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COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN II)
Northern and Central California, Nevada, and Utah
Contract No. N62474-94-D-7609
Contract Task Order No. 314

Prepared for

DEPARTMENT OF THE NAVY
Naval Facilities Engineering Command
Southwest Division
San Diego, California

FINAL
FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN ADDENDUM 2
ADDITIONAL POLYCHLORINATED BIPHENYL INVESTIGATION
OF THE FORMER STORAGE YARD
NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

March 7, 2002

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FINAL
FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN ADDENDUM 2
ADDITIONAL POLYCHLORINATED BIPHENYL INVESTIGATION
OF THE FORMER STORAGE YARD
NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

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FIELD SAMPLING PLAN/ QUALITY ASSURANCE PROJECT PLAN FOR ADDITIONAL POLYCHLORINATED BIPHENYL INVESTIGATION OF THE FORMER STORAGE YARD

DATED 31 MAY 2001

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APPENDIX

1 RESPONSE TO AGENCY COMMENTS

FIGURE

Figure

1 PROPOSED INDOOR AIR SAMPLING LOCATIONS AND FINAL CONFIRMATION SAMPLES

TABLE

Table

8 DATA QUALITY OBJECTIVES SUMMARY

ACRONYMS AND ABBREVIATIONS

bgs	Below ground surface
CLEAN	Comprehensive Long-term Environmental Action Navy
COC	Chain-of-custody
CTO	Contract task order
DQO	Data quality objective
EPA	U.S. Environmental Protection Agency
FSP	Field sampling plan
FSY	Former storage yard
HSM	Health and safety manager
IDL	Instrument detection limit
IDW	Investigation-derived waste
IR	Installation restoration
L/min	Liter per minute
MCB	monochlorinated biphenyls
mg/kg	Milligrams per kilogram
NAVSTA TI	Naval Station Treasure Island
Navy	U.S. Department of the Navy
ng/m^3	nanogram per cubic meter
PAH	Polycyclic aromatic hydrocarbons
Penta-CB	pentachlorinated biphenyl
PCB	Polychlorinated biphenyl
PRG	Preliminary remediation goal
PRRL	Project-required reporting limit
PUF	Polyurethane foam
QA	Quality assurance
QC	Quality control
QAPP	Quality assurance project plan
RI	Remedial investigation
TtEMI	Tetra Tech EM Inc.

1.0 PROJECT DESCRIPTION AND MANAGEMENT

Tetra Tech EM Inc. (TtEMI) received Contract Task Order (CTO) No. 314 under Comprehensive Long-term Environmental Action Navy (CLEAN) Contract No. N62474-94-D-7609 (CLEAN II) from the U.S. Department of the Navy (Navy), Naval Facilities Engineering Command, Southwest Division. The CTO entails additional characterization of the Former Storage Yard (FSY) adjacent to Installation Restoration (IR) Site 12 at Naval Station Treasure Island (NAVSTA TI) in San Francisco, California.

This second addendum to the field sampling plan and quality assurance project plan (FSP/QAPP) is a supplement to the "Final Field Sampling and Quality Assurance Project Plan for Additional Polychlorinated Biphenyl Investigation of the Former Storage Yard, Naval Station Treasure Island" approved by the Navy on May 31, 2001 (TtEMI 2001). Where noted, tables, figures, and appendices referenced in this addendum were provided in the original FSP/QAPP. Only sections requiring changes are presented. Sections not requiring change contain a "no change" notation. This addendum was developed to guide additional characterization of polychlorinated biphenyls (PCB) in indoor air in buildings 1102, 1104, and 1106 in Halyburton Court at the Former Storage Yard at IR Site 12.

Table 1 of the original FSP/QAPP compares the elements of a QAPP as specified in U.S. Environmental Protection Agency (EPA) QA/R-5 (EPA 1997) and the corresponding sections of the FSP/QAPP (TtEMI 2001) as well as this addendum.

1.1 PROBLEM DEFINITION AND BACKGROUND

This section describes the requirements for the following:

- Purpose of the Investigation (Section 1.1.1)
- Problem to be Solved (Section 1.1.2)
- Facility Background (Section 1.1.3)
- Site Description (Section 1.1.4)
- Physical Setting (Section 1.1.5)
- Summary of Previous Investigations (Section 1.1.6)
- Principal Decision Makers (Section 1.1.7)
- Technical or Regulatory Standards (Section 1.1.8)

1.1.1 Purpose of the Investigation

The purpose of this investigation is to evaluate whether PCBs are present in indoor air at concentrations that pose an unacceptable risk to human health as a result of potential vapor intrusion from soils beneath

the buildings. To achieve this goal, additional data on indoor air will be collected to supplement information obtained in October 2000.

1.1.2 Problem To Be Solved

Analytical results from previous investigations and confirmation sampling conducted during a soil removal action in August 2000 indicate that it is very likely that PCBs remain in soil beneath buildings in the eastern portion of the FSY (Figure 1 of the original FSP/QAPP). It is possible that the concentrations of PCBs in the soils may be high enough to contribute to indoor air contamination within the Buildings 1102, 1104, and 1106 in Halyburton Court. PCBs were originally detected in indoor air in Building 1100 in Halyburton Court in October 2000. During that sampling event and subsequent events in January, June, and November 2001, Building 1100, particularly Unit C and a limited number of units in Bigelow Court were tested. Indoor air results indicate that PCBs beneath the buildings (other than Building 1100) are not volatilizing into indoor air at levels that would pose an unacceptable risk. No other buildings in Halyburton Court have been tested. The additional sampling presented in this FSP/QAPP addendum is required to investigate indoor air in the units of Halyburton Court.

If PCBs are present, additional questions must be answered. A determination should be made about whether the concentrations present pose an unacceptable risk to human health. The source (vapor or particulate) of the PCBs should be identified. At least two units will be sampled from every building in Halyburton Court. Indoor air samples will be obtained from every unit in Halyburton Court where concentrations of PCBs in soil in the excavation sidewalls immediately adjacent to that unit exceed the soil cleanup goal of 1 milligram per kilogram (mg/kg). In buildings where no sidewall sample results exceed 1 mg/kg, two units will be selected based on the highest sidewall or floor results. After the investigation is complete, the data generated will then be used to generate a risk assessment.

1.1.3 Facility Background

No Change.

1.1.4 Site Descriptions

No Change.

1.1.5 Physical Setting

No Change.

1.1.6 Summary of Previous Investigations

Previous investigations at the site have involved collection of soil and grab groundwater samples and studies of ambient air in buildings. These investigations are described in detail in the paragraphs that follow. During the initial investigation process, the preliminary remediation goal for residential soil (0.22 mg/kg) was used as a screening criterion. Once the focused PCB removal action began, a cleanup goal of 1 mg/kg was used.

1.1.6.1 Soil and Grab Groundwater Investigations

On October 18, 1999, soil samples were collected at 17 locations in the FSY (KC-1 through KC-17, depicted in Figure 2 of the original FSP/QAPP) at depths of 0.5 to 1.0 foot below ground surface (bgs) and 3.5 to 4.0 feet bgs. Samples were obtained with a Geoprobe and were analyzed for a broad suite of constituents, as described in the sampling plan for the activity (TtEMI 1999). Data obtained through that investigation indicated concentrations of polycyclic aromatic hydrocarbons (PAHs) and PCBs exceeding U.S. Environmental Protection Agency (EPA) preliminary remediation goals (PRG) for residential soil primarily in samples from the southeastern portion of the investigation area. Soil samples from four locations (KC-6, KC-8, KC-14, and KC-15) contained PCBs at concentrations higher than the PRG for residential soil. The highest concentration of Aroclor 1260, 48 mg/kg, was detected in a sample from location KC-8, collected at 3.5 to 4.0 feet bgs. The EPA PRG for Aroclor 1260 is 0.22 mg/kg. Samples from four locations (KC-5, KC-6, KC-9, and KC-12) contained concentrations of PAHs higher than the PRG; the highest concentration of benzo(a)pyrene, 7.2 mg/kg (EPA PRG 0.062 mg/kg), was detected in a sample from location KC-6, collected at 3.5 to 4.0 feet bgs. Additional data indicated that no further investigation was needed in the vicinity of location KC-12 and the area southwest of location KC-6.

On November 18 and 20, 1999, 23 locations were sampled (KC-18 through KC-40, depicted in Figure 2 of the original FSP/QAPP) to further define areas where elevated PCBs and PAHs concentrations. Concentrations of Aroclor 1260 in samples from four of the additional locations near the margins of the study area, KC-29, KC-31, KC-36, and KC-37, exceeded the residential soil PRG of 0.22 mg/kg.

Ten additional sampling locations (KC-41 to KC-50, depicted in Figure 2 of the original FSP/QAPP) were proposed to define the boundaries of contamination (PCBs in excess of the residential soil PRGs) in the FSY. The 10 locations were sampled on December 18, 1999. Results of that round of sampling showed that low concentrations of PAHs and PCBs are present at several of the locations. All

concentrations of PCBs were below PRGs. Samples from two of the locations, KC-43 and KC-49, contained benzo(a)pyrene at concentrations above the PRG, 0.062 and 0.11 mg/kg.

On May 1 and 2, 2000, 45 locations in the FSY (KC-51 through KC-95, depicted in Figure 2 of the original FSP/QAPP) were each sampled at three intervals: 0.5 to 1.0, 1.5 to 2.0, and 3.5 to 4.0 feet bgs. Four of the 45 locations were also sampled at 7.5 to 8.0 feet bgs, and a grab groundwater sample was collected at those four locations at 8 feet bgs. Samples from 31 of the 45 locations contained PCBs at concentrations above PRGs, and samples from two locations (KC-66 and KC-86, depicted in Figure 2 of the original FSP/QAPP) contained high concentrations of PAHs. Three of the four groundwater samples contained low concentrations of PCBs; the fourth was nondetect for PCBs.

On June 12, 2000, 18 additional locations in the FSY (KC-96 through KC-113, depicted in Figure 2) were each sampled at three intervals: 0.5 to 1.0, 1.5 to 2.0, and 3.5 to 4.0 feet bgs. Samples from four of the 18 locations contained PCBs at concentrations above the 1-mg/kg cleanup goal; all of these concentrations were detected in samples from the 0.5- to 1.0-foot-bgs interval (KC-103, KC-106, KC-107, and KC-112, depicted in Figure 2 of the original FSP/QAPP).

International Technology Corporation completed a removal action in July and August 2000. Soil containing PCBs at levels in excess of the cleanup goal of 1 mg/kg and soil in places where access was unrestricted by buildings or other structures such as transformer pads was removed to 4 feet bgs (Figure 3 of the original FSP/QAPP). Soil was removed to the maximum extent possible without damaging the building foundations. Soil beneath each building was left in place to avoid damaging the buildings. During this removal action, the Navy collected confirmation samples from the sidewalls and floor of the excavation. Based on these sample results, it was determined that PCBs were left in place under buildings at concentrations that exceeded 1 mg/kg. Soil concentrations in sections of the sidewall near Building 1100 contained concentrations that exceeded 120 mg/kg.

The Johnson and Ettinger model for subsurface vapor intrusion into buildings (Environmental Quality Management, Inc. 1997) was used to screen potential concentrations of PCBs in indoor air on the basis of concentrations of PCBs in soil adjacent to buildings in the FSY. The Johnson and Ettinger model is a one-dimensional analytical solution that provides a conservative estimate of vapor concentrations indoors based on concentrations in soil. The model was applied to date for each building, using the highest PCB concentration detected in soils adjacent to each building.

The Johnson and Ettinger model estimated an excess cancer risk exceeding $1.0E^{-04}$ resulting from volatilization of PCBs for Building 1100 based on a concentration of 139 mg/kg of Aroclor 1260 directly below the slab foundation. Using the Johnson and Ettinger model, the soil saturation concentration for

Aroclor 1260 was calculated as 139 mg/kg. Estimated excess cancer risks were between $1.0E^{-04}$ and $1.0E^{-05}$ for Buildings 1101, 1102, 1104, and 1110. Estimated excess cancer risks were less than $1.0E^{-05}$ for the remaining buildings. Highly conservative default assumptions were used in the Johnson and Ettinger model; therefore, because of the highly conservative default assumptions used, the results probably significantly overestimate the potential risk posed by vapor intrusion from volatilization of PCBs into the buildings. Based on the results of this model, indoor ambient air samples were collected to provide actual data on PCB concentrations in indoor ambient air.

1.1.6.2 Investigations of Indoor Ambient Air

In October 2000, eight samples of indoor ambient air and two outdoor ambient air samples were collected near Halyburton and Bigelow courts in the FSY. One indoor air sample was collected from each of the six units in Building 1100 (Halyburton Court), and the seventh and eighth samples were collected in unit 1103-A and unit 1103-B (Bigelow Court). Samples were collected from units in Building 1103 for quality control (QC) purposes; Building 1103 is outside the area of PCB soil contamination. Outdoor ambient air samples were also collected outside of and near Buildings 1100 and 1103 (Figure 2 of the original FSP/QAPP). PCBs were detected in four units within Building 1100, and the highest concentrations were detected in Unit C (Table 2 of the original FSP/QAPP). These indoor air sampling results show remarkably good correlation with the soil sampling results; the highest concentration of PCBs in soils was detected adjacent to Building 1100-C. The majority of the detections were monochlorinated biphenyl congeners, which are generally expected to be more volatile than the more chlorinated PCB congeners.

In January 2001, the Navy collected indoor ambient air samples from units 1101-A, 1101-B, 1103-A, 1105-G, 1105-H, 1107-B, and 1107-C in Bigelow Court; from unit 1100-C in Halyburton Court; and between Buildings 1100 and 1103. The results of this study were nearly identical to the original Navy study of October 2000, showing detected concentrations of principally monochlorinated biphenyls (mono-CB) only in samples collected at Building 1100 (Table 4 of the original FSP/QAPP).

In June 2001, at the request of regulatory agencies, the Navy collected samples from all units in Buildings 1101, 1103, 1105, and 1107 in Bigelow Court as well as from unit 1100-C in Halyburton Court. Samples from all units, outdoor air samples, and trip blanks contained detectable concentrations of PCBs. The majority of the PCB congeners detected were pentachlorinated biphenyls (penta-CB). During a review of the analytical procedures, it was determined that the sampling media had not been precleaned as requested. For this reason, the make-up of the PCBs detected in the four trip blanks was examined. It was determined that only a small percentage of the penta-CBs detected could be attributed to the uncleaned sampling media. The PCBs detected, though penta-CBs, were not the same PCBs detected in

the majority of the actual samples. A further confounding factor was that the outdoor air samples collected upwind of Bigelow Court and at the Northern edge of the island contained the highest concentrations of penta-CBs. Of the 34 units of Bigelow Court sampled, samples from 17 contained concentrations greater than 3.4 nanograms per cubic meter (ng/m^3). 3.4 ng/m^3 is the ambient air preliminary remediation goal used for screening purposes during these investigations.

The congeners detected consistently in unit 1100-C were primarily Mono-CBs with minor quantities of di-, tri-, and hexa-chlorinated biphenyls. This is consistent with a conceptual site model in which the more volatile congeners are more likely to be present as vapors in air. Other congeners were also detected in samples collected from Unit 1100-C and other units; however, the congener patterns are inconsistent with that conceptual site model and were not consistent among different sampling events. Those results suggest the hypothesis that the inconsistent congener patterns represent artifacts of sampling, transportation, storage, analysis, etc. The purpose of this sampling is to gather additional data to evaluate the hypothesis.

In November 2001, the Navy resampled all units in Bigelow Court where previous results showed detections greater than 3.4 ng/m^3. Unit 1100-C was again included in this investigation. The results showed that only samples from unit 1100-C contained concentrations greater than 3.4 ng/m^3. Based on these results, the Navy, with concurrence from the California Environmental Protection Agency Department of Toxic Substances Control, determined that no further action regarding indoor air in Bigelow Court was required.

1.1.7 Principal Decision Makers

No change.

1.1.8 Technical or Regulatory Standards

Regulatory action levels or cleanup goals have not been fully established for PCB congeners in indoor air at Treasure Island. Following EPA guidance, the appropriate PRG will be determined based on the congener make-up of all samples collected. Project-required reporting limits (PRRL) are below the most conservative anticipated technical or regulatory standards (Table 6 of the original FSP/QAPP).

1.2 PROJECT AND TASK DESCRIPTION

The following subsections discuss the objectives and measurements of the project and contain a schedule of field activities.

1.2.1 Project Objectives and Description

As stated in Section 1.1.1, the primary objective of the additional investigation is to obtain indoor air data to allow a comparison to human health criteria for inhalation of PCBs from vapor intrusion. The following field activities will be carried out to meet this objective:

- Indoor air samples will be collected from the following units: 1100-C and -H; 1102-B, -C, -D, -E, and -G; 1104-A, -B, -D, -E, and -F; and 1106-A and -D. Indoor air samples will be collected from 14 units and analyzed for PCB congeners by EPA Method 1668 (EPA 1999a). The same units will then be resampled within 1 week. Samples will be analyzed within 2 weeks. Additional units of Halyburton Court may be sampled based on the findings of this study.
- If PCBs are detected at concentrations exceeding 3.4 ng/m^3 and outdoor air has been eliminated as a possible source, a subset of these units will be rigorously cleaned and resampled to verify that the detections originated from vapor and not PCBs sorbed to particulate matter.
- Outdoor air samples will be collected from the center of Halyburton Court during the 24-hour period during which the buildings are left open as well as during the 8-hour indoor air sampling events. An outdoor sample will also be collected from the berm behind Building 1123 during the 8-hour events.

1.2.2 Project Measurements

No Change.

1.3 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

The following sections present the data quality objectives (DQO) identified for this additional investigation. The DQOs are summarized in Table 8 (revised since the original FSP/QAPP).

1.3.1 Data Quality Objectives

All changes to this section are presented in the revised Table 8.

1.3.2 Project Quality Assurance Objectives

No change.

1.4 PROJECT AND TASK ORGANIZATION

No change.

1.5 SPECIAL TRAINING AND CERTIFICATION

No change.

1.6 DOCUMENTS AND RECORDS

No change.

2.0 DATA GENERATION AND ACQUISITION

This section describes the requirements for the following:

- Sampling Process Design (Section 2.1)
- Sampling Methods (Section 2.2.)
- Sample Handling and Custody (Section 2.3)
- Analytical Methods (Section 2.4)
- QC (Section 2.5)
- Equipment Testing, Inspection, and Maintenance (Section 2.6)
- Instrument Calibration and Frequency (Section 2.7)
- Inspection and Acceptance of Supplies and Consumables (Section 2.8)
- Nondirect Measurements (Section 2.9)
- Data Management (Section 2.10)

2.1 SAMPLING PROCESS DESIGN

The data for indoor air samples will provide the basis for a comparison to relevant risk-based levels for human health. The following subsections present the proposed sampling locations, the analytical parameters, and a summary of the rationale for the selection of analytical parameters.

2.1.1 Sampling Locations

The following process will be followed for sampling indoor and outdoor air.

Indoor Air

Results of the analysis of indoor air will be used as a basis for developing risk-based levels for human health. Two samples will be collected from each of the following units (Figure 1 of this addendum): 1100-C; 1102-B, -C, -D, -E, and -G; 1104-A, -B, -D, -E, and -F; and 1106-A and -D. The second sample will be collected within 1 week of the original. This investigation proposes that 26 indoor ambient air samples be collected in the units that surround Halyburton Court and that three outdoor ambient air samples be collected daily from locations both within and outside of the FSY.

Four of the indoor air samples will be collected in duplicate. The units where samples are to be collected in duplicate are: 1100-C, 1102-C, 1104-A, and 1106-A.

Outdoor Air

Results of outdoor air analysis will be used to determine whether the ambient air is influencing the detected concentrations within the buildings. The concentration and congener pattern will both be used in this determination. One outdoor ambient air sample will be collected during the same 8-hour period as the indoor samples on each day of the indoor air sampling from the berm behind Building 1123 and from the center of Halyburton Court. One additional outdoor ambient air sample will be collected to encompass the entire 24-hour period during which the buildings are left open before sampling. The outdoor air samples will all be collected in duplicate. The location and time of sample collection will be considered during any evaluation of outdoor air results.

2.1.2 Sample Analysis

No change.

2.1.3 Selection of and Rationale for Analytical Parameters

No change.

2.1.4 Building Cleaning

If results show PCB in air concentrations greater than the established PRG, an outside contractor will clean the interior of a subset of the buildings. This cleaning process will include vacuuming of the floors, windowsills, air ducts, and countertops using high-efficiency particulate air filtration. The indoor air in these buildings will then be resampled for PCBs in air.

2.1.5 Management of Investigation-Derived Waste

No change.

2.2 SAMPLING METHODS

This section describes the procedures for sample collection, including sampling methods and equipment, sample preservation requirements, decontamination procedures, and any materials needed. Before sample collection and building cleaning activities, a job hazard analysis will be conducted and submitted to the health and safety manager (HSM) for evaluation. Upon examination of the job hazard analysis, the HSM will determine the level of personal protective equipment required for each stage of the investigation.

2.2.1 Sampling Methods and Equipment

The units to be sampled will be opened to allow air to flow through the building for a period of 24 hours and then closed for 72 hours before sampling begins to represent normal living conditions. To avoid contamination of the samples, access to the housing units will be limited during the sampling interval. Samples of ambient air will be collected by placing a polyurethane foam (PUF) cartridge and a pump in each location for 8 hours to collect a representative ambient air sample. Indoor ambient air samples will be collected in the first floor bathrooms of each unit.

Samples will be collected according to the methods described in the FSP/QAPP (TtEMI 2001), this addendum, and in EPA's compendium Method TO-10A (EPA 1999b). Indoor ambient air samples will be collected using PUF cartridges. Samples will be collected by means of a low-volume sampling technique. High-volume sampling will not be used because the creation of a large vacuum would generate unnatural conditions in an enclosed indoor space. Each sampling cartridge consists of a glass tube containing a single 76-millimeter PUF sorbent ring (SKC Inc. Catalog no. 226-92 or equivalent). The sampling cartridge will be connected with flexible tubing to a Model 224-PCXR4 Personal or Area

Air Sampling Pump (SKC Inc. Catalog no. 224-PCXR4 or equivalent). This is a continuous-flow air-sampling pump, with a flow range of 0.005 to 5 liters per minute (L/min).

Sampling Procedure

- The laboratory will clean the cartridges to levels consistent with the PRRLs. A gas chromatograph and mass spectrometer report must be received from the laboratory certifying that the cleaning of each batch of cartridges was effective.
- The cartridges will then be prespiked with 10 ng each ^{13}C-22'55'-tetra-chlorinated biphenyl (PCB-52) and ^{13}C-22'33'55'6-hepta chlorinated biphenyl. Other congeners may be added if technically feasible. These spike compounds will be used to monitor the recovery of the PCBs.
- Cartridges are sent from the laboratory to the field wrapped tightly in aluminum foil to prevent degradation by ultraviolet light.
- Prepared sample cartridges will be used within 30 days of certification and handled only with latex or precleaned cotton gloves.
- The following activities will occur before sampling:
  - All windows and doors of each unit will be opened for a 24-hour period.
  - Following the 24-hour "airing-out" of the units, the units will be closed for a period of 72 hours before initiation of sampling.
  - Sampling pumps will be calibrated following the manufacturers recommendations.
  - Sampling pumps will be precleaned with an alconox wash and a final rinse with organic-free water.
  - Once the pumps have dried, the intake manifold filter will be replaced.
  - A 24-inch length of new tygon tubing will be cut and placed on the pump.
  - A wipe, moistened with hexane, will be used to wipe the surface of the pump. This wipe will then be placed in a 4-ounce glass jar and refrigerated.
  - The entire pump and tubing apparatus will be sealed in a ziplock bag for delivery to the sampling location
- All field workers will wear Tyvek boot covers before entering each unit.
- Sample collection instructions are as follows:
  - The cartridge is removed from the glass jar. The aluminum foil is carefully removed and returned to the glass jar and resealed.
  - The cartridge is attached to the tygon tubing/continuous-flow sampling pump.

- The pump is placed in the sink, and the tubing is allowed to hang out of the sink. The sampling cartridge is positioned 1 meter above ground level, with the cartridge intake in a downward position. The cartridge will be located in an unobstructed area at least 0.5 meter from any obstacle to airflow.

- The power switch to the pump is turned on, and the flow rate is adjusted to 4 to 5 L/min. The elapsed-time meter is activated.

- After 8 hours, the power will be turned off, and the PUF cartridge will be removed from the sampler and wrapped with the original aluminum foil. Cartridges will be placed in sealed, labeled containers with ice for transport to the laboratory. Sealed containers will be shipped directly from the site with a chain-of-custody (COC) form to the analytical laboratory. All samples will be labeled and documented on COC forms.

- Duplicate samples will be collected using separate pumps. The units will be placed in such a way as to avoid the collecting the exhaust of other pumps. In the majority of cases the pumps will be placed in the sink in the bathroom, and the tubing will be placed so that the PUF cartridges hang below the sink at the proper height.

- The following information will be recorded on the field data sheet during sampling:

  - Pump serial number

  - Sample identification number

  - Start time

  - Meteorological conditions including temperature, humidity, wind speed, and direction

  - Flow rate will be recorded at the start of sampling and every 2 hours

  - The condition of the building including broken window/doors, graffiti, evidence of intruders

  - A diagram of the sampling apparatus location and setup

- Outdoor samples will be collected in the same manner. Duplicate samples will be collected as close as possible to each other, sharing the same tripod. Care will be taken to avoid collection of the pump exhaust.

- For the 24-hour outdoor air samples, the pumps will be changed after each 8-hour period

- A passive field blank will be collected from the same location as the outdoor sample in Halyburton Court. A cartridge will be removed from the glass container, removed from the aluminum foil, and allowed to sit for 1 minute. The cartridge will then be resealed. This will allow for the field sample handling, independent of pumps and tubing to be studied.

2.2.2 Decontamination

No change.

2.2.3 Disposal of Investigation-Derived Waste

No change.

2.2.4 Sample Containers and Holding Times

No change.

2.3 SAMPLE HANDLING AND CUSTODY

No change.

2.4 ANALYTICAL METHODS

No change.

2.5 QUALITY CONTROL

The main functions of any sampling and analysis program are to obtain accurate, representative environmental samples and to provide valid analytical data. A program to evaluate field and laboratory data was developed to achieve these goals. The quality of the field data will be assessed through collection and analysis of field QC samples on a regularly scheduled basis. Laboratory QC samples will also be analyzed in accordance with referenced analytical method protocols to ensure that laboratory procedures and analyses are conducted properly.

The following subsections discuss the types of QC samples collected and analyzed for this project and their role in the assurance of acceptable project data. QC procedures are not limited to those discussed in this section. Field and laboratory personnel implement additional procedures in accordance with specific method protocols. The following subsections discuss field QC samples, laboratory QC samples, and laboratory QC procedures.

2.5.1 Field Quality Control Samples

QC samples are collected in the field and used to evaluate the validity of the field sampling effort. Field QC samples are collected for laboratory analysis to check sampling and analytical precision, accuracy,

and representativeness. The following section discusses the types and purposes of field QC samples that will be collected for this project. Table 10 of the original FSP/QAPP summarizes the types and frequency of collection of field QC samples.

2.5.1.1 Field Duplicates

Field duplicate samples are two samples collected at the same time and from the same source, submitted as separate samples to one laboratory for analysis. Field duplicates will be collected from units 1100-C, 1102-C, 1104-A, and 1106-D as well as all of the outdoor samples. Both samples will be assigned unique sample identification numbers. Field duplicates will be collected only to determine the extent of inherent sample variation and not for sampling precision.

2.5.1.2 Trip Blanks

The trip blank for this investigation is used to demonstrate that contamination is not originating from the sampling media. A precleaned and spiked PUF cartridge, supplied by the laboratory, will serve as the trip blank for ambient air samples. Trip blanks are transported to the site with the PUF cartridges to be used for sample collection. The trip blanks are stored at the site until the proposed field samples have been collected. Trip blanks are required for each day of sampling within the buildings. One trip blank will accompany the transport container used to ship ambient air samples back to the laboratory for each day of sampling within the buildings. The trip blank is not opened until it is returned to the laboratory. Trip blanks are analyzed in the same manner as the actual samples.

2.5.1.3 Equipment Rinsates

No change.

2.5.1.4 Field Blank

A passive field blank will be collected from the same location as the outdoor sample in the center of Halyburton Court. Using the sample procedures as employed during sampling, a cartridge will be removed from the glass container, removed from the aluminum foil, and allowed to sit for 1 minute. The cartridge will then be resealed. This will allow for the field sample handling, independent of pumps and tubing to be studied.

2.5.2 Quality Control Procedures for Field Sampling

No change.

2.5.3 Laboratory Quality Control Samples

No change.

2.5.4 Laboratory Control Procedures

No change.

2.6 EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

No change.

2.7 INSTRUMENT CALIBRATIONS AND FREQUENCY

Following manufacturers recommendations, sampling pumps will be calibrated daily using a certified National Institute of Science and Technology-traceable flow meter (SKC Scientific DryCal flowmeter, Catalog 717-04 or equivalent).

2.8 INSPECTION AND ACCEPTANCE OF SUPPLIES AND CONSUMABLES

No change.

2.9 NONDIRECT MEASUREMENTS

No change.

2.10 DATA MANAGEMENT

No change.

3.0 ASSESSMENT AND OVERSIGHT

No change.

4.0 DATA VALIDATION AND USABILITY

No change.

5.0 REFERENCES

Environmental Quality Management, Inc. 1997. "User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings." September.

TtEMI. 1999. "Final Sampling Plan Addendum for Site Investigation of the Former Storage Yard, NAVSTA TI." October 15.

TtEMI. 2001. "Final Field Sampling Plan / Quality Assurance Project Plan, Additional Polychlorinated Biphenyl Investigation of the Former Storage Yard, Naval Station Treasure Island." May

U.S. Environmental Protection Agency (EPA). 1994. EPA Guidance for the Data Quality Objectives Process. EPA QA/G-4. September.

EPA. 1997. EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations. EPA QA/R-5. October.

EPA. 1999a. "Method 1668, Revision A: Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by HRGC/HRMS" Office of Water. EPA-821-R-00-002.

EPA 1999b. "Determination of Pesticides and Polychlorinated Biphenyls in Ambient Air Using Low Volume Polyurethane Foam (PUF) Sampling Followed by Gas Chromatographic/Multi-Detector Detection (GC/MD)." EPA/625/R-96/010b.

APPENDIX

RESPONSE TO GEOMATRIX CONSULTANTS COMMENTS ON DRAFT FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN ADDENDUM 2 ADDITIONAL POLYCHLORINATED BIPHENYL INVESTIGATION OF THE FORMER STORAGE YARD NAVAL STATION TREASURE ISLAND SAN FRANCISCO, CALIFORNIA

This document presents the Tetra Tech EM Inc. responses to comments for the draft field sampling plan/quality assurance project plan dated February 13, 2002 for the additional investigation of polychlorinated biphenyls in the former storage yard. The work will be performed at Halyburton Court in the former storage yard on Naval Station Treasure Island in San Francisco, California. The following comments were received from Geomatrix Consultants, environmental consultant to the City and County of San Francisco, Gary Foote, on March 4, 2002.

RESPONSES TO GEOMATRIX

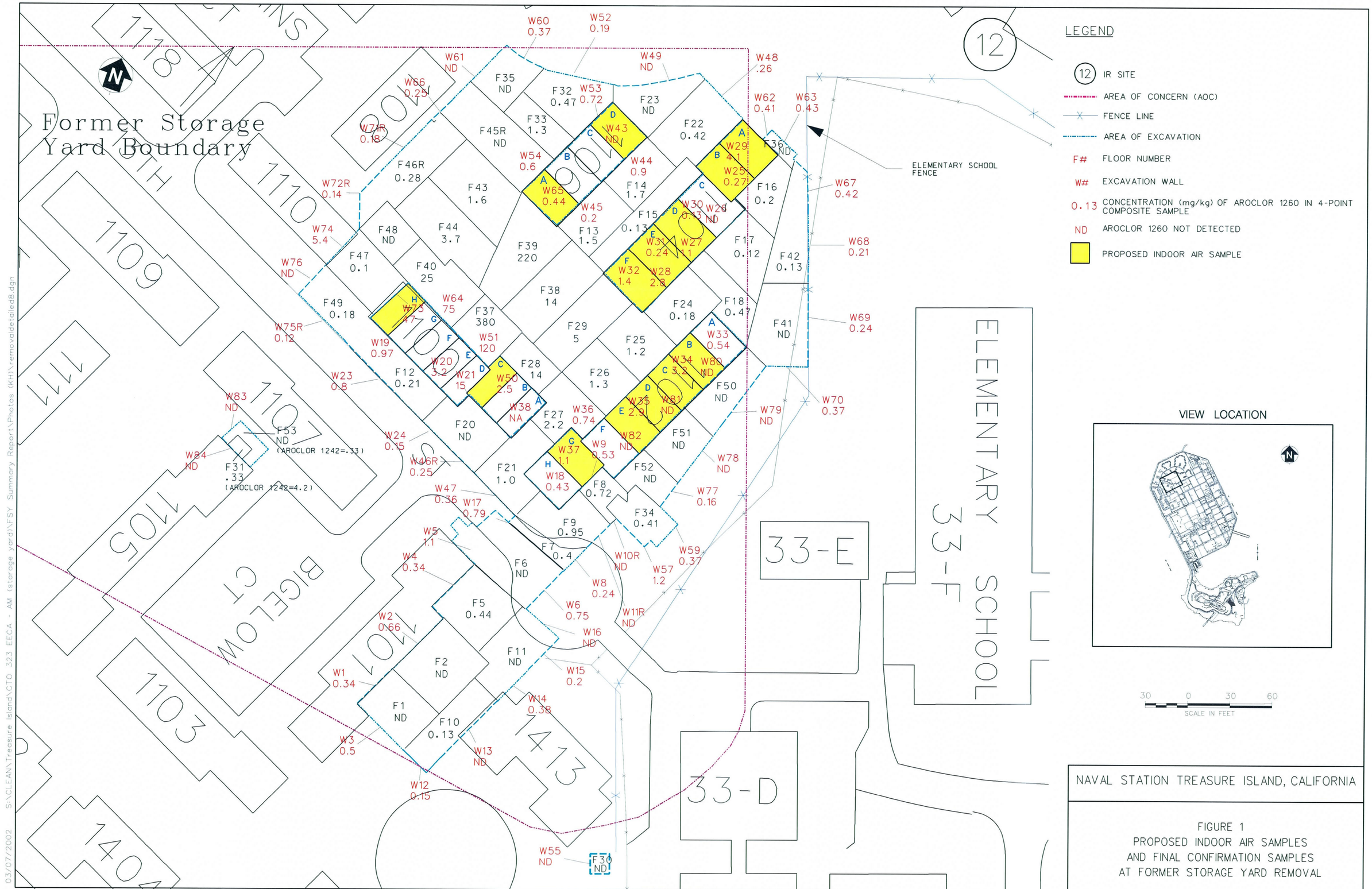
1. **Comment:** **Section 1.1.2 Problem to be Solved. This section summarizes results for previous air sampling at Bigelow Court in October 2000 and January, June, and November 2001 and states "Indoor air results indicated that PCBs were not present at detectable concentrations in indoor air in buildings other than Building 1100." This statement may be somewhat misleading. Perhaps a more accurate statement may be something like "Indoor air results indicate that PCBs beneath buildings (other than Building 1100) are not volatilizing into indoor air at levels that would pose an unacceptable health risk."**

   Response: Section 1.1.2 has been changed as requested.

2. **Comment:** **Section 1.1.6.2 Investigations of Indoor Ambient Air. This section discusses previous sample results that exceeded 3.4 ng/m3 but does not explain the significance of this level. The document should explain that 3.4 ng/m3 is the residential PRG that was used for screening level purposes.**

   Response: Section 1.1.6.2 has been changed as requested.

FIGURES



NAVAL STATION TREASURE ISLAND, CALIFORNIA

FIGURE 1
PROPOSED INDOOR AIR SAMPLES
AND FINAL CONFIRMATION SAMPLES
AT FORMER STORAGE YARD REMOVAL

DS.0314.17653

03/07/2002 S:\CLEAN\Treasure Island\CTO 323 EECA - AM (storage yard)\FSY Summary Report\Photos (KH)\removaldetailed8.dgn

TABLES

TABLE 8
DATA QUALITY OBJECTIVES SUMMARY
FORMER STORAGE YARD
NAVAL STATION TREASURE ISLAND

Step 1 State the Problem	Step 2 Identify the Decision	Step 3 Identify Inputs to the Decision	Step 4 Define the Study Boundaries	Step 5 Develop Decision Rules	Step 6 Specify Acceptable Tolerable Limits on Decision Errors	Step 7 Optimize the Sampling Design
• PCBs are present in the soil beneath the buildings of Halyburton Court that could volatilize into soil gas and enter the buildings at concentrations that pose a risk to human health.	• Are PCBs present in indoor air at concentrations exceeding the established PRG? • If concentrations of PCBs are present at concentrations exceeding the established PRG in indoor air, are they the result of vapor intrusion from the soils from under the buildings?	• Risk based screening criteria that has been agreed upon by all stakeholders • Historical soil and indoor air analytical results • Physical parameters of the various lithologic zones • Risk assessment guidelines • Validated, defensible analytical data for PCBs in indoor and outdoor air	• Indoor air will be collected from the 13 residential units where PCBs were detected in sidewall samples at concentrations exceeding the excavation clean-up goal of 1mg/kg.	• If the concentrations are below the PRG calculated using the proper congener-based slope factor, then indoor air will not be considered a barrier to occupancy of the buildings. Otherwise, additional action will be considered • If indoor air results are greater than the established PRG, then the concentration and congener pattern will be studied to determine whether outdoor ambient air can be considered as a likely source. If outdoor ambient air is considered the likely source of concentrations above the PRG, then indoor air will not be considered a barrier to occupation of the buildings. Otherwise, additional action will be considered.	• For this investigation, proposed sampling locations were based on previous chemical data in soil. Because of this judgmental sampling approach, limits on decision errors cannot be specified. False positive and negative error is minimized by adherence to selected sampling and analytical methods.	• Indoor air will be collected from the 13 residential units where PCBs were detected in sidewall samples at concentrations exceeding the excavation clean-up goal of 1mg/kg. Future step-out samples may include additional sampling in these units or other units in Halyburton Court. • Prior to sampling, the doors and windows in the buildings will be opened for a period of 24 hours, then closed for a period of 72 hours. • The indoor air samples will be collected in the bathrooms where pipes enter the slab foundation and represent the potential worst-case scenario for intrusion of soil gas from beneath the slab. • Duplicate samples will be collected within one week. • One outdoor air control sample will be collected daily on the berm behind Building 1123 and from the center of Halyburton Court. • All samples will be analyzed for PCBs using EPA Method 1668.

Notes:

BCT = Base Closure Team
EPA = U.S. Environmental Protection Agency
FSY = Former storage yard
PCB = Polychlorinated biphenyl