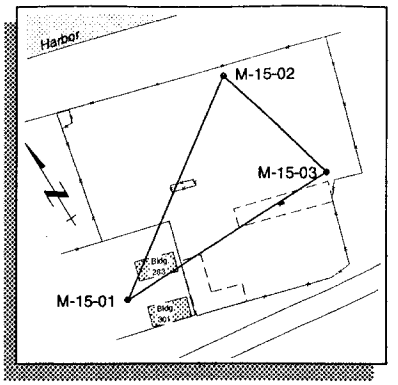
The IAS states that prior to 1974, transformers were stored on bare ground in the vicinity of Buildings 283, 301, and 389. According to personnel familiar with site operations, an estimated 200 to 400 gallons of oil containing PCBs from transformers may have been stored at any one time. Occasional leaks of the PCB-containing oil were recalled. However, the PCB-containing oil was also drained on a regular basis and used to spray on the grounds around the nearby buildings for weed control (Ecology and Environment, Inc. 1983).

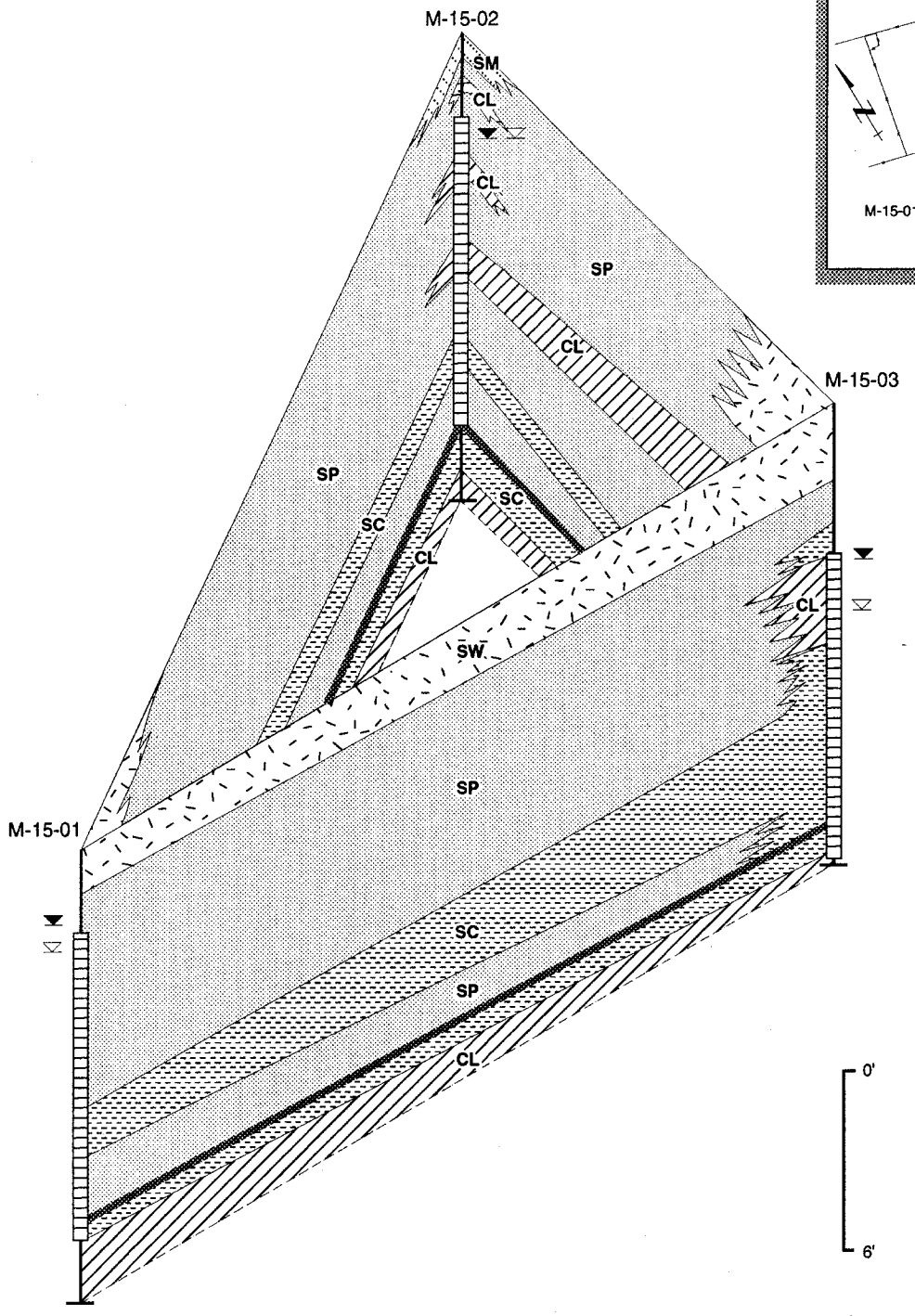
## 1.2 CURRENT OPERATIONS

The fire department now uses the area around Buildings 283 and 301 for storage of equipment. The area around both buildings is fenced. The area around the foundation of Building 389 is used as a storage yard by one of the base maintenance groups. This area is also enclosed by a fence.

## 1.3 SITE GEOLOGY

Material underlying Site 15 can be divided into two groups: fill material and native sediments (PRC/JMM 1992). Fill material underlies the site from ground surface to approximately 12 to 13 feet below ground surface (bgs). The fill material consists of interbedded fine-grained, well-sorted sands, moderately well-sorted silty to clayey sands, and clays. The native sediments consist of sandy-silty clay and clayey sand to clay. The native sediments are believed to be Holocene Bay Mud. Figure 4 is a geologic fence diagram of the site.




0'
6'

0' 50'
SCALE IN FEET

LEGEND:

- SW Gravelly Sand
- SP Sand
- SC Clayey Sand
- SM Silty Sand
- CL Clay
- Approximate Fill/Native Sediment Interface
- First Water During Drilling
- Water Level During Water Sampling
- Monitoring Well
- Screened Interval

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA
**SITE 15**
**GEOLOGIC FENCE DIAGRAM**

FIGURE 4

## 2.0 RESULTS OF PREVIOUS INVESTIGATIONS

Previous investigations performed at Site 15 include (1) an investigation under the Navy Assessment and Control of Installation Pollutants (NACIP) program and (2) the remedial investigation (RI) under the IR program.

**NACIP Program Investigation.** Sampling of surface soil was performed by Wahler Associates during the verification step of the NACIP program. Twelve surface soil samples were collected from north of the Building 389 concrete foundation. The samples were analyzed for PCBs only. The highest PCB concentration detected was 3 milligrams per kilogram (mg/kg) (Canonie Environmental 1990; Wahler Associates 1985).

**IR Program Remedial Investigation.** The RI conducted by the PRC team at Site 15 included surface geophysics, surface soil sampling, soil borings, soil sampling, installation and sampling of monitoring wells, in-situ permeability testing, and groundwater level measuring. Results of the RI are presented in the data summary report, Phases 2B and 3, remedial investigation/feasibility study (RI/FS) (PRC/JMM 1992). Surface soil samples collected at Site 15 contained moderate levels of PCBs and lead and low levels of pesticides, semi-volatile organic compounds (SVOCs), and other metals. PCB Aroclor-1260 was detected in 58 of 61 surface soil samples collected at concentrations ranging from 0.14 mg/kg to 19 mg/kg. Lead concentrations detected in surface soil samples ranged from 5 mg/kg to 1,350 mg/kg. The occurrence of PCB in surface soils was sporadic and does not appear to be related to a point source. The most likely source of the PCBs is past weed control practices.

## 3.0 SAMPLING PLAN

This section describes the objectives of the investigation, sampling locations, and sample analysis at Site 15 performed under this CTO.

## 3.1 SAMPLING OBJECTIVES AND APPROACH

The objective of the sampling program is to delineate the extent of PCBs and lead in surface soil at Site 15. Surface soil sampling will be conducted in two phases in which initial field screening samples will be collected and analyzed for PCBs in the field to estimate the extent of PCBs in surface soil. Based upon results from previous investigations and from the field screening samples, final confirmation samples will be collected to confirm the lateral extent of PCBs and lead in surface soil. The final confirmation samples will be submitted to NATEX, Mid-Pacific Environmental Laboratory, Inc. (Mid-Pacific) in Mountain View, California, a Navy CLEAN approved lab, and analyzed for SVOCs, pesticides/PCBs, and metals. It is assumed that all soil sampling will be performed in Level D personal protective equipment (PPE) with provisions for upgrading to Level C based on dust monitoring. The revised health and safety plan (HSP) from the draft NAS Alameda RI/FS work plan addendum, dated September 29, 1993, will be followed for the field investigation at Site 15 (PRC/Montgomery Watson 1993b).

## 3.2 SAMPLE LOCATIONS AND COLLECTION

**Field Screening Soil Sampling.** The PRC team will collect 42 surface soil samples from Site 15 in a gridded pattern as shown on Figure 3. Soils for analysis will be taken from the surface to a depth of 6 inches bgs using a hand auger equipped with stainless steel sleeves. Field screening soil samples will be immediately extracted from the most undisturbed portion (bottom) of the stainless steel sleeves for performing the PCB field test as described in Section 3.3. The PCB field test requires 5.0 grams of soil per test sample. Sample identification of the field screening samples is listed in Table 1. Sample holes will be filled to grade with the removed soil. Sample holes located in paved surfaces will be cold-patched.

The sampling grid developed was based on previous investigation sampling and analyses and the PRC team's understanding of the site history and operations. However, recent activities at this site may have altered the lateral distribution of PCBs in surface soil. If the results of the field screening samples indicate that modifications of the sampling grid are required, the proposed modifications will be discussed with the Navy and regulatory agencies.

**TABLE 1**

**SAMPLE IDENTIFICATION NUMBERS**
**NAS ALAMEDA RI/FS**
**SITE 15**
**FIELD INVESTIGATION WORK PLAN**

| Sample Type | Laboratory ID | Field ID | Analyte | SVOC | PCB | Pest/ PCB | Metals |
|---|---|---|---|---|---|---|---|
| | | | Method | CLP | Field Test Kit | CLP | CLP |
| Field Screening Samples | NA | S15 - S1 | | | X | | |
| | NA | S15 - S2 | | | X | | |
| | NA | S15 - S3 | | | X | | |
| | NA | S15 - S4 | | | X | | |
| | NA | S15 - S5 | | | X | | |
| | NA | S15 - S6 | | | X | | |
| | NA | S15 - S7 | | | X | | |
| | NA | S15 - S8 | | | X | | |
| | NA | S15 - S9 | | | X | | |
| | NA | S15 - S10 | | | X | | |
| | NA | S15 - S11 | | | X | | |
| | NA | S15 - S12 | | | X | | |
| | NA | S15 - S13 | | | X | | |
| | NA | S15 - S14 | | | X | | |
| | NA | S15 - S15 | | | X | | |
| | NA | S15 - S16 | | | X | | |
| | NA | S15 - S17 | | | X | | |
| | NA | S15 - S18 | | | X | | |
| | NA | S15 - S19 | | | X | | |
| | NA | S15 - S20 | | | X | | |
| | NA | S15 - S21 | | | X | | |
| | NA | S15 - S22 | | | X | | |
| | NA | S15 - S23 | | | X | | |
| | NA | S15 - S24 | | | X | | |
| | NA | S15 - S25 | | | X | | |
| | NA | S15 - S26 | | | X | | |
| | NA | S15 - S27 | | | X | | |
| | NA | S15 - S28 | | | X | | |
| | NA | S15 - S29 | | | X | | |
| | NA | S15 - S30 | | | X | | |
| | NA | S15 - S31 | | | X | | |
| | NA | S15 - S32 | | | X | | |
| | NA | S15 - S33 | | | X | | |
| | NA | S15 - S34 | | | X | | |
| | NA | S15 - S35 | | | X | | |

## TABLE 1

## SAMPLE IDENTIFICATION NUMBERS
## NAS ALAMEDA RI/FS
## SITE 15
## FIELD INVESTIGATION WORK PLAN
## (Continued)

| | | | Analyte | SVOC | PCB | Pest/ PCB | Metals |
|---|---|---|---|---|---|---|---|
| Sample Type | Laboratory ID | Field ID | Method | CLP | Field Test Kit | CLP | CLP |
| | NA | S15 - S36 | | | X | | |
| | NA | S15 - S37 | | | X | | |
| | NA | S15 - S38 | | | X | | |
| | NA | S15 - S39 | | | X | | |
| | NA | S15 - S40 | | | X | | |
| | NA | S15 - S41 | | | X | | |
| | NA | S15 - S42 | | | X | | |
| Final | CTO-S15-001 | S15-56 | | X | | X | X |
| Confirmation | CTO-S15-002 | S15-57 | | X | | X | X |
| Samples | CTO-S15-003 | S15-58 | | X | | X | X |
| | CTO-S15-004 | S15-59 | | X | | X | X |
| | CTO-S15-005 | S15-60 | | X | | X | X |
| | CTO-S15-006 | S15-61 | | X | | X | X |
| | CTO-S15-007 | S15-62 | | X | | X | X |
| | CTO-S15-008 | S15-63 | | X | | X | X |
| | CTO-S15-009 | S15-64 | | X | | X | X |
| | CTO-S15-010 | S15-64-Dup | | X | | X | X |
| | CTO-S15-011 | S15-65 | | X | | X | X |
| | CTO-S15-012 | S15-66 | | X | | X | X |
| | CTO-S15-013 | S15-67 | | X | | X | X |
| | CTO-S15-014 | S15-68 | | X | | X | X |
| | CTO-S15-015 | S15-69 | | X | | X | X |
| | CTO-S15-016 | S15-70 | | X | | X | X |
| | CTO-S15-017 | S15-71 | | X | | X | X |
| | CTO-S15-018 | S15-71-Dup | | X | | X | X |
| Equipment | CTO-S15-019 | S15-ER-01 | | X | | X | X |
| Rinsates | CTO-S15-020 | S15-ER-02 | | X | | X | X |

Notes:
Field Screening Soil Samples - Analyzed using EnviroGard PCB Test Kit
LP - Contract Laboratory Program
NA - Not Applicable

**Final Confirmation Soil Sampling.** Based upon the results from previous investigations and from the field screening samples, the PRC team will collect final confirmation soil samples to confirm the extent of PCB and lead contamination in surface soil. The final confirmation soil samples will be collected from the surface to a depth of 6 inches bgs using a hand auger equipped with stainless steel sleeves. The stainless steel sleeves will be immediately sealed with Teflon sheets and plastic end caps and the end caps will be secured with silicone tape. Each sample will be labeled in the field with a unique identification number (Table 1). It is assumed that no more than 16 final confirmation samples and 2 duplicate samples will be collected, based upon the assumption that half of the total number of samples collected at the outer limit of the sampling grid (Figure 3) would be final confirmation samples. Actual sample locations of the 18 soil samples will be based on the field screening soil sample results. Upon completion of soil sampling, all surface sample locations will be filled to grade with the removed soil or cold-patched and staked with metal flags. All surface sample locations will be surveyed later by a California-registered surveyor using the State Plane Coordinate System.

## 3.3 SAMPLE ANALYSIS

Field screening soil samples will be analyzed for PCBs using EnviroGard™ PCB test kits. Procedures for preparing the sample, performing the test, and interpreting the results are outlined in Appendix A. Results of the field screening will be used to delineate the extent of surface soil contamination and to identify locations for final confirmation sampling.

Final confirmation samples will be submitted immediately to a Mid-Pacific laboratory and analyzed for SVOCs, pesticides/PCBs, and metals using Contract Laboratory Program (CLP) protocol. Data deliverables will fulfill Level D requirements (Naval Energy and Environmental Support Activity [NEESA] 1988).

## 3.4 DECONTAMINATION

The purpose of decontamination during sampling tasks is to prevent cross-contamination between sample locations. Before each use, sampling equipment (one hand auger) will be cleaned by washing with a non-phosphate detergent such as Liquinox or its equivalent. The detergent will be removed

with a tap water rinse followed by two purified water rinses. Cleaned equipment will be allowed to air-dry away from the sampling area to reduce cross-contamination. Pre-cleaned stainless steel sleeves and plastic end caps will be used for this project. At the end of each final confirmation sampling day, an equipment rinsate will be collected and submitted to Mid-Pacific and analyzed for CLP SVOCs, CLP pesticides/PCBs, and CLP metals. Because no more than two days of final confirmation sampling are projected, it is assumed that no more than two equipment rinsate samples will be collected and submitted to the lab for analyses. Decontamination fluids will be stored in a 55-gallon drum, sampled, and analyzed.

## 4.0 INVESTIGATION-DERIVED WASTE MANAGEMENT AND DISPOSAL

The PRC team will plan and coordinate the disposal of all investigation-derived waste (IDW) generated during the field effort within 90 days in accordance with federal, state, and local regulations. IDW will consist of residual soils from the field screening samples, decontamination water, and PPE and will be collected in separate 55-gallon drums. Results of the chemical analyses performed on the decontamination water sample will be submitted to the Navy Public Works Center to obtain approval for discharging the decontamination water to the Building 5 industrial wastewater treatment plant. A composite soil sample will be collected from the residual soils drum and will be submitted along with the final confirmation soil sampling results to a Class I facility for waste profiling. Residual soils and PPE will be disposed of in a Class I landfill.

## 5.0 RESPONSE TO COMMENTS ON DRAFT FIELD INVESTIGATION WORK PLAN

This section presents the Navy's response to comments received from the State of California Environmental Protection Agency Department of Toxic Substances Control (DTSC), State of California Department of Fish and Game (F&G), and Community Advisory Committee (CAC) in letters dated January 6, 1994, December 14, 1993, and December 16, 1993, respectively. DTSC's comments included the Regional Water Quality Control Board (RWQCB) - San Francisco Bay Region comments sent to DTSC in a letter dated January 5, 1994. The DTSC, RWQCB, F&G, and CAC comments are presented verbatim in bold typeface. The Navy responses are in normal typeface.

## DTSC AND RWQCB COMMENTS

GENERAL COMMENTS

**Comment No. 1:**

**The purpose of the work plan is to establish procedures for identifying the lateral extent of PCB contamination at the site. Currently, the objective of the remedial action is to remove PCB contaminated soil. Lead is also a soil contaminant at Site 15. If the objective of the remedial action is to address all known contaminants of concern at Site 15, the Field Investigation Work Plan should address lead contamination. Unlike PCBs, lead contamination exists near Buildings 301 and 283, and the former Building 389. Therefore, the investigation of lead contamination should be directed at finding out the southern and western extent of lead contaminated soil.**

Response to Comment:

The final field investigation work plan will be revised to identify the objective of the sampling program as further delineating the extent of PCBs and lead in soil at Site 15. The draft field investigation work plan proposes that 18 final confirmation samples be submitted to the laboratory for PCBs/pesticides, SVOCs and metals (including lead) analysis. Based on the verbal comments from DTSC on December 22, 1993, during the telephone conference among the Navy, U.S. Environmental Protection Agency, DTSC, RWQCB, PRC Environmental Management, Inc. and Montgomery Watson, samples will be selected for analysis to adequately characterize the southern and western extent of lead contaminated soil at Site 15.

**Comment No. 2:**

**On December 20, 1993, the DTSC sent a letter to the Navy requesting NAS Alameda to use detection limits lower than those found in the U.S. EPA, Contract Laboratory Program (CLP). The new requested detection limit for lead is .05 ppm. The CLP Contract Required Quantitation Limit of PCB, Aroclor-1260 is 33 ppb. This quantitation limit is appropriate for PCB confirmation sample analysis.**

Response to Comment:

The quantitation limit issue will be addressed in a position paper prepared by the Navy. The position paper is presently in internal Navy review. At other Navy installations, a quantitation limit of 0.5 ppm lead has been proposed. It is assumed that the 0.05 ppm lead is a misprint. If, however, the new requested quantitation limit is 0.05 ppm lead, the Navy requests DTSC provide written justification and references for this limit.

**Comment No. 3:** **Additional field sampling may be necessary if this field investigation does not fully characterize the extent of PCB contamination, or lead contamination if lead is included in the Interim Remedial Action.**

Response to Comment: The Navy believes that the proposed field sampling will be sufficient to delineate the extent of PCBs and lead in soil that requires remediation. If the field investigation results indicate that additional sampling is required for delineation, additional sampling will be performed prior to implementing the removal action. Upon completion of the removal action, final confirmation sampling will be conducted to characterize the residual PCB and lead concentrations in soil. A sampling plan will be prepared for the final confirmation sampling and will be submitted to DTSC for review and comments. The final confirmation sampling will provide sufficient characterization for the remedial investigation/ feasibility study (RI/FS) evaluation to be performed.

## F&G COMMENTS

GENERAL COMMENTS

**Comment No. 1:** **The document indicates that the site is being evaluated for PCBs in surficial soils around buildings 301 and 389. The document indicates "approximately 200 to 400 gallons of PCB oil contained in transformers, were stored in Building 389," hydraulic fluids were stored in Building 301. The report does not indicate the type (i.e., PCB containing) nor amounts of fluid(s) were stored in Building 301. Can you provide that information? How was the amount of PCB oil estimated for building 389?**

Response to Comment: Existing information is insufficient for identifying the type or amounts of PCB fluids reportedly stored at Site 15. According to the Ecology and Environment, Inc. (E&E) "Initial Assessment of Naval Air Station, Alameda, California" report dated April 1983, transformers were stored on bare ground in the vicinity of Buildings 301 and 389. Furthermore, personnel familiar with site operations estimate that 200 to 400 gallons of PCB oil may have been present at any one time. The final field investigation work plan will be revised to reflect E&E's statements.

**Comment No. 2:** **The presence of PCBs in the immediate vicinity of one of California's most important sites for a fully protected species, the least tern, is a concern. Because of an existing problem with PCBs in San Francisco Bay's biota, we are anxious to identify and eliminate contributing sources of these chemicals at the earliest opportunity. The sampling scheme, as proposed, doesn't fully**

**address these concerns as it will only identify surficial materials. Presumably, if the surficial perimeter samples contain PCBs, additional samples will be taken to profile both the depth and areal distribution of those chemicals. We note that the sampling array does not extend to the northern boundary of NAS and into the Oakland Inner Harbor. If PCBs have been released into Oakland Inner Harbor, how will your sample screening detect this(ese) release(s)?**

Response to Comment:

The proposed locations are considered sufficient to delineate the areal extent of PCBs in soil requiring remediation. If results from these samples indicate elevated levels of PCBs, then additional surface soil samples will be collected to complete the delineation. Upon completion of the interim removal action, confirmation sampling will be conducted to characterize the residual PCB concentration in vadose zone soil. Results of the confirmation sampling will be used for the human health and environmental risk assessment. Results of previous investigations presented in the "Data Summary Report, RI/FS Phases 2B and 3, Volume 1 of 2," dated October 27, 1992, indicate that the vertical extent of PCBs in soil requiring remediation is limited to less than 2.0 feet below ground surface. A total of 55 surface locations were sampled and 14 subsurface soil samples collected at Site 15. Surface samples were collected at a depth of 0.0 feet below ground surface. Subsurface samples were collected at depth intervals of 2.0, 8.0, and 14.0 feet below ground surface. PCBs were not detected in soil samples collected at depths greater than or equal to 2.0 feet below ground surface. The Navy believes that PCBs have not been released laterally in surface soil or within soil to the Oakland Inner Harbor because an elevated berm exists between the site and the Oakland Inner Harbor and PCBs have not been detected in the groundwater at this site.

SPECIFIC COMMENTS

**Comment No. 1:**

**We note that the IR report found PCB-Aroclor 1260 in almost all surface soil samples in concentrations ranging from 140 µg/kg to 19,000 µg/kg. It is indicated that there was no pattern to the PCB occurrence and "didn't appear to be related to a point source." The most likely source of the detected compound was stated to be from past pest control practice (Page 3). Please describe the pest control practice(s) and the permitting requirements under which the PCBs were applied. Were these chemicals registered for agricultural pesticide use?**

Response to Comment:

The draft field investigation work plan incorrectly states that the most likely source of the detected PCBs is past pest control practices. This sentence will be corrected in the final field investigation work plan to state that the most likely source of the detected PCBs is past weed

control practices. At present, no information is available to indicate whether permits or registrations were obtained for past usage of the PCB oil for weed control.

**Comment No. 2:**

**The plan to take 42 surficial soil samples is of value to determine the surface distribution of PCB release(s) (Page 4). It is not adequate to determine the depth of contamination for purposes of taking removal actions. Did PCBs migrate to ground waters and/or move laterally in the surface or within soil to the Oakland Inner Harbor waters and sediment (Site 20)?**

Response to Comment:

The objective of the sampling program is to delineate the extent of PCBs and lead in surface soil at Site 15 for purposes of conducting a removal action to reduce the potential for PCBs and lead to impact the groundwater and mitigate potential exposure to human health and the environment. Based on analytical results from previous investigations, as reported in "Data Summary Report, RI/FS Phases 2B and 3, Volume 1 of 2," dated October 27, 1992, PCBs and lead were detected in surface soils. At depths greater than or equal to 2.0 feet below ground surface (bgs), PCBs were not detected and lead was detected at concentrations less than 10 milligrams per kilogram (mg/kg). Furthermore, PCBs and lead were not detected in the groundwater. The average depth to groundwater was 3.7 feet below ground surface and ranged from 2.5 to 5.2 feet below ground surface. The Navy believes that PCBs and lead have not been released laterally in surface soil or within soil to the Oakland Inner Harbor because an elevated berm exists between the site and the Oakland Inner Harbor and PCBs and lead have not been detected in the groundwater at this site.

**Comment No. 3:**

**The report indicates "recent activities at this site may have altered the lateral distribution of PCBs in surface soil" (Page 4). Please describe the activities and how they may have altered PCB distributions. We are particularly interested in how this activity may have, or is affecting, least terns as well as their potential introduction(s) to the Oakland Inner Harbor.**

Response to Comment:

The recent activity was the storage of private vehicles belonging to sailors from the U.S.S. Abraham Lincoln in an area where PCB contamination had been found in surface soil samples. The vehicles may have altered the PCB distribution in the surface soil by being moved around on site. The Navy decontaminated the vehicles by washing the tires and undersides of the vehicles on a metal washrack with a water hose and moved them to a clean location between December 15 and 17, 1993. At present, we do not believe that this activity impacted the least terns and their potential introduction(s) to the Oakland Inner Harbor because the least terns are located at least 3,500 feet south of Site 15, across Runway 7-25 and several taxiways.

The recent activities at Site 15 did not include any vehicle traffic to or near the vicinity of the least terns.

**Comment No. 4:** **The review document appears to be missing pages 2, 4, 6, and 8 (Appendix A). Please renumber the pages sequentially or forward the missing pages.**

Response to Comment: Pages 2, 4, and 6 of Appendix A were inadvertently not included in the draft field investigation work plan. Appendix A includes a total of 11 pages. A complete Appendix A will be incorporated in the final field investigation work plan.

**Comment No. 5:** **The "EnviroGard" test is standardized using Aroclor 1248. The SOP indicates the correlation slope will depend upon the PCB (aroclor) measured. What is the correlation between non-Aroclor 1248 and standard calibrator (Page 7 of Appendix A)?**

Response to Comment: Page 6 of the EnviroGard SOP states:

> For Aroclors 1242, 1016, 1248, and 1254, the confidence interval for negative samples (negative samples are the soil samples tested, positive samples are the 1, 5, 10 and 50 ppm PCB calibrator samples) (i.e. $\leq$ 1 ppm, $\leq$ 5 ppm, $\leq$ 10 ppm, and $\leq$ 50 ppm) exceeds 99%. For Aroclor 1260 the confidence interval is smaller, but still exceeds 95%.
>
> The EnviroGard kit can be used to quantitate PCB levels only if the contaminating Aroclor is known and only if the assay is standardized using the corresponding PCB mixture. If the contaminating Aroclor is not known, or the assay is standardized using a different PCB mixture, the EnviroGard kit can only be used as a screening test.

In this investigation, the EnviroGard kit will be used as a screening tool to select soil samples for laboratory PCB analysis. Therefore, the use of the EnviroGard kit during this sampling event will not compromise the objectives and results of the sampling.

## CAC COMMENTS

GENERAL COMMENTS

**Comment No. 1:** **The data deliverables from the lab (NATEX, Mid-Pacific Environmental Laboratory in Mountain View) are described on page 5 as fulfilling "Level D" requirements. Does this mean**

**wrapping gc stripcharts in tyvek? Please confirm that analysis includes identification by PCB congener. In general, statement of relevant factors from the CLP protocols is helpful. These procedures are not currently present in the public repository or elsewhere in the public library system in the bay area or EPA Region IX.**

Response to Comment:

"Level D" data deliverable requirements are explained in "Sampling and Chemical Analysis, Quality Assurance Requirements for the Navy Installation Restoration Program," Document Number NEESA 20.2-047B, Second Revision June, 1988, and will be made available at the Alameda main library public repository. Laboratory analysis includes identification of Aroclors 1016, 1221, 1232, 1242, 1248, 1254 and 1260 following EPA CLP guidelines. These compounds will be identified in laboratory reports for each sample. The CLP protocols are described in "Statement of Work for Inorganic Analyses Multi-Media Multi-Concentration, USEPA Contract Laboratory Program OLM01.0, December 1990," and "Statement of Work for Organic Analyses Multi-Media Multi-Concentration, USEPA Contract Laboratory Program OLM02.0, December 1990." These documents should be available from the USEPA Region IX.

SPECIFIC COMMENTS

**Comment No. 1:**

**...it is unclear what the expected uncertainty is in the (site screening test) procedure. The procedure for interpreting the results (page 4) refers to Appendix A. ...pages 2, 4, 6 (of Appendix A) are omitted. It would be helpful to know whether the difference between calibrator standard and actual concentrations reflect the statistical estimate of 99% probability of less PCB given on page 1 of Appendix A and whether this probability applies to Aroclor 1260 as well as Aroclor 1248.**

Response to Comment:

Performance characteristics of the EnviroGard PCB Test Kit are stated as follows:

> The sensitivity of the PCB field test kit is sufficient to perform the test at each calibrator level with 99 percent confidence. The minimum reliable detection limit for the EnviroGard PCB Test Kit is 3.3 ppm in soil for the standard protocol and 0.5 ppm in soil for the high sensitivity protocol. This is the lowest concentration of PCB in soil that is differentiated 99 percent of the time from zero. The sensitivity of the assay also depends on the specific Aroclor that is measured.

The PCB antibody used in the test kit binds to different Aroclors with different affinities. The test specificity is restricted to PCBs. The test response to Aroclors 1016, 1242, 1254 and 1260 is within twofold of the response for Aroclor 1248. The calibrator levels are adjusted to detect the specified Aroclors with 95 percent confidence that there will be no false negatives.

A complete Appendix A will be incorporated in the final field investigation work plan.

**Comment No. 2:**

**Although incubation usually refers to a 37C water bath, this is not specified in the available appendix pages. Also the wavelength for the spectrophotometer is not given. Please confirm where the tests will be conducted to allow the quantitative, if approximate, comparison rather than by the "visual inspection". The stability of the chromophore and the frequency response of various congeners would also be helpful in estimating the limits of the procedure.**

Response to Comment:

The term "incubation" refers to time and not temperature when using an enzyme immunoassay. The wavelength for the spectrophotometer is 450 nanometers. All field screening tests will be conducted to allow quantitative comparison rather than "visual inspection." The shelf life of the Millipore PCB Test Kit is 15 months under proper refrigeration. Information regarding cross-reactivity of various congeners is attached.

## REFERENCES


Canonie Environmental. 1990. "Sampling Plan, Remedial Investigation/Feasibility Study Naval Air Station Alameda, California, Volume I." Prepared for NAVY-WESTDIV. February 12, 1990.

Ecology and Environment, Inc. 1983. "Initial Assessment Study of Naval Air Station, Alameda, California." NEESA 13-014. April 1983.

Naval Energy and Environmental Support Activity (NEESA). 1988. "Sampling and Chemical Analysis, Quality Assurance Requirements for the Navy Installation Restoration Program." Document Number 20.2-047B. Second Revision, June 1988.

PRC Environmental Management, Inc. (PRC) and James M. Montgomery, Consulting Engineers [JMM]. 1992. "NAS Alameda, Alameda, California, Data Summary Report RI/FS Phases 2B and 3 Final." Prepared for Navy WESTDIV. October 27, 1992.

PRC and Montgomery Watson (formerly JMM). 1993a. "Follow-on Field Sampling Plan, Remedial Investigation/Feasibility Study, Phases 2B and 3 (Draft Final), Naval Air Station Alameda." Prepared for Navy WESTDIV. September 28, 1993.

PRC and Montgomery Watson. 1993b. "Remedial Investigation/Feasibility Study Work Plan Addendum (Draft), Naval Air Station Alameda." Prepared for Navy WESTDIV. September 29, 1993.

Wahler Associates, 1985. "Draft Report, Verification Step, Confirmation Study." Prepared for Western Division Naval Facilities Engineering Command. May 1985.

# APPENDIX A

# ENVIROGARD PCB TEST KIT INSTRUCTIONS

MILLIPORE

# EnviroGard™ PCB Test Kit

ENVR 000 09 (with PCB calibrators)
ENVR 0NC 09 (without PCB calibrators)

## Intended Use

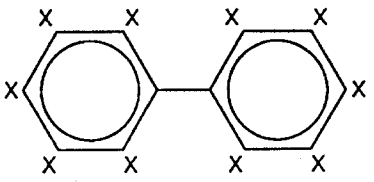
The Millipore EnviroGard PCB Test Kit is an enzyme immunoassay for the detection of a range of polychlorinated biphenyls (PCB) in soil, to include Aroclors 1016, 1242, 1248, 1254, and 1260. The EnviroGard PCB Test Kit allows for reliable and rapid screening for PCB in soils at specified action levels within the following sensitivity ranges:

- 5, 10, 50 part per million (ppm) (standard range)
- 1, 5, 10 ppm (high sensitivity range)

NOTE: If you use the EnviroGard PCB test kit without calibrators (ENVR 0NC 09), modify the directions according to the calibrator or standards in use.

## Test Summary and Explanation

PCBs are a family of compounds with the following general structure.




where X = Hydrogen (H) or Chlorine (Cl)

There are 209 individual forms (or congeners) containing from 1–10 chlorine atoms on the biphenyl structure shown. PCBs were originally sold in the U.S.A. under the trade name Aroclor. Each Aroclor is composed of many congeners. Many Congeners may appear in more than one Aroclor. Aroclors are differentiated on the basis of average chlorine content (percent chlorine by weight). Aroclor nomenclature, the last two digits of the four digit label indicate this percentage. For example, Aroclor 1248 is approximately 48% chlorine by weight. The sole exception to this rule, Aroclor 1016, is similar in total chlorine content to Aroclor 1242, but contains a different congener distribution.

NOTE: Refer to the section "Results Interpretation" and "Specificity" for more information on Aroclors.

The EnviroGard PCB Test Kit employs an antibody against PCB that is coated onto 12 X 75 millimeter (mm) polystyrene test tubes. The method is based on the principles of competitive immunoassay, where the absorbance signal (optical density) of the final reaction mixture is inversely proportional to the concentration of analyte (PCB) present in the original sample. A soil sample that generates a signal greater than the signal of the PCB assay calibrator (e.g., 50 ppm) has a 99% probability of containing less PCB than the specified assay calibrator (e.g., < 50 ppm).

## Test Principles

PCBs present in soil extracts and assay calibrators are bound during the first incubation by the anti-PCB antibodies, which have been adsorbed onto the test tubes. After you decant the sample and wash test tubes, a peroxidase-PCB conjugate is added.

NOTE: The amount of conjugate that is bound (by unoccupied anti-PCB antibody binding sites in the test tube) is inversely proportional to the amount of PCB that was originally present in the sample.

After at 15-minute incubation, unbound conjugate is decanted and the test tubes are washed again. Finally, a solution that contains a chromogenic peroxidase substrate is added to the test tubes.

NOTE: Color development is directly proportional to enzyme concentration and inversely proportional to PCB concentration in the original sample in the test tubes.

## Test Principles, Continued

The determination of PCB level in unknown samples is interpreted relative to standard assay calibrator levels (e.g., 1, 5, 10, 50 ppm) or Aroclor standards, using visual comparison or reading by a spectrophotometer.

## Precautions

- Treat PCBs, solutions that contain PCBs, and potentially contaminated soil samples as hazardous materials.
- Use gloves, proper protective clothing, and means to contain and handle hazardous material where appropriate.
- Obtain (if appropriate) permits pertaining to the handling, analysis and transport of PCB-containing materials.

Store all test kit components at 4 degrees Celsius (°C) to 8°C (39 degrees Fahrenheit (°F) to 46°F) when not in use. Storage at ambient temperature (18°C to 27°C or 64°F to 81°F) on the day of use is acceptable.

- Do not freeze test kit components or expose them to temperatures greater than 37°C (99°F).
- Allow all reagents to reach ambient temperature (18°C to 27°C or 64°F to 81°F) before beginning the test. This typically requires at least 30 minutes to warm from recommended storage conditions.
- Do not use test kit components after the expiration date.
- Do not use reagents or test tubes from one test kit with reagents or test tubes from a different test kit.
- Use approved methodologies to confirm any positive results.
- Distribution of PCB in soils may be highly variable and can be minimized through use of a composite sampling technique. Adequate sample number and distribution are the responsibility of the analyst.

## Materials Provided

- 20 PCB antibody-coated, 12 mm X 75 mm polystyrene test tubes
- 15 milliliter (mL) Assay Diluent
- 0.5 mL Negative Control (Methanol)
- 5.0 mL PCB-Enzyme Conjugate
- 15 mL Chromogenic Substrate
- 15 mL Stop Solution
- 20-Place test tube rack
- 22 Pre-assembled 1–25 µL Gilson Microman® positive displacement pipette tips
- 4 PCB positive assay calibrators:

  0.5 mL 1.0 ppm calibrator
  0.5 mL 5.0 ppm calibrator
  0.5 mL 10 ppm calibrator
  0.5 mL 50 ppm calibrator

NOTE: The PCB positive assay calibrators reflect the actual PCB (Aroclor) concentrations provided. See "Calibrator Concentration" for the actual PCB concentrations.

## Materials You Supply

See "Ordering Information" for the appropriate catalogue numbers. To order refer to the "Technical Assistance" section for the phone numbers of the nearest Millipore office.

### Methanol

Methanol (60 mL for 12 samples) is required for soil extractions.

### iroGard Soil Extraction Kit

Use this kit for the extraction of PCB from soil samples. This kit contains the following items to test 12 samples:

- 12 Polypropylene bottles with screw caps, 30 mL (each bottle contains five stainless steel mixing beads)
- 12 Filtration devices, comprised of 12 upper (filter unit) and lower (sample tube) units
- 15 Wooden spatulas
- 12 Screw top glass storage vials, 4 mL
- 15 Weigh boats

### EnviroGard Soil Field Lab
*(Starter Accessory Kit)*

This kit contains the following items:

- 1 Positive displacement precision pipettor, adjustable (2-250 microliters [µL])
- 1 Eppendorf™ Repeater® pipettor
- 1 Electronic timer
- 13 Polystyrene test tubes, 12 mm X 75 mm (for blanking the spectrophotometer and dilutions)
- 1 Portable balance with a 100 gram (g) calibrator weight
- 1 Wash bottle, 500 mL
- 4 Six-position test tube racks
- 100 1–25 µL Positive displacement pipette tips (yellow), non-preassembled
- 100 50–250 µL Positive displacement pipette tips (pink), non-preassembled
- 8 5.0 mL Pipette tips for the Repeater pipettor, (for 0.1 mL and 0.5 mL dispensing volumes)
- 4 12.5 mL Pipette tips for the Repeater pipettor, (for 0.25 mL and 1.250 mL dispensing volumes)
- 1 50 mL Pipette tip for the Repeater pipettor (for 1.0 mL and 5.0 mL dispensing volumes)

NOTE: Order replacement pipettors and tips separately. See the "Ordering Information" section.

### Millipore Differential Photometer

The Millipore Differential Photometer allows you to measure results in the form of optical density values. These values can be used for objective record keeping, quality assurance, or quantitative determination of sample concentrations from an Aroclor standard curve. See "Ordering Information" for the catalogue number.

### Other

- Tap or distilled water for test tubes washes

## Materials Suggested but Not Required

- Protective clothing (e.g., latex gloves)
- Absorbent paper for blotting test tubes
- Liquid and solid waste containers

## Assay Procedure

### Collect/Store the Sample

The following steps explain how to properly collect and store your samples.

1. Collect soil in appropriately-sized and labeled containers.

   NOTE: Take care to remove excess twigs, organic matter, and rocks or pebbles from the soil sample to be tested.

2. Soils obtained from areas adjacent to standing water, surface soils collected during or immediately after rain or snow, or any soils with relatively high

## llect/Store the Sample, Continued

amounts of water (≥ 30% by weight) should be dried before testing.

NOTE: Contact technical service for recommended methods.

3. Store soil samples at 4°C (39°F) or room temperature for up to 1 month. Recommended soil storage for EPA method 8080 (gas chromatography [GC] analysis of PCBs in soil) is at 4°C (39°F).

## Prepare the Sample/Extract the Soil

Refer to the *EnviroGard Field Soil Extraction* product insert.

The following steps explain how to weigh your samples using a portable balance.

1. Use the portable balance, wooden spatula, and a weigh boat to measure out 5.0 g of soil:
2. Place the balance on a level surface and press ON/MEMORY.
3. Place the weigh boat on the balance and press TARE.
4. Weigh the soil.
5. Transfer the 5.0 g of soil into a labeled, 30 mL polypropylene bottle.

NOTE: If you are testing more than one soil sample, cap the vial loosely and repeat steps 1 and 2 until all soil samples are weighed out. Use a clean weigh boat for each sample.

6. Position the Repeater pipettor at Setting **5** and use a **50** mL pipette tip to pipette 5.0 mL of Methanol into each soil sample.
7. Cap all vials tightly and shake vigorously for approximately two minutes. Let the contents settle briefly.

Pour the liquid contents of each bottle into the labeled, lower (sample tube) piece of the filter base unit. To obtain optimal filtering efficiency, do not let more than one or two mixing beads slip into the filter device.

NOTE: When extracting clay samples, it is possible that the sample will soak up all of the methanol, leaving little or no excess liquid to decant. You should add an additional 5.0 mL of methanol to the sample and shake vigorously for an additional 1–2 minutes. Continue on to step 9. Make sure to factor the dilution into the calculations. See the "Results Interpretation" section.

9. Insert the plunger into the filter base unit.
10. Push down on the plunger. After 30–60 seconds, push down on the plunger again.
11. For longer term or spill-safe storage, remove the cap from the plunger and carefully pour the sample extract into an appropriately-labeled 4.0 mL glass storage vial and cap. Repeat this step for each of the sample extracts.

## Perform the Test

The PCB Test Kit can be performed in either of the two following ranges:

| Standard Protocol | High Sensitivity Protocol |
|---|---|
| For PCB analyses in the 5.0-50 ppm range, use a 5.0 microliter( µL) volume sample and the appropriate calibrators (5, 10, 50 ppm). | For PCB analyses in the 1.0-10 ppm range, use a 25 µL volume sample and the appropriate calibrators (1, 5, 10 ppm). |

NOTE: Allow all test kit components to come to ambient temperature before use.

Follow the appropriate steps and calibrators for your protocol.

1. Label the 12 mm X 75 mm test tubes (no more than 20 tubes/assay). You do not have to perform the assay in duplicate; however, doing so increases the precision of the test.

## orm the Test, Continued

| Standard Protocol | | High Sensitivity Protocol | |
|---|---|---|---|
| Tube Label | Tube Contents | Tube Label | Tube Contents |
| NC | Negative Control | NC | Negative Control |
| 5 ppm | 5 ppm PCB calibrator | 1 ppm | 1 ppm PCB calibrator |
| 10 ppm | 10 ppm PCB calibrator | 5 ppm | 5 ppm PCB calibrator |
| 50 ppm | 50 ppm PCB calibrator | 10 ppm | 10 ppm PCB calibrator |
| | Sample 1 | S1 | Sample 1 |
| S2 | Sample 2 | S2 | Sample 2 |

NOTE: The negative control is an optional control for assay quality control purposes.

2. Place the test tubes in the test tube rack pressing down firmly on each tube so that they are secured

**CAUTION:** Do not "snap" the test tubes into the rack as this may result in a cracked tube.

3. Position the Repeater pipettor at Setting **2** and use the **12.5 mL** syringe to add **500** µL of Assay Diluent to all test tubes.

4. Attach a clean yellow pipette tip to the positive displacement pipet and adjust the dial to **"250"** to pipet 25 µL or **"050"** to pipet 5 µL.

5. Use the positive displacement pipettor, to add the Negative Control (methanol) and the appropriate calibrator to the corresponding test tubes as follows:

| Standard Protocol | | High Sensitivity | |
|---|---|---|---|
| Calibrator | Volume Added | Calibrator | Volume Added |
| Neg. control | 5 µL | Neg. control | 25 µL |
| 5 ppm | 5 µL | 1 ppm | 25 µL |
| 10 ppm | 5 µL | 5 ppm | 25 µL |
| 50 ppm | 5 µL | 10 ppm | 25 µL |

**CAUTION:** Replace the cap(s) on the calibrator vials immediately after use to minimize evaporation.

6. Briefly shake the test tube rack to mix, then incubate for 15 minutes.

7. Vigorously shake out the test tube contents into a sink or suitable container. Fill the test tubes to overflowing with cool tap or distilled water, then decant and vigorously shake out the remaining water.

8. Repeat this wash step three more times, being certain to shake out as much water as possible on each wash. After the final wash, remove as much water as possible by tapping the inverted tubes on absorbent paper.

9. Position the Repeater pipettor at Setting **2** and use the **5 mL** syringe to add 200 µL of the PCB enzyme-conjugate to all test tubes. Briefly shake the test tube rack to mix, then incubate for 5 minutes.

10. Vigorously shake out the test tube contents into a sink or suitable container. Fill the test tubes to overflowing with cool tap or distilled water, then decant and vigorously shake out the remaining water.

11. Repeat this wash step three more times, being certain to shake out as much water as possible on each wash. After the final wash, remove as much water as possible by tapping the inverted tubes on absorbent paper.

### form the Test, Continued

12. Position the Repeater pipettor at Setting **2** and use a clean **12.5 mL** syringe to add 500 µL of Substrate to all test tubes. Briefly shake the test tube rack to mix, then incubate for 5 minutes.

13. Position the Repeater pipettor at Setting **2** and use a **12.5 mL** syringe to add 500 µL of Stop Solution to all test tubes.

**▲ WARNING: Stop solution is 1.0 N hydrochloric acid. Handle carefully.**

14. Add 1.0 mL of Stop Solution to the blank test tube and insert the tube into the left well of the spectrophotometer. Dry the outside of each assay tube and measure the absorbance by placing each tube into the right well of the spectrophotometer. Record the absorbance of each tube.

NOTE: For more details refer to the Millipore Differential Photometer instructions (P17500). See the "References" section of this insert.

### Results Interpretation

- Samples with $OD_{450}$ values > $OD_{450}$ of the 1.0 ppm PCB calibrator contain *less* than 1.0 ppm PCB.

  Samples with $OD_{450}$ values ≤ $OD_{450}$ of the 1.0 ppm PCB calibrator may contain *more* than 1.0 ppm PCB.

- Samples with $OD_{450}$ values > $OD_{450}$ of the 5 ppm calibrator contain *less* than 5 ppm PCB.

  Samples with $OD_{450}$ values ≤ $OD_{450}$ of the 5 ppm calibrator *may* contain *more* than 5 ppm PCB.

- Samples with $OD_{450}$ values > $OD_{450}$ of the 10 ppm calibrator contain *less* than 10 ppm PCB.

  Samples with $OD_{450}$ values ≤ $OD_{450}$ of the 10 ppm calibrator *may* contain *more* than 10 ppm PCB.

  Samples with $OD_{450}$ values > $OD_{450}$ of the 50 ppm calibrator contain *less* than 50 ppm PCB.

  Samples with $OD_{450}$ values ≤ $OD_{450}$ of the 50 ppm calibrator *may* contain *more* than 50 ppm PCB.

Soil samples that were extracted with more than 1.0 mL of methanol per gram of soil (e.g., for clay samples) require a correction factor to interpret the results. Multiply each of the calibrator concentrations by the ratio of methanol (mL) to soil (grams).

### Example

If you use 10 mL of methanol to extract 5.0 g of soil, then the ratio of methanol to soil is "2" (10/5). The calibrator levels used for this soil would change to 10 ppm, 20 ppm, and 100 ppm (2 X 5 ppm, 10 ppm, and 50 ppm).

For Aroclors 1242, 1016, 1248, and 1254, the confidence interval for negative samples (i.e. ≤ 1 ppm, ≤ 5 ppm, ≤ 10 ppm, and ≤ 50 ppm) exceeds 99%. For Aroclor 1260 the confidence interval is smaller, but still exceeds 95%.

It is possible to analyze other Aroclors not previously described in this insert, including Aroclors 1221, 1232, 1262, and 1268. Sensitivities and confidence intervals may be different for each of these. Any such analysis would require calibration with the matching Aroclor. For more information, refer to the section, "Technical Assistance" for the number of the Millipore office nearest you.

## Performance Characteristics

### Sensitivity

The sensitivity is sufficient to perform the test at each calibrator level with 99% confidence. The minimum reliable detection limit for the EnviroGard PCB Test Kit is 3.3 ppm in soil for the standard protocol and 0.5 ppm in soil for the high sensitivity protocol. This is the lowest concentration of PCB in soil that is differentiated 99% of the time from zero. The sensitivity of the assay also depends on the specific Aroclor that is measured. Continue on to the "Specificity" section.

### Specificity

The PCB antibody in this kit binds to different Aroclors with different affinities. The test specificity is restricted to

### cificity, Continued

PCBs. The test response to Aroclors 1016, 1242, 1254, and 1260 is within twofold of the response for Aroclor 1248. The calibrator levels are adjusted to detect the specified Aroclors with 95% confidence that there will be no false negatives.

### Interfering Substances

The following substances were tested and found to have less than 0.5% weight-to-weight of the immunoreactivity of Aroclor 1248.

| | |
|---|---|
| 1,2-dichlorobenzene | 2,5-dichlorophenol |
| 1,3-dichlorobenzene | 2,4,5-trichlorophenol |
| 1,4-dichlorobenzene | 2,4,6-trichlorophenol |
| 1,2,4-trichlorobenzene | biphenyl |
| 2,4-dichlorophenol | pentachlorophenol (PCP) |

## Limitations of the Procedure

EnviroGard PCB Test Kit is a screening test *only*. Actual quantitation of PCBs by EnviroGard immunoassay is only possible if the contaminating Aroclor is known and if the assay is standardized using the corresponding PCB mixture.

Soil sampling error may significantly affect testing reliability. The distribution of PCBs in different soils can be extremely heterogeneous. You should homogenize soils thoroughly before analysis by any method. Split samples (e.g., for GC and immunoassay) should always come from the same homogenate.

To ensure accurate and reliable results, you should make every effort to perform the EnviroGard PCB Test at temperatures between 15°C (59°F) and 30°C (86°F).

## Expected Values for PCB- Contaminated Soils

Contaminated soils have PCB levels that correlate well (correlation coefficient [r] ~ 0.9) with GC values. The ...e of the correlation will depend on the contaminating Aroclor. Aroclor 1248-contaminated samples have a slope close to "1" since the EnviroGard PCB Test Kit is standardized using Aroclor 1248.

**CAUTION:** There is a sample size difference between the standard (5.0, 10, 50 ppm) and high sensitivity (1.0, 5.0, 10 ppm) PCB assay ranges. This differs only in the volume of calibrator or sample extract added at the beginning of the assay.

Use 5 µL when working with calibrators in the 5.0-50 ppm range. You can't achieve a 1.0 ppm sensitivity with this protocol. Use 25 µL when working with calibrators in the 1.0-10 ppm range.

If you work at 5.0 and 10 ppm action levels, use either a 5.0 µL or 25 µL volume, however, be sure to use the same sample size for calibrators and samples.

## Calibrator Concentrations

| Standard | Actual Concentration |
|---|---|
| 1.0 ppm calibrator | 0.5 ppm Aroclor 1248 |
| 5 ppm calibrator | 3.0 ppm Aroclor 1248 |
| 10 ppm calibrator | 5 ppm Aroclor 1248 |
| 50 ppm calibrator | 22.0 ppm Aroclor 1248 |

## Quality Control

If a blue color does not develop in the negative control test tube within 5 minutes after you add the substrate solution, the test is invalid and you must repeat the entire test.

## References

Data related to the EnviroGard PCB Test Kit is on file at Millipore Corporation. Refer to the section, "Technical Assistance," for the phone number of the nearest Millipore office.

## rdering Information

The following table lists descriptions and catalogue numbers for various EnviroGard PCB and soil extraction test kits and related products.

| Description | Catalogue Number |
|---|---|
| EnviroGard PCB Test Kit includes:<br>■ 22 Assembled positive displacement pipette tips<br>■ 20 PCB antibody-coated, 12 mm X 75 mm polystyrene test tubes<br>■ 15 mL Assay Diluent<br>■ 0.5 mL Negative Control (Methanol)<br>■ 0.5 mL 1.0 ppm PCB Calibrator<br>■ 0.5 mL 5 ppm PCB Calibrator<br>■ 0.5 mL 10 ppm PCB Calibrator<br>■ 0.5 mL 50 ppm PCB Calibrator<br>■ 5.0 mL PCB-Enzyme Conjugate<br>■ 15 mL Chromogenic Substrate<br>■ 15 mL Stop Solution (1.0 N Hydrochloric acid)<br>■ 20-Place test tube rack | ENVR 000 09 |
| EnviroGard Field Soil Extraction Kit includes the following items to text 12 samples:<br>■ 12 Polypropylene bottles with screw caps, 30 mL, each containing 3 stainless steel mixing beads<br>■ 12 Filtration devices, comprised of 12 upper (filter unit) and lower (sample tube) units<br>■ 15 Wooden spatulas<br>■ 12 Screw-top glass vials, 4 mL<br>■ 15 Weigh boats | ENSP 000 20 |

*Continued*

## Ordering Information, Continued

| Description | Catalogue Number |
|---|---|
| EnviroGard PCB in Soil Test Kit, shipping kit includes:<br>■ EnviroGard PCB Test Kit (ENVR 000 09)<br>■ EnviroGard Field Soil Extraction Kit (ENSP 000 20)<br>■ Methanol, 100 mL (ELCR 000 07) | ENVR 000 10 |
| Methanol for soil extraction, 100 mL bottle | ELCR 000 07 |
| EnviroGard PCB Soil Lab, Starter Accessory Kit for use with the EnviroGard PCB in Soil Test Kit, includes:<br>■ 1 Positive displacement precision pipettor, adjustable (2-250 µL)<br>■ 1 Eppendorf Repeater pipettor<br>1 Electronic timer<br>■ 13 Polystyrene test tubes, 12 mm X 75 mm (for blanking the spectrophotometer and dilutions)<br>■ 1 Portable balance with a 100 gram calibrator weight<br>■ 1 Wash bottle, 500 mL<br>■ 4 Test tube racks, six-position<br>■ 100 1–25 µL Positive displacement pipette tips (yellow), non-preassembled<br>■ 100 50-250 µL Positive displacement pipette tips (pink), non-preassembled<br>■ 8 5.0 mL Pipette tips for the Repeater pipettor, (for 0.1 mL and 0.5 mL dispensing volumes)<br>■ 4 12.5 mL Pipette tips for the Repeater pipettor, (for 0.25 mL and 1.25 mL dispensing volumes)<br>■ 1 50 mL Pipette tip for the Repeater pipettor (for 1.0 mL and 5.0 mL dispensing volumes) | ENVR L00 09 |

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## Ordering Information, Continued

| Description | Catalogue Number |
|---|---|
| Millipore Differential Photometer: | |
| ■ 115 volt (V) | ENVR 000 00 |
| ■ 230 V | ENVR 002 30 |
| EnviroGard Replacement Pipettor Tips (available separately): | |
| ■ Positive displacement pipettor tips, 1.0-25 µL, 200 pack, non-preassembled | ENVR L04 09 |
| ■ Positive displacement pipettor tips, 50-250 µL, 200 pack, non-preassembled | ENVR L07 09 |
| ■ Repeater pipettor tips, 5.0 mL, 100/pk | ENVR L01 09 |
| ■ Repeater pipettor tips, 12.5 mL, 100/pk | ENVR L02 09 |
| ■ Repeater pipettor tips, 50 mL, 10/pk | ENVR L03 09 |
| nviroGard PCB Test Kit (without PCB calibrators) | ENVR 0NC 09 |

## Technical Assistance

Call the office in your country to get additional product information, technical assistance, or order parts.

NOTE: To receive the current edition of our *Laboratory Products Catalogue*, contact Technical Assistance at the Millipore office closest to you.

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