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NSWC CRANE
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United States Navy
Crane, Indiana

INTERIM MEASURES WORK PLAN FOR THE PCB CAPACITOR BURIAL POLE YARD REMEDIATION SWMU 17/04

Naval Surface Warfare Center
Crane, Indiana

April 2003

TOLTEST, INC.

DEPARTMENT OF THE NAVY
CRANE DIVISION
NAVAL SURFACE WARFARE CENTER
300 HIGHWAY 361
CRANE INDIANA 47522-5001

IN REPLY REFER TO:

5090/S4.7.3
Ser 095/2378

06 DEC 2002

U.S. Environmental Protection Agency, Region V
Waste, Pesticides, & Toxics Division
Waste Management Branch
Illinois, Indiana, and Michigan Section
ATTN: Mr. Peter Ramanauskas (DW-8J)
77 West Jackson Blvd.
Chicago, IL 60604

Dear Mr. Ramanauskas:

Crane Division, Naval Surface Warfare Center (NSWC Crane) submits the Draft Interim Measures Workplan, Health and Safety Plan (HASP), and Quality Assurance Project Plan (QAPP) for the PCB Capacitor Burial Pole Yard Remediation (PCB-PY), Solid Waste Management Unit 17/04. Two copies may be found as enclosure (1). The permit required Certification Statement is provided as enclosure (2).

NSWC Crane point of contact is Mr. Thomas J. Brent, Code 09510, telephone 812-854-6160.

Sincerely,

James M. Hunsicker

JAMES M. HUNSICKER
Director, Environmental
Protection Department
By direction of the Commander

Encl:
(1) Draft PCB-PY Workplan, HASP, and QAPP
(2) Certification Statement

Copy to:
ADMINISTRATIVE RECORD
SOUTHNAVFACENGCOM (Code ES32)
IDEM (Doug Griffin)
IDEM (George Ritchotte)
SAIC (Deborah Leighty) (w/o encl)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

James M. Hunsicker
SIGNATURE

Environmental Protection Department Manager — 12/05/02
TITLE — DATE

United States Navy
Crane, Indiana

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FOR

U.S. NAVY
CRANE, INDIANA

SUBMITTED

APRIL 2003

ENVIRONMENTAL JOB ORDER CONTRACT (EJOC)
CONTRACT NO. N68950-00-D-0200
DELIVERY ORDER NO. FC 49
TOLTEST PROJECT NO. 75110.01

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ACRONYM LISTING

°F	degrees Fahrenheit
AHA	Activity Hazard Analyses
amsl	above mean sea level
bgs	below the ground surface
CAAA	Crane Army Ammunition Activity
CD	compact disc
CFR	Code of Federal Regulations
COC	Chain of Custody
COTR	Contracting Officers Technical Representative
ECOTR	Environmental Contracting Officers Technical Representative
EPA	Environmental Protection Agency
EPD	Environmental Protection Department
ES	Environmental Specialist
HASP	Health and Safety Plan
HS	hazardous substance
HSO	Health and Safety Officer
IAC	Indiana Administrative Code
IDEM	Indiana Department of Environmental Management
IDW	Investigation Derived Wastes
IM	Interim Measures
IMR	Interim Measures Report
MDLs	method detection limits
MS/MSD	matrix spike/matrix spike duplicate
NA	not available
NAD	Naval Ammunition Depot
NAVFACENGCOM	Naval Facilities Engineering Command
NSWC	Naval Surface Warfare Center
OICC	Officer in Charge of Construction
OSHA	Office of Safety and Health Administration
PCB	polychlorinated biphenyl
PM	Project Manager
PPE	personal protective equipment
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RM	Regional Manager
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedures
SPM	Senior Project Manager
SW Labs	Southwest Laboratories of Oklahoma, Inc.
SWMU	Solid Waste Management Unit
TSCA	Toxic Substance and Control Act
TtNUS	Tetra Tech NUS, Inc.
TVs	threshold values
U.S.	United States
U.S. EPA	U.S. Environmental Protection Agency
WP	Work Plan

1.0 INTRODUCTION

1.1 Scope and Applicability

TolTest has been retained by the Naval Facilities Engineering Command (NAVFACENGCOM), Officer in Charge of Construction (OICC) under contract N68950-00-D-0200, Delivery Order #FC49 to provide an Interim Measures (IM) Work Plan (WP) for completing remediation activities at the Solid Waste Management Unit (SWMU) 17 Polychlorinated Biphenyls (PCB) Burial/Pole Yard, Naval Surface Warfare Center (NSWC) Crane, Indiana (hereafter referred to as "the SWMU 17 site"). This plan will be reviewed and approved by the Contracting Officers Technical Representative (COTR), Environmental COTR (ECOTR), Indiana Department of Environmental Management (IDEM), and the United States (U.S.) Environmental Protection Agency (EPA) Region V (U. S. EPA Reg. V), prior to the start of any field activities.

The primary objective of this work is to remove and dispose of PCB contaminated soil and buried capacitor(s); remove, decontaminate and reinstall pole supports; perform additional investigative sampling; and restore the site to original conditions. Soil will be removed to the 1 ppm PCB cleanup level. The standards used in this project will be the Toxic Substance and Control Act (TSCA) High Occupancy Standard of 1 mg/kg (i.e., ppm) and the TSCA Low Occupancy Standard of 25 mg/kg [40 CFR 761.61(a)(3)(i)(A and B)]. Hereafter, these standards shall be referred to as simply, the 1 mg/kg standard and the 25 mg/kg standard, respectively. Total PCB concentrations of individual samples will be compared to these standards and soil will be removed to the 1 ppm PCB cleanup level. Work will be accomplished to cause the least interference with NSWC Crane operations, to protect existing work from damage, and to replace that which is damaged. Environmental protection, health and safety, and quality control will be maintained throughout the project.

This WP is supplemented by the Health and Safety Plan (HASP) (Appendix A), and the Quality Assurance Project Plan (QAPP) (Appendix B). The WP, HASP and QAPP all conform to the Occupational Safety and Health Administration (OSHA) regulations identified in 29 Code of Federal Regulations (CFR) 1910.120, "Hazardous Waste Operations and Emergency Response," and applicable parts of 29 CFR 1920 and 1926. A copy of this WP will be on site during remedial activities.

Remediation activities will be conducted in accordance with U.S. EPA Reg. V, IDEM, and U.S. Department of Transportation (49 CFR) regulations. In addition, the above objectives will be accomplished in compliance with 40 CFR 260 – 268, 40 CFR 761, 329 Indiana Administrative Code (IAC) 4.1, 20 CFR 1910 and 1926, and the Tetra Tech NUS, Inc. (TtNUS) QAPP and Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report.

1.2 Site Description

1.2.1 Facility Location and Description

NSWC Crane is located in the southern part of Indiana, immediately east of Crane Village and Burns City. The facility is approximately 75 miles southwest of Indianapolis and 71 miles northwest of Louisville, Kentucky (Figure 1-1). NSWC Crane encompasses approximately 100 square miles (62,463 acres); the majority of the facility is located in the northern portion of Martin County. Smaller portions of the facility are located in Greene, Daviess, and Lawrence Counties. The area around NSWC Crane is rural and sparsely populated. Most of the facility is forested, and the surrounding area is wooded or farmed land. [*TtNUS, 2002*]

NSWC Crane provides naval support for equipment, shipboard weapons systems, and ordnance. NSWC Crane also supports the Crane Army Ammunition Activity (CAAA) with production and renovation of conventional ammunition and storage, shipment, demilitarization, and disposal of conventional ammunition [*Murphy, 1992*]. The SWMU 17 site is located in the north-central portion of the installation, as shown on Figure 1-1. [*TtNUS, 2002*]

1.2.2 History of Ownership and Operation

In 1940, Congress authorized construction of a Naval Ammunition Depot (NAD) in southern Indiana, and the NAD Burns City was commissioned in late 1941. In 1943, NAD Burns City was renamed NAD Crane, and the town of Crane was built to house the rapidly growing number of civil service employees. NAD Crane's overall mission was to load, prepare, renovate, receive, store, and issue ammunition to the fleet. [*TtNUS, 2002*]

During World War II, NAD Crane's mission expanded to include pyrotechnics production, mine filling, rocket assembly, field storage, torpedo storage, and ordnance spare parts and mobile equipment storage. During the 1950's, several new departments were created, the Ammunition Loading and Production Engineering Center was transferred to Crane, and the Central Ammunition Supply Control Office was established. NAD Crane supplied ammunition to the fleet during the Korean and Vietnam Conflicts. During the Southeast Asia crisis, the number of full-time employees at NAD Crane grew to 6,800. [*TtNUS, 2002*]

In 1975, NAD Crane was designated Naval Weapons Support Center Crane . Its new mission was to provide support for ships, aircraft, equipment, shipboard weapons systems, and assigned ordnance items, and to perform additional functions as directed. [*TtNUS, 2002*]

In 1977, the Single Manager Concept was implemented. The CAAA was created, and the Army assumed ordnance production, storage, and related responsibilities as a tenant organization. Other functions remained under the control of the Navy, and currently the Navy retains ownership of all real estate and facilities at NSWC Crane. In 1992, the facility was designated as NSWC Crane. Responsibility for overall station safety, security, and environmental protection remains with the Commanding Officer, NSWC Crane. [*TtNUS, 2002*] Presently, approximately 4,529 people are employed at NSWC Crane, with 18 departments and 5 tenant activities.

1.3 Site Physical Characteristics

1.3.1 General Characteristics of NSWC Crane and the SWMU 17 Site

1.3.1.1 Physiography and Topography

The topography is generally flat in the vicinity of the SWMU 17 site and ranges between 720 feet-above mean sea level (amsl) and 730 feet-amsl. The site sits at a local topographic high with surface elevation decreasing to the north, south, and west. The topography could be described as steeply rolling hills. The industrialized portion of the site is devoid of vegetation. Woods are located along the perimeter of the developed industrialized portion of the site. [*TtNUS, 2002*]

1.3.1.2 Climatology and Meteorology

NSWC Crane is located in a warm, temperate climatic zone. In general, the summers are warm and humid, and winters are mild with occasional short cold periods. The temperature ranges from an average maximum July temperature of 89 degrees Fahrenheit (°F) to an average minimum January temperature of 26°F. Precipitation is fairly evenly distributed throughout the calendar year; the maximum precipitation is during the spring and early summer. The average annual precipitation at the facility is 44 inches, which consists of 42 inches of rain and 15 inches of snow. The average humidity ranges from 40 to 90 percent in summer and 60 to 90 percent in winter. Long-term climatological records for the area indicate that the monthly prevailing wind direction is from the southwest from April through December and from the northwest during January through March [*National Oceanic and Atmospheric Administration, 1988*]. The annual prevailing wind direction for the region is from the southwest, and the annual average wind speed for the area is about 9.6 miles per hour. [*TtNUS, 2002*]

1.3.2 SWMU 17 Operations

The SWMU 17 site has been in use since before 1966. Historically, the site has been used for the following:

- Storage of capacitors, some of which contained PCBs;
- Storage of transformers, some of which contained PCBs;
- Reported burial of capacitors, some of which may have contained PCBs; and
- Storage of creosote-impregnated utility poles, some of which may have contained PCBs as a result of burst transformers. [*TtNUS, 2002*]

It is known that capacitors were buried at the SWMU 17 site in the early to mid-1970's, but it is not known whether any capacitors were buried before the early 1970's or after mid-1970. [*TtNUS, 2002*]

1.3.3 Historical Soil Data

Surface soil samples (collected at depths between 0 and 2 feet) and subsurface soil samples (collected at depths between 2 and 4 feet) were collected in March 2002 from the SWMU 17 site and analyzed for the presence of PCBs during the investigation phase of the RFI performed by TtNUS. Based on the analytical data obtained during this investigation, and a previous investigation performed during March 2001 by Science Applications International Corporation (SAIC), the nature and extent of contamination in the surface and subsurface soil at the SWMU 17 site are discussed in the following subsections. [*TtNUS, 2002*] Past soil sample locations are presented on Figure 1-2.

1.3.3.1 March 2001 Sampling Event

PCBs were detected in 22 of the 28 surface soil samples collected during the March 2001 sampling event by SAIC. Aroclor-1260 and Aroclor-1242 were the only PCB congener mixtures detected in these samples. As displayed in Table 1-1, concentrations of PCB-1260 ranged from 0.067 mg/kg to 210 mg/kg. PCB-1242 was detected at a concentration of 15 mg/kg in sample GSUB04. Total PCB concentrations in samples CSS01, CSS02, CSS05, GSS03, CSUB01, GSUB03, and GSUB04 exceeded the 1 mg/kg standard but were less than the 25 mg/kg standard. Total PCB concentrations in samples GSS04 (180 mg/kg), GSS05 (96mg/kg), GSS06 (170 mg/kg), CSUB02 (37 mg/kg), CSUB05 (67 mg/kg), and GSUB05 (210 mg/kg) were in excess of the 25 mg/kg standard. [*TtNUS, 2002*]

1.3.3.2 March 2002 Sampling Event

PCBs were detected in 23 of the 44 surface soil samples collected during the March 2002 sampling event. Aroclor-1260 was the only PCB congener mixture detected in these samples. As displayed by Table 1-2, concentrations of Aroclor-1260 ranged from 0.13 mg/kg to 140 mg/kg. Total PCB concentrations in samples 17SS110002, 17SS120002, 17SS140002, 17SS150002, 17SS210002, 17SS220002, 17SS370002, and 17SS400002 exceeded the 1 mg/kg standard but were less than the 25 mg/kg standard. The sample locations are displayed in Figure 1-2, and are labeled as locations 17SB11, 17SB12, 17SB14, 17SB15, 17SB21, 17SB22, 17SB37, and 17SB40, respectively. Total PCB concentrations in samples 17SS100002 (120 mg/kg) and 17SS420002 (140 mg/kg) were in excess of the 25 mg/kg standard. [*TtNUS, 2002*]

PCBs were detected in six of the 44 subsurface soil samples collected during the March 2002 sampling event. Aroclor-1260 was the only PCB congener mixture detected in these samples. As displayed by Table 1-3, concentrations of PCB-1260 ranged from 0.13 mg/kg to 1.6 mg/kg. The Total PCB concentration in sample 17SB380204 (i.e., location 17SB38) exceeded the 1 mg/kg standard but was less than the 25 mg/kg standard. All Total PCB results were less than the 25 mg/kg standard [*TtNUS, 2002*].

The soil samples were analyzed for PCBs via SW-846 Method 8081A (U.S. EPA June 1997). The following PCB congener mixtures were targeted in this analysis: Aroclor-1016, Aroclor-1221, Aroclor-

1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260. Aroclor is the industrial trade name for these PCB congener mixtures. Positive PCB results in soil samples were tallied and displayed as Total PCBs; non-detectable results were not included in this tally. [*TtNUS, 2002*]

Soil data collected from the SWMU 17 site were compared to the TSCA 1 mg/kg standard and the 25 mg/kg standard. Total PCB concentrations of individual samples were compared to these standards. [*TtNUS, 2002*]

1.3.3.3 March 2002 Geophysical Survey

A geophysical survey was conducted at the SWMU 17 site by Tetra Tech EMI, Inc., from March 4 to March 7, 2002. The survey, conducted to a maximum depth of 10 feet, successfully identified several anomalies (potentially buried PCB capacitors), as well as a large waste burial area and many locations of subsurface metal, including buried utilities. The capacitors were believed to have been buried sometime in the 1970's. A previous geophysical survey, conducted by the U.S. Army Corps of Engineers Waterway Experiment Station in 1996 (TtNUS, 2002), failed to locate the capacitors. As proposed, a Geonics EM61 time domain metal detector and a Geometrics G-858 gradiometer were used to complete the survey. Figure 1-4 shows the location and summary of the survey. [*TtNUS, 2002*]

1.3.3.4 Consolidated Results

To concisely summarize results, the SWMU 17 site was broken down into several different areas: the Building 357 – Pole Yard Area (which is defined as the area immediately east of the geophysical survey area and encompassed by and including Highway 470), the Former Transformer Storage Area (which is defined as the area immediately east of the geophysical survey area and north of Highway 470), the Geophysical Survey Area, and the Drainage Ways. [*TtNUS, 2002*]

1.3.3.4.1 BUILDING 357 – POLE YARD AREA

As shown in Figures 1-2, surface soil samples collected from locations 17SB10, 17SB42, GSS05, CSS05, and GSS06 displayed a maximum total PCB concentration in excess of the 25 mg/kg standard. These samples were collected within 30 feet of Building 357. PCBs were not detected in the subsurface soil samples from locations 17SB10 and 17SB42. [*TtNUS, 2002*]

The maximum Total PCB concentrations in surface soil samples collected from locations 17SB11, 17SB12, and 17SB14 exceeded the 1 mg/kg standard but were less than the 25 mg/kg standard. These samples were collected within 60 feet of Building 357. PCBs were not detected in the subsurface soil samples collected from locations 17SB11 and 17SB12. In the remainder of the surface samples and all subsurface soil samples collected from within the Pole Yard vicinity, each contained PCBs at concentrations less than the 1 mg/kg standard. It did not appear that PCBs in the Pole Yard area were migrating beyond Highway 470. [*TtNUS, 2002*]

1.3.3.4.2 FORMER TRANSFORMER STORAGE AREA

All but one surface soil samples collected in the vicinity of the Former Transformer Storage Area contained PCBs at concentrations less than the 1 mg/kg standard. Sample 17SB15 exceeded the 1 mg/kg standard but was less than the 25 mg/kg standard. PCBs were not detected in subsurface soil samples collected in the vicinity of the Former Transformer Storage Area. [*TtNUS, 2002*]

1.3.3.4.3 GEOPHYSICAL SURVEY AREA (POTENTIAL BURIED CAPACITORS)

Surface soil sample locations, CSS01, 17SB37, 17SB21, 17SB22, and 17SB40, which were collected from within the boundary of the geophysical survey area, contained Total PCBs at concentrations greater than the 1 mg/kg standard but less than the 25 mg/kg standard. Surface soil collected from location

CSS02 contained maximum Total PCB concentrations in excess of the 25 mg/kg standard. Additionally, a subsurface soil sample collected from 17SB38 also contained Total PCBs in excess of the 1 mg/kg standard but less than the 25 mg/kg standard. PCB concentrations in the remainder of the subsurface soil samples from within the geophysical survey area were less than the 1 mg/kg standard, or not detected. [*TtNUS, 2002*]

1.3.3.4.4 DRAINAGE WAYS

PCBs were not detected in surface soil collected from location GSS01, in the extreme eastern portion of the SWMU 17 site. Surface soil collected at location GSS02, which is near a drainage way to the north of the Pole Yard, contained Total PCBs at concentrations less than the 1 mg/kg standard. No other samples were collected in the vicinity of samples GSS01 and GSS02. [*TtNUS, 2002*]

Surface soil from location GSS03, which was collected in a drainage way southwest of Building 357 and the geophysical survey area, contained Total PCBs at a concentration of 1.7 mg/kg, which is greater than the 1 mg/kg standard but less than the 25 mg/kg standard. Soil samples outside the drainage channel were collected in this vicinity, however the Total PCB concentrations in these samples (both surface and subsurface) were less than the 1 mg/kg standard, or not detected. [*TtNUS, 2002*]

Samples were also collected from a drainage way to the north and to the extreme west of both Building 357 and the geophysical survey area. The surface soil samples collected from GSS04 contained maximum Total PCBs at a concentration in excess of the 25 mg/kg standard, however PCBs were not detected in any of the surface and subsurface soil samples surrounding this location. [*TtNUS, 2002*]

A few key features of the contaminant distributions were evident. Samples GSS03 and GSS04 were collected in drainage ditches that drain the western side of the SWMU 17 site. These samples exhibited Total PCB concentrations of 1.7 mg/kg and 180 mg/kg, respectively. Of all the surface and subsurface soil samples (locations 17SB01 through 17SB07, and 17SB33 through 17SB35) that were collected outside of the respective drainage ditches near these two samples, the Total PCB concentrations were less than detectable concentrations. The sole exception was the surface soil sample at location 17SB33, which had a Total PCB concentration of 0.89 mg/kg. This contamination pattern was consistent with the migration of contaminated soil runoff and sediment within, but not outside of, the drainage channels. Sample GSS04, at 180 ppm of Total PCBs, represented significant PCB transport to the northwest of the site. The Total PCB concentration of sample GSS03 barely exceeded the 1 mg/kg standard at 1.7 mg/kg, which indicated a much lesser PCB transport to the southwest of the site. Surface and subsurface soil contamination patterns on the western side of the SWMU site exhibited greater concentrations near the head of the northwestern drainage channel than at the head of the southwestern drainage channel. This contamination pattern, especially for surface soils that were expected to feed surface runoff to the drainage channels, was consistent with greater PCB concentrations in the northwestern drainage channel. The extent of contaminated sediment in this channel was unknown. [*TtNUS, 2002*]

1.3.4 PCB Contaminated Soil

The presence of PCB contaminated soils correlates with information regarding historical activities at the SWMU 17 site. PCBs were found at locations where capacitors were reportedly buried, transformers were stored, and creosote-impregnated utility poles were stored. PCBs were also found at a drainage area receiving runoff from the transformer storage and capacitor burial areas. [*TtNUS, 2002*]

The majority of elevated concentrations observed for soil samples followed a line flanked by Highway 470, running east to west through the SWMU 17 site, following the northern edge of Building 357, and crossing the highway to the west. The contamination patterns, displayed in Figures 1-2 and 1-3, showed a much greater impact to surface soils than to subsurface soils. This was consistent with the typical behavior of PCBs in soil; to remain relatively localized in soils unless transported through erosion. [*TtNUS, 2002*]

The contamination patterns, in general, suggested a patchy distribution of PCB contamination, primarily in surface soils. Despite this patchiness, two characteristics were clear: 1) there was much less impact to subsurface soils than to surface soils, and 2) the greatest PCB concentrations were observed in the Pole Yard Area, where utility poles were stored. The east-west surface and subsurface soil contaminant patterns were well bounded by the sampling pattern to the north, east, and south at the 1 ppm level. A sole exception existed at sampling location 17SB15, where the surface soil had a total PCB concentration of 4.4 mg/kg. To the west, the soil contaminant patterns were not completely bounded relative to the 1 mg/kg standard, but they were bounded relative to the 25 mg/kg standard. PCBs were being transported in drainage channels, but the majority of this transport was associated with the northwestern channel. Contamination in this channel was not bounded relative to either the 1 mg/kg or the 25 mg/kg standard. Contamination in the southwestern drainage channel was not bounded relative to the 1 mg/kg standard, but it was bounded relative to the 25 mg/kg standard. Contamination in the northeastern drainage exhibited no PCB contamination in excess of the 1 mg/kg standard. [*TtNUS, 2002*]

PCBs were detected most frequently in surface soil samples. PCB concentrations increased with depth at the following locations: 17SB38, CSS02, CSS05, and GSS05. PCB concentrations decreased with depth in the remainder of the sample locations. In many cases, subsurface soil samples collected from the 2 to 4 foot depth range did not contain any positive PCB detections. [*TtNUS, 2002*]

In order to provide a clear picture of PCB contamination in soil, Tetra Tech EMI divided the site into three data sets, and Figure 1-3 was generated to include PCB concentration contours. Included in their findings was the following information:

1) All samples points except those associated with the northwest and southwest drainage ways.
2) The northwest drainage way, which included samples from locations GSS04, 17SB01, 17SB02, 17SB03, 17SB04, 17SB05, and 17SB06.
3) The southwest drainage way, which included samples from locations GSS03, 17SB33, 17SB34, and 17SV35. [*TtNUS, 2002*]

Figure 1-3 displays a blue contour line outlining the area of soil exceeding the 1 mg/kg standard and a magenta contour line outlining the area of soil exceeding the 25 mg/kg standard. This figure displays cross-hatching of the anticipated excavation area. Excavation areas do not move past the fence line to the west of the site into the transmission corridor and do not include areas under buildings or paved surfaces [*TtNUS, 2002*]. Should contamination be found to have moved beyond this outlined are, an updated contour line will be composed and all additional areas of contamination will be remedied per this plan.

The contours were used to calculate soil volumes proposed for excavation. The delineated areas of PCB contamination in surface soil and subsurface soil were measured. These measurements, along with the scale of the figures, were used to calculate the total volume of PCB contamination in surface soil and subsurface soil. Each noncontiguous contour location was measured separately and added together to get the total soil area. Figure 1-3 denotes these areas as 1A through 1E (i.e., those contoured location/areas exceeding the 1 mg/kg standard) and 25A through 25E (i.e., those contoured locations/areas exceeding the 25 mg/kg standard). The total volume of surface soil exceeding the 25 mg/kg standard is 265 cubic yards, the total volume of surface soil exceeding the 1 mg/kg standard but less than the 25 mg/kg standard is 1047 cubic yards, and finally, the total volume of subsurface soil exceeding the 1 mg/kg standard is 10 cubic yards. There were no subsurface soil exceedances of the 25 mg/kg standard. [*TtNUS, 2002*]

1.3.5 Buried Capacitors

The results of the geophysical survey identified four general response sources, which are described below. These are identified on the interpretation map (Figure 1-4):

1) Point Sources: Point sources are essentially identified by a "spike" response (small closure of bull's eye). These are responses from one buried object, or several buried objects that are so

close together that their response essentially behaved as one object. Point sources are the most likely candidates for the target objects (the capacitors), since historical records suggest that they are buried together in several holes. Point sources, considered to be primary candidates for the search target are marked by red open circles, and those considered secondary targets are marked by blue open circles.

2) Extended sources: These areas contained larger amounts of buried metal and are essentially several, or many, point sources buried together so that their responses merged, making target discrimination difficult. Extended sources that are considered primary candidates for the search targets are marked in red, and those considered secondary candidates for the search targets are marked in blue, based on the criteria discussed below.
3) Non-target sources: These included buried utilities, such as pipes and culverts, and shallow buried metal point sources. Utilities are marked in green and shallow buried metal point sources are marked by a small black cross symbol.
4) Cultural interferences: These included above ground metal objects, such as fences, surface debris, buildings, power lines, etc. These are shown in Figure 1-4 as labeled, dashed or solid black lines. [*TtNUS, 2002*]

The interpretation map (Figure 1-4) displays all four different types of sources, as described. Many of these anomalous areas were marked already out in the field. These are shown as numbers 1 through 33. Additional candidate areas were interpreted upon more detailed data examination. [*TtNUS, 2002*]

Sources believed to be the primary candidates for the buried capacitors are marked in red, as described above. These areas were chosen based upon the following assumptions:

- Three capacitors buried in each of several holes by a mechanical post hole digger;
- The capacitors measured about 4 inches by 12 inches by 24 inches, were encased in steel, and probably weighed about 20 pounds each;
- The capacitors were buried at a depth of greater than 1 foot and so would likely be isolated by the EM61 "D" channel response (i.e., would be visible on the "D" response map, Figure 1-5, with an exception, described below). This is because the difference in response from the top and bottom coils from shallow, relatively small metal sources is negligible compared to more massive metal sources buried at depth or by massive, shallow or surface targets;
- If the depth of burial was less than about 5 feet, both the EM61 and G858 would respond well to these targets, since capacitors contain magnetically soft ferrous metal (i.e., steel casings) (see Figures 1-5 and 1-6); and
- If the depth of burial were greater than approximately 5 feet, the targets would likely only be identified by the gradiometer and total field responses. In this special case, the response would not be visible on the EM61 response maps. These types of anomalies were also considered primary target locations. The only anomaly identified as meeting these criteria is located at the field coordinates 60,120. [*TtNUS, 2002*]

A significant area of interest delineated by the survey was a massive burial, or "dump area", that straddled the fence line of the property to the northwest. This area extended about 20 feet into the property and about another 40 feet across the fence line into a gully outside the survey area (Figure 1-7). The boundaries of this anomaly outside the survey area were marked in the field by scanning with the EM61. Field observations showed targets that may have been cylinders or other types of containers, and it was suggested that this area be investigated. This area was also marked as a primary area for the target sources, since several point sources were resolved in this area and it was not unreasonable to assume that they were buried in a known dump area.

All other buried areas are marked in blue. These should be considered of secondary importance, but not ignored. Sources that are identified as secondary candidates did not meet all the assumed criteria, based on likely response and assumed burial depth.

In the case that suspected anomalies prove to be in excess of original estimation, a new scope of work will be defined.

TABLE 1-1
RESULTS OF MARCH 2001 SAMPLING EVENT

Table 1-1
RESULTS OF MARCH 2001 SAMPLING EVENT

Sample ID	Depth Range (feet):	PCB-1260 (mg/kg)	PCB-1242 (mg/kg)	Total PCBs (mg/kg)
CSS01	0 – 6"	17	NA	17
CSS02	0 – 6"	7.3	NA	7.3
CSS03	0 – 6"	0.11	NA	0.11
CSS04	0 – 6"	0.067	NA	0.067
CSS05	0 – 6"	11	NA	11
CSS06	0 – 6"	0.83	NA	0.83
GSS01(1)	0 – 6"	0.05 U	NA	ND
GSS02(1)	0 – 6"	0.65	NA	0.65
GSS03(1)	0 – 6"	1.7	NA	1.7
GSS04(1)	0 – 6"	180	NA	180
GSS05	0 – 6"	96	NA	96
GSS06	0 – 6"	170	NA	170
GSS07	0 – 6"	0.12	NA	0.12
GSS08	0 – 6"	0.05 U	NA	ND
CSUB01	6 – 12"	9.3	0.05 U	9.3
CSUB02	6 – 12"	37	0.05 U	37
CSUB03	6 – 12"	0.05 U	0.05 U	ND
CSUB04	6 – 12"	0.05 U	0.05 U	ND
CSUB05	6 – 12"	67	0.05 U	67
CSUB06	6 – 12"	0.29	0.05 U	0.29
GSUB01(1)	6 – 12"	0.05 U	0.05 U	ND
GSUB02(1)	6 – 12"	0.2	0.05 U	0.2
GSUB03(1)	6 – 12"	1.5	0.05 U	1.5
GSUB04(1)	6 – 12"	3	15	18
GSUB05	6 – 12"	210	0.05 U	210
GSUB06	6 – 12"	0.35	0.05 U	0.35
GSUB07	6 – 12"	0.084	0.05 U	0.084
GSUB08	6 – 12"	0.05 U	0.05 U	ND

(1) - Grab sample collected in the surface water drainage pathway.
U - Indicates that the chemical was not detected at the numerical detection limit (sample-specific quantitation limit) noted. Nondetected results from the laboratory are reported in this manner. This qualifier is also added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.
ND - Not Detected.
NA - Not Available.
mg/kg - milligram per kilogram.
PCBs – Polychlorinated biphenyls.
Note: Samples collected in March 2001 by SAIC. Data were provided by the Navy. [*TINUS, 2002*]

TABLE 1-2
RESULTS OF 2002 SURFACE SAMPLING EVENT

Table 1-2
RESULTS OF 2002 SURFACE SAMPLING EVENT
Depth Range: 0 – 2 feet

Sample ID	PCB-1260 (mg/kg)	Total PCBs (mg/kg)	Sample ID	PCB-1260 (mg/kg)	Total PCBs (mg/kg)
17SS010002	0.16 U	ND	17SS230002	0.24	0.24
17SS020002	0.15 U	ND	17SS240002	0.44 J	0.44
17SS030002	0.15 U	ND	17SS250002	0.14 U	ND
17SS040002	0.15 U	ND	17SS260002	0.60 J	0.6
17SS050002	0.15 U	ND	17SS270002	0.14 U	ND
17SS060002	0.16 U	ND	17SS280002	0.14 U	ND
17SS070002	0.13 U	ND	17SS290002	0.14 UJ	ND
17SS080002	0.83	0.83	17SS300002	0.14 U	ND
17SS090002	0.18 J	0.18	17SS310002	0.14 U	ND
17SS100002	120	120	17SS320002	0.15 U	ND
17SS110002	1.2 J	1.2	17SS330002	0.89	0.89
17SS120002	1.8 J	1.8	17SS340002	0.15 U	ND
17SS130002	0.82 J	0.82	17SS350002	0.15 U	ND
17SS140002	20	20	17SS360002	0.14 U	ND
17SS150002	4.4	4.4	17SS370002	1.6	1.6
17SS160002	0.17	0.17	17SS380002	0.28	0.28
17SS170002	0.14 U	ND	17SS390002	0.42	0.42
17SS180002	.15 U	ND	17SS400002	11	11
17SS190002	0.15 U	ND	17SS410002	0.36	0.36
17SS200002	0.32	0.32	17SS420002	140 J	140
17SS210002	3.4	3.4	17SS430002	0.87 J	0.87
17SS220002	1.3	1.3	17SS440002	0.13 U	ND

U – Indicates that the chemical was not detected at the numerical detection limit (sample-specific quantitation limit) noted. Nondetected results from the laboratory are reported in this manner. This qualifier is also added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.
UJ – Indicates that the chemical was not detected. However, the detection limit (sample-specific quantitation limit) is considered to be estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate or imprecise.
J – Indicates that the chemical was detected. However, the associated numerical result is not a precise representation of the amount that is actually present in the sample. The laboratory-reported concentration is considered to be an estimate of the true concentration.
ND – Not Detected.
mg/kg – milligram per kilogram.
PCBs – Polychlorinated biphenyls.
Note: Samples collected in March 2002 by TtNUS. Data were provided by the Navy. [*TtNUS, 2002*]

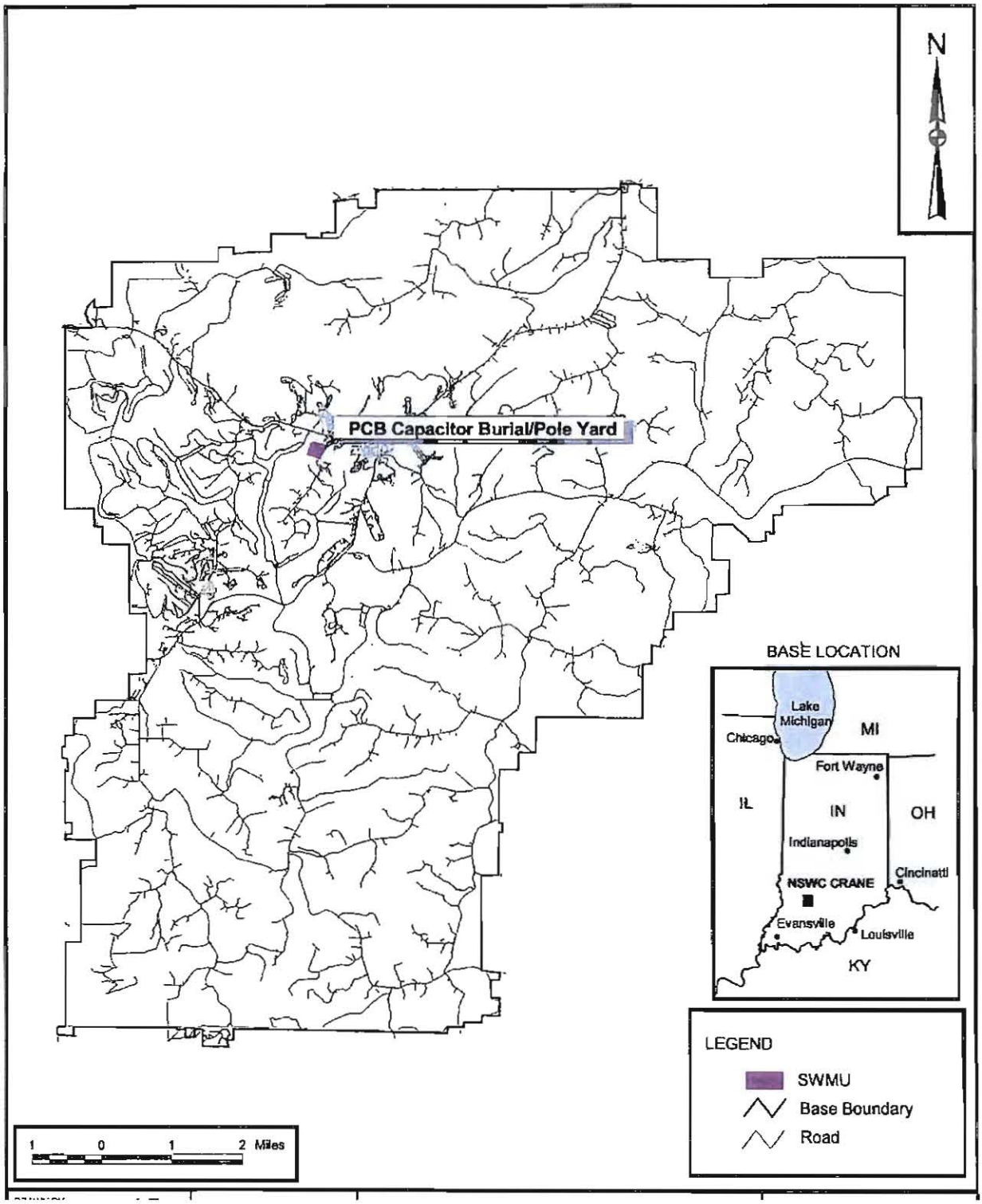
TABLE 1-3
RESULTS OF 2002 SUBSURFACE SAMPLING EVENT

Table 1-3
RESULTS OF 2002 SUBSURFACE SAMPLING EVENT
Depth Range: 2 – 4 feet

Sample ID	PCB-1260 (mg/kg)	PCB-1242 (mg/kg)	Total PCBs (mg/kg)	Sample ID	PCB-1260 (mg/kg)	PCB-1242 (mg/kg)	Total PCBs (mg/kg)
17SB010204	0.17 U	0.17 U	ND	17SB230204	0.15 U	0.15 U	ND
17SB020204	0.13 U	0.13 U	ND	17SB240204	0.15 UJ	0.15 UJ	ND
17SB030204	0.15 U	0.15 U	ND	17SB250204	0.14 U	0.14 U	ND
17SB040204	0.14 U	0.14 U	ND	17SB260204	0.33 J	0.13 UJ	0.33
17SB050204	0.13 U	0.13 U	ND	17SB270204	0.15 U	0.15 U	ND
17SB060204	0.14 U	0.14 U	ND	17SB280204	0.14 U	0.14 U	ND
17SB070204	0.14 U	0.14 U	ND	17SB290204	0.15 UJ	0.15 UJ	ND
17SB080204	0.15 U	0.15 U	ND	17SB300204	0.14 U	0.14 U	ND
17SB090204	0.14 UJ	0.14 UJ	ND	17SB310204	0.14 U	0.14 U	ND
17SB100204	0.13 U	0.13 U	ND	17SB320204	0.14 U	0.14 U	ND
17SB110204	0.14 UJ	0.14 UJ	ND	17SB330204	0.15 U	0.15 U	ND
17SB120204	0.13 UJ	0.13 UJ	ND	17SB340204	0.15 U	0.15 U	ND
17SB130204	0.2 J	0.14 UJ	0.2	17SB350204	0.14 U	0.14 U	ND
17SB140204	0.69	0.13 U	0.69	17SB360204	0.14 U	0.14 U	ND
17SB150204	0.14 U	0.14 U	ND	17SB370204	0.43	0.14 U	0.43
17SB160204	0.15 U	0.15 U	ND	17SB380204	1.6	0.14 U	1.6
17SB170204	0.14 U	0.14 U	ND	17SB390204	0.14 U	0.14 U	ND
17SB180204	0.13 U	0.13 U	ND	17SB400204	0.14 U	0.14 U	ND
17SB190204	0.15 U	0.15 U	ND	17SB410204	0.14 U	0.14 U	ND
17SB200204	0.15 U	0.15 U	ND	17SB420204	0.13 U	0.13 U	ND
17SB210204	0.14 U	0.14 U	ND	17SB430204	0.14 UJ	0.14 UJ	ND
17SB220204	0.15 UJ	0.15 UJ	ND	17SB440204	0.26	0.13 U	0.26

U – Indicates that the chemical was not detected at the numerical detection limit (sample-specific quantitation limit) noted. Nondetected results from the laboratory are reported in this manner. This qualifier is also added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.
UJ – Indicates that the chemical was not detected. However, the detection limit (sample-specific quantitation limit) is considered to be estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate or imprecise.
J – Indicates that the chemical was detected. However, the associated numerical result is not a precise representation of the amount that is actually present in the sample. The laboratory-reported concentration is considered to be an estimate of the true concentration.
ND – Not Detected.
mg/kg – milligram per kilogram.
PCBs – Polychlorinated biphenyls.
Note: Samples collected in March 2002 by TtNUS. Data were provided by the Navy. [*TtNUS, 2002*]

FIGURE 1-1
SITE LOCATION MAP



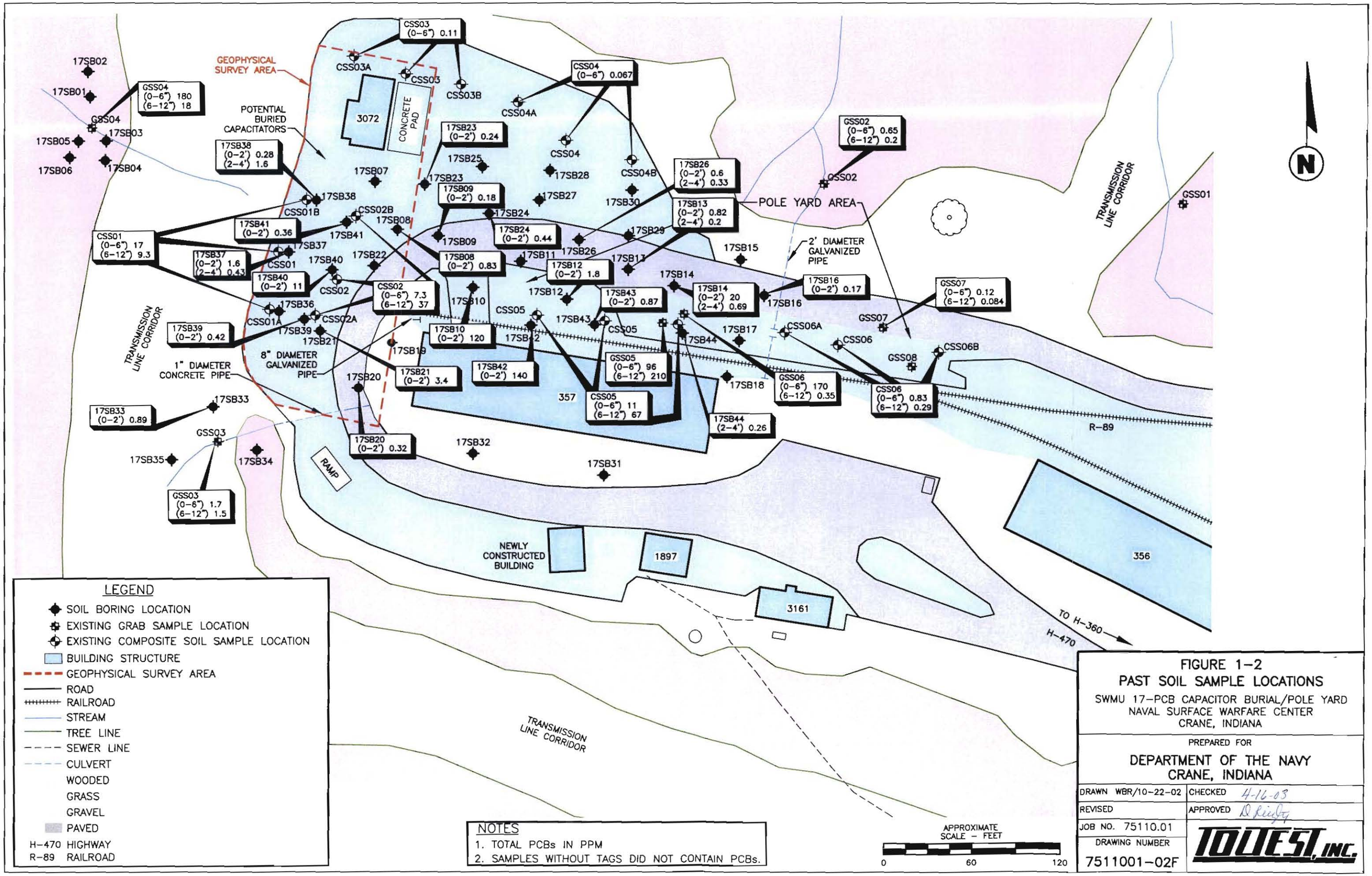


FIGURE 1-2
PAST SOIL SAMPLE LOCATIONS
SWMU 17-PCB CAPACITOR BURIAL/POLE YARD
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA

PREPARED FOR
DEPARTMENT OF THE NAVY
CRANE, INDIANA

DRAWN WBR/10-22-02	CHECKED 4-16-03
REVISED	APPROVED D. Reidy
JOB NO. 75110.01	TOLTEST, INC.
DRAWING NUMBER 7511001-02F	

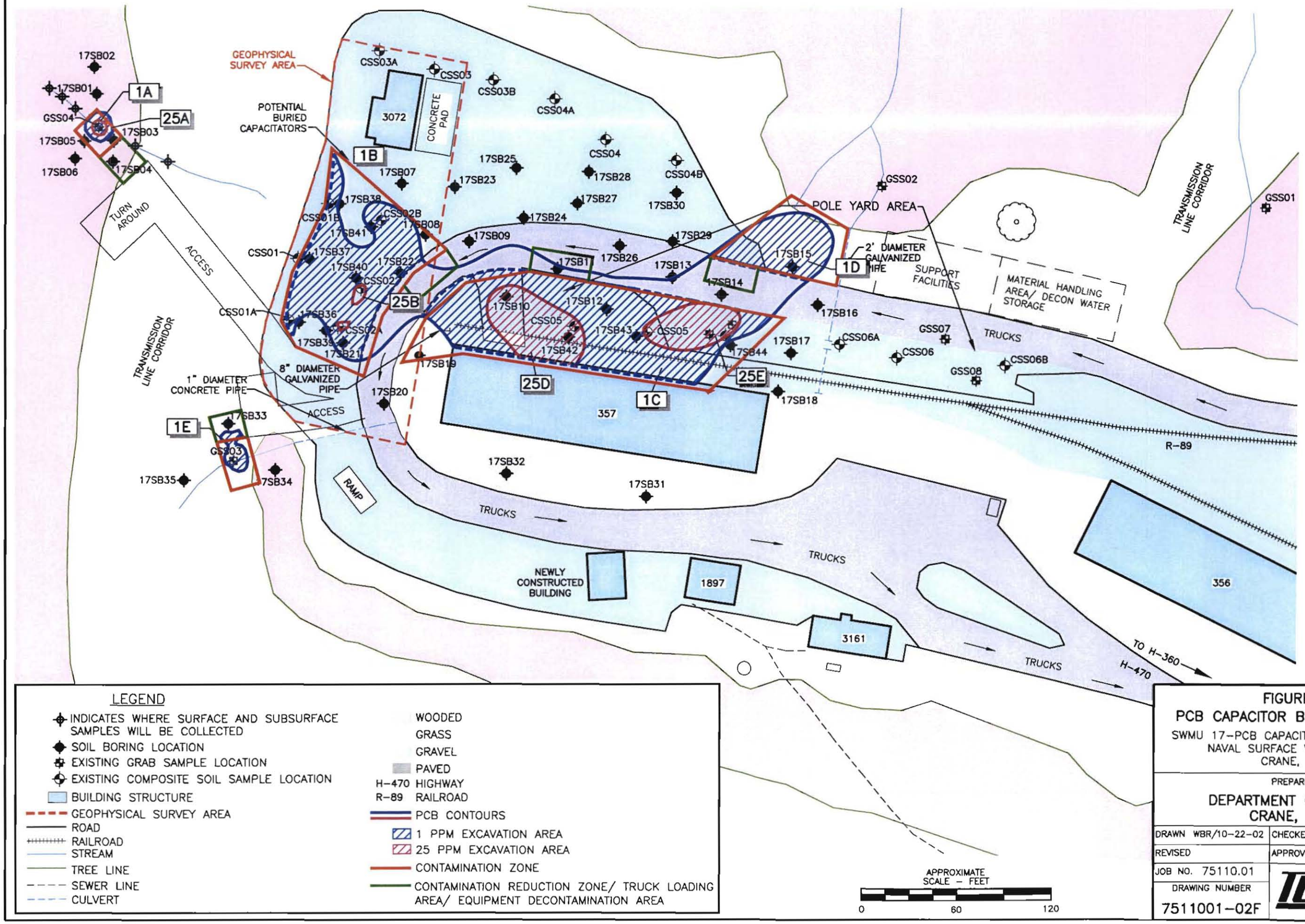


FIGURE 1-3
PCB CAPACITOR BURIAL POLE YARD
SWMU 17-PCB CAPACITOR BURIAL/POLE YARD
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA

PREPARED FOR
DEPARTMENT OF THE NAVY
CRANE, INDIANA

DRAWN WBR/10-22-02	CHECKED 4-16-03
REVISED	APPROVED D Kirby
JOB NO. 75110.01	TOLTEST, INC.
DRAWING NUMBER 7511001-02F	

FIGURE 1-4
INTERPRETATION OF GEOPHYSICAL SURVEY

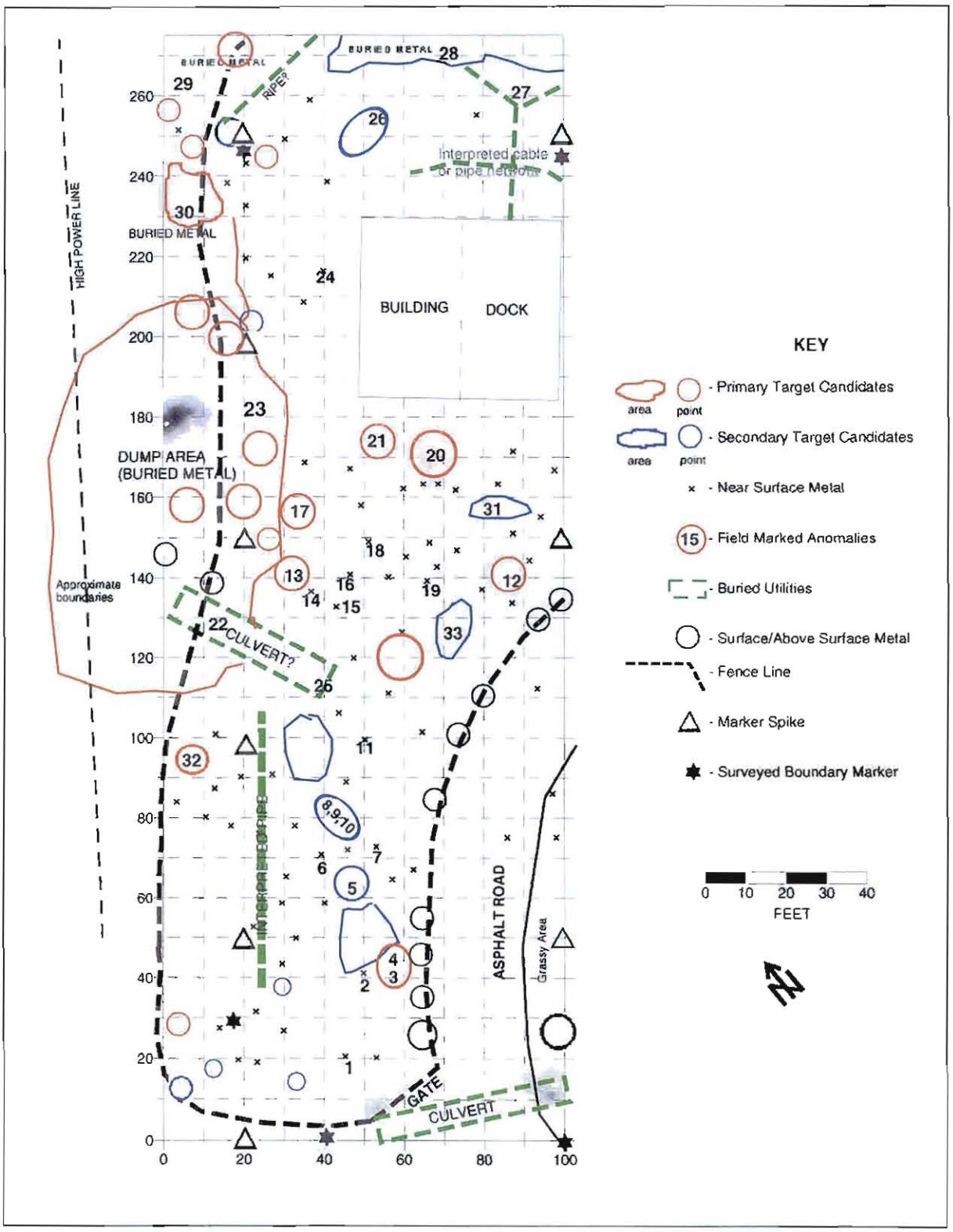


FIGURE 1-5
EM61 DATA

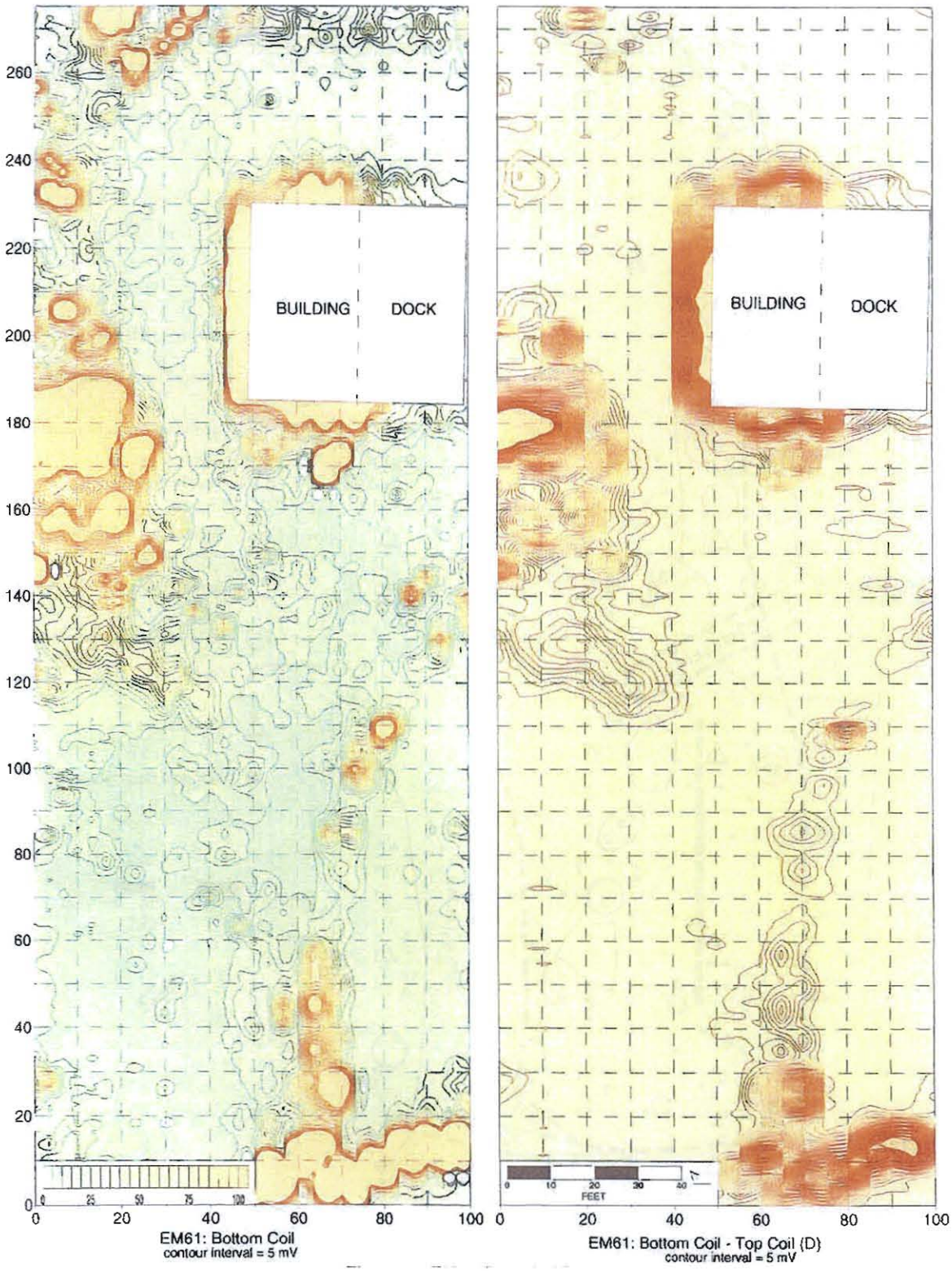


FIGURE 1-6
GRADIENT AND TOTAL FIELD DATA

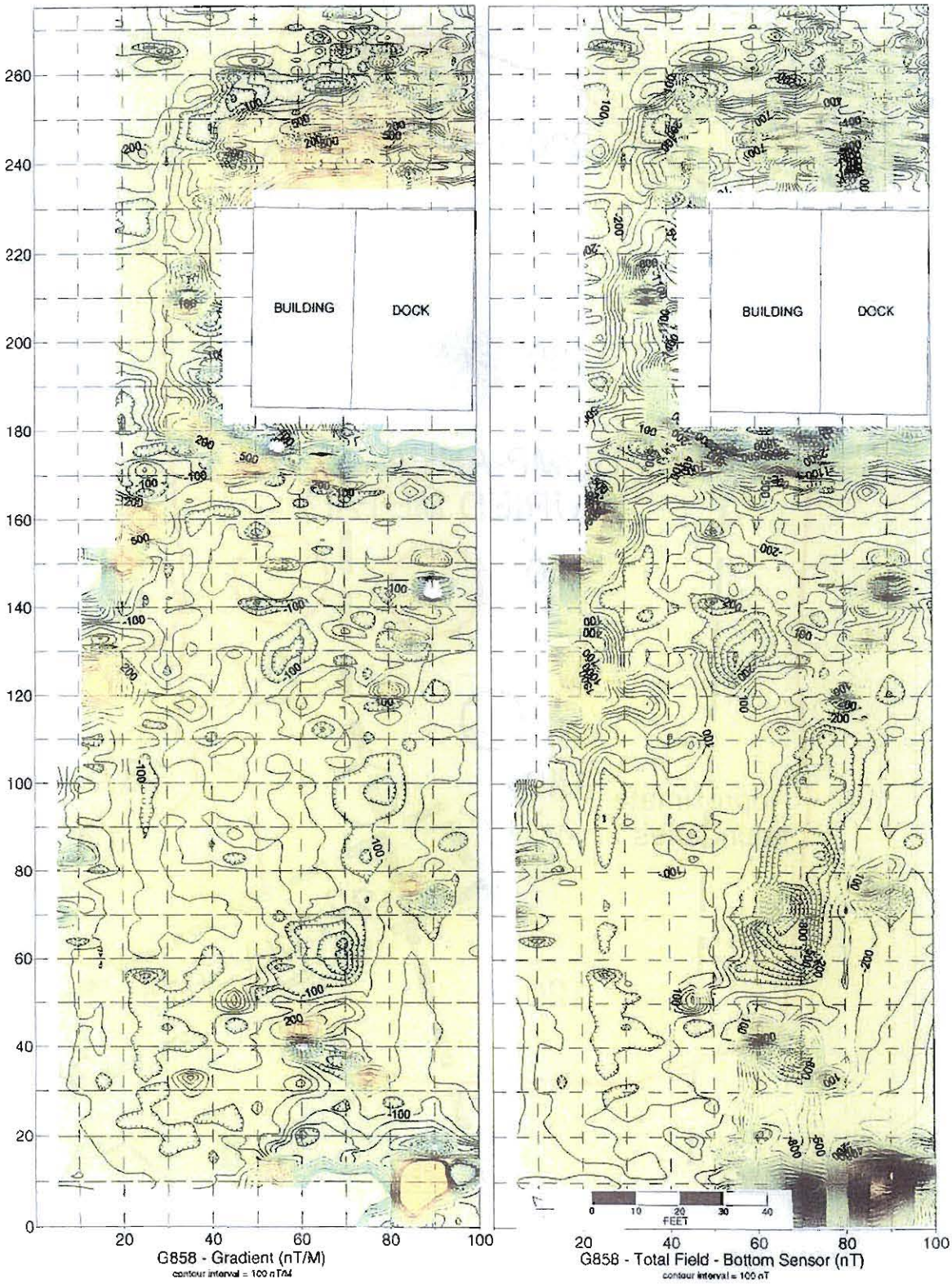
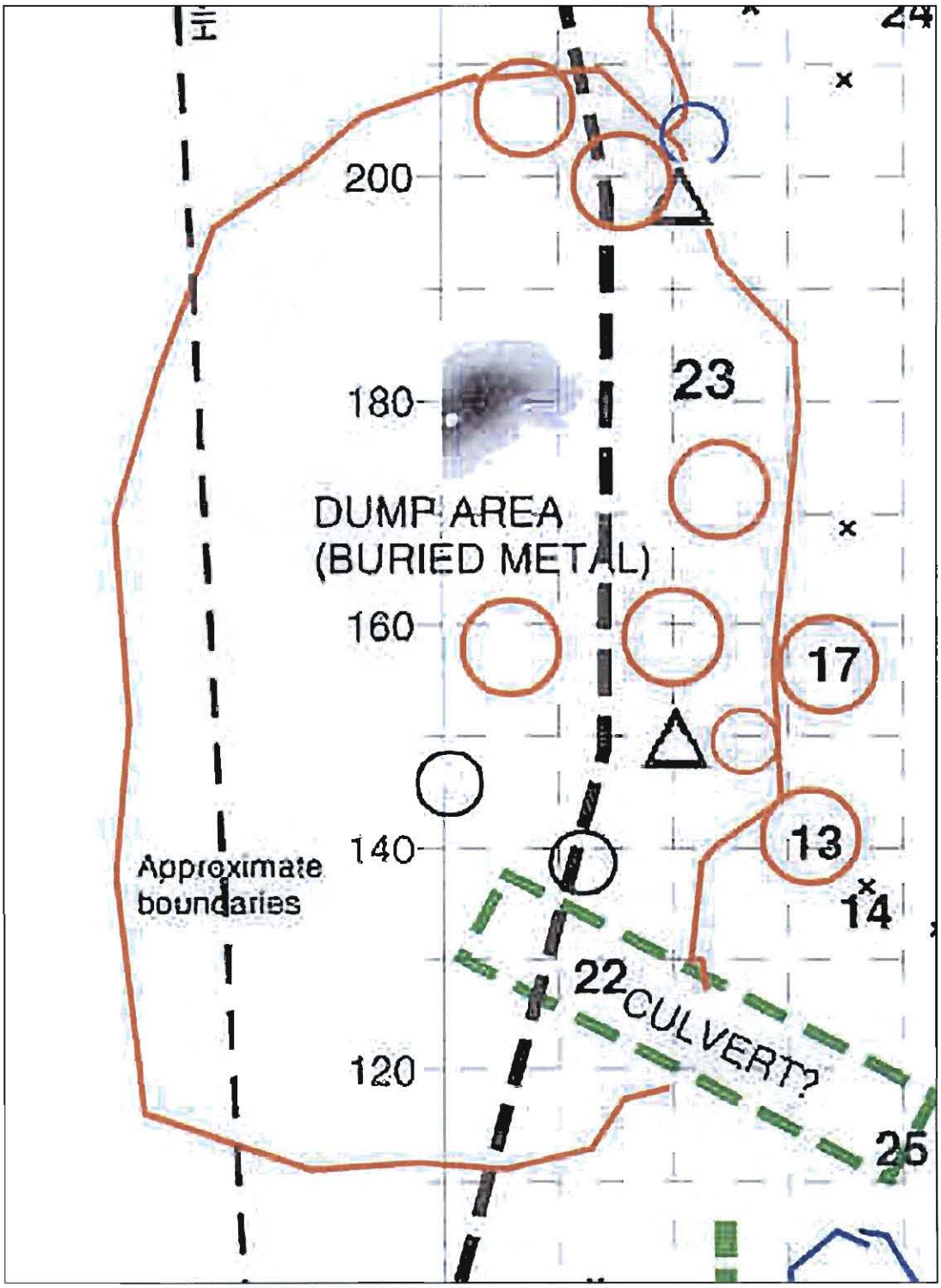


FIGURE 1-7
"DUMP AREA"



2.0 PERSONNEL AND EQUIPMENT

The organizational structure for this project reflects the resources and expertise needed to execute this WP, while minimizing risks to worker health and safety, the environment, and the general public. The names of the individuals and organizations at the site and lines of responsibility and communication are shown on the organizational chart for the site (Figure 2-1). Table 2-1 includes a list of addresses and phone numbers for key individuals. The sections below outline the responsibility of key site personnel. Table 2-2 lists the equipment expected to be used and TolTest personnel positions assigned to this cleanup activity.

2.1 NAVFACENGCOM Southern Division

Southern Division provides overview of project execution and coordination between TolTest, NSWC Crane, U.S. EPA and other agencies.

2.2 U.S. EPA Reg. V

Responsibilities include overview of all site activities to assure compliance with RCRA, and approval of all work plans and reports.

2.3 IDEM

Responsibilities include overview of all site activities to assure compliance with RCRA.

2.4 NSWC Crane Environmental Protection Department (EPD)

The NSWC Crane EPD oversees the effective overall implementation of this plan. Personnel from the EPD will sign, as the generator, any shipping manifests for waste disposal. An EPD representative will serve as the ECOTR. This individual also acts as the on-site representative and liaison between NSWC Crane, U.S. EPA, IDEM, and TolTest.

2.5 NSWC Crane Officer in Charge of Construction

Southern Division's on-site representative and liaison between NSWC Crane and TolTest. This individual is referred to as the COTR.

2.6 TolTest Regional Manager (RM)

TolTest's RM is responsible for implementing the project and has the authority to commit the resources necessary to meet project objectives and requirements. The RM will report directly to the OICC and will control all matters concerning contractual issues on the project.

2.7 TolTest Senior Project Manager (SPM)

The SPM will approve all reports (deliverables) before their submission to the U.S. Navy and U.S. EPA Reg. V, and ultimately be responsible for the preparation and quality of IM reports.

2.8 TolTest Project Manager (PM)/Site Supervisor

TolTest's PM/Site Supervisor's primary function is to ensure that technical, financial, and scheduling objectives are achieved successfully. The PM/Site Supervisor has the responsibility for ensuring that the project meets objectives and TolTest's quality standards. The PM/Site Supervisor will be responsible for leading and coordinating the day-to-day activities of the various resource specialists under her supervision and will report directly to the SPM. The PM/Site Supervisor is the primary point of contact with the ECOTR concerning environmental issues. Specific duties include:

- Develop a detailed work plan schedule;
- Establish project policy and procedures to address the specific needs of the project as a whole, and the objectives of each task;
- Orient all support staff concerning the project's special considerations;
- Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product;
- Review the work performed on each task to ensure its quality, responsiveness, and timeliness;
- Review and analyze overall task performance with respect to planned requirements and authorizations;
- Provide day-to-day coordination on technical issues in specific areas of expertise;
- Implement field-related work plans, assure schedule compliance and adhere to management-developed study requirements;
- Coordinate and manage field staff activities including sampling, excavation, and site restoration;
- Adhere to work schedules;
- Coordinate and oversee technical efforts of subcontractors assisting the field team;
- Identify problems at the field team level, resolve difficulties by implementing and documenting corrective action procedures, and providing communication between team and upper management;
- Document daily field activities for inclusion in the Contractors Production Report; and
- Participate in the preparation of the IM Report (IMR).

2.9 TolTest Quality Assurance/Quality Control (QA/QC) Representative

The qualifications and requirements of the QA/QC Representative are in accordance with the Department of the Navy, NAVFACENGCOM, Guide Specification NFGS-01450J, dated 31 March 2000.

The QA/QC Representative will implement and manage TolTest's QC program on this project. This individual will remain independent of direct job involvement and day-to-day operations and will not be on-site every day. This individual will have direct access to corporate executive staff as necessary to resolve any QA dispute, and will be responsible for auditing the implementation of the QA program in conformance with this plan and TolTest's policies. Specific functions and duties include:

- Providing QA audits on various phases of the field operations;
- Reviewing and approving of QA plans and procedures;
- Providing QA technical assistance to project staff; and
- Reporting on the adequacy, status, and effectiveness of the QA program on a regular basis to the RM and PM.

2.10 TolTest Health and Safety Officer (HSO)

The qualifications and requirements of the HSO are in accordance with the Department of the Navy, NAVFACENGCOM, Guide Specification NFGS-01525F, dated 31 March 2000.

The HSO reports to the PM and implements and ensures compliance with the HASP and tracks and reports on safety related matters. The HSO, or a designated representative, will be on-site , or on-call, during all phases of work. Specific responsibilities include:

- Implements personnel surveillance program;
- Provides site-specific training as required by the HASP;
- Conducts audits, as appropriate, to ensure compliance; and
- Stops work when necessary to ensure the safety of personnel and to prevent damage to the environment.

2.11 TolTest Environmental Specialist (ES)

The ES will be responsible for implementing the environmental sampling and monitoring requirements of this WP in the field, and will ensure that project objectives are met. Duties will include sample collection and proper shipment of samples to the laboratory. The ES will interpret and report results of analytical data to the ECOTR, RM, and PM. The ES will coordinate the proper disposal of contaminated soils with the PM and the ECOTR.

2.12 TolTest Operators/Drivers

Equipment operators will be responsible for the proper operation and maintenance of heavy equipment utilized on the site. They will be familiar with the scope of work and will be under the direct supervision of the Site Supervisor.

2.13 TolTest Laborers

Laborers will report to the Site Supervisor and will be responsible for general site cleanup and maintenance.

TABLE 2-1
PERSONNEL CONTACT INFORMATION

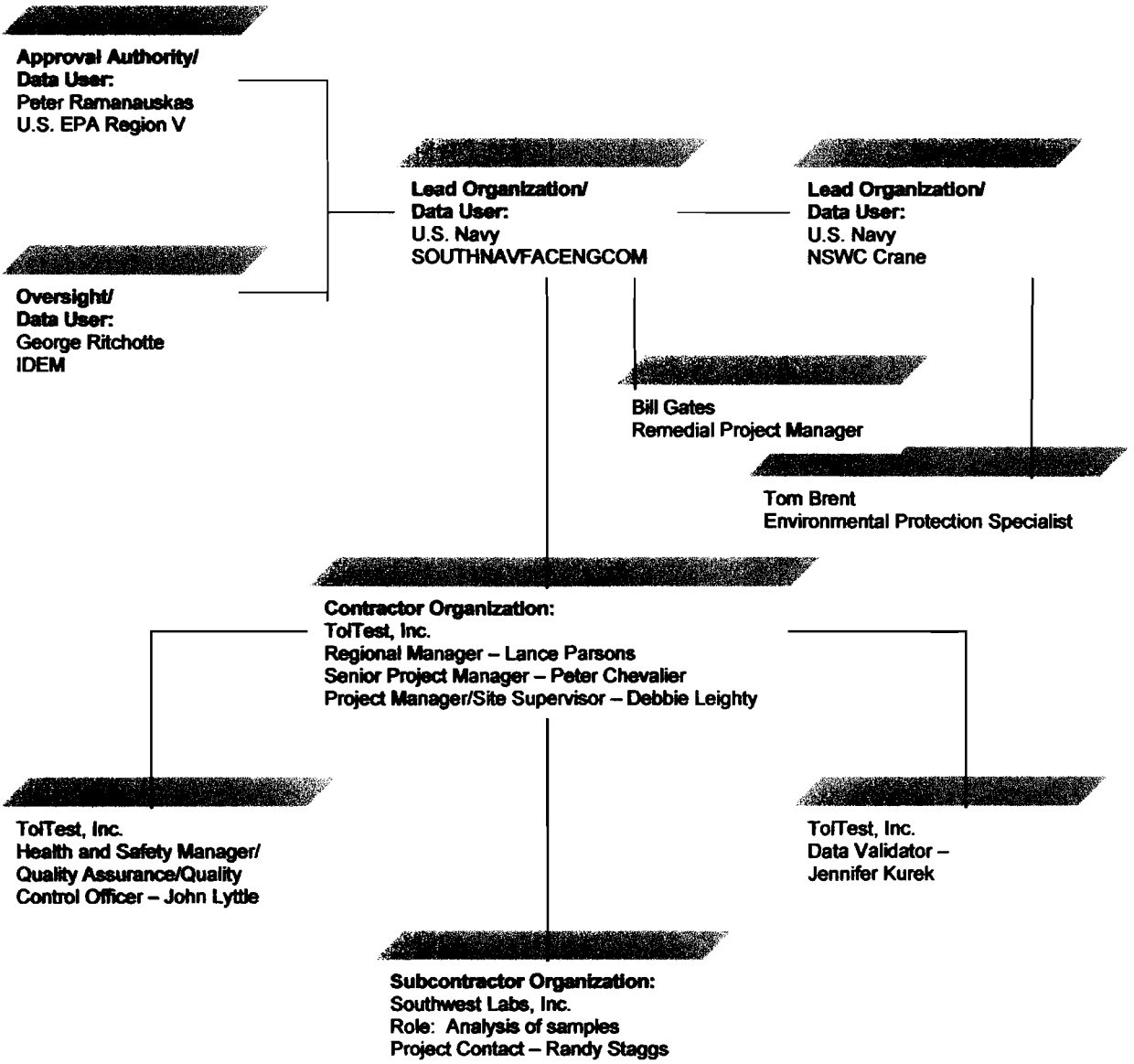
Table 2-1
PERSONNEL CONTACT INFORMATION

Responsible Party	Title	Contact Information
Lance Parsons	TolTest Regional Manager	(812) 854-0941 (812) 295-6910 – cell (812) 636-4877 – home
Peter Chevalier	TolTest Senior Project Manager	(812) 636-8501
Debbie Leighty	TolTest Project Manager/Site Supervisor	(812) 636-8501 (812) 295-6643 – cell (812) 636-7657 – home
Tom Brent	Environmental Protection Department NSWC Crane	(812) 854-6160 (812) 854-1132 (812) 277-4539 - pager
John Lyttle	TolTest Health and Safety Officer	(812) 636-8501
Law Enforcement	NSWC Crane Security (Base)	(812) 854-1333 – emergency (812-854-3300 – administration
Fire Department	NSWC Crane Fire Department (Base)	(812) 854-1333 – emergency (812) 854-1235
Ambulance Service	NSWC Crane Ambulance (Base)	(812) 854-1333 – emergency (812) 854-1235 – non-emergency
Eric McQueen	OSH Director	(812) 854-1625
Rich Barcum, CSP	TolTest Corporate Safety Manager	(419) 241-7175 (419) 460-7655 – cell (800) 532-1388 – pager
Poison Control Center	Poison Control Center	(800) 942-5969
National Response Center	National Response Center	(800) 424-8802
Richard Karl	Regional Chemical Accident Response National Response Team	(312) 353-9295
Medical Facility (Non-Life Threatening Injuries) – TolTest	Prompt Care	(812) 332-3443
Medical Facility – Government	NSWC Crane Base Medical Facility Head Nurse (Mary Muessig)	(812) 854-1220 (812) 854-4319
Hospital	Bedford Medical Center 2900 West 16th Street Bedford, IN 47432	(812) 275-1200
Hospital	Bloomington Hospital 601 West Second Street Bloomington, IN	(812) 336-9515
NSWC Crane EOD	Explosive Ordnance Disposal Detachment	(812) 854-3456 – administration (812) 854-1333
Using Cell Phone	Emergency Number on Base	(812) 854-1333

TABLE 2-2
PERSONNEL AND EQUIPMENT TO BE USED

Table 2-2 PERSONNEL AND EQUIPMENT TO BE USED	
Equipment	**TolTest Key Personnel**
Backhoe/Excavator	Regional Manager
Rubber Tire Loader	Senior Project Manager
Dump Trucks	Project Manager/Site Supervisor
Rolloff Boxes	QA/QC Representative
Assorted Hand Tools	Health and Safety Officer
Personal Protective Equipment	Environmental Specialist
Decontamination Equipment	Operators/Drivers
Sampling Equipment	Laborer
Drums	

FIGURE 2-1
ORGANIZATIONAL CHART



3.0 EXCAVATION SEQUENCE AND OPERATIONAL APPROACH

The excavation sequence and operational approach to complete the project objectives are defined in the following sections.

3.1 Permitting and Notification

The NSWC Crane facility requires issuance of permits before initiation of excavation activities. TolTest's PM will be responsible for obtaining an Excavation and Trenching Permit through the OICC, Public Works Department, Code 094, Building 2516, and a "hot work" permit from the Crane Fire Department, if necessary. An unexploded ordnance clearance will be obtained by the ECOTR, if needed.

3.2 Site Preparation

Once the WP has been approved, a series of site preparation tasks will be completed as described below. Figure 1-3 shows the site plan for SWMU 17. Site setup and preparation are described herein.

- Clear and grub along the perimeter and within the excavation area, as needed;
- Establish work zones and decontamination facilities;
- Install access roads from Highway 470 to the two contaminated areas located in the drainage ways.. Establish truck turnarounds in these areas and maintain existing access roads; provide additional crushed stone, as necessary;
- Mobilize support facilities, such as utility services, personnel decontamination facilities, and sanitary facilities;
- Construct an equipment decontamination pad where equipment and trucks can be spray washed;
- Construct a temporary water treatment facility, comprised of holding tanks for the collection, management, and treatment/disposal of rinse water from the decontamination process, as well as water that accumulates as precipitation or groundwater in the remediation and load out areas; and
- Establish material handling areas, including a waste storage area, and waste loading area.

3.3 Remedial Approach

The material contained in the SWMU 17 site will be removed using conventional excavation equipment. Based on existing data, the material will be excavated and transported to a TSCA landfill. The following major steps will be used to remove TSCA regulated materials:

- Using data from the 2002 TtNUS RFI Report, determine which areas within the site are considered to be above the action limits;
- Using survey control measurements, identify/demarcate horizontal and vertical excavation limits;
- Excavate and remove all TSCA regulated materials in 1-foot increments. Material will be loaded directly into trucks for disposal in a material loading area along the perimeter of the exclusion zone;
- PCB field screening kits will be used to determine disposal decisions and project completion decisions. All soils will be removed to meet the 1 ppm standard, but the concentration difference will dictate to what type of landfill they may be shipped. If the field sample indicates that the concentration of PCBs in the soil is below the clean up objective, the excavation activities will be stopped in that area and soil confirmation samples will be collected. Field screening with lab confirmation will be completed at the 25 ppm boundary for the disposal decision and at the 1 ppm boundary for project completion decisions. For areas that fail the screening, additional soils will be excavated. Testing and excavation will be performed until the area passes screening. Post-excavation verification sample analysis will be done using a fixed lab;
- Excavate and remove capacitors no greater than 12 feet deep in the following order (listed by number and/or coordinates): #21 (67,170), #21 (54,174), #23 (25,172), (18,200), (7, 205), (7, 247), (25,245), #26 (50,250), #29 (2,257), and (18,272N). Capacitors will be inspected and a

determination will be made as to whether the oil within the capacitors should be transferred into 55-gallon drums;

- Metal pole supports will be removed and decontaminated with a pressure washer and Pipe-X. Decontamination water will be assumed hazardous and will be stored for eventual disposal;
- Contaminated soil will be loaded into lined trucks using a backhoe and transported to an acceptable TSCA landfill. Visqueen will be placed between the stockpile and truck to capture any spilled material. Thick plastic will be placed underneath the truck so spilled soil does not touch native soil;
- Inspect and decontaminate all trucks prior to leaving the site either by dry sweeping or by spray washing, or both, if necessary;
- Perform post-excavation sampling to verify the effectiveness of the remediation; and
- Additional soil samples will be taken to delineate a potential PCB impacted area located in a drainage ditch to the north and to the extreme west of both Building 357 and the geophysical area. A survey crew will document the sample location points. If the additional samples indicate the presence of PCBs above 1 ppm, the impacted area will be delineated and the volume of soil that is impacted by PCBs will be quantified.

3.4 Waste Management

All decontamination water will be assumed to be TSCA waste and stored until the end of the project and then characterized for disposal. PCB-impacted soil and decontamination water characterized as TSCA-waste will be disposed of at the Chemical Waste Management facility in Model City, New York. PCB-impacted soil characterized as a non-TSCA-waste will be disposed of at the Waste Management Twin Bridges Landfill in Danville, Indiana. Decontamination water containing < 3 ppm PCB will be managed as non-TSCA waste. Capacitors and capacitor oil will be disposed of at the Superior Specialty Services facility in Phoenix, Arizona.

3.5 Site Restoration

If the soil samples indicate that the remaining soil has a concentration of PCBs less than the desired clean up objective, the excavation will be backfilled and compacted with excess excavation materials and the site will be returned to the original condition. Imported fill material, containing < 1 ppm PCB, will be utilized to complete the backfill activities at each excavation. The areas that originally maintained grass will be restored with seed, fertilizer and mulch. This restored area will be maintained to promote the regrowth of grass. Site restoration will include grading the work site to repair ruts caused by heavy equipment and filling and compacting areas where large pieces of debris were removed. All imported and excavated materials will be compacted in a manner to prevent significant settling. The access road will be removed and all areas will be graded to match the existing contours. All materials, including gravel or aggregate, cleared for the preparation of site activities will be returned to their original locations. Erosion control measures will be implemented to minimize erosion from the site. These measures will consist of spreading grass seed and covering it with straw, and installing silt fences and straw bales.

3.6 Equipment and Personnel Decontamination

3.6.1 Sampling Equipment

Equipment used to sample the contaminated soil in containers will be decontaminated prior to and after sampling, according to the following procedures:

- Wash in soapy water (alconox or equivalent);
- Rinse in potable water;
- Rinse with 10% nitric acid;
- Rinse with reagent grade water; and
- Air dry.

The amount of water generated for sampling equipment decontamination will be kept to a minimum (2 gallons or less). Water generated in this process will be put back into the soil container and absorbed by the soil prior to disposal.

3.6.2 Heavy Equipment

Heavy equipment utilized for excavation of contaminated soil will be decontaminated prior to leaving the site. Since the amount of contamination is expected to be minimal, or non-existent, it is anticipated that only the bucket of the equipment will come into contact with the contaminated soil. If the contamination covers a large area, the equipment will be placed on a protective barrier (such as 60 mil plastic) to prevent contact of the tracks or tires with the contaminated soil.

At the conclusion of the excavation activities, contaminated soil adhering to the bucket of the equipment will be scraped off and loaded into the last remaining disposal container. Pipe-X will be used to remove the remaining contaminated soil while placing the bucket over a bermed decontamination pad constructed of 6-mil plastic sheeting. A hand held pump sprayer and brushes will be used to remove the remaining soil, followed by a final fine mist rinse. A minimal amount of water will be used in this process. The soil and water that has collected in the decontamination pad, and the plastic from the pad, will be placed in the disposal container. Shovels, scrapers, or other tools used to decontaminate the bucket will be cleaned in a similar manner.

3.6.3 Personnel

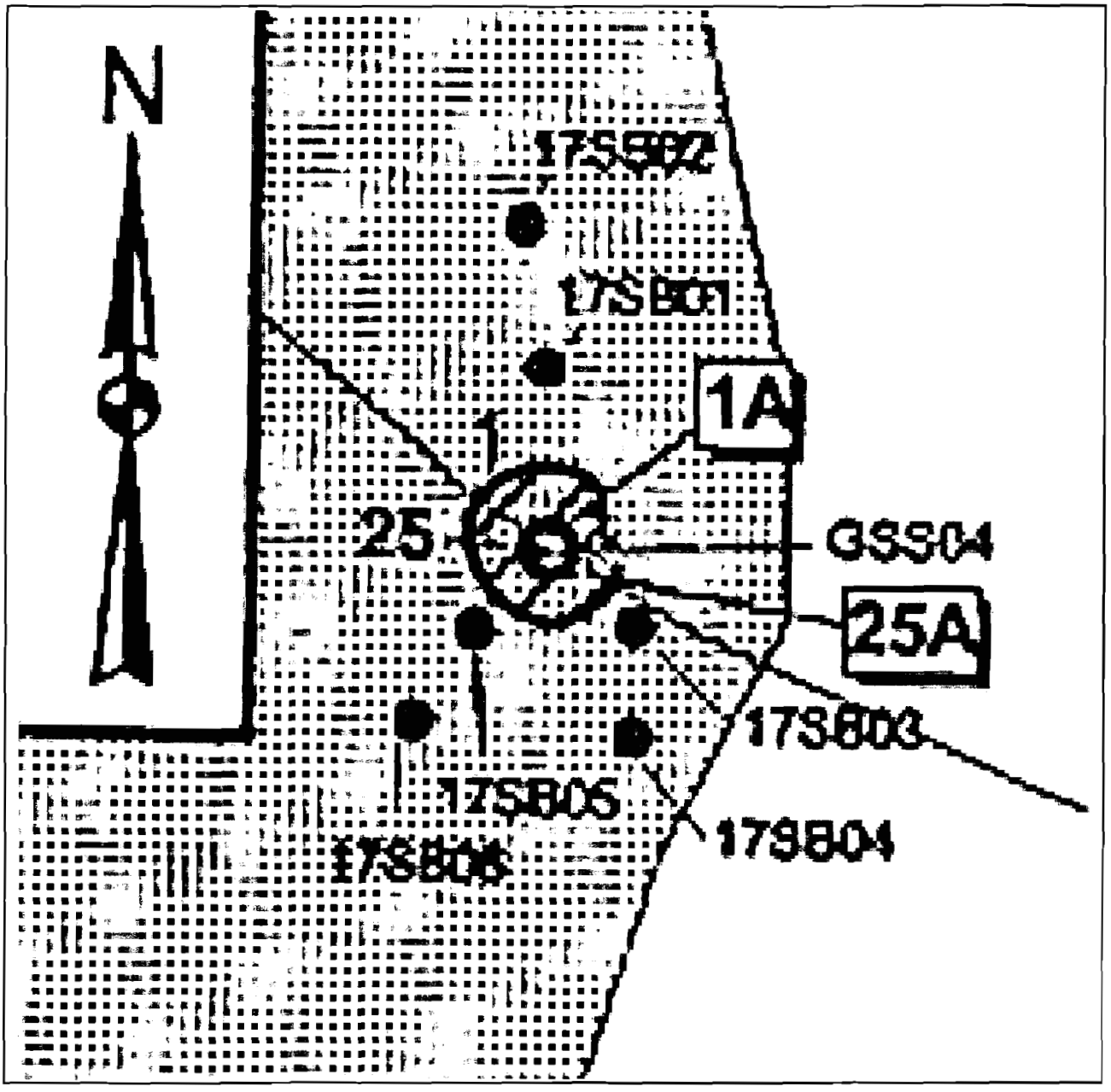
Personal protective equipment (PPE) that may be used during soil sampling and excavating activities shall consists of disposable clothing, such as Tyvek suits, over-boots, and Nitrile gloves. Since the majority of the clothing is disposable, decontamination water will be kept to a minimum.

3.7 Cleanup and Emergency Response

Each day upon completion of work, TolTest will remove all excess materials and debris from the NSWC Crane property. The work areas will be left in a neat and clean condition and all materials and/or debris will be disposed of properly.

All hazardous substance (HS) releases or spills involving NSWC Crane waste or property will be immediately reported to the COTR and the ECOTR. Off-site HS releases will be immediately reported to the proper Federal, State, and Local agencies and the ECOTR. Spill cleanup, remediation and damage to the environment resulting from TolTest's actions will be the responsibility of TolTest.

FIGURE 3-1
INVESTIGATIVE SAMPLING AREA



4.0 SAMPLING AND ANALYSIS PLAN (SAP)

4.1 Introduction

This SAP has been prepared to address the sampling objectives associated with the remediation of the SWMU 17 site at NSWC Crane, Indiana. This SAP is supported by and intended to be used in conjunction with the QAPP (Appendix B).

This SAP addresses field screening, post-remediation verification, investigative, and Investigation Derived Wastes (IDW) sampling.

4.2 Field Screening

Field test kits will be used during removal activities to determine disposal decisions and project completion decisions. If the field sample indicates that the concentration of PCBs in the soil is below the clean up objective, the excavation activities will be stopped in that area and soil confirmation samples will be collected. Field screening, with lab confirmation, will be completed at the 25 ppm boundary for disposal decisions and at the 1 ppm boundary for project completion decisions. For areas that fail the screening, additional soils will be excavated. Testing and excavation will be performed until the area passes screening. Excavations will not be backfilled until Post-remediation Verification sampling confirms cleanup to 1 ppm or below.

Field screening will be accomplished in accordance with Standard Operating Procedure (SOP) Number PCB75110.01-12 (Attachment 1 of the QAPP).

4.3 Post-remediation Verification

The goal of verification sampling is to ensure that cleanup has occurred based on the guidelines described in the TSCA regulations (40 CFR 761 Subpart 0). Two excavation scenarios are addressed with this verification sampling. The surficial excavation scenario pertains to a situation where the width of the excavation is greater than the depth. The pit excavation scenario will be for excavations that are deeper than 1 meter. Ten percent of samples with less than 25 ppm of PCBs, and 100 percent of samples with less than 1 ppm of PCBs, as indicated by the field analysis, will be sent to Southwest Laboratory of Oklahoma, Inc. (SW Labs) for analysis. If the verification of samples with less than 25 ppm PCBs are not in agreement with the field results, all verification samples will be sent for lab analysis. If all of the samples with less than 1 ppm PCBs are not in agreement with the field results, the area will be resampled and verification sampling will be repeated until they are in complete agreement. The rules for the verification sampling grid area are as follows:

- The verification grid must be aligned with magnetic north;
- A composite sample must be composed of nine or less sample aliquots;
- Individual sample aliquots will represent no more than 25 square feet of exposed excavation area each;
- A minimum of three composite samples will be required to assess an individual, discreet excavation; and
- Only one composite sample will represent a given area. Composite samples will not have overlapping areas. [*TtNUS, 2001*]

4.3.1 Sampling Techniques

All soil samples will be collected in accordance with SOP Number PCB75110.01-07, included in Attachment 1 of the QAPP. The soil borings will be collected by hand auger drilling, which will involve manually advancing a 2-inch diameter stainless steel bucket bit downward into the ground to the desired depth.

4.3.1.1 Surficial Excavations

For excavation areas larger than 225 square feet (20 square meters), a square-based grid system will overlay the area to be sampled. The grid axis will be oriented on a magnetic north-south line centered in the area and an east-west axis perpendicular to the magnetic north-south axis also centered in the area. The distance between grid lines in both the north-south direction and the east-west direction will be 5 feet (approximately 1.5 meters). Nine samples will be selected from contiguous grid points and samples will be combined from the nine contiguous grid points into one composite sample (SOP Number PCB75110.01-10 in Attachment 1 of the QAPP). A composite sample shall not consist of grid points represented in other composite samples. The composite sampling will be continued until the entire remediation area has been characterized by the sampling effort and the results show that cleanup standards have been achieved.

For excavation areas smaller than 225 square feet, less than 9 sample aliquots can be collected for composite samples. As with the larger excavation described in the preceding paragraph, any one composite sample shall not represent more than 225 square feet (20 square meters) of excavated area.

4.3.1.2 Pit Excavations

The sample density on excavation sidewalls varies somewhat from the excavation bottom samples. This is because sidewall sampling is expected to be from walls that are no higher than 3 feet (one meter). The determination of sample quantities assumes that one composite sample is taken for each 225 square feet (20 square meters) of exposed sidewall. Table 4-1 shall be used to determine the number of samples to be combined for one sidewall composite samples.

The following describe the likely sampling scenario for pits created from the excavation and removal of PCB capacitors.

Pits that are deeper than they are wide will likely be PCB capacitor burial sites. Verification samples will be collected from both excavation sidewalls and excavation floors.

For very small pits with less than 675 square feet of sidewall, a minimum of three composite samples will be taken. Each aliquot shall represent a 25 square foot area.

For pits with greater than 675 square feet of sidewall area, the nine-sample aliquot procedure discussed in Section 4.3.1.1 shall apply. In these larger test pits, the composite samples shall come from only one or two sidewalls.

4.4 Investigative Sampling

Surface and subsurface soil samples will be collected in and around the drainage ditch, which is located to the north and to the extreme west of both Building 357 and the geophysical survey area. Figure 4-1 was created by enlarging the area of concern on Figure 1-3. The legend has been included for informational purposes. The following surface and subsurface soil sampling activities are intended to determine the extent of contamination and to characterize the source area concentrations in the surrounding soils.

4.4.1 Survey

All surveying will be contracted to an Indiana-licensed surveyor. Ground surface elevation at each new boring location will be surveyed to within 0.01-foot vertical accuracy. Vertical elevations will be referenced to the 1988 National Geodetic Vertical Datum. Existing survey monuments around NSWC Crane will be used as reference points. Horizontal locations of soil borings will be surveyed to Indiana State Plane coordinates within the nearest 0.10 of a foot and referenced to the 1927 North American Datum.

The surveyor will stake out all historical sampling points and new sampling locations before any sampling activities will be initiated. Tall wooden lathes will identify the boring locations. Each lathe will be labeled with a waterproof marker, which will identify a unique soil boring number, corresponding to the boring log; the boring log will contain the survey data for the boring.

4.4.2 Sampling Techniques

This section discusses the sampling methodology for surface and subsurface soil sampling activities to be performed at the SWMU 17 site. All soil samples will be collected in accordance with SOP Number PCB75110.01-07, included in Attachment 1 of the QAPP. The soil borings will be collected by hand auger, direct-push technology, or split-barrel samplers. Soil samples will be collected for both chemical analysis and lithologic logging. The new sampling locations are shown in Figure 4-1.

4.4.2.1 Surface Samples

A total of 5 surface soil samples will be collected during this field investigation. These samples will be collected from the ground surface to a maximum depth of 2 feet, using hand auger (with a decontaminated 3-inch diameter stainless-steel bucket bit) sampling techniques. A decontaminated stainless-steel mixing bowl and single-use, disposable plastic trowel will be used to remove rocks, gravel, and other coarse debris and homogenize the sample. The sample will then be collected for PCB analysis in the required container. The container will be labeled, tagged, bubble bagged, sealed in a Ziploc plastic bag and placed in an insulated cooler at 4°C. As samples are added to the cooler, the chain-of-custody (COC) form will be updated to include each new sample container. The surface soil sampling information will be recorded on soil sample log sheets and in the field logbook.

The soil core will be visually inspected and logged by a trained technician, noting the soil texture, grain size (sand, silt, or clay), color (and any unusual discoloration), moisture content, and classification according to the Unified Soil Classification System. The data will be recorded on the boring log form in accordance with SOP Number PCB75110.01-06 (presented in Attachment 1 of the QAPP). A new boring log form will be used for each boring.

Details regarding the collection and labeling of soil samples are included in SOP Number PCB75110.01-01 and SOP Number PCB75110.01-07 (located in Attachment 1 of the QAPP).

4.4.2.2 Subsurface Samples

A total of 5 subsurface soil samples will be collected during this field investigation. All borings will be drilled to a depth of 4 feet below the ground surface (bgs), and the subsurface soil sample will be collected from a depth of 2 to 4 feet bgs. A decontaminated stainless-steel mixing bowl and single-use disposable plastic trowel will be used to remove rocks, gravel, and other coarse debris and homogenize the sample. The sample will then be collected for PCB analysis in the required container. The container will be labeled, tagged, bubble bagged, sealed in a Ziploc plastic bag, and placed in an insulated cooer at 4°C. As samples are added to the cooler, the COC form will be updated to include each new sample container. The surface soil sampling information will be recorded on soil sample log sheets and in the field logbooks.

4.4.2.3 QA/QC Samples

QA/QC samples will be collected at the following frequencies:

- Duplicate samples and rinsate blanks will be collected and analyzed at a rate of one for every soil samples batch. and
- Matrix spike/matrix spike duplicate (MS/MSD) samples will be collected and analyzed in the fixed laboratory at a rate of one per every 20 soil samples.

4.5 IDW Sampling

Field investigations and remediation will generate potentially contaminated wastes, primarily disposable PPE and equipment decontamination fluids. Based on the activities and types of contaminants assumed to be present, the residues should not represent a significant risk to human health or the environment when properly managed. Management of each residue will be performed as follows:

- Disposable PPE/equipment will be decontaminated, double-bagged, and placed in trash receptacles at the facility; and
- Decontamination fluids will be collected and stored onsite in 55-gallon drums. As per SOP Number PCB75110.01-08 (Attachment 1 of the QAPP), the decontamination fluids may be discharged into the NSWC-permitted sanitary sewer system if PCB concentrations are less than 3 parts per billion. The laboratory will analyze samples of decontamination fluid in order to ascertain the fate of the wastes.

4.6 Sample Management

4.6.1 Sample ID System

All samples will be properly labeled with an adhesive-backed sample label affixed to, and a tag tied to, each sample container, in accordance with SOP Number PCB75110.01-01 (Attachment 1 of the QAPP). The sample labels and tags will include the following information: project name, project location, sample tracking number, sampling date, sampling time, type of analysis required, matrix type, preservative, initials of sampler, and the name of the analytical laboratory to which the sample will be submitted.

Each sample will be assigned a unique sample tracking number. The sample tracking number for soil samples will be a four-segment, alphanumeric code beginning with the site identification (17 represents the SWMU number) and followed by codes for the sample type, sample location, and sample depth. This numbering scheme is described in SOP Number PCB75110.01-02 (Attachment 1 of the QAPP). Any other pertinent information regarding identification will be recorded in the field logbooks and sample log sheets.

The sampling time recorded on the COC form and labels for duplicate samples will be 0000 so that the duplicate samples are "blind" to the laboratory. Notes detailing the sample number, time, date, and type will be recorded on the sample log sheets and will document the location of the duplicate sample (sample log sheets will not be provided to the laboratory).

MS/MSD samples will be designated on the field documentation forms and COC form (see SOP Number PCB75110.01-04 in Attachment 1 of the QAPP).

4.6.2 Quality Control Samples

This section focuses on field QC samples that will be collected as part of this environmental investigation. Field QC samples include field duplicates, source water blanks, and equipment rinsate blanks. Field QC sample requirements include field duplicates, source water blanks, equipment rinsate blanks, and trip blanks and are described below.

Field Duplicates. Field duplicates will be obtained during a single act of sampling and will be used to assess the overall precision of the sampling and analysis program. Duplicate samples will be collected at a rate of one for every sample batch. All duplicate samples will be analyzed for the same parameters in the laboratory as their environmental sample counterparts. Duplicate samples will be preferentially collected where field evidence (staining) indicates that contamination is likely to be present in the environmental sample. The duplicate samples will be given unique QC sample IDs (see SOP Number PCB75110.01-02 in Attachment 1 of the QAPP))

Equipment Rinsate Blanks. Equipment rinsate blanks will be obtained under representative field conditions by running deionized water through sample collection equipment after decontamination and

placing it in the appropriate sample containers for analysis. Equipment rinsate blanks will be collected for non-dedicated equipment for all sampling rounds. For surface and subsurface soil sampling activities, rinsate blanks will be collected from a decontaminated stainless-steel bowl and mixing spoon. These items will be used to mix soil before it is placed in sample jars. One rinsate blank will be collected for every twenty regular samples obtained.

Source Water Blanks. Source water blanks will be obtained by sampling each water source (e.g., potable water and distilled water) used for decontamination activities during the field investigation. Source water blanks will be used to determine whether the water is contributing to sample contamination. Source water blanks will be collected for each type of water used for decontamination and will be submitted at a frequency of one per month. Source water blanks, as applicable, will be analyzed for the entire suite of parameters under investigation. It is anticipated that two source water blanks will be collected during the field investigation: one potable water sample and one sample of distilled water used for decontamination.

4.6.3 Sample Handling, Packaging, and Shipping

Sample Preservation. All soil samples need only be cooled to 4°C ± 2°C; no chemical preservatives are necessary. All samples will be promptly chilled with ice to 4°C ± 2°C and packaged in an insulated cooler with ice. Procedures in SOP Number PCB75110.01-11 (Attachment 1 of the QAPP) will be followed. Table 4-2 summarizes sample preservation requirements.

Sample Labeling. Before samples are packaged, the sample labels and tags will be checked to ensure that all information on the label and tag is complete and correct (see SOP Number PCB75110.01-01 in Attachment 1 of the QAPP)). This information should be checked to ensure that it matches the information placed on the sample collection log sheets and the COC form.

Sample Packaging. Sample packaging procedures can be found in SOP Number PCB75110.01-11 (Attachment 1 of the QAPP).

Sample Shipping. Sample shipping procedures can be found in SOP Number PCB75110.01-11 (Attachment 1 of the QAPP).

Sample Custody. Custody of samples must be maintained and documented at all times in accordance with SOP Number PCB75110.01-03 (Attachment 1 of the QAPP), beginning with the collection of samples in the field.

4.6.4 Record keeping

Standard forms, field notebooks, and a field logbook will be used to record all sample collection activities, field measurements, observations concerning site conditions, and other project-related information. These records include sample log sheets, daily activity records, field logbooks, drilling completion log sheets, and field instrument calibration log sheets, among others. More details regarding record keeping are included in SOP Number PCB75110.01-03 (Attachment 1 of the QAPP).

Field Logbooks. Bound, weatherproof field notebooks will be maintained by sampling personnel. All information related to sampling and other field activities will be recorded in field notebooks. This information will include, but is not limited to, sampling time, weather conditions, unusual events, field measurements, and descriptions of photographs.

All supervisors will maintain a bound, weatherproof logbook. These books will contain a summary of each day's activities and will reference the field notebooks when applicable.

Drilling Logs. A drilling log will be completed for every boring that occurs during these field activities. A trained technician will complete the boring log. The log will include information regarding date, time, personnel, drilling and sampling equipment, geologic materials encountered, fracture locations and density in bedrock (where appropriate), color, texture, odors, and readings made with screening

instruments (see SOP Number PCB75110.01-05 and SOP Number PCB75110.01-06 in Attachment 1 of the QAPP).

Equipment Calibration Logs. An equipment calibration log sheet will be used to record each time an instrument is calibrated, or recalibrated, or when calibration is checked against a standard or background.

Sample Collection Logs. One sample collection log sheet will be completed for every environmental sample, every duplicate sample, and every field blank sample collected during the field activities.

COC Forms. A COC form will be completed for every cooler that contains samples being shipped to an off-site laboratory for analyses. These forms are a record of the people that have custody of the samples from the time the samples are collected to the time they are analyzed and disposed. See Figure 4-2 for a sample COC. The completed field COC document will be signed, placed in a sealed plastic envelope, and taped to the top inside cover of the shipping container before it is shipped. The sampler will retain a copy of the document.

Shipping Forms/Air Bills. The sampler will retain copies of all forms and air bills related to shipment of coolers in order to track the shipment and to communicate with the receiving laboratory.

Permanent Record File. At completion of the field activities, the sampler will submit all field records, data, field notebooks, logbooks, COC records, sample log sheet, daily activity logs, and other records concerning the project, to the PM. The PM will check these records for legibility and completeness prior to submitting them to the SPM. These forms, data, and field notes will become part of the permanent project record.

TABLE 4-1
DETERMINATION OF NUMBER OF SAMPLES FOR ONE SIDEWALL COMPOSITE SAMPLE

Table 4-1 DETERMINATION OF NUMBER OF SAMPLES FOR ONE SIDEWALL COMPOSITE SAMPLE		
Wall Height (feet)	**Wall Length (feet)**	**Number of Sample Aliquots Combined into One Sidewall Composite Sample**
1.25	1 – 85	3
1.25	85 – 177	6
1.25	177 – 266	9
2.5	1 – 85	6
2.5	85 – 177	9
2.5	177-266	9

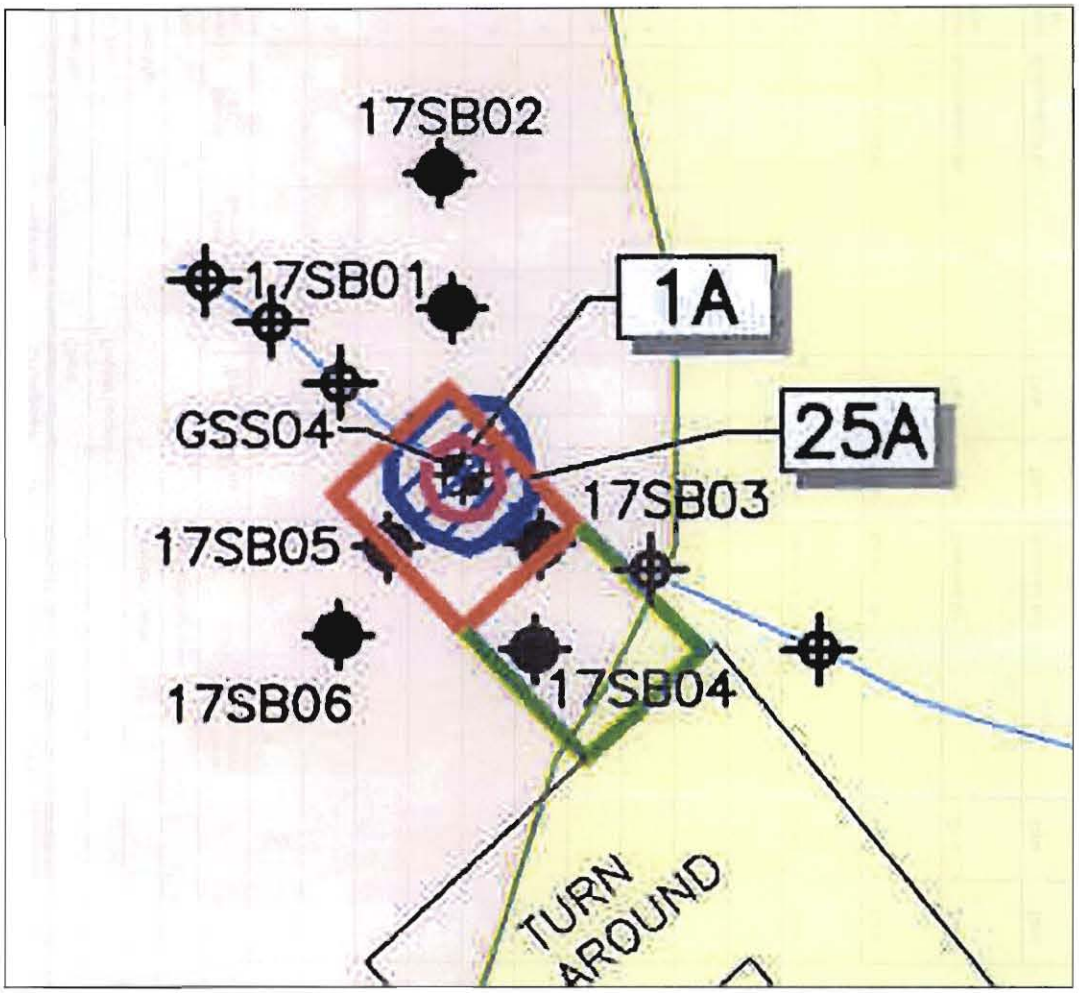
TABLE 4-2
SUMMARY OF SAMPLE ANALYSES AND QUALITY CONTROL SAMPLES

Table 4-2
SUMMARY OF SAMPLE ANALYSES AND QUALITY CONTROL SAMPLES

Parameter[1]	Samples	Field Duplicates[1]	Rinsate Blanks[2]	Matrix Spike/ Matrix Spike Duplicates[3]	Total
PCBs	33	3	3	3/3	45

1 – Field duplicates will be collected at a frequency of one per every 10 samples.
2 – Rinsate blanks will be collected at a frequency of one per every 10 samples, with a minimum of one per day of sampling, per sampling device/instrument. These amounts are estimates and may vary.
3 – Matrix spike (MS) and matrix spike duplicate (MSD) samples will be collected at a frequency of one per every 20 samples. MS/MSDs are not applicable (NA) for field analyses. MS/MSD are not considered in the total number of analyses.

FIGURE 4-1
INVESTIGATIVE SAMPLING AREA



LEGEND

- INDICATES WHERE SURFACE AND SUBSURFACE SAMPLES WILL BE COLLECTED
- SOIL BORING LOCATION
- EXISTING GRAB SAMPLE LOCATION
- EXISTING COMPOSITE SOIL SAMPLE LOCATION
- BUILDING STRUCTURE
- GEOPHYSICAL SURVEY AREA
- ROAD
- RAILROAD
- STREAM
- TREE LINE
- SEWER LINE
- CULVERT
- WOODED
- GRASS
- GRAVEL
- PAVED
- H-470 HIGHWAY
- R-89 RAILROAD
- PCB CONTOURS
- 1 PPM EXCAVATION AREA
- 25 PPM EXCAVATION AREA
- CONTAMINATION ZONE
- CONTAMINATION REDUCTION ZONE/ TRUCK LOADING AREA/ EQUIPMENT DECONTAMINATION AREA

FIGURE 4-2
SAMPLE CHAIN-OF-CUSTODY FORM

TOLTEST INC.

1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186; Voice (419) 241-7175, Fax (419) 321-6259
Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304; Voice (419) 241-7175, Fax (419) 241-1808
Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other _____

Chain of Custody Record

40058 Page _____ of _____

Project No.:		Client:	
P.O. No.:		Project/Location:	
Project Mgr.:		Sampler's Name	
Phone No.		Sampler's Signature	

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	Parameters								Preserved Yes/No	LAB USE ONLY Lab #
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time

LAB USE ONLY

Were samples delivered ☐ in person ☐ by courier
Were samples preserved ☐ in field ☐ in lab ☐ N/A
Temp of samples _____ °C
Did samples arrive intact and sealed? ☐ yes ☐ no ☐ N/A
Were proper containers used? ☐ yes ☐ no
Was container labeled properly for contents? ☐ yes ☐ no
Were samples packaged properly for type of material? ☐ yes ☐ no
Was shipping label completed properly per regulations? (49 CFR 170, etc.) ☐ yes ☐ no

Comments: _____

TAT _____

Distribution: Original plus one accompanies shipment (white and yellow); copy to coordinator field files (pink)

Rev. 4/99

5.0 ENVIRONMENTAL PROTECTION

TolTest will provide and maintain environmental protection through the completion of this project. Environmental protection will be provided to correct conditions that develop during the project or that are required to control pollution that develops during normal work practices. TolTest's operations will comply with all Federal, State and Local regulations pertaining to water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

TolTest will at all times be aware of and adhere to all applicable environmental laws, regulations, and environmental protection policies in effect at NSWC Crane. Information concerning Navy environmental policies will be obtained from OPNAVINST 5090.1B and the NSWC Hazardous Waste Management Plan. TolTest will at all times comply with 329 IAC 4.1, 40 CFR 262, 263, 264, 265, and 761.

Any hazardous waste created, used, or brought onto NSWC Crane property by TolTest will be the responsibility of TolTest. Storage of hazardous waste will be in approved and properly labeled containers (49 CFR 178). The waste will be properly labeled with the proper shipping description, accumulation start date, and generator information. The containers (if any) will be removed from the project site, stored, and treated/disposed of in accordance with 40 CFR 263, and 264.

All waste will be manifested from the site and will be handled through the NSWC Crane ECOTR, who will approve and sign for all waste manifested from the site. Manifesting arrangements will be scheduled 24 hours in advance, excluding emergencies. After hours, or on weekends and holidays, manifesting can be requested in writing 48 hours prior to shipment. NSWC Crane reserves the right to refuse all after hour, weekend, and holiday manifesting at the convenience of NSWC Crane.

TolTest will preserve the integrity of the natural resources of the project area. This includes returning the site to its approximate pre-construction conditions, ensuring that the surrounding area is not environmentally damaged in any way and preventing the release of any HS into the surrounding air, land or water.

6.0 SITE SAFETY AND HEALTH

Site safety and health is described in detail in the HASP, Appendix A to this plan. In addition, activity hazard analyses (AHAs) have been prepared for each definable feature of work. The HSO will be responsible for reviewing the AHA with all field personnel involved in a specific task. The following describes each task/operation in terms of the definable features associated with each major phase of work. Definable features of work include the following:

- Site Delineation;
- Debris Removal;
- Excavation;
- Site Restoration; and
- Soil Sampling.

7.0 REPORTING REQUIREMENTS

7.1 IMR

TolTest will prepare an IMR that complies with 40 CFR 260 – 268, 40 CFR 761, and 329 IAC 4.1. The IMR will include as-built drawings and photographs. Data will be in the electronic data deliverable format and will be compatible with the format used by TtNUS and Laucks Lab. All draft documents will be provided as hard copies and electronically editable files. All final documents will be provided as hard copies and electronic files on compact disks (CD). The CD will include the WP, IMR, QAPP, and the electronic database. The schedule for the preparation of the IMR is as follows:

7.2 Monthly Status Report

TolTest will provide a Monthly Status Report on the 10th of each month.

TABLE 7-1
IMR SCHEDULE

Table 7-1 IMR SCHEDULE	
DELIVERABLE	**SCHEDULE**
Internal Draft IMR	60 days after completion of fieldwork
	Allow 15 days for Navy comments
Draft IMR	15 days after receipt of comments
	Allow 45 days for EPA comments
Final IMR	15 days after receipt of comments
	Allow 45 days for EPA approval

8.0 SCHEDULE

The work schedule will be eight to ten-hour days, five to six days per week. The construction sequence will begin once approvals and all necessary permits and notifications have been received. Fieldwork will commence within fifteen days after the date of order to proceed by the government. If the Contracting Officer concurs that weather conditions are not favorable to proceed with the excavation activities (i.e., rain, frozen ground, etc.) then excavation will not begin until more appropriate weather conditions prevail. Table 8-1 provides an estimated work schedule.

The work will be conducted in such a manner as to cause the least interference with the normal functions of the site and surrounding area. Portions of the site will be vacated for periods of time, as necessary for TolTest to perform certain work, stage equipment and materials. Prior to beginning any work, TolTest will meet with the ECOTR in order to approve the site requirements and sequence of work.

TABLE 8-1
ESTIMATED WORK SCHEDULE

Table 8-1 ESTIMATED WORK SCHEDULE				
Activities	**Dates (MM/DD/YY)**		**Deliverable**	**Deliverable Due Date**
	Anticipated Date(s) of Initiation	**Anticipated Date of Completion**		
Select General Contractor/Laboratory		9-6-02		
Prepare Internal Draft WP	9-6-02	10-6-02		
Prepare Draft WP	10-13-02	10-28-02		
Prepare Final WP	12-12-02	12-27-02		
Fieldwork	1-11-03	3-26-03		
Prepare Internal Draft IMR	3-26-03	5-27-03		
Prepare Draft IMR	6-11-03	6-26-03		
Prepare Final IMR	8-10-03	8-25-03		

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40 CFR 761.61(a)(4)(i)(A-B).

APPENDIX A

HEALTH AND SAFETY PLAN
for the
INTERIM MEASURES WORK PLAN for the
PCB CAPACITOR BURIAL POLE YARD REMEDIATION
SWMU 17/04

NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA

HEALTH AND SAFETY PLAN FOR THE INTERIM MEASURES WORK PLAN FOR THE PCB CAPACITOR BURIAL POLE YARD REMEDIATION SWMU 17/04 NAVAL SURFACE WARFARE CENTER CRANE, INDIANA

FOR

U.S. NAVY
CRANE, INDIANA

SUBMITTED

APRIL 2003

ENVIRONMENTAL JOB ORDER CONTRACT (EJOC)
CONTRACT NO. N68950-00-D-0200
DELIVERY ORDER NO. FC 49
TOLTEST PROJECT NO. 75110.01

TOLTEST, INC.
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Approved By:

TolTest Regional Manager	Lance Parsons	(Date)
TolTest Senior Project Manager/ Environmental Specialist	Peter J. Chevalier	(Date)
TolTest Project Manager/ Site Supervisor	Debbie Leighty	(Date)

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Attachment 2 Material Safety Data Sheet for PCBs
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ACRONYM LISTING

°F	degrees Fahrenheit
AHA	Activity Hazard Analyses
CFR	Code of Federal Regulations
COTR	Contracting Officer's Technical Representative
CPR	Cardiopulmonary Resuscitation
ECOTR	Environmental Contracting Officer's Technical Representative
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSO	Health and Safety Officer
IDEM	Indiana Department of Environmental Management
IM	Interim Measures
IMR	Interim Measures Report
MSDS	Material Safety Data Sheet
NAVFACENGCOM	Naval Facilities Engineering Command
NSWC	Naval Surface Warfare Center
OICC	Officer in Charge of Construction
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyl
PM	Project Manager
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RM	Regional Manager
SPM	Senior Project Manager
SWMU	Solid Waste Management Unit
TSCA	Toxic Substance Control Act
TtNUS	Tetra Tech NUS, Inc.
U.S. DOT	United States Department of Transportation
U.S. EPA	United States Environmental Protection Agency
WP	Work Plan

1.0 INTRODUCTION

TolTest has been retained by the Naval Facilities Engineering Command (NAVFACENGCOM), Officer in Charge of Construction (OICC) under contract N68950-00-D-0200, Delivery Order #FC49 to provide an Interim Measures (IM) Work Plan (WP) for completing remediation activities at the Solid Waste Management Unit (SWMU) 17 Polychlorinated Biphenyls (PCB) Burial/Pole Yard, Naval Surface Warfare Center (NSWC) Crane, Indiana. Throughout the remainder of this document this site will be referred to as the SWMU 17 site. This plan will be reviewed and approved by the Contracting Officers Technical Representative (COTR), Environmental COTR (ECOTR), Indiana Department of Environmental Management (IDEM), and the United States Environmental Protection Agency Region V (U.S. EPA Reg. V), prior to the start of any field activities.

This site-specific Health and Safety Plan (HASP) is a supplement to the above referenced WP and describes the health and safety procedures to be implemented during the remediation of the SWMU 17 site at NSWC Crane, IN. The purpose of the plan is to communicate the known and suspected hazards associated with the project and to establish appropriate safety procedures for all companies, agencies, and personnel working at the site.

This HASP has been developed through the cooperation of key associates of TolTest, Inc. and NSWC Crane. Prior to the start of work, each associate working at this site will be required to review and sign this HASP.

When subcontractors become involved in potentially hazardous work at the site, they will also be required to review the HASP for their personnel. In this event, the subcontractor will be given the opportunity to review this HASP and request any modifications appropriate to the nature of their work. Any request for a site-specific HASP modification must be reviewed and approved by the TolTest Health and Safety Officer (HSO) and Project Manager (PM), as described in the HASP.

The term "site" as used throughout this document refers to that portion of the SWMU 17 site that will be secured and used for project operations during the excavation, loading, and transfer of contaminated materials. This includes all exclusion zone and support zone areas.

1.1 OBJECTIVE

The primary objective of this work is to remove and dispose of PCB contaminated soil and buried capacitor(s); remove, decontaminate and reinstall pole supports; perform additional investigative sampling; and restore the site to original conditions. Soil will be removed to the 1-ppm PCB cleanup level. Work will be accomplished to cause the least interference with NSWC Crane operations, to protect existing work from damage, and to replace that which is damaged. Environmental protection, health and safety, and quality control will be maintained throughout the project.

1.1.1 Site Preparation/Site Setup

Figure 1-1 shows the site excavation plan for the SWMU 17 site. A complete Activity Hazard Analyses (AHA) is included as Attachment 1. Prior to the start of excavation, the following site preparation activities will take place:

- Clear and grub along the perimeter and within the excavation area, as needed;
- Establish work zones and decontamination facilities, as described in Sections 6.0 and 7.0 of this document;
- Install access roads from Highway 470 to the two contaminated areas located in the drainage ways. Establish truck turnarounds in these areas and maintain existing access roads; provide additional crushed stone, as necessary;

- Mobilize support facilities, such as utility services, personnel decontamination facilities, and sanitary facilities;
- Construct an equipment decontamination pad where equipment and trucks can be spray washed;
- Construct a temporary water treatment facility comprised of holding tanks for the collection, management, and treatment/disposal of rinse water from the decontamination process, as well as water that accumulates as precipitation or groundwater in the remediation and load out areas; and
- Establish material handling areas, including a waste processing area, waste storage area, and waste loading area.

1.1.2 Remediation Activities for SWMU 17

The material contained in the SWMU 17 site will be removed using conventional excavation equipment. Based on existing data, the material will be excavated and transported to a Toxic Substance Control Act (TSCA) landfill. The following major steps will be used to remove TSCA regulated materials as presented in the IM WP. A complete AHA is included as Attachment 1.

- Using data from the 2002 Tetra Tech NUS, Inc. (TtNUS) Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report, determine which materials within the site are considered TSCA regulated materials;
- Using survey control measurements, identify/demarcate horizontal and vertical excavation limits;
- Excavate and remove all TSCA regulated materials in 1-foot increments. Material will be loaded directly into trucks for disposal in a material loading area along the perimeter of the exclusion zone;
- PCB field screening kits will be used to determine disposal decisions and project completion decisions. If the field sample indicates that the concentration of PCBs in the soil is below the clean up objective, the excavation activities will be stopped in that area and soil confirmation samples will be collected. Field screening with lab confirmation will be completed at the 25 ppm boundary for the disposal decision and at the 1 ppm boundary for project completion decisions. For areas that fail the screening, additional soils will be excavated. Testing and excavation will be performed until the area passes screening;
- Excavate and remove all capacitors no greater than 12 feet deep in the following order (listed by number and/or coordinates): #20 (67,170); #21 (54,174); #23 (25,172); (18,200); (7,205); (7,247); (25,245); #26(50,250); #29 (2,257); and (18,272N). Capacitors will be inspected and a determination will be made as to whether the oil within the capacitors should be transferred into 55-gallon drums;
- Metal pole supports will be removed and decontaminated with a pressure washer and Pipe-X. Decontamination water will be assumed hazardous and will be stored for eventual disposal;
- Contaminated soil will be loaded into lined trucks using a backhoe and transported to an acceptable TSCA landfill. Visqueen will be placed between the stockpile and truck to capture any spilled material. In addition, thick plastic will be placed underneath the truck so spilled soils do not touch native soils;
- Inspect and decontaminate all trucks prior to leaving the site either by dry sweeping or by spray washing, or both, if necessary;
- Perform post-excavation verification sampling to verify the effectiveness of the remediation;
- Ten additional soil samples will be taken to delineate a potential PCB impacted area located in a drainage ditch. A survey crew will document the sample location points. If the additional samples indicate the presence of PCBs above 1 ppm, the impacted area will be delineated and the volume of soil that is impacted by PCBs will be quantified; and
- Once all the contaminated material has been removed, backfill and compact the excavated areas with clean fill. Revegetate all disturbed areas.

1.2 SITE AND FACILITY DESCRIPTION

The SWMU 17 site has been in use since before 1966. Historically, the site has been used for the following:

- Storage of capacitors, some of which contained PCBs;
- Storage of transformers, some of which contained PCBs;
- Reported burial of capacitors, some of which may have contained PCBs; and
- Storage of creosote-impregnated utility poles, some of which may contain PCBs as a result of burst transformers. [*TtNUS, 2002*]

Pure PCBs have never been found in transformers or capacitors at NSWC Crane. The greatest concentrations of PCBs have been in the range of 10,000 ppm. Therefore, any releases of capacitor or transformer oil at the SWMU 17 site would be expected to exhibit concentrations up to that range. It is known that capacitors were buried at the SWMU 17 site in the early to mid 1970's. However, it is not known whether any capacitors were buried prior to the early 1970s or after mid-1970. Figure 1-2 shows the SWMU 17 site, including areas where sampling activities have historically occurred. [*TtNUS, 2002*]

Soil data collected from the SWMU 17 site were compared to TSCA environmental soil cleanup standards. The standards used in this comparison were the TSCA High Occupancy Standard of 1 mg/kg (i.e., ppm) and the TSCA Low Occupancy Standard of 25 mg/kg [40 Code of Federal Regulations (CFR) 761.61(a)(3)(i)(A and B)]. Total PCB concentrations of individual samples were compared to these standards. Throughout this document, these standards shall be referred to as simply, the 1-mg/kg standard and the 25-mg/kg standard, respectively. [*TtNUS, 2002*]

Surface soil samples (collected at depths between 0 and 2 feet) were collected by Science Applications International Corporation in March 2001 from the SWMU 17 site and analyzed for the presence of PCBs. PCB's were detected in 22 of the 28 samples (see Figure 1-2). Arolclor-1260 and Aroclor-1242 were the only PCB congeners detected in these samples. Concentrations of Arolclor-1260 ranged from 0.067 mg/kg to 210 mg/kg. Aroclor-1242 was detected at a concentration of 15 mg/kg in one sample. Total PCB concentrations in seven samples exceeded the 1 mg/kg standard but were less than the 25 mg/kg standard. Total PCB concentrations in 6 samples were in excess of the 25 mg/kg standard. These concentrations ranged from 37 mg/kg to 210 mg/kg. [*TtNUS, 2002*]

In March of 2002, TtNUS completed the RFI Report. During this investigation surface soil and subsurface soil samples (collected at depths between 2 and 4 feet) were collected and analyzed for the presence of PCBs. The soil samples were analyzed for PCBs via SW-846 method 8081A (U.S. EPA June 1997). The following PCB congener mixtures were targeted in this analysis: Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260. Aroclor is the industrial trade name for these PCB congeners. Positive PCB results in soil samples were tallied and displayed as Total PCBs; nondetected results were not included in this tally. [*TtNUS, 2002*]

PCBs were detected in 23 of the 44 surface soil samples collected and 6 of the 44 subsurface soil samples collected (see Figure 1-2). Aroclor-1260 was the only PCB congener detected in these samples. Concentrations of Aroclor-1260 ranged from 0.013 mg/kg to 140 mg/kg in the surface samples. Total PCB concentrations in 8 surface samples exceeded the 1 mg/kg standard but were less than the 25 mg/kg standard. These concentrations ranged from 1.2 mg/kg to 20 mg/kg. Two samples exceeded the 25 mg/kg standard and ranged from 120 mg/kg to 140 mg/kg. [*TtNUS, 2002*]

Concentrations of Aroclor-1260 ranged from 0.2 mg/kg to 1.6 mg/kg in the subsurface samples. Total PCB concentrations in 1 sample exceeded the 1 mg/kg standard but was less than the 25-mg/kg standard. All Total PCB results were less than the 25 mg/kg standard. [*TtNUS, 2002*]

A geophysical survey was conducted at the SWMU 17 site by Tetra Tech EMI, Inc., from March 4 to March 7, 2002. The survey, conducted to a maximum depth of 10 feet, successfully identified several

anomalies (potentially buried PCB capacitors), as well as a large waste burial area and many locations of subsurface metal, including buried utilities. The capacitors were believed to have been buried sometime in the 1970's. A previous geophysical survey, conducted by the U.S. Army Corps of Engineers Waterway Experiment Station in 1996 [*TtNUS, 2002*], failed to locate the capacitors. As proposed, a Geonics EM61 time domain metal detector and a Geometrics G-858 gradiometer were used to complete the survey. Figure 1-3 shows the location and summary of the survey. [*TtNUS, 2002*]

1.3 POLICY STATEMENT

This HASP is Appendix A of the WP. The Quality Assurance Project Plan (QAPP) is Appendix B of the WP. The three documents were created to be used in unison. The WP, HASP and QAPP conform to Occupational Safety and Health Administration (OSHA) regulations identified in 29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response (HAZWOPER)" and applicable parts of 29 CFR 1910 and 1926. A copy of the WP, along with its supplements, will be on site during remedial activities.

Remediation activities will be conducted in accordance with U.S. EPA Reg. V, IDEM, and the U.S. Department of Transportation (U.S. DOT) 49 CFR regulations. In addition, the above objectives will be accomplished in compliance with 40 CFR 260 – 268, 40 CFR 761, 329 Indiana Administrative Code 4.1, 20 CFR 1910 and 1926, and the TtNUS QAPP and RFI Report.

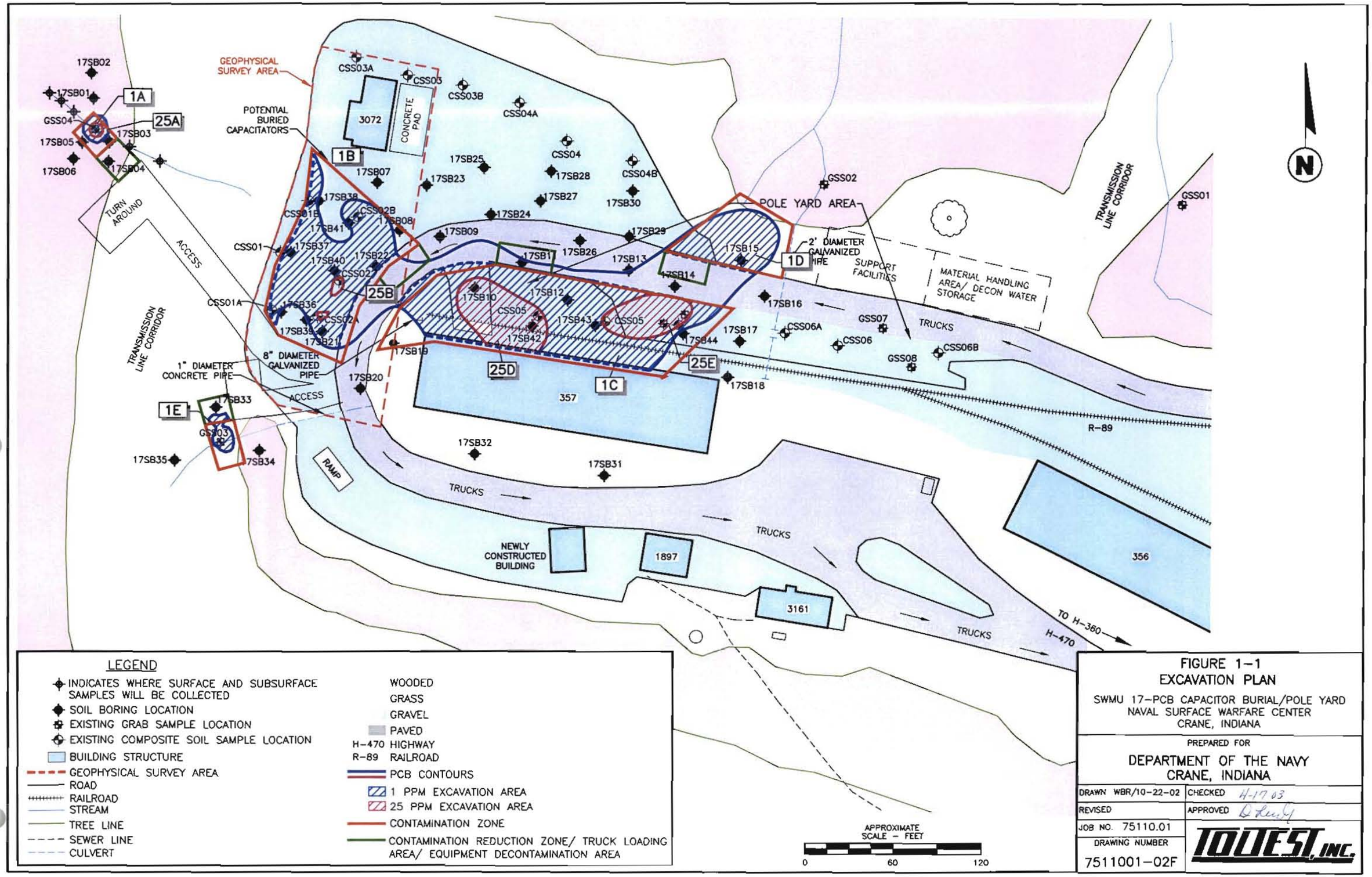


FIGURE 1-1
EXCAVATION PLAN

SWMU 17-PCB CAPACITOR BURIAL/POLE YARD
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA

PREPARED FOR

DEPARTMENT OF THE NAVY
CRANE, INDIANA

DRAWN WBR/10-22-02	CHECKED H-17 03
REVISED	APPROVED D Lewis
JOB NO. 75110.01	TOLTEST, INC.
DRAWING NUMBER 7511001-02F	

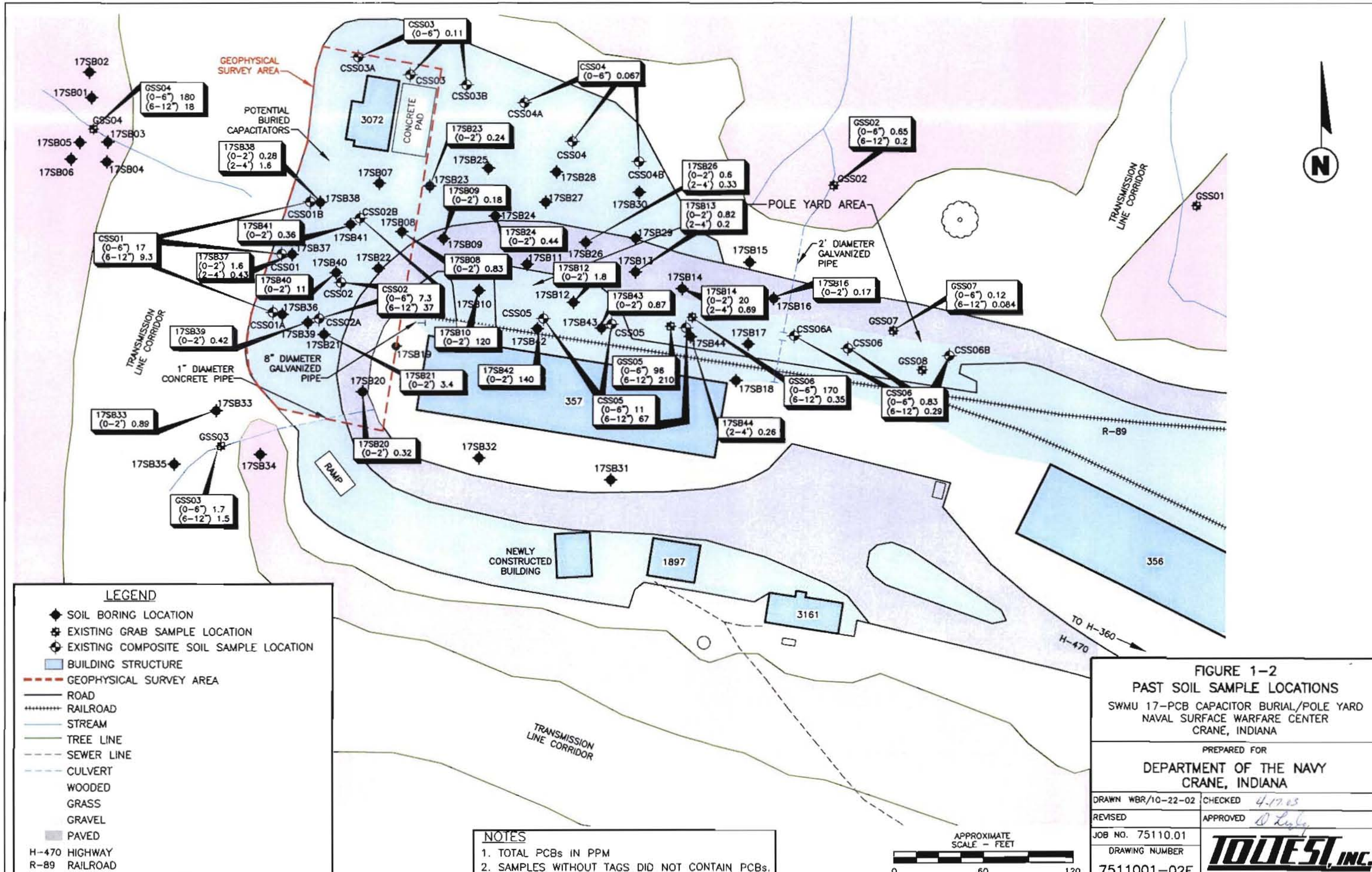
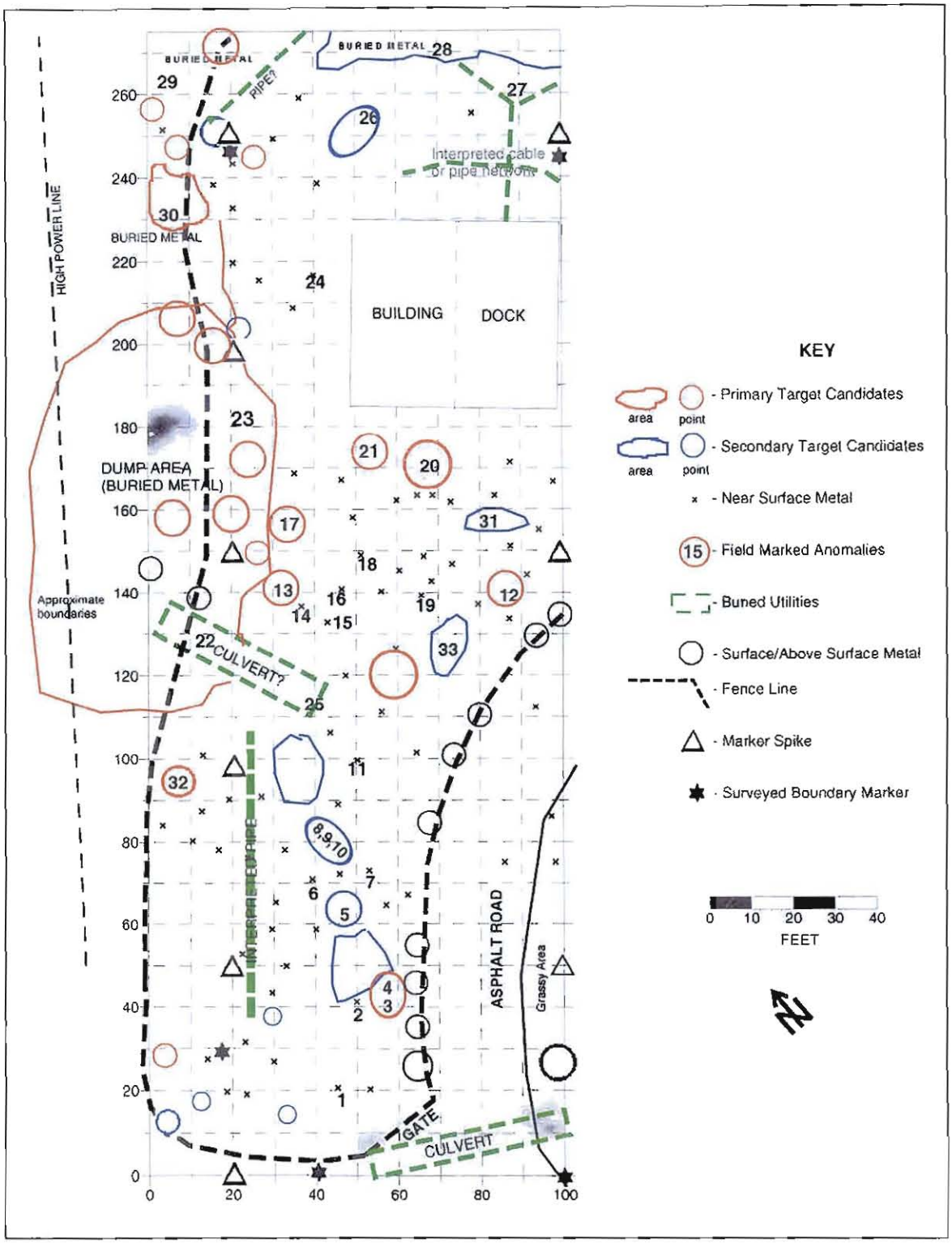


FIGURE 1-2
PAST SOIL SAMPLE LOCATIONS
SWMU 17-PCB CAPACITOR BURIAL/POLE YARD
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA

PREPARED FOR
DEPARTMENT OF THE NAVY
CRANE, INDIANA

DRAWN WBR/10-22-02	CHECKED 4-17-03
REVISED	APPROVED D. Lisby
JOB NO. 75110.01	TOLTEST, INC.
DRAWING NUMBER 7511001-02F	

FIGURE 1-3
GEOPHYSICAL SURVEY



2.0 RESPONSIBILITIES

The organizational structure of this project reflects the resources and expertise needed to execute the WP, while minimizing risks to worker health and safety, the environment, and the general public. The names of the individuals and organizations at the site, as well as lines of responsibility and communication, are shown on the organizational chart in Figure 2-1. The sections below outline the responsibilities of key site personnel.

2.1 ALL PERSONNEL

TolTest is responsible for the safety, health and emergency response provisions for this remediation project. These provisions are provided through the development and implementation of this HASP. The HASP will be available at all times on the project site. All personnel on site will be informed of this plan and any potential health and safety hazards of the operations. Every associate, regardless of job title, shares in the responsibility for safety and is required to report any unsafe condition without fear of reprisal.

2.2 TOLTEST CORPORATE HEALTH AND SAFETY MANAGER

The Corporate Health and Safety Manager, Richard L. Barcum, CSP, administers the safety program for TolTest. It is his job to develop and administer an overall health and safety program. All TolTest Site HSOs report directly to him.

2.3 TOLTEST HSO

The qualifications and requirements of the HSO are in accordance with the Department of the Navy, NAVFACENGCOM; Guide Specification NFGS-01525F dated, 31 March 2000.

The HSO reports to the PM and implements and ensures compliance with the HASP, and tracks and reports all safety related matters. The HSO, or a designated representative, will be on-site, or on-call, during all phases of work. Specific responsibilities include:

- Implements personnel surveillance program;
- Provides site-specific training as required by the HASP;
- Conducts audits, as appropriate, to ensure compliance; and
- Stops work when necessary to ensure the safety of personnel and to prevent damage to the environment.

2.4 TOLTEST REGIONAL MANAGER (RM) AND SENIOR PROJECT MANAGER (SPM)

The RM is responsible for implementing the project and has the authority to commit the resources necessary to meet project objectives and requirements. The RM will report directly to the OICC, will be the major point of contact, and will control all matters concerning contractual issues on the project.

The Senior Project Manager (SPM) will approve all reports (deliverables) before their submission to the U.S. Navy and the U.S. EPA Reg. V, and will ultimately be responsible for the preparation and quality of the IM reports.

2.5 TOLTEST PM/SITE SUPERVISOR

The PM/Site Supervisor's primary function is to ensure that technical, financial, and scheduling objectives are achieved successfully. The PM/Site Supervisor has the responsibility for ensuring that the project achieves or exceeds objectives, as well as TolTest quality standards. The PM/Site Supervisor will be responsible for leading and coordinating the day-to-day activities of the various resource specialists under

her supervision and will report directly to the RM or SPM. The PM/Site Supervisor will be the primary point of contact with the ECOTR concerning environmental issues. Specific duties will include:

- Develop a detailed work plan schedule;
- Establish project policy and procedures to address the specific needs of the project as a whole, and the objectives of each task;
- Orient all support staff concerning the project's special considerations;
- Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product;
- Review the work performed on each task to ensure its quality, responsiveness, and timeliness;
- Review and analyze overall task performance with respect to planned requirements and authorizations;
- Provide day-to-day coordination on technical issues in specific areas of expertise;
- Implement field-related work plans, assure schedule compliance, and adhere to management-developed study requirements;
- Coordinate and manage field staff activities including sampling, excavating, and site restoration;
- Adhere to work schedules;
- Coordinate and oversee technical efforts of subcontractors assisting the field team;
- Identify problems at the field team level, resolve difficulties, implementing and documenting corrective action procedures, and providing communication between team and upper management;
- Document daily field activities for inclusion in the Contractors Production Report; and
- Participate in the preparation of the IM Report (IMR).

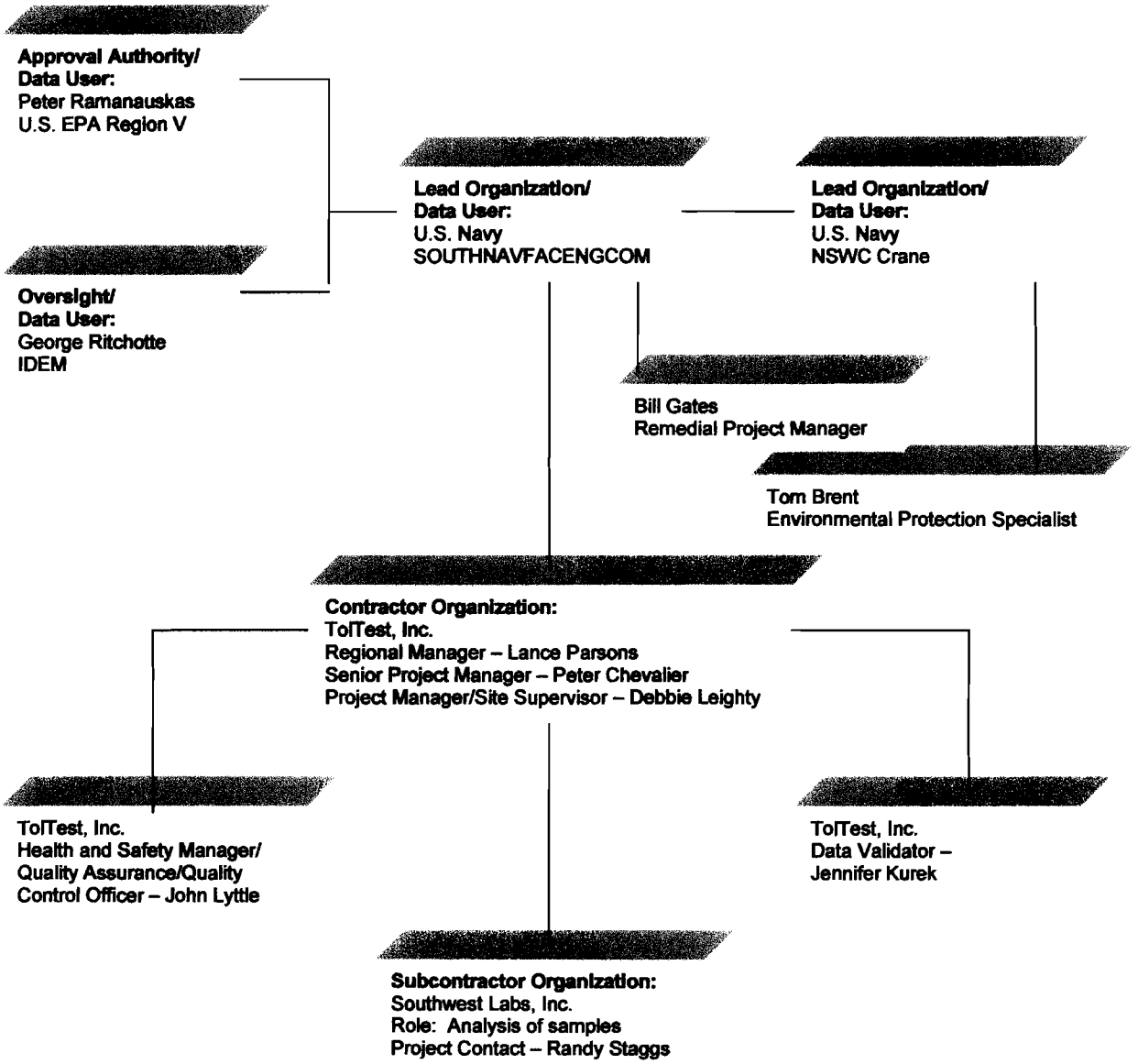
2.6 SUBCONTRACTORS

Various subcontractors will be required for this project. The procedures described in this HASP will be the responsibility of all subcontractors, as well as supervisors and associates.

2.7 ON-SITE PERSONNEL AND VISITORS

All on-site personnel will be required to comply with this HASP and will be briefed on its contents prior to being permitted entry to the site.

FIGURE 2-1
ORGANIZATIONAL CHART



3.0 JOB HAZARD ANALYSIS

3.1 SCOPE OF WORK

This section addresses the identified health and safety hazards associated with the activities covered by the WP. Specific hazards associated with each task to be performed are outlined in the AHA, which is presented in Attachment 1.

Additional AHA's will be performed by the HSO and the PM on an as-needed basis. These task-specific hazard analyses will address the hazards and safety procedures associated with individual operations or tasks, such as permitting a confined space entry or developing a lifting plan for crane operations.

3.2 JOB HAZARD ASSESSMENT

3.2.1 Chemical Hazards

PCBs have been determined to be the primary constituents of concern on site. Waste materials containing PCBs >1 ppm and/or 25 ppm (see the WP for more information) will be disposed of at a TSCA-permitted facility. Two example Material Safety Data Sheets (MSDSs) for PCBs (Aroclor 1260) are presented in Attachment 2. These MSDSs provide a summary of toxicological data information, chemical properties, and proper handling procedures for the material.

Activities involving a potential for exposure to PCBs include, but are not limited to:

- Excavation of impacted soils;
- Removal and handling of capacitors and capacitor parts;
- Processing of posts and buried equipment via spray washing;
- Load out and transport of impacted materials;
- Equipment and vehicle decontamination activities;
- Verification sampling; and
- Wastewater treatment activities.

Some potential for exposure to PCBs is associated with the loading of impacted material for transportation offsite. The Personal Protective Equipment (PPE) and procedures specified for these specific activities would reflect the level of protection needed. Activities may be reclassified as more environmental data are evaluated.

Some project activities may have the potential to result in offsite exposure to the public. The potential for public exposure is greatest through inhalation because of the possibility of fugitive dust constituents from impacted areas, if any. Perimeter and personnel exposure monitoring will be completed on a regular basis.

The dust release potential will be mitigated by dust suppression and material handling procedures designed to minimize the generation of dust. These procedures will include minimizing the extent of open excavation and consolidation areas to help reduce the total amount of dust released. Once materials have been placed, they will be covered to prevent erosion, as needed.

Capacitors containing PCB fluids will be removed from the site. Although these materials will be primarily handled using heavy equipment, there is still a potential for dermal contact from fluids that may leak or spill from damaged capacitors. Handling oily or oil-filled waste will require stringent PPE adherence, which is address in Section 5.0.

In addition to PCB exposure, the excavation of material from a former dumpsite presents the potential for exposure to a range of other potentially hazardous substances. These could include asbestos, lead,

solvents, hazardous residential wastes, or drums of industrial waste placed prior to the implementation of the RCRA regulations. Based on the period of operation of the dump, only minimal amounts of these materials should be present, if any. Continuous organic vapor monitoring, including personnel monitoring, will be used along with ongoing inspection of the excavation areas to identify any potentially hazardous conditions. The HSO will be responsible for determining safety precautions, changes to the PPE program, or other modifications to this HASP that would be appropriate in response to unanticipated chemical hazards.

Every hazardous chemical that is brought on site must be reported to the HSO in accordance with the OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Any hazardous material that is present on site must be addressed in the site-specific Hazard Communication Program, which will be available at the command post. A chemical inventory will be kept to track all chemicals that are brought on site. The written Hazard Communication Program will address all hazards associated with the chemicals in use. The hazards associated with these materials will be conveyed by the HSO to personnel involved in their use prior to beginning work activities.

3.2.2 Biological Hazards

Biological hazards include plants, animals, bacteria, or viruses that may cause disease in humans. A wide variety of biological hazards are present in and around the SWMU 17 site. These include, but are not limited to, ticks (Lyme Disease and Rocky Mountain Spotted Fever), poison ivy and oak, chiggers, rodents, bees, wasps, snakes, and blood borne pathogens. Workers should avoid contact and adopt appropriate controls. Allergic reactions caused by contact with plants, insect bites, and other biological hazards should be reported to the HSO immediately.

All first aid activities involving potential exposure of personnel to blood or blood-tainted (contaminated) body fluids shall be conducted in accordance with the requirements of the Bloodborne Pathogen Standard, 29 CFR 1910.1030. Personnel involved in first aid procedures shall don the proper PPE and dispose of blood-contaminated materials, as required. Responding personnel will don surgical gloves and other PPE deemed necessary by the HSO at the time of the incident. An adequate inventory of such PPE will be maintained with the first aid kit located at the first aid station near the decontamination area. Contact with blood or blood-tainted body fluids during first aid procedures should be reported immediately to the HSO.

3.2.3 Physical and Environmental Hazards

Physical and environmental hazards may be encountered during work activities. The HSO will be responsible for maintaining written procedures Standard Operating Procedures for many of these activities. Subcontractors preferring to use their own procedures may do so, when applicable, provided they are at least as protective of site personnel as this HASP. Prior to using an alternate procedure, however, the subcontractor will be required to submit the company's applicable operating procedures. Specific emphasis will be placed on the anticipated physical and environmental hazards described in the paragraphs that follow.

3.2.3.1 Slips, Trips, and Falls

All work paths and work areas must be kept clear of slip and trip hazards. To control material spills, felt and plastic sheeting will be placed on the ground between the material being loaded and the truck (see Section 3.0 of the WP). Workers should be aware of the slip hazard associated with the plastic sheeting. Applicable OSHA standards for walkways, stairways, etc. (29 CFR 1926.500) will apply.

Pits or voids often characterize landfills, dump areas, and areas of unstable ground caused by settling or erosion. Strict adherence to foot protection will be required. Workers should go out of their way to walk on compacted roads where sure footing is more available.

Due to the slip and trip hazards described above, compounded by the nature of trash to contain sharp objects, there is a high hazard potential for puncture wounds at this site. Tetanus, an acute spasmodic disease, is commonly caused when the skin is punctured or cut by an object that can carry infection, such as a rusty nail.

3.2.3.2 Heavy Equipment

Only experienced equipment operators shall be permitted to operate heavy equipment. All machines will be supplied with a fire extinguisher and a backup alarm. Equipment should be inspected by the operator each morning prior to use to ensure that all safety equipment and devices (e.g., backup alarms, brakes) are fully operational.

The number of ground personnel working around heavy equipment shall be kept to a minimum. Workers should maintain eye contact with operators. In addition, all ground personnel shall wear orange safety vests for easy identification. Should heavy equipment operations continue after daylight work hours, all persons working on site would be required to wear reflective safety vests and to put reflectors on all sides of their hard hats.

3.2.3.3 Fuel Storage

A storage area will be established in the support zone for all fuels and other flammable liquids. The area will be clearly marked with "Caution – Flammables" and "No Smoking" signs. The area also will include a secondary containment berm to control spills. Site personnel will strictly adhere to applicable provisions of 29 CFR 1926, Subpart F, "Fire Protection and Prevention", when handling, using and storing flammable and combustible materials. The fuel storage area will be inspected daily by the HSO for signs of leakage, spillage, containment integrity, and improper storage.

3.2.3.4 Electrical Power

All electrical power will have a ground fault circuit interrupter as part of the circuit. All equipment will be suitable and approved for the class of hazard. Applicable OSHA standards for electrical equipment (29 CFR 1926, Subpart K, "National Fire Protection Association 70 National Electric Code") shall apply.

3.2.3.5 Equipment Decontamination – Pressure Washer Operations

Personnel participating in equipment decontamination activities, as well as the processing of large items removed during excavation activities, shall be properly trained in the operation of the pressure washer prior to beginning decontamination activities. Equipment shall be inspected each day prior to use. All personnel shall don the proper PPE, as defined in Section 5.0 The area will be clearly marked, and all employees not directly involved in these activities shall remain outside the work area.

3.2.3.6 Heat Stress

When the temperature exceeds 70 degrees Fahrenheit (°F) and personnel are wearing protective clothing, a heat stress-monitoring program will be implemented, as appropriate. The HSO will be responsible for implementing this program and for monitoring site personnel for the signs and symptoms of heat stress. In addition, adequate drinking water will be available.

3.2.3.7 Cold Stress

Potential exposure to extreme cold, coupled with the presence of moisture, may result in cold stress related disorders. The HSO will be responsible for monitoring site personnel for the signs and symptoms of cold stress (e.g., skin condition and color, sluggishness). If the signs and symptoms of cold exposure are discovered, the HSO will be responsible for implementing appropriate first aid procedures. An enclosed heated environment will be made available at the site during the duration of the project.

3.2.3.8 Flame, Heat, or Spark-producing Operations

Utilization of flame, heat, and/or spark-producing equipment (e.g., cutting, welding torches, or abrasive saws) may be necessary during the course of this project. When the use of such equipment is necessary, the PM will be responsible for obtaining a Hot Work Permit from the NSWC Crane Fire Department, and the operation will be carefully monitored to ensure compliance with the provisions stated in 29 CFR 1926.353 for flame, heat, or spark-producing operations.

3.2.3.9 Noise

Those employees working around heavy equipment, or in other noisy areas, will be subject of possible exposure to noise above the OSHA Permissible Exposure Limit of 90 decibels (dBA). All heavy equipment operators will be required to use hearing protection unless sound level measurements clearly demonstrate that protection is not required. Other employees will utilize hearing protection when working around heavy equipment or in areas where sound level measurements in excess of 85 dBA are encountered.

3.2.3.10 Lifting

All personnel shall know their lifting limits and the proper way(s) to lift an object. Lifting shall be limited by factors such as: the route and distance to be traveled, the amount of time required, and the center of gravity necessary to handle the load safely. A worker shall not lift more than 50 lb. without assistance from another person or mechanical help. This includes handling and sorting of capacitors.

3.2.3.11 Hand Tools/Power Tools

Proper eye, face, and hearing protection shall be provided and worn while using all power tools. Prior to beginning work operations, the user shall inspect all tools. Defective tools will not be used and will be tagged out. Only tools designed for the application in mind will be used. The proper strength tool will be used as specified for each job. For hand tools, the use of handle extensions and cheater bars will be strictly prohibited.

Power tools and machines will be disconnected from their power source before making adjustments or attachment changes. Guards or safety devices will not be removed. All fuel-powered tools will be shut off before refueling. Blade guards will be in place and working properly. Air-powered tools must have safety clips or retainers on all hose connections. Manufacturers' safe operating pressures will not be exceeded for any fittings.

3.2.3.12 Excavations

During excavation activities, appropriate monitoring will be conducted. If personnel enter an excavation 4 ft. deep or greater, hazardous atmosphere monitoring will be conducted. Further, if the excavation is 5 ft. deep or greater, or the potential for cave-in exists, actions will be taken to address the stability of the excavation in accordance with 29 CFR 1926.650, Subpart P, "Excavations".

Daily documented inspections shall be made by a trained competent person, for evidence of a situation that could result in possible cave-ins, indications of a failure of protection systems, hazardous atmospheres, or other hazardous conditions. Excavations shall be inspected either daily or prior to entry and shall also be inspected after every rainstorm.

Excavations that are to be left open shall be barricaded with a safety fence.

3.2.3.13 Confined Space Entries

No person on this site will be permitted to enter a confined space, as defined by the HSO, until a confined space entry permit has been completed. This permit will verify that the confined space is safe for entry

and that it has been tested for oxygen level, flammable vapors, and toxic gases. Monitoring of the confined space and completion of the permit will be the responsibility of the HSO. All persons on this site shall be required to comply with the requirements of 29 CFR 1910.146.

4.0 HAZARD CONTROL PROGRAM

4.1 GENERAL PRACTICES

4.1.1 Buddy System

The buddy system shall be practiced at all times on site. The "buddy system" is a system of organizing employees into work groups in such a manner that each employee of the work group is designated to be observed by at least one other employee in the work group. The purpose of the buddy system is to provide rapid assistance to employees in the event of an emergency. Visual, voice, or radio communication will be maintained at all times. Any site worker observed with abnormal behavior shall be escorted from the work area immediately.

4.2 PROJECT SPECIFIC PRACTICES

Eating, drinking, and smoking will be permitted only in designated areas in the support zone.

Hands and face shall be thoroughly washed immediately upon leaving the decontamination zone and prior to eating, drinking, smoking, or applying cosmetics.

4.3 HEAT AND COLD ILLNESS PREVENTION

Site workers shall be protected from exposure to cold so that the core body temperature does not fall below 98.6°F. Lower body temperatures will very likely result in reduced mental alertness, reduction in rational decision-making or loss of consciousness with the threat of fatal consequences. To prevent such occurrence, the following measures may be implemented:

1) Site workers will be required to wear warm clothing, such as gloves, heavy socks, etc., when the air temperature is below 45°F. Protective clothing, such as Tyvek or other disposable overall, may be used to shield employees from the wind.
2) When the air temperature is below 32°F, clothing for warmth may include:
    - Insulated suits, such as whole body thermal underwear;
    - Wool socks or polypropylene socks to keep moisture off the feet;
    - Insulted gloves;
    - Insulated boots;
    - Insulated head cover such as hard hat, winter liner, or knit cap; and/or
    - Insulated jacket, with wind and water resistant outer layer.
3) At air temperatures below 32°F, the following work practices will be implemented:
    - If the possibility exists for the clothing of a site worker to become wet in any way on the job site, the outer layer of clothing will be water permeable;
    - If a site worker's underclothing becomes wet in any way, the worker will change into dry clothing immediately. If the clothing becomes wet from sweating (and the employee is uncomfortable), the employee may finish the task at had prior to changing into dry clothing;
    - Site workers will be provided with a warm (65°F or above) break area;
    - The intake of coffee and tea will be limited, due to their circulatory and diuretic effects;
    - The buddy system shall be practiced at all times on site. Any site worker observed with severe shivering shall leave the work area immediately; and/or
    - Site workers shall dress in layers, with thinner lighter clothing worn next to the body.

Heat stress monitoring and observation of personnel shall commence when the ambient temperature is 80°F or above (65°F if chemical protective clothing is worn).

All employees will be informed of the possibility and symptoms of heat stress. If an employee experiences extreme fatigue cramps, dizziness, headache, nausea, profuse sweating, or pale, clammy skin, the employee and the HSO will take control measures. If the symptoms do not subside after a reasonable rest period, the HSO shall seek medical assistance.

To prevent heat stress, the following control measures will be implemented:

- Site workers will be encouraged to drink plenty of water throughout the day;
- On-site drinking water will be kept cool to encourage personnel to drink frequently;
- A work regimen that will provide adequate rest periods for cooling down will be established, as required;
- All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps; and
- Employees will be instructed to observe and monitor themselves and coworkers for signs of heat stress and to take additional breaks as necessary. All breaks shall take place in cool, well ventilated, and shaded rest areas.

4.4 HEARING CONSERVATION

The HSO will evaluate site tasks to determine which ones will require hearing protection. Personnel shall wear hearing protection when exposed to noise levels exceeding 85 dBA.

4.5 CONFINED SPACES

No person on this site will be permitted to enter a confined space, as defined by the HSO, until a confined space entry permit has been completed. This permit will verify that the confined space is safe for entry and that it has been tested for oxygen level, flammable vapors, and toxic gases. Monitoring of the confined space and completion of the permit will be the responsibility of the HSO. All persons on this site shall be required to comply with the requirements of 29 CFR 1910.146.

4.6 LOCKOUT/TAGOUT PROCEDURES

All affected associates will be notified that lockout/tagout procedures are to be followed. The authorized associate will know the type and magnitude of energy that the machine or equipment uses and must understand the hazards involved. If the machine or equipment is operating, it will be shut down by the normal stopping procedure. This will isolate the equipment. Stored energy will be dissipated or restrained by a reliable method such as repositioning, blocking, bleeding down, etc. Energy isolating devices will be locked out/tagged out with an assigned individual lock(s) or tag(s). After ensuring that no associates are exposed, and as a check on having disconnected the energy source, normal operating controls can be initiated to make certain the equipment will not operate. Operating controls will be returned to neutral of off after the test.

After servicing and/or maintenance has been completed, the equipment will be ready for normal operations. The area around the machine will be checked to ensure that no one is exposed to it. After all tools have been removed from the machine or equipment, guards have been reinstalled, and employees are in the clear, all lockout/tagout devices may be removed.

4.7 SANITATION

During the mobilization tasks described in Section 1.1, washing water and portable toilets will be provided onsite. The HSO will closely monitor site sanitation ensuring workers leave contaminated clothing inside the decontamination area, wash their hands and other possibly exposed body parts prior to exiting the decontamination zone. The HSO will implement procedures which will allow him to periodically monitor decontamination operations to ensure decon crews are thoroughly decontaminating equipment, material, containers, and personnel passing through the decontamination zone. All of these activities are designed

to ensure workers do not bring contaminants into clean areas such as the support zone eating and rest areas.

4.7.1 Break Areas

Readily accessible lunchroom facilities shall be provided to associates. These areas will be kept as free as practicable from PCB contaminated materials.

Affected associates shall wash their hands and face prior to eating, drinking, using tobacco products, or applying cosmetics.

Protective clothing and equipment shall be removed before entering the lunchroom facilities.

4.7.2 Potable Water

On-site drinking water will be available and will be kept cool to encourage personnel to drink frequently.

4.7.3 Sanitary Facilities

Adequate hand washing facilities shall be provided.

Showers shall be provided, where feasible, for use by associates who may be exposed to PCB contamination. Exposed personnel shall shower at the end of the work shift. Where showers are not feasible, associates shall wash their hands and face at the end of the work-shift as an interim until they can use the nearest shower facility.

4.7.4 Lavatory

Adequate lavatory facilities shall be provided. Associates shall not leave the workplace wearing any protective clothing that is required to be worn during the work shift. Hands and face will be thoroughly washed immediately upon leaving the decontamination zone.

4.7.5 Trash Collection

All surfaces shall be maintained as free as practicable of accumulations of contaminants.

5.0 PERSONAL PROTECTION EQUIPMENT

The following subsections describe the minimum PPE to be used by all personnel involved in project operations at this site. The PPE described here has been selected based on the anticipated chemical and physical hazards associated with each work zone and job function included in the WP. This plan may be modified if project hazards or air monitoring results identify higher-than-anticipated levels of PCB exposure.

5.1 LEVELS OF PROTECTION

The following are brief descriptions of the minimum levels of PPE that will be required for site activities.

5.1.1 Level C Protection

This is the maximum level of protection for all personnel on site and will be required of all personnel handling capacitors:

- Full-face air-purifying respirator with high-efficiency particulate air filter cartridge;
- Polyethylene-coated Tyvek or equivalent/better coveralls with hood;
- Latex, vinyl, or nitrite inner gloves;
- Nitrile outer gloves (taped to outer suit);
- Chemical-protective Neoprene over boots (taped to outer suit);
- Steel-toe/steel-shank, high-ankle work boots;
- Respirator optical kits, where appropriate; and
- Hard hat.

5.1.2 Level D Protection

This is the minimum level of protection for all personnel on site and is generally required for all support zone operations.

- Field work uniform;
- Steel-toe/steel-shank, high-ankle work boots;
- Safety glasses with side shields; and
- Hard hat.

5.1.2.1 Modified Level "D" Protection

This is the level of protection that is initially anticipated for material handling operations inside the exclusion zone.

- Tyvek coveralls;
- Latex, vinyl, or nitrite inner gloves;
- Nitrile outer gloves (taped to outer suit);
- Chemical-protective Neoprene over boots (taped to outer suit);
- Steel-toe/steel-shank, high-ankle work boots;
- Safety glasses with side shields; and
- Hard hat.

5.1.2.2 Modified Level "D" Splash Gear

This dress-out regimen is intended primarily for all "wet" work involving contact with PCB-impacted decontamination or runoff water, as during equipment decontamination operations.

- Polyethylene-coated Tyvek or equivalent/better coveralls with hood;
- Latex, vinyl, or nitrile inner gloves;
- Nitrile outer gloves (taped to outer suit);
- Chemical-protective Neoprene over boots (taped to outer suit);
- Steel-toe/steel-shank, high-ankle work boots;
- Safety glasses with side shields;
- Hard hat; and
- Splash shield.

5.1.3 Selection of PPE

The HSO will be responsible for ensuring site workers are using the appropriate PPE. Under the "Hazardous Waste Site" section, the standard (29 CFR 1910.120 and 1926.65) requires that positive pressure devices be used when chemical exposure levels present will cause possibility of death, serious illness or injury, or impair the ability to escape.

5.2 RESPIRATORY PROTECTION

Elevated airborne PCB concentrations represent one of the primary worker exposure concerns at the site. To ensure an effective program of sampling and monitoring air quality, both in the work zones and at the site perimeter, the air monitoring program will include the collection of personnel and perimeter air samples and the use of real-time monitoring equipment. Methods, frequencies, action levels, and record keeping requirements for this site are summarized in Table 5-1.

Results of the daily air monitoring activities will be recorded and evaluated by the HSO. All data will be maintained with the project records and available for review.

5.3 SELECTION MATRIX

Table 5-2 provides a list of job functions and work zones and identifies the PPE required for each scenario. As additional work tasks are identified during the course of the project, the HSO will be responsible for identifying the appropriate regimen of PPE and for adding the new scenario to this table.

5.4 USING PPE

5.4.1 Donning Procedures

- Change into work clothing/PPE in the clean section of the designated changing areas, prior to entering the work area;
- Store any clothing not worn under protective clothing in the designated changing area; and
- Don appropriate level of PPE to be used. Tape or seal all openings. Place the team members name on the outer surface of the suit for identification. The HSO will visually check each site worker for proper PPE prior to him or her entering into the contamination reduction or exclusion zone.

5.4.2 Doffing Procedures

- Remove visible contamination from protective clothing in the work area;
- Remove shoe covers and leave them in the work area. If shoe covers are not worn, wash gross contaminated material from boots in a boot wash;
- Remove protective clothing and gear at the contamination reduction zone. Carefully roll down coveralls to reduce exposure to airborne contaminants; and
- Remove respirator last. Clean respirator. Dispose of respirator cartridges at the end of the day.

TABLE 5-1
SITE SPECIFIC AIR MONITORING REQUIREMENTS FOR SWMU 17

Table 5-1
SITE-SPECIFIC AIR MONITORING REQUIREMENTS FOR SWMU 17

Instrument	Location/Frequency	Hazard	Action Level	Action
Perimeter PUF sampler	Daily for minimum of 20 hr during remedial activities	PCBs	Greater than or equal to ug/m3 above background	Implement engineering controls for dust suppression
Personnel sampling pump (NIOSH Method 5503)	Initially, daily from personnel selected by HSO. Subsequent frequency to be determined by HSO.	PCBs	>0.5 mg/m3	Identify source and upgrade to Level C
MiniRam	Periodically during dust generating activities (e.g., excavation, truck loading)	Total dust	>10mg/m3 above background (5-min TWA)	Implement engineering controls for dust suppression. Increase frequency of monitoring.

TABLE 5-2
PERSONAL PROTECTION REQUIREMENTS FOR SPECIFIC ACTIVITIES

Table 5-2
PERSONAL PROTECTION REQUIREMENTS FOR SPECIFIC ACTIVITIES

Activity	Location	Level of Protection
Site Preparation	Entire site	Level D
Excavation and loading	Exclusion Zone	Modified Level D (downgrade to Level C based on personnel air monitoring results).
Capacitor handling	Exclusion Zone	Modified level D
Processing of large items via spray washing	Exclusion Zone	Modified Level D with splash gear.
Wastewater treatment	Water Treatment area	Modified Level D
Post-excavation sampling	Exclusion Zone	Modified Level D
Equipment decontamination (including pressure washing)	Contamination Reduction Zone	Modified Level D with splash gear, including face shield.
Support zone operations	Support Zone	Level D

6.0 SITE CONTROL

6.1 ENTRY REQUIREMENTS

The objectives for establishing work zones at this site are to delineate clearly the hazardous area perimeter, prevent migration of hazardous materials into clean areas, and prevent access or exposure to hazardous areas by unauthorized persons. Figure 1-1 shows the approximate locations of key work zone boundaries and identifies the anticipated locations for personnel and equipment decontamination facilities and field offices at the SWMU 17 site. Truck staging areas and turnarounds are also presented on Figure 1-1. Fuel and flammable liquids storage, site access, parking, and sanitary facilities will be established upon mobilization.

In the even that major modifications to this work zone plan become necessary during either mobilization or site operations, a revised drawing(s) will be prepared, approved, and distributed as a modification to this HASP.

6.1.1 Exclusion Zone

The Exclusion Zone boundaries will be clearly identified with caution tape or safety fence, and signs will be posted. Access to the Exclusion Zone will be limited to the access corridor, where personnel will be required to don PPE as described in Section 5.0. All personnel entering the Exclusion Zone will be required to meet the training and medical monitoring requirements defined in Sections 9.0 and 10.0 of this HASP.

6.1.2 Contamination Reduction Zone

The Contamination Reduction Zone (decontamination zone) is the area where all personnel and equipment decontamination will take place. This area will be clearly identified, and access will be restricted. Separate facilities will be delineated for personnel and equipment decontamination, as discussed in Section 7.0 of this HASP.

In addition to decontamination facilities, each Contamination Reduction Zone will include the site access corridor and an emergency station. The access corridor shall provide a single point of entry for personnel entering and exiting the Exclusion Zone and will facilitate accurate tracking of personnel in that zone. This corridor will include a storage area for PPE and an area to dress out prior to entering the Exclusion Zone. The emergency station in the personnel decontamination area will be accessible from both the Exclusion Zone and the Support Zone and will include, at a minimum, an emergency shower, emergency eyewash, a fire extinguisher, and a first aid kit. Emergency equipment is further discussed in Section 11.0.

6.1.3 Support Zone

The Support Zone shall include all areas for support operations, including office facilities, equipment storage, a break area, sanitary facilities, emergency vehicle access, fuel and flammable liquids storage, and designated parking. No PCB-impacted material will be placed in this zone.

6.2 AUTHORIZATION TO ENTER

All visitors to the project site will be required to report immediately to the HSO and sign in. Visitors' vehicles shall be required to be parked in designated locations to avoid interfering with project operations.

TolTest will certify that all personnel assigned to perform fieldwork on this project are medically cleared and fully trained/certified per 29 CFR 1910.120. A list of authorized site workers will be maintained by the HSO. The PM will be able to add or delete authorized personnel from this list. Training for this project

shall be at the Hazardous Materials Technician Level. Personnel shall be medically qualified per the requirements of 29 CFR 1910.120 and 29 CFR 1910.134.

6.3 HAZARD BRIEFING

In general, visitor access to the site will be limited to the Support Zone. Visitors will be escorted at all times by the HSO, or his designee. Visitors intending to enter the restricted areas will first participate in a site orientation training session (as described in Section 9.4). No access into the Exclusion Zone will be permitted during site operations without providing documentation of HAZWOPER training and medical monitoring to the HSO prior to entry. The HSO will be responsible for authorizing entry into restricted areas and for determining which areas are appropriate for site visitors based upon his/her current knowledge of the hazards and ongoing site operations.

6.4 ENTRY LOG

An Entry Log will be located in the Support Zone. All personnel entering the Contamination Reduction Zone or Exclusion Zone will first sign the Entry Log. Upon exiting, they will be required to sign out.

6.5 EMERGENCY ENTRY AND EXIT

In an emergency evacuation scenario, all site personnel will be directed to discontinue what they're doing immediately, notify their buddy and any other nearby workers, and quickly leave the site via the most accessible route. Personnel shall then proceed to an emergency evacuation rendezvous point located at the site entrance and remain there until directed by their supervisor. Emergency evacuation scenarios typically include toxic gas releases or major fires that have the potential to release toxic vapors or cut off escape routes. No such scenarios are anticipated on this project.

If a person working in an Exclusion Zone is physically injured, Red Cross first aid procedures will be followed. Depending on the severity of the injury, emergency medical response may be sought. If the employee can be moved, he will be taken to the edge of the work area (on a stretcher, if needed), where contaminated clothing will be removed, emergency first aid administered, and transportation to a local emergency medical facility will be provided. If it is necessary for outside emergency medical personnel to enter the Exclusion Zone to treat or move an injured worker, the HSO will brief these personnel on the nature of the hazards present and will determine what protective equipment they must wear. Extra PPE will be available for emergencies.

7.0 DECONTAMINATION

7.1 POSTING

Signs will be placed around the perimeter of the Contamination Reduction Zone and the Exclusion Zone in order to effectively delineate these areas.

7.2 DECONTAMINATION GENERAL RULES

In general, everything that enters the Exclusion Zone will either be properly decontaminated or properly disposed of upon exit from the Exclusion Zone. All personnel shall enter and exit the Exclusion Zone through the Contamination Reduction Zone. Any material that is generated by decontamination procedures will be stored in a designated area in the Exclusion Zone until disposal arrangements are made. All wash/rinse water generated during decontamination activities will be collected and transferred to the wastewater treatment process for treatment and disposal.

7.3 EQUIPMENT DECONTAMINATION

Prior to demobilization, equipment will be decontaminated in the Contamination Reduction Zone and inspected by the HSO, or his designee, before it is moved into the Support Zone. These inspections will be recorded in the daily site logbook.

Any vehicle working in an Exclusion Zone will be decontaminated in the Contamination Reduction Zone before leaving the site. Sweeping excess soil and debris off the wheels will clean the vehicle. A high-pressure sprayer will then be used to wash the wheels, if necessary. Each piece of equipment will be inspected after cleaning for any soil remaining on the tires or elsewhere. A wipe sample may be collected on heavy equipment to verify compliance with OSHA occupational exposure levels. All vehicles will be cleaned to the satisfaction of the HSO, or his designee, prior to entering the Support Zone or leaving the site.

7.4 PPE DECONTAMINATION

At a minimum, personnel decontamination in the Contamination Reduction Zone will include the following:

- **Station 1:** Equipment drop;
- **Station 2:** Outer boot and outer glove wash and rinse;
- **Station 3:** Outer boot and outer glove removal;
- **Station 4:** Outer garment removal;
- **Station 5:** Inner glove removal; and
- **Station 6:** Field wash.

All personnel who enter the Exclusion Zone will be required to wash their hands and face with soap and water prior to eating, drinking, smoking, or applying cosmetics.

Personnel decontamination operations will be conducted in the Contamination Reduction Zone atop plastic sheeting with bermed sides to contain liquids and other materials that may be generated in the process.

8.0 SITE MONITORING

8.1 AIR MONITORING

Elevated airborne PCB concentrations represent one of the primary worker exposure concerns at the site. To ensure an effective program of sampling and monitoring air quality, both in the work zones and at the site perimeter, air monitoring will include the collection of personnel and perimeter air samples and the use of real-time monitoring equipment. Methods, frequencies, action levels, and record keeping requirements are summarized in Table 5-1.

8.2 NOISE MONITORING

The HSO will evaluate site tasks to determine which ones will require hearing protection. Personnel shall wear hearing protection when exposed to noise levels exceeding 85 dBA.

8.3 MONITORING RECORDS

All monitoring records will be maintained by the HSO through the duration of the project. In addition, the TolTest Corporate Health and Safety Department will maintain an accurate record of associate exposure measurements.

8.4 NOTIFICATION

A copy of the monitoring results will be provided to the associate within 24 hours of the event. Records will be provided, upon request, to any associate, former associate, representative designated by an individual associate, and/or the Assistant Secretary of the Department of Labor.

9.0 ASSOCIATE TRAINING

9.1 GENERAL

9.1.1 Tailgate Safety Meetings

The HSO, or his designee, will hold daily safety meetings. During these meetings, the HSO will discuss any safety concerns, changes in site conditions, monitoring results, or other safety-related topics for the SWMU 17 site remediation activities. Periodic retraining on important site-specific safety issues will also be addressed. Attendance lists, including signatures and topics discussed, will be maintained as part of the project safety records.

9.1.2 MSDSs

The only known hazardous materials anticipated at the SWMU 17 site is PCBs. The MSDS for PCBs is included as Attachment 2. All employees, prior to start of work, will initial the MSDS. MSDSs shall be added to this attachment when/if additional chemicals are encountered at the site.

9.1.3 Project-specific HASP

Associates will be trained on the contents of this HASP prior to work on site. All associates will read the entire plan, comprehend the contents of the plan, and sign the acknowledgement sheet attached to the plan (Attachment 3).

9.2 SITE WORKERS

All personnel (including visitors) entering the Exclusion Zone or Contamination Reduction Zone must have completed all applicable training requirements for HAZWOPER work in accordance with OSHA 29 CFR 1910.120. Copies of the current training certificates for all personnel must be provided to the HSO before beginning work. In the event that any worker's annual training will expire during the course of the project, he/she must complete the required refresher training prior to the expiration date.

9.3 SUPERVISORS

In addition to the requirements in Section 9.2, associates required to supervise or manage site investigation/cleanup associates must have an additional 8 hours of supervisory safety training as required under OSHA 29 CFR 1910.120.

9.4 SITE SPECIFIC TRAINING

The HSO will design and implement a site-specific training program for all site employees. The program will present all aspects of this HASP and will provide site employees an opportunity to ask questions regarding the HASP. The HSO will instruct employees in proper material handling techniques; proper methods for the use, storage, and disposal of decontamination fluids; preventive maintenance of safety equipment; personal hygiene practices; PPE; and appropriate responses to emergencies.

The training program will provide site employees instruction on responding effectively to an emergency. The appropriate response to fires, explosions, and the shutdown of operations will be reviewed, as well as the proper response to an unacceptable level of dust resulting from site activities. Emergency procedures, areas of the site that have restricted access, methods used for project decontamination, and general safety will also be covered in the training.

At a minimum, the site-specific orientation-training program will cover the following topics:

- Site history;
- Explanation of the effects of toxic chemicals identified at the site;
- Requirements for personnel protection (e.g., respirators);
- Prohibited actions or procedures;
- Safety precautions;
- Emergency procedures;
- Decontamination procedures;
- Work areas;
- Air monitoring program;
- Symptoms and treatment of heat- or cold-related illnesses;
- Location of site safety equipment, emergency phone numbers, and route to the nearest hospital;
- Confined space and hot work permits; and
- Awareness of local surroundings and precautions to use when working around them.

9.5 FIRST AID AND CARDIO PULMONARY RESUSCITATION (CPR)

To respond to emergencies, at least one person at the site, in addition to the HSO, will be certified in first aid and CPR by the American Red Cross or other approved agency. These individuals will be available to provide emergency first aid in the event of an injury.

10.0 MEDICAL SURVEILLANCE

Medical screening provides a method for identifying those employees whose medical history indicates potentially increased health risk when exposed to contaminants present within a working environment. The medical screening directly, and indirectly, measures the functional activity of organs potentially affected by chemical exposure during work, and assesses the employee's ability to utilize protective equipment safely.

10.1 MEDICAL EXAMINATION

All TolTest and subcontractor associates engaged in hazardous waste work will be required to participate in their respective company-sponsored medical monitoring programs, have a medical examination by a qualified physician, and be in good health prior to starting site work. At a minimum, the examination must be in accordance with OSHA Standards 29 CFR 1910.120 and 29 CFR 1910.134.

The medical examination will include a judgment by the examiner of the ability of the person to use negative- or positive-pressure respirators and whether he/she is medically able to perform his/her job. An individual determined to have a medical condition that could be aggravated directly, or indirectly, by exposure to those chemical substances, or other special conditions within the work environment, will not be allowed to participate in any activity that could result in such exposure. Some typical conditions that might require such measures include reduced lung function (which would be a problem for respirator wearers), back conditions (which would limit one's ability to lift heavy objects), and liver conditions (which might be aggravated by exposure to lower levels of contamination).

A physician will reexamine any employee who suffers a lost-time illness or sustains a lost-time injury during the project before returning to the work site. The physician will certify that the employee is fit to return to work before his employment on site can continue. A written copy of this certification will be maintained at the site and included in the employee's records.

No one other than personnel authorized by the HSO will be permitted to enter the work areas. Before an Exclusion Zone can be entered, a statement, signed by a doctor indicating that a medical examination (encompassing the tests described previously) has been successfully completed, will be required of everyone, except emergency medical personnel. Copies of these physician statements will be maintained by the HSO.

10.1.1 Pre-Placement Exam

All baseline examinations will be conducted on a post-offer, or pre-placement basis. Once the TolTest Corporate Health and Safety Department receives notification that a formal offer of employment has been made, arrangements shall be made for their examination. Post-offer examinations done at the inception of employment with TolTest, which result in a positive drug test, shall result in the immediate withdrawal of the conditional offer of employment.

10.1.2 Routine/Periodic Exam

Each month the TolTest Corporate Health and Safety Department will send a list of associates, due for their routine exams, to their responsible manager. It shall be the responsibility of the manager, as well as the associate, to stay current with their physical requirements.

10.1.3 Exit Exam

Exit examinations are required for all associates leaving the company, except those classified as "administrative", unless waived by the TolTest Corporate Health and Safety Department. All exit

examinations will be scheduled through the TolTest Corporate Health and Safety Department upon their receipt of a notification of the terminating associate.

10.1.4 Biological Monitoring

All associates assigned to jobs with potential occupational exposures shall receive specialized training prior to commencement of work and at least annually thereafter. The remediation project for the SWMU 17 site considers the following to be potential biological concerns:

- Working in hot environments; and
- Working in cold environments.

10.2 FIRST AID AND MEDICAL TREATMENT

If an injury/illness, or possible exposure occurs, personnel shall seek medical attention immediately. TolTest field personnel are trained in first aid and CPR, and will be available to assist in providing immediate assistance, if requested.

10.3 MEDICAL RESTRICTIONS

Whenever a restricted medical clearance is issued, the TolTest Corporate Health and Safety Department, Human Resources Department, and the persons immediate supervisor will determine, in unison, if the medical restriction will have an impact on the associate's ability to perform the essential duties of the intended job, and will act accordingly.

11.0 EMERGENCY PROCEDURES

TolTest will implement emergency response and contingency procedures, in accordance with OSHA Standards 29 CFR 1910.120(i). This section addresses work zones and excavation procedures, decontamination, emergency medical treatment, emergency response procedures, spill and discharge control.

The following response procedures have been developed in an effort to prepare project site personnel to respond effectively in the event of an emergency.

Several types of emergencies are outlined in the following subsections. These are not intended to cover all potential situations, and the corresponding response procedures shall not be followed blindly. Every accident is a unique event that must be dealt with by trained personnel working in a calm, controlled manner. In the event of an accident/unusual event, the prime consideration will be to provide the appropriate initial response to assist those in jeopardy without placing additional personnel at an unnecessary risk.

11.1 GENERAL RESPONSE CONSIDERATIONS

Emergencies must be dealt with in a manner that minimizes the health and safety risks to site personnel and the public. The following procedures will be implemented in the event of an emergency:

- Horseplay will not be tolerated during work activities. All personnel shall be expected to act in a mature manner to prevent potential accidents/incidents from occurring during work activities;
- First aid or other appropriate initial action closest to the accident/event. This assistance will be coordinated by the ranking individual on site and will be conducted in a manner such that those rendering assistance are not placed in a situation of unacceptable risk. The primary concern will be to avoid placing a greater number of workers in jeopardy;
- Employees shall report all accidents and unusual events immediately to the HSO and/or the PM;
- The HSO shall be responsible for initiating the emergency response in an efficient, rapid, and safe manner. The HSO will decide if offsite assistance and/or medical treatment are required and will be responsible for alerting offsite authorities and arranging for their assistance; and
- The HSO will provide the TolTest Corporate Health and Safety Department and PM with an Accident/Incident Report that includes the following:
    - A description of the emergency (including date, time, duration, and cause);
    - Date, time, and name of all persons/agencies notified, along with their response; and
    - A description of corrective actions implemented, or other resolution of the event.

To respond to emergencies, the American Red Cross, or other approved agency, will certify at least one person at the site, in addition to the HSO, in first aid and CPR. These individuals will be available to provide emergency first aid in the event of an injury.

11.2 RESPONSIBILITIES

The HSO, or a designated substitute, will have the responsibility for directing response activities in the event of an emergency. The HSO will:

- Assess the situation;
- Determine required response measures;
- Notify appropriate authorities;
- Determine and direct onsite personnel during the emergency; and
- At the direction of the PM, contact and coordinate with government agencies.

In the event that outside emergency response agencies are mobilized, the HSO will coordinate response activities with those of public agencies.

11.3 EMERGENCY CONTACTS

Table 11-1 presents a list of response agencies, organizations, and personnel who may, depending on the nature of the situation, need to be contacted in the event of a site emergency. All primary response agencies will be notified prior to commencement of work as to the nature of activities at the site.

In addition, all of these phone numbers will be verified from the project site during the initial site setup phase of the project.

11.4 EMERGENCY RESPONSE EQUIPMENT

During the site preparation phase of the project, TolTest will mobilize the appropriate emergency response equipment and facilities. At a minimum, prior to the start of waste handling operations, the following equipment will be provided, and tested to verify that it is in working order:

- First aid station (i.e., stretcher, first aid kit, and decontamination equipment). Contents of the first aid kit will meet OSHA 1910.151 requirements;
- Portable eyewash station;
- Emergency shower facility;
- Chemical fire extinguishers at each work location, the decontamination area, and on all heavy equipment; type ABC, 20 lb.;
- List of persons and phone numbers for emergency notification;
- Working telephone; and
- Two-way radios:
    - HSO; and
    - Each Site Supervisor.

Other equipment used for the routine implementation of the worker health and safety protection and monitoring programs (i.e., air monitoring equipment, confined space entry equipment) will be available, as needed, to support any emergency response activity.

11.5 ACCIDENTS AND INJURIES

The vast majority of worker injuries on hazardous waste sites are not chemical in nature. The injuries tend to be sprains, rashes, and lacerations, which must be treated promptly. Follow-up care is extremely important to ensure that a minor injury or illness does not become aggravated by site conditions or continued work in chemical protective clothing. All site personnel are instructed to report any and all injuries and illnesses to the HSO.

If a person working in an Exclusion Zone is physically injured, Red Cross first aid procedures will be followed. Depending on the severity of the injury, emergency medical response will be sought. If the employee can be moved, he will be taken to the edge of the work area (on a stretcher, if needed), where contaminated clothing will be removed, emergency first aid will be administered, and then he/she will be transported to a local emergency medical facility. Directions to the nearest hospital are presented in Section 11-9. These directions will be posted at each site telephone and will be placed in each site vehicle.

If it is necessary for outside emergency medical personnel to enter the Exclusion Zone to treat or move an injured worker, the HSO will brief these personnel on the nature of the hazards present and will determine what protective equipment they must wear. Extra PPE will be available for emergencies.

If the injury to the worker is chemical in nature (e.g., overexposure), first aid procedures will be implemented as described in the MSDS for the chemical(s) involved. MSDSs for all hazardous substances that are present, or will be used on the site, will be compiled in the field and made available to all employees by the HSO. MSDS's for known hazardous substances at the site are presented in Attachment 2.

11.6 SPILLS

Potential spills can occur from the handling of damaged or leaking capacitors, improper fuel handling, overloading or improperly loading trucks, leakage or breakage of wastewater lines, and many other scenarios. The following procedures have been established to minimize the potential for accidental spills and to maximize site preparedness in the event that a spill does occur. In addition to these measures, daily inspections of the site will be conducted by the HSO to evaluate the effectiveness of these measures, and to identify and address any previously unanticipated spill scenarios.

Excavation will proceed so as to minimize the handling of capacitors over previously confirmed areas. Capacitors will be placed directly into U.S. DOT-approved containers as they are removed from the excavation area. The containers will be sealed as they are filled and staged in the loading area pending transport offsite.

All fuels, oils, and other flammable or combustible liquids will be stored in one designated spot on the site. This location will be equipped with a secondary containment adequate to contain a release of 110 percent of the largest container, plus additional freeboard to contain accumulated rainwater. The area will be barricaded in a manner that allows effective refueling but prevents accidents from vehicular traffic. Signs will be posted identifying the area and prohibiting smoking.

To minimize spillage during the loading process, felt and plastic sheeting will be placed on the ground between the material being loaded and the truck, and the truck liner will be draped over the side of the truck. Any spillage, whether from the truck or from the excavator bucket, will be cleaned up regularly. During rainy conditions, any needed spill cleanup will be accomplished immediately to avoid impacting storm water. After loading, each truck will have a minimum of 6 inches of freeboard on all sides. Tires on loaded trucks will be washed prior to the truck leaving the site.

Wastewater will be contained in tanks that are located, or barricaded, to prevent accidents. Pumps and hoses will be drained and handled in a manner that minimizes leakage or spillage. Any spillage of PCB-impacted wastewater will be promptly cleaned up.

11.7 FIRES

Although a fire is unlikely, the office facility will maintain effective communication to summon assistance in the event of a fire. If a fire breaks out, the HSO will be notified immediately. The HSO will evaluate the extent of the fire and make a decision whether to call the local fire department or have site personnel attempt to operate fire-fighting equipment. Site personnel will only become involved in the fire fighting actions when the fire is clearly within the capability of the fire extinguishers on site. All personnel shall be trained in the use, capabilities, and limitations of the available fire extinguishers.

11.8 SITE EVACUATION PLAN

Procedures for evacuation have been established for this project, even though the materials being handled and the procedures being used make an actual evacuation extremely unlikely. Two types of evacuation procedures are in place for this project: emergency evacuation procedures and non-emergency evacuation procedures. An emergency evacuation shall be warranted only if the nature of the situation is so extreme that implementation of a more controlled and orderly non-emergency procedure could endanger the health or safety of site personnel.

In the event that an employee identifies a situation of the site that he believes warrants an evacuation, he should immediately notify the HSO, the PM, or his immediate supervisor. Generally, the HSO or PM will be responsible for evaluating the situation and initiating an evacuation. Under extreme or obvious evacuation circumstances, however, any site worker will be required to initiate an evacuation.

The primary means of initiating an evacuation will be an audible signal. A combination of air horns, truck horns, and site radios will be utilized to ensure that all site personnel are notified of the intent to evacuate the site. The audible signals will be as follows:

- Single long blast (repeated as necessary) for emergency evacuation signal;
- Double brief blasts for non-emergency evacuation signal.

In an emergency evacuation scenario, all site personnel will be directed to discontinue what they're doing immediately, notify their buddy and any other nearby workers, and quickly leave the site via the most accessible route. Associates shall then proceed to the emergency evacuation rendezvous point located at the site entrance and remain there until directed by their supervisor. Emergency evacuation scenarios typically include toxic gas releases or major fires that have the potential to release toxic vapors or cut off escape routes. No such scenarios are anticipated on this project.

In a non-emergency evacuation scenario, associates shall discontinue their work, making sure all equipment is turned off and secure, and proceed with their buddy to the office facility for further instructions. Non-emergency evacuation scenarios may include imminent severe thunderstorms, tornado warnings, or airborne concentrations of contaminants that have reached evacuation action levels.

The HSO, or designated representative, will be responsible for coordinating evacuation procedures and for conducting a head count at the rendezvous point located at the site entrance. Missing personnel shall be reported immediately to the HSO, PM, or outside response agency's representative.

11.9 EMERGENCY RESPONSE

All hazardous substance releases, or spills involving Government waste or Government property, other than the original release, will be immediately reported to the NSWC Crane EPD Manager. Table 11-1 includes a list of emergency numbers. Emergency service organizations and directions to the nearest hospitals follow this paragraph. A telephone will be kept on site at all times.

- Directions to NSWC Crane Medical Facility On-site: ***The NSWC Crane Fire Department coordinates the on-site ambulance service. The Medical Facility is located in Building 12, off of H-2 just north of H-5. This location will be used for life threatening emergencies only.***

- Directions to Bedford Medical Center: ***From Bloomington Gate, head east on Highway 58 to the city of Bedford, then turn left onto 16th Street. Distance to hospital is approximately 20 miles.***

- Directions to Bloomington Hospital: ***From Bloomington Gate, head north on Highway 45 to the city of Bloomington. Stay on 45, which turns into 2nd street. Hospital will be on right hand side. Distance to hospital is approximately 25 miles.***

11.10 MEDICAL EMERGENCY

All personnel associated with the remediation of the SWMU 17 site shall be involved in the medical screening and surveillance programs. If an injury/illness or possible exposure occurs, personnel shall seek medical attention immediately. TolTest field personnel are trained in first aid and CPR and can assist in providing immediate assistance.

In the event of personnel chemical exposure, skin contact, inhalation, or eye contact, the first aid procedures listed on the MSDS for the material involved will be followed. If an exposure of an unknown chemical occurs, the victim will be moved to fresh air. If skin or eyes are contaminated, they will be flushed with water for 15 minutes and medical attention will be sought immediately. The HSO will complete an accident report form as soon as possible following a medical emergency.

11.11 REPORTING INJURIES AND ILLNESSES

All reporting and record keeping requirements will be adhered to. TolTest forms will be completed for all incidents including personal injury reports, safety incident reports, equipment damage reports, and vehicle accident reports. The HSO will complete initial reports within 24 hours of any accident.

11.12 EMERGENCY INFORMATION

Table 11-1 includes a list of emergency numbers, including key personnel and public agencies.

TABLE 11-1
EMERGENCY TELEPHONE NUMBERS

Table 11-1 EMERGENCY TELEPHONE NUMBERS		
Responsible Party	**Title**	**Contact Information**
Lance Parsons	TolTest Regional Manager	(812) 854-0941 (812) 295-6910 – cell (812) 636-4877 – home
Peter Chevalier	TolTest Senior Project Manager	(812) 636-8501
Debbie Leighty	TolTest Project Manager/Site Supervisor	(812) 636-8501 (812) 295-6643 – cell (812) 636-7657 – home
Tom Brent	Environmental Protection Department NSWC Crane	(812) 854-6160 (812) 854-1132 (812) 277-4539 - pager
John Lyttle	TolTest Health and Safety Officer	(812) 636-8501
Law Enforcement	NSWC Crane Security (Base)	(812) 854-1333 – emergency (812-854-3300 – administration
Fire Department	NSWC Crane Fire Department (Base)	(812) 854-1333 – emergency (812) 854-1235
Ambulance Service	NSWC Crane Ambulance (Base)	(812) 854-1333 – emergency (812) 854-1235 – non-emergency
Eric McQueen	OSH Director	(812) 854-1625
Rich Barcum, CSP	TolTest Corporate Safety Manager	(419) 241-7175 (419) 460-7655 – cell (800) 532-1388 – pager
Poison Control Center	Poison Control Center	(800) 942-5969
National Response Center	National Response Center	(800) 424-8802
Richard Karl	Regional Chemical Accident Response National Response Team	(312) 353-9295
Medical Facility (Non-Life Threatening Injuries) – TolTest	Prompt Care	(812) 332-3443
Medical Facility – Government	NSWC Crane Base Medical Facility Head Nurse (Mary Muessig)	(812) 854-1220 (812) 854-4319
Hospital	Bedford Medical Center 2900 West 16th Street Bedford, IN 47432	(812) 275-1200
Hospital	Bloomington Hospital 601 West Second Street Bloomington, IN	(812) 336-9515
NSWC Crane EOD	Explosive Ordnance Disposal Detachment	(812) 854-3456 – administration (812) 854-1333
Using Cell Phone	Emergency Number on Base	(812) 854-1333

ATTACHMENT 1

ACTIVITY HAZARD ANALYSES (AHAs)

ACTIVITY HAZARD ANALYSIS

ACTIVITY: ***Soil Excavation***

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS	EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Excavation	1. Exposure to airborne contaminants released during intrusive activities. 2. Sides of excavation can cave in. Possible burying or crushing of workers due to 1) absence of shoring, 2) misjudgment of stability, 3) defective shoring, and/or 4) undercut sides. 3. Falling during access/egress or while monitoring or dismounting equipment, or stumbling into excavation. 4. Congested work area due to too many workers in a small area. 5. Existing utilities. 6. Airborne Contaminants	1. Monitor for airborne contaminants. 2. Regularly inspect trenches for conditions. 3. Provide adequate shoring or sloping of sides of the excavation (solid rock, cemented sand or gravel = 90 degrees; compact angular gravel = 63 degrees 26 ft.; compacted sharp sand = 33 degrees 41 ft deep; rounded loose sand = 26 degrees 34 ft. deep.) 4. Provide an adequate barrier around open pits. Material from pit must be placed away from edge to prevent cave ins and instability of pit. 5. To prevent overexertion, limit manual lifting and emphasize mechanical means where practical. 6. Maintain ample workroom between workers. 7. Find and mark utilities before excavating utilizing the Joint Utility Locating Information for Excavators (JULIE) service 72 hours prior to excavation activities. Use care while excavating, shore existing utilities crossing excavation area. Watch for overhead lines. 8. Check that utilities have been marked.	1. Backhoe/excavator 2. Rolloff Boxes 3. Hand tools 4. Sampling equipment	Daily, prior to use per manufactures recommendations. Fill out Safety Inspection Checklist. Use of assistive climbing equipment when covering or placing tarp on box.	1. OSAH 1910.120 40-hr training, 3 day OJT, 8-hr. Supervisory, 8-hr. refresher OSHA Hazard Communication, Respirator and operator training.

ACTIVITY HAZARD ANALYSIS

ACTIVITY: ***Site Preparation/Layout***

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS	EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Site walk through Identification of work zones for construction activities	1. Exposure to irritant and toxic plants such as poison ivy and sticker bushes may cause allergic reactions. 2. Surfaces covered with heavy vegetation and under growth create a tripping hazard. 3. Back strain due to carrying instruments. 4. Native wildlife such as rodents, ticks, and snakes present the possibility of insect bites and associated diseases such as Lyme disease. 5. Driving vehicles on uneven or unsafe surfaces can result in accidents such as overturned vehicles or flat tires. 6. Electrical hazard due to fallen lines. 7. Thermal stress due to hot/cold temperature extremes.	1. Wear long sleeved clothing and slacks to minimize contact with irritant and toxic plants and to protect against insect bites. Appropriate first aid for personnel's known allergic reactions. 2. Be alert and observe terrain while walking to minimize slips and falls. Steel-toed boots provide additional support and stability. 3. Use proper lifting techniques to prevent back strain. 4. Avoid wildlife when possible. In case of an animal bite, perform first aid and capture the animal, if possible, for rabies testing. Perform a tick check after leaving a wooded or vegetated area. 5. Ensure all maintenance is performed on vehicles before going to the field. Site surveillance on foot might be required to choose clear driving paths. 6. Ensure fallen power lines are not energized. 7. Implement thermal stress management techniques such as shifting work hours, fluid intake, and monitoring employees, especially those considered high risk.			1. Review hazard analysis with personnel performing site walk through prior to beginning work.

ACTIVITY HAZARD ANALYSIS

ACTIVITY: ***Backfill & Site Restoration***

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS	EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Backfill excavation Compact backfill Seed area	1. Noise levels exceeding the ACGIH Action of 85 dBA are both a hazard and a hindrance to communication. 2. Carbon monoxide from the heavy equipment. 3. Overhead utility wires, i.e., electrical and telephone, can be hazardous when the dump truck bed is in the upright position. 4. Falling backfill material from dump truck may cause injury. 5. Moving the equipment over uneven terrain may cause the vehicle to roll over or get stuck in a rut or mud. Be aware of hazards associated with moving heavy machinery and other associated injury. 6. High-pressure hydraulic lines and airlines used on heavy equipment are hazardous when they are in ill repair or incorrectly assembled.	1. Earmuffs or earplugs effectively reduce noise levels. 2. Review the contaminants suspected to be on-site and perform air monitoring as required. Shut down equipment and/or divert exhaust fumes. 3. All chains, lines, cables shall be inspected daily for weak spots. 4. Hard hats shall be worn at all times when working around heavy equipment. 5. Secure loose clothing. 6. To avoid contact with any overhead lines, the truck bed shall be lowered prior to moving the truck. Overhead utilities shall be considered "live" until determined otherwise. 7. The truck bed should not be erected within 10 feet of an overhead electrical line until the line is de-energized, grounded, or shielded and an electrician has certified that arcing cannot occur. 8. All high-pressure lines shall be checked prior to and during use.	1. Backhoe 2. Compactor	Daily, prior to use per manufacturers recommendations. Fill out Safety Inspection Checklist	1. OSAH 1910.120 40-hr training, 3 day OJT, 8-hr. Supervisory, 8-hr. refresher OSHA Hazard Communication, Respirator and operator training.

ACTIVITY HAZARD ANALYSIS

ACTIVITY: ***Soil Sampling***

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS	EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Surface Soil Sampling	1. Dermal contact with or inhalation of contaminants, potentially in high concentrations in sampling media. 2. Back strain and muscle fatigue due to lifting, shoveling and auguring techniques. 3. Dermal contact with or inhalation of decontamination solutions.	1. To minimize exposure to chemical contaminants, a thorough review of suspected contaminants shall be completed and implementation of an adequate protection program. 2. .PPE shall include level D consisting of work uniform, steel toe boots/shoes, hard hat, safety glasses, hearing protection (when levels exceed 85 dBA) and Tyvek suit (may not be needed depending on site conditions. 3. Proper lifting (pre-lift weight assessment, use of legs, multiple personnel) techniques will prevent back strain. Use slow easy motions when shoveling, auguring, and digging to decrease muscle strain. 4. Material Safety Data Sheets for all decontamination solutions shall be included with the Site Health and Safety Plan. 5. First aid equipment shall be available based on MSDS requirements.	1. Soil sampling tools.		1. OSAH 1910.120 40-hr training, 3 day OJT, 8-hr. Supervisory, 8-hr. refresher OSHA Hazard Communication, and Respirator training. 2. Knowledge and training on collection of environmental samples.

ACTIVITY HAZARD ANALYSIS

ACTIVITY: ***Equipment Decontamination***

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS	EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Decontaminate Heavy Equipment Using High Pressure Wash or Hand Scrubbing Decontaminate Sampling Equipment by Hand Washing	1. Contact with contaminated material, inhalation of airborne aerosols, contact with high-pressure wash stream, and unexpected movement of material to be decontaminated. 2. Contact with high-pressure washer wand.	1. Decontamination area to provide isolation and controlled access. 2. Level D PPE with face shield. Secure items to be decontaminated. Visually inspect integrity of containment liners and containers used for wastewater. CRZ provided for worker decontamination. 3. MSDS' obtained and reviewed for all cleaning solutions chemicals if used. 4. Personnel shall not be allowed to point the washer wand at any point on their own or a co-workers body.	1. High-pressure wash with soap solution, other decontamination solutions, and scrub brushes.	Use general safety rules and procedures listed in HASP, review manufacturer's recommendation and guidance on inspection equipment. Complete on daily basis after use.	1. OSAH 1910.120 40-hr training, 3 day OJT, 8-hr. Supervisory, 8-hr. refresher OSHA Hazard Communication, and Respirator training.

ACTIVITY HAZARD ANALYSIS

ACTIVITY: ***Soil Loadout***

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS	EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Loadout Soil	1. Noise levels exceeding the ACGIH Action of 85 dBA are both a hazard and a hindrance to communication. 2. Carbon monoxide from the heavy equipment. 3. Overhead utility wires, i.e., electrical and telephone, can be hazardous when the dump truck bed is in the upright position. 4. Falling backfill material from dump truck may cause injury. 5. Moving the equipment over uneven terrain may cause the vehicle to roll over or get stuck in a rut or mud. Be aware of hazards associated with moving heavy machinery and other associated injury. 6. High-pressure hydraulic lines and airlines used on heavy equipment are hazardous when they are in ill repair or incorrectly assembled.	1. Earmuffs or earplugs effectively reduce noise levels. 2. Review the contaminants suspected to be on-site and perform air monitoring as required. Shut down equipment and/or divert exhaust fumes. 3. All chains, lines, cables shall be inspected daily for weak spots. 4. Hard hats shall be worn at all times when working around heavy equipment. 5. Secure loose clothing. 6. To avoid contact with any overhead lines, the truck bed shall be lowered prior to moving the truck. Overhead utilities shall be considered "live" until determined otherwise. 7. Be aware of hazards associated with moving heavy equipment. 8. All high-pressure lines shall be checked prior to and during use.	1. Backhoe	Daily, prior to use per manufacturers recommendations. Fill out Safety Inspection Checklist	1. OSAH 1910.120 40-hr training, 3 day OJT, 8-hr. Supervisory, 8-hr. refresher OSHA Hazard Communication, Respirator and operator training.

ATTACHMENT 2

MATERIAL SAFETY DATA SHEET (MSDS) FOR POLYCHLORINATED BIPHENYLS (PCBs)

EPA-1362, AROCLOR 1260 HIGH CONCENTRATION (SUP DAT)

Product and Company Identification
Composition/Information on Ingredients
Hazards Identification
First Aid Measures
Fire Fighting Measures
Accidental Release Measures
Handling and Storage
Exposure Controls/Personal Protection
Physical and Chemical Properties
Stability and Reactivity
Toxicological Information
Ecological Information
Disposal Considerations
Transport Information
Regulatory Information
Other Information / Hazmat Info / Hazcom Label

MSDS Safety Information TOP

FSC: 6810 MSDS Date: 06/14/1995 MSDS Num: CBXYT

Submitter: N EN LIIN: 00N072324 Tech Review: 08/22/1996 Status CD: C

Product ID: **EPA-1362, AROCLOR 1260 HIGH CONCENTRATION (SUP DAT)** MFN: 01

Article: N Kit Part: N

Responsible Party Cage: 0MU35
Name: ULTRA SCIENTIFIC

Address: 250 SMITH ST
City: NORTH KINGSTOWN State: RI Zip: 02852

Country: US
Info Phone Number: 401-294-9400

Emergency Phone Number: 401-294-9400

Preparer's Name: N/P

Proprietary Ind: N Review Ind: N
Published: Y Special Project CD: N

Contractor Summary TOP

http://www.setonresourcecenter.com/dtSearch/dtisapi6.dll?cmd=getdoc&DocId=96106&I... 10/31/2002

Cage:0MU35 Name:**ULTRA SCIENTIFIC**

Address:250 SMITH STREET
City:NORTH KINGSTOWN State:RI Zip:02852-5000

Country:US Phone:401-294-9400

Ingredients TOP

Cas: 540-81-1 Code: M RTECS #: SA3320000 Code: M

Name: **PENTANE, 2,2,4-TRIMETHYL-; (ISOOCTANE) (CERCLA)**

% Text: 99.85 Environmental Wt:
Other REC Limits: N/K

OSHA PEL: N/K (FP N) Code: M OSHA STEL: Code:
ACGIH TLV: N/K (FP N) Code: M ACGIH STEL: N/P Code:
EPA Rpt Qty: DOT Rpt Qty:

Ozone Depleting Chemical:

Cas: 11096-82-5 Code: M RTECS #: TQ1362000 Code: M

Name: **POLYCHLORINATED BIPHENYL (AROCLOR 1260); (AROCLOR 1260) (SARA 313) (CERCLA)**

% Text: 0.145 Environmental Wt:
Other REC Limits: N/K

OSHA PEL: N/K (FP N) Code: M OSHA STEL: Code:
ACGIH TLV: N/K (FP N) Code: M ACGIH STEL: N/P Code:
EPA Rpt Qty: 1 LB DOT Rpt Qty: 1 LB

Ozone Depleting Chemical: N

Health Hazards Data TOP

LD50 LC50 MixtureNONE SPECIFIED BY MANUFACTURER.

Route Of Entry Inds - Inhalation:YES Skin:YES Ingestion:YES
Carcinogenicity Inds - NTP:YES IARC:NO OSHA:NO

Health Hazards Acute And Chronic

ACUTE: TOXIC. IRRITANT. ALL CHEMICALS SHOULD BE CONSIDERED HAZARDOUS. DIRECT PHYSICAL CONTACT SHOULD BE AVOIDED. POLYCHLORINATED BIPHENYLS (PCBS) APPEAR ON THE NAVY OCCUPATIONAL CHEMICAL REPRODUCTIVE HAZARDS LIST (FP N).

Explanation Of Carcinogenicity

AROCLOR 1260: NTP 7TH ANNUAL REPORT ON CARCINOGENS, 1994: ANTICIPATED TO BE CARCINOGEN. ANIMAL: LIVER.

Signs And Symptions Of Overexposure

SEE HEALTH HAZARDS.

Medical Cond Aggravated By Exposure

NONE SPECIFIED BY MANUFACTURER.

First Aid Information TOP

EYES/SKIN: FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. INHALATION: REMOVE TO FRESH AIR. GIVE OXYGEN, IF NECESSARY. CONTACT MD. INGESTION: CALL MD IMMEDIATELY (FP N).

Spill Release Procedures TOP

DUE TO THE SMALL QUANTITY INVOLVED, SPILLS OR LEAKS SHOULD NOT POSE A SIGNIFICANT PROBLEM. A LEAKING BOTTLE MAY BE PLACED IN A PLASTIC BAG AND NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SAMPLES MAY BE ABSORBED ON VERMICULITE OR SAND.

Neutralizing Agent

NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Methods TOP

BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. OBSERVE ALL FEDERAL, STATE, AND LOCAL LAWS CONCERNING DISPOSAL.

Handling and Storage Precautions TOP

KEEP TIGHTLY CLOSED, AND STORE IN A COOL, DRY PLACE.

Other Precautions

THIS MATERIAL SHOULD ONLY BE USED BY THOSE PERSONSTRAINED IN THE SAFE HANDLING OF HAZARDOUS CHEMICALS.

Fire and Explosion Hazard Information TOP

Flash Point Method: N/P

Flash Point: **Flash Point Text:** N/A

Autoignition Temp: **Autoignition Temp Text:** N/A

Lower Limits: N/A Upper Limits: N/A

Extinguishing Media

COMBUSTIBLE. USE CARBON DIOXIDE, DRY CHEMICAL POWDER, OR WATER SPRAY.

Fire Fighting Procedures

WEAR NIOSH APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire/Explosion Hazard

NONE SPECIFIED BY MANUFACTURER.

Control Measures TOP

Respiratory Protection

USE APPROPRIATE NIOSH APPROVED SAFETY EQUIPMENT.

Ventilation

NONE SPECIFIED BY MANUFACTURER.

Protective Gloves

IMPERVIOUS GLOVES (FP N).

Eye Protection

ANSI APPRVD CHEM WORKERS GOGGS (FP N).

Other Protective Equipment

ANSI APPRVD EMER EYEWASH & DELUGE SHOWER (FP N). WEAR CHEM RESIST CLTHG SUCH AS LAB COAT AND/OR RUBBER APRON (SUP DAT)

Work Hygienic Practices

NONE SPECIFIED BY MANUFACTURER.

Supplemental Safety and Health

TRADE NAME/PART #: SOLUTION IN 1000 UG/ML IN ISOOCTANE. OTHER PROT EQUIP: TO PREVENT SKIN CONTACT WITH EYES, SKIN, AND CLOTHING.

Physical/Chemical Properties TOP

HCC: NRC/State LIC No:

Net Prop WT For Ammo:
Boiling Point: B.P. Text: N/K

Melt/Freeze Pt: M.P/F.P Text: N/K
Decomp Temp: Decomp Text: N/K

Vapor Pres: N/K Vapor Density: N/K
Volatile Org Content %: Spec Gravity: N/K

VOC Pounds/Gallon: PH: N/K

VOC Grams/Liter:

Viscosity: N/P

Evaporation Rate & Reference: N/K

Solubility in Water: N/K

Appearance and Odor: LIQUID

Percent Volatiles by Volume: N/K

Corrosion Rate: N/K

Seton Resource Center

Allow access to non-virtual folders: 0

Reactivity Data

Stability Indicator: YES

Stability Condition To Avoid: NONE SPECIFIED BY MANUFACTURER.

Materials To Avoid: NONE SPECIFIED BY MANUFACTURER.

Hazardous Decomposition Products: NONE SPECIFIED BY MANUFACTURER.

Hazardous Polymerization Indicator: NO

Conditions To Avoid Polymerization: NOT RELEVANT.

Toxicological Information

Toxicological Information: N/P

Ecological Information

Ecological: N/P

MSDS Transport Information

Transport Information: N/P

Regulatory Information

Sara Title III Information: N/P

Federal Regulatory Information: N/P

State Regulatory Information: N/P

Other Information

Other Information: N/P

HMIS HAZCOM Label TOP

Product ID: **EPA-1362, AROCLOR 1260 HIGH CONCENTRATION (SUP DAT)**

Cage: 0MU35 Assigned IND: N

Company Name: ULTRA SCIENTIFIC
Street: 250 SMITH STREET PO Box:

City: NORTH KINGSTOWN State: RI Zipcode: 02852-5000
Country: US

Health Emergency Phone: 401-294-9400

Label Required IND: Y
Status Code: C
Label Date: 08/22/1996

Date Of Label Review: 08/22/1996
MFG Label NO:
Year Procured: N/K

Origination Code: G
Eye Protection IND: YES

Chronic Hazard IND: Y
Skin Protection IND: YES

Signal Word: WARNING

Respiratory Protection IND: YES

Health Hazard: Moderate
Contact Hazard: Slight

Fire Hazard: Slight
Reactivity Hazard: None

Hazard And Precautions

COMBUSTIBLE. ACUTE: TOXIC. IRRITANT. ALL CHEMICALS SHOULD BE CONSIDERED HAZARDOUS. DIRECT PHYSICAL CONTACT SHOULD BE AVOIDED. CHRONIC: CANCER HAZARD. CONTAINS AROCLOR 1260, WHICH IS LISTED AS AN ANIMAL LIVER CARCINOGEN (FP N). POLYCHLORINAT ED BIPHENYLS (CBS) APPEAR ON THE NAVY OCCUPATIONAL CHEMICAL REPRODUCTIVE HAZARDS LIST (FP N).

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MSDS Basic Information TOP

FSC: 6550 MSDS Date: 01/17/1995 MSDS Num: CFCBF

Submitter: F BT LIIN: 00F050476 Tech Review: 09/04/1996 Status CD: C

Product ID: **C-260S-M-28.5X ACROCLOR 1260 SOLUTION** MFN: 01

Article: N Kit Part: N

Responsible Party Cage: 0U4A8
Name: ACCUSTANDARD INC

Address: 25 SCIENCE PK SUITE 687 Box: N/K
City: NEW HAVEN State: CT Zip: 06511-5000

Country: US
Info Phone Number: 203-786-5290

Emergency Phone Number: 203-786-5290

Preparer's Name: N/P

Proprietary Ind: N Review Ind: Y
Published: Y Special Project CD: N

Preparer Co. when other than Responsible Party Co. TOP

Cage: 0U4A8 Assigned Ind: N

Name: ACCUSTANDARD INC
Address: 125 MARKET ST Box:

City: NEW HAVEN State: CT Zip: 06513

Contractor Summary TOP

Cage:0U4A8 Name:**ACCUSTANDARD INC**

Address:125 MARKET ST
City:NEW HAVEN State:CT Zip:06513

Country:US Phone:203-786-5290

Ingredients TOP

Cas: 11096-82-5 Code: M RTECS #: TQ1362000 Code: M

Name: **POLYCHLORINATED BIPHENYL, PCB, AROCLOR 1260, (CL 60%) (SUSPECTED HUMAN CARCINOGEN BY IARC, NTP - GROUP 2A) *96-2***

% Text: 0.1 Environmental Wt:
Other REC Limits: 0.001 MG/CUM NIOSH

OSHA PEL: N/K Code: M OSHA STEL: Code:
ACGIH TLV: N/K Code: M ACGIH STEL: N/P Code:
EPA Rpt Qty: 1 LB DOT Rpt Qty: 1 LB

Ozone Depleting Chemical: N

Cas: 67-56-1 Code: M RTECS #: PC1400000 Code: M

Name: **METHANOL (METHYL ALCOHOL), COLUMBIAN SPIRITS *96-2***

% Text: 99.9 Environmental Wt:
Other REC Limits: 200 PPM

OSHA PEL: 200 PPM Code: M OSHA STEL: Code:
ACGIH TLV: 200 PPM Code: M ACGIH STEL: N/P Code:
EPA Rpt Qty: 5000 LBS DOT Rpt Qty: 5000 LBS

Ozone Depleting Chemical: N

Health Hazards Data

TOP

LD50 LC50 MixtureN/P

Route Of Entry Inds - Inhalation:YES Skin:YES Ingestion:YES
Carcinogenicity Inds - NTP:YES IARC:YES OSHA:NO

Health Hazards Acute And Chronic

TOXIC BY INGESTION, INHALATION & SKIN ABSORPTION, MAY AFFECT THE CNS, OPTIC NERVE & ENLARGEMENT OF THE LIVER. CHRONIC EXPOSURE MAY ALSO CAUSE DAMAGE TO KIDNEYS, CNS & RESPIRATORY FAILURE. INGESTION: CAN PRODUCE BLINDNESS/DEATH. SKIN: IRRITA TION.

Explanation Of Carcinogenicity

SEE INGREDIENTS.

Signs And Symptions Of Overexposure

INTOXICATION, IMPAIRMENT OF VISION, DIZZINESS, NAUSEA, MUSCLE WEAKNESS, NARCOSIS, BLINDNESS, IRRITATION.

Medical Cond Aggravated By Exposure

SKIN CONDITIONS, EYE PROBLEMS. IMPAIRED LIVER/KIDNEY FUNCTION.

First Aid Information

TOP

SKIN: IMMEDIATELY FLUSH THOROUGHLY W/LARGE AMOUNTS OF WATER. EYES: IMMEDIATELY FLUSH THOROUGHLY W/WATER FOR 15 MINS. INHALATION: REMOVE TO FRESH AIR; GIVE CPR IF NEEDED. INGESTION: IF CONSCIOUS, DRINK WATER & INDUCE VOMITING. NEVER GIVE ANY THING BY MOUT TO AN UNCONSCIOUS PERSON. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Spill Release Procedures

TOP

WEAR SUITABLE PROTECTIVE EQUIPMENT. ELIMINATE ANY IGNITION SOURCES UNTIL AREA IS FREE FROM EXPLOSION/FIRE HAZARDS. CONTAIN THE RELEASE & ELIMINATE ITS SOURCE, IF THIS CAN BE DONE W/O RISK.

Neutralizing Agent

N/K

Waste Disposal Methods

TOP

DISPOSE AS HAZARDOUS WASTE IAW/FEDERAL, STATE & LOCAL REGULATIONS.

Handling and Storage Precautions

TOP

KEEP CONTAINER CLOSED. STORE IN A COOL AREA AWAY FROM IGNITION SOURCES & OXIDIZERS.

Other Precautions

DON'T BREATHE VAPOR/MIST. DON'T GET IN EYES,SKIN/CLOTHING. DON'T TAKE INTERNALLY.

Fire and Explosion Hazard Information

TOP

Flash Point Method: TCC

Flash Point:

Flash Point Text: 52F

Autoignition Temp:

Autoignition Temp Text: N/A

Lower Limits: 6.7

Upper Limits: 36.5

Extinguishing Media

WATER SPRAY, FOAM, DRY CHEMICAL, CO2.

Fire Fighting Procedures

WEAR SCBA & PROTECTIVE CLOTHING.

Unusual Fire/Explosion Hazard

DANGEROUS FIRE & EXPLOSIVE HAZARD. CLOSED CONTAINERS MAY EXPLODE UPON HEATING. VAPOR CAN TRAVEL DISTANCES TO IGNITION SOURCE & FLASH BACK.

Control Measures

TOP

Respiratory Protection

IF WORKPLACE EXPOSURE LIMITS EXCEED TLV/PEL, A NIOSH/MSHA APPROVED AIR SUPPLIED RESPIRATOR. OSHA ALSO PERMIT OTHER NIOSH/MSHA RESPIRATORS(NEGATIVE PRESSURE TYPE)UNDER SPECIFIED CONDITIONS.

Ventilation

HANDLE/TRANSFER IN AN APPROVED FUME HOOD/W/ADEQUATE VENTILATION.

Protective Gloves

BUTYL RUBBER/VITON/EQUIVALENT

Eye Protection

SAFETY GLASSES W/SIDE SHIELDS

Other Protective Equipment

EYE WASH & SAFETY EQUIPMENT.

Work Hygienic Practices

REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.

Supplemental Safety and Health

N/K

Physical/Chemical Properties

TOP

HCC:

NRC/State LIC No:

Net Prop WT For Ammo:

Boiling Point: B.P. Text: 149F

Melt/Freeze Pt: M.P/F.P Text: -144.4F
Decomp Temp: Decomp Text: N/K

Vapor Pres: 97 Vapor Density: 1.1
Volatile Org Content "%: Spec Gravity: 0.791

VOC Pounds/Gallon: PH: N/K
VOC Grams/Liter: Viscosity: N/P

Evaporation Rate & (BU AC = 1): 5.9
Reference:
Solubility in Water: COMPLETE
Appearance and Odor: CLEAR LIQUID

Percent Volatiles by Volume: 99.9 Corrosion Rate: N/K

Seton Resource Center

Allow access to non-virtual folders: 0

Reactivity Data

Stability Indicator: YES

Stability Condition To Avoid: HEAT, IGNITION SOURCES.
Materials To Avoid: ACIDS, OXIDIZERS, REACTIVE METALS.
Hazardous Decomposition Products: CARBON OXIDES, FORMALDEHYDE.

Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: N/K

Toxicological Information

Toxicological Information: N/P

Ecological Information

Ecological: N/P

MSDS Transport Information

Transport Information: N/P

Regulatory Information

Sara Title III Information: N/P

Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information TOP

Other Information: N/P

HMIS HAZCOM Label TOP

Product ID: **C-260S-M-28.5X ACROCLOR 1260 SOLUTION**

Cage: 0U4A8 Assigned IND: N

Company Name: ACCUSTANDARD INC
Street: 125 MARKET ST PO Box:

City: NEW HAVEN State: CT Zipcode: 06513
Country: US

Health Emergency Phone: 203-786-5290

Label Required IND: Y
Status Code: A
Label Date:

Date Of Label Review: 10/12/1999
MFG Label NO:
Year Procured: N/K

Origination Code: G
Eye Protection IND: N/P

Chronic Hazard IND: N/P
Skin Protection IND: N/P

Signal Word: N/P

Respiratory Protection IND: N/P

Health Hazard:
Contact Hazard:

Fire Hazard:
Reactivity Hazard:

Hazard And Precautions

TOXIC BY INGESTION, INHALATION & SKIN ABSORPTION, MAY AFFECT THE CNS, OPTIC NERVE & ENLARGEMENT OF THE LIVER. CHRONIC EXPOSURE MAY ALSO CAUSE DAMAGE TO KIDNEYS, CNS & RESPIRATORY FAILURE. INGESTION: CAN PRODUCE BLINDNESS/DEATH. SKIN: IRRITA TION.

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ATTACHMENT 3

ACKNOWLEDGEMENT SHEET
for the
HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN REVIEW
and
ACKNOWLEDGEMENT SHEET

A signature on this page acknowledges that the TolTest Associate, or Subcontractor's Associate, has read, in full, the Health and Safety Plan for the PCB Capacitor Burial Pole Yard Remediation Project at the Naval Surface Warfare Center, Crane, Indiana. In signing this sheet, the individual declares that he/she will abide by all of the regulations within the document.

Print Name	Signature	Date

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN
for the
INTERIM MEASURES WORK PLAN for the
PCB CAPACITOR BURIAL POLE YARD REMEDIATION
SWMU 17/04
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA

QAPP Worksheet #1
TITLE AND APPROVAL PAGE

Site Name/Project Name: PCB Capacitor Burial Pole Yard
Site Location: Naval Surface Warfare Center Crane (NSWC Crane), Indiana

Quality Assurance Project Plan for the Interim Measures Work Plan for the PCB Capacitor Burial Pole Yard
Document Title

NSWC Crane, Indiana
Lead Organization (Agency, State, Tribe, Federal Facility, PRP, or Grantee)

Debbie Leighty, TolTest, Inc.
Preparer's Name and Organizational Affiliation

508 W. Elnora St, Odon, IN 47562 (812) 636-8501
Preparer's Address and Telephone Number

April 2003
Preparation Date (Day/Month/Year)

Investigative Organization's Project Manager: _____
Signature

Lance Parsons, TolTest, Inc.
Printed Name/Organization/Date

Investigative Organization's Project QA Officer: _____
Signature

John Lyttle, TolTest, Inc.
Printed Name/Organization/Date

Lead Organization's Project Officer: Thomas J. Brent 7/21/03
Signature

Tom Brent, NSWC Crane
Printed Name/Organization/Date

Approval Signatures: _____ 7/16/03
Signature

Peter Ramanauskas, RPM, U.S. EPA
Printed Name/Title/Date

U.S. EPA Region V
Approval Authority

Other Approval Signatures: Allan A. Debus 5-22-03
Signature

Alan Debus, U.S. EPA QA Officer
Printed Name/Title/Date

Document Control Number: PCB17-00

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ATTACHMENT 3 – SOUTHWEST LABS PERFORMANCE EVALUATION

QAPP Worksheet #2
QAPP IDENTIFYING INFORMATION

Site Name/Project Name: PCB Capacitor Burial Pole Yard
Site Location: NSWC Crane, IN
Site Number/Code: Solid Waste Management Unit (SWMU) #17/04
Operable Unit: SWMU #17/04
Contractor Name: TolTest, Inc.
Contractor Number: N68950-00-D-0200
Contract Title: Environmental Job Order Contract, Various Midwest States, Great Lakes, IL
Work Assignment Number: FC #49

1. Identify guidance used to prepare QAPP: Uniform Federal Policy for Quality Assurance Project Plans, Intergovernmental Data Quality Task Force, Draft Version 2, June 2001

2. Identify program: U. S. EPA Region V, RCRA ,TSCA

3. Identify approval entity: U. S. EPA Region V

4. Indicate whether the QAPP is a generic program QAPP or a project-specific QAPP. (circle one)

5. List dates of contract negotiation meetings that were held: August 29, 2002

6. List dates and titles of QAPP documents written for previous site work, if applicable:

Title	Approval Date
Quality Assurance Project Plan for PCB Capacitor Burial/Pole Yard Solid Waste Management Unit (SWMU) 17/04, Resource Conservation and Recovery Act Facility Investigation and Verification of Removal, December 2001	

7. List organizational partners (stakeholders) and connection with Lead Organization: U.S. EPA Region V

8. List data users: U.S. EPA Region V, IDEM, and NSWC Crane, IN

9. If any required QAPP elements (1 – 20), worksheets and/or required information are not applicable to the project, then circle the omitted QAPP Elements, Worksheets and Required Information on the attached Table. Provide an explanation for their exclusion below:
Field test kits will be verified by approved laboratory.

QAPP IDENTIFYING INFORMATION (CONTINUED)

REQUIRED QAPP ELEMENT(S) AND CORRESPONDING QAPP SECTION(S)	REQUIRED INFORMATION
Project Management and Objectives	
2.1 Title and Approval Page	- Title and Approval Page
2.2 Table of Contents and Document Format 2.2.1 Table of Contents 2.2.2 Document Control Format 2.2.3 Document Control Numbering System 2.2.4 QAPP Identifying Information	- Table of Contents - QAPP Identifying Information
2.3 Distribution List and Project Personnel Sign-Off Sheet	- Distribution List - Project Personnel Sign-Off Sheet
2.4 Project Organization 2.4.1 Project Organizational Chart 2.4.2 Communication Pathways 2.4.2.1 Modifications to Approved QAPP 2.4.3 Personnel Responsibilities and Qualifications 2.4.4 Special Training Requirements/Certification	- Organizational Chart - Communication Pathways - Personnel Responsibilities and Qualifications Table - Special Personnel Training Requirement Table
2.5 Project Planning/Problem Definition 2.5.1 Project Planning Meetings 2.5.2 Problem Definition/Site History and Background	- Project Planning Meeting Documentation - Project Scoping Meeting Attendance Sheet with Agenda - Problem Definition/Site History and Background - Site Maps (historical and present)
2.6 Project Description and Schedule 2.6.1 Project Overview 2.6.2 Project Schedule	- Project Description - Contaminants of Concern and Other Target Analytes Table - Field Quality Control Sample Summary Table - Analytical Services Table - System Designs - Project Schedule Timeline Table
2.7 Project Quality Objectives and Measurement Performance Criteria 2.7.1 Project Quality Objectives 2.7.2 Measurement Performance Criteria	- Measurement Performance Criteria Table

QAPP IDENTIFYING INFORMATION (CONTINUED)

REQUIRED QAPP ELEMENT(S) AND CORRESPONDING QAPP SECTION(S)	REQUIRED INFORMATION
Measurement/Data Acquisition	
3.1.1 Sampling Process Design 3.1.1.1 Sampling Design Rational	- Sampling Design and Rationale - Sampling Locations, Sampling and Analysis Methods/SOP Requirements Table - Sample Location Map
3.1.2 Sampling Procedures and Requirements 3.1.2.1 Sampling Procedures 3.1.2.2 Sampling SOP Modifications 3.1.2.3 Cleaning and Decontamination of Equipment/Sample Containers 3.1.2.4 Field Equipment Calibration 3.1.2.5 Field Equipment Maintenance, Testing, and Inspection Requirements 3.1.2.6 Inspection and Acceptance Requirements for Supplies/Sample Containers	- Sampling SOPs - Project Sampling SOP Reference Table - Sampling Container, Volumes, and Preservation Table - Field Sampling Equipment Calibration Table - Cleaning and Decontamination SOPs - Field Equipment Maintenance, Testing, and Inspection Table
3.1.3 Sample Handling, Tracking, and Custody Requirements 3.1.3.1 Sample Collection Documentation 3.1.3.1.1 Field Notes 3.1.3.1.2 Field Documentation Management System 3.1.3.2 Sample Handling and Tracking System 3.1.3.3 Sample Custody	- Sample Handling, Tracking and Custody SOPs - Sample Handling Flow Diagram - Sample Container Label (Sample Tag) - Chain-of-Custody Form and Seal
3.2.1 Field Analytical Method Requirements 3.2.1.1 Field Analytical Methods and SOPs 3.2.1.2 Field Analytical Method/SOP Modifications 3.2.1.3 Field Analytical Instrument Calibration 3.2.1.4 Field Analytical Instrument/Equipment Maintenance, Testing, and Inspection Requirements 3.2.1.5 Field Analytical Inspection and Acceptance Requirements for Supplies	- Field Analytical Methods/SOPs - Field Analytical Method/SOP Reference Table - Field Analytical Instrument Calibration Table - Field Analytical Instrument/Equipment Maintenance, Testing, and Inspection Table

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REQUIRED QAPP ELEMENT(S) AND CORRESPONDING QAPP SECTION(S)	REQUIRED INFORMATION
3.2.2 Fixed Laboratory Analytical Method Requirements 3.2.2.1 Fixed Laboratory Analytical Methods and SOPs 3.2.2.2 Fixed Laboratory Analytical Method/SOP Modifications 3.2.2.3 Fixed Laboratory Instrument Calibration 3.2.2.4 Fixed Laboratory Instrument/Equipment Maintenance, Testing, and Inspection Requirements 3.2.2.5 Fixed Laboratory Inspection and Acceptance Requirements for Supplies	- Fixed Laboratory Analytical Methods/SOPs - Fixed Laboratory Analytical Method/SOP Reference Table - Fixed Laboratory Instrument Maintenance and Calibration Table
3.3.1 Quality Control Requirements 3.3.1.1 Sampling Quality Control 3.3.1.2 Analytical Quality Control 3.3.1.2.1 Field Analytical QC 3.3.1.2.2 Fixed Laboratory QC	**Sampling** - ~~Field Sampling QC Table~~ - Field Sampling SOP Precision and Accuracy Table **Analytical** - ~~Field Analytical QC Sample Table~~ - ~~Field Analytical Method/SOP~~ Precision and Accuracy Table - Field Screening/Confirmatory Analysis Decision Tree - Fixed Laboratory Analytical QC Sample Table - Fixed Laboratory Method/SOP Precision and Accuracy Table
3.4.1 Data Acquisition Requirements	- Non-Direct Measurements Criteria and Limitations Table
3.5.1 Documentation, Records, and Data Management 3.5.1.1 Project Documentation and Records 3.5.1.2 Field Analysis Data Package Deliverables 3.5.1.3 Fixed Laboratory Data Package Deliverables 3.5.1.4 Data Reporting Formats 3.5.1.5 Data Handling and Management 3.5.1.6 Data Tracking and Control	- Project Documents and Records Table - Data Management SOPs

QAPP IDENTIFYING INFORMATION (CONTINUED)

REQUIRED QAPP ELEMENT(S) AND CORRESPONDING QAPP SECTION(S)	REQUIRED INFORMATION
Assessment/Oversight	
4.1 Assessments and Response Actions 4.1.1 Planned Assessments 4.1.2 Assessment Findings and Corrective Action Responses 4.1.3 Additional QAPP Nonconformance's	- Assessment and Response Actions - Project Assessment Table - Audit Checklists
4.2 QA Management Reports	- QA Management Reports Table
Data Verification/Validation and Usability	
5.1 Verification and Validation Requirements and Procedures	- Data Verification/Validation Process Table - Data Verification/Validation Summary Table
5.2 Data Usability/Reconciliation with Data Quality Objectives	- Data Usability Assessment

Worksheet #3
DISTRIBUTION LIST

QAPP RECIPIENTS	TITLE	ORGANIZATION	TELEPHONE NUMBER	DOCUMENT CONTROL NUMBER
Peter Ramanauskas	U.S. EPA Project Manager	U.S. EPA Region V	312-886-7890	PCB17-01
George Ritchotte	IDEM Project Manager	Indiana Department of Environmental Management	317-308-3123	PCB17-02
Tom Brent	Environmental Protection Specialist	NSWC Crane Environmental Protection Department (EPD)	812-854-6160	PCB17-03
Administrative Record	N/A	NSWC Crane EPD	812-854-4423	PCB17-04
William Gates	Remedial Project Manager	Southern Division Naval Facilities Engineering Command	843-820-7360	PCB17-05
Lance Parsons	General Manager	TolTest, Inc.	812-636-8501	PCB17-06
Peter Chevalier	Senior Project Manager	TolTest, Inc.	812-636-8501	PCB17-07
Debbie Leighty	Project Manager	TolTest, Inc.	812-636-8501	PCB17-08
John Lyttle	Health and Safety Officer (HSO), Quality Assurance/Quality Control (QAQC) Representative	TolTest, Inc.	812-636-8501	PCB17-09
Jennifer Kurek	Data Validator	TolTest, Inc.	419-241-7175	PCB17-10
Randy Staggs	Project Manager	Southwest Laboratory of Oklahoma, Inc.	918-251-2858	PCB17-11
Chuck Hoover	Laboratory QA Officer	Southwest Laboratory of Oklahoma, Inc.	918-251-2858	PCB17-12

Worksheet #4

PROJECT PERSONNEL SIGN-OFF SHEET

Organization: NSWC Crane, IN

TITLE	TELEPHONE NUMBER	SIGNATURE	DATE QAPP READ	QAPP ACCEPTABLE AS WRITTEN
Environmental Protection Specialist (Tom Brent)	812-854-6160			

Worksheet #4
PROJECT PERSONNEL SIGN-OFF SHEET

Organization: TolTest, Inc.

TITLE	TELEPHONE NUMBER	SIGNATURE	DATE QAPP READ	QAPP ACCEPTABLE AS WRITTEN
General Manager (Lance Parsons)	812-636-8501			
Senior Project Manager (Peter Chevalier)	812-636-8501			
Project Manager / Site Supervisor (Debbie Leighty	812-636-8501			
HSO/QAQC Representative (John Lyttle)	812-636-8501			
Data Validator (Jennifer Kurek)	419-241-7175			

Worksheet #4
PROJECT PERSONNEL SIGN-OFF SHEET

Organization: Southwest Laboratory of Oklahoma, Inc.

TITLE	TELEPHONE NUMBER	SIGNATURE	DATE QAPP READ	QAPP ACCEPTABLE AS WRITTEN
Laboratory Director (Robert Harris)	918-251-2858			
Project Manager (Randy Staggs)	918-251-2858			
Laboratory QA Officer (Chuck Hoover)	918-251-2858			

Worksheet #5
ORGANIZATIONAL CHART

Approval Authority/
Data User:
Peter Ramanauskas
U.S. EPA Region V

Oversight/
Data User:
George Ritchotte
IDEM

Lead Organization/
Data User:
U.S. Navy
SOUTHNAVFACENGCOM

Lead Organization/
Data User:
U.S. Navy
NSWC Crane

Bill Gates
Remedial Project Manager

Tom Brent
Environmental Protection Specialist

Contractor Organization:
TolTest, Inc.
Regional Manager – Lance Parsons
Senior Project Manager – Peter Chevalier
Project Manager/Site Supervisor – Debbie Leighty

TolTest, Inc.
Health and Safety Manager/
Quality Assurance/Quality
Control Officer – John Lyttle

TolTest, Inc.
Data Validator –
Jennifer Kurek

Subcontractor Organization:
Southwest Labs, Inc.
Role: Analysis of samples
Project Contact – Randy Staggs

Communication Pathways

- Tom Brent will be the primary point of contact for Peter Ramanauskas (U.S. EPA Region 5 PM).
- Debbie Leighty will be the responsible person for all project phases and will take direction from Tom Brent, who will in turn communicate with Peter Ramanauskas, on matters of field related problems. Communication may be via e-mail, fax, mailed reports or in person.
- Southwest Laboratory manager Randy Staggs will address QA and analytical questions to Debbie Leighty.
- Debbie Leighty will coordinate all sample collection/lab receipt and analysis with Randy Staggs.
- Debbie Leighty will be the contact point for Jennifer Kurek on questions regarding sampling, analysis, or field quality control samples.
- Corrective actions required due to sampling or analysis problems will be determined by Debbie Leighty.
- No data will be released until data are validated and then approved for release by Jennifer Kurek, Debbie Leighty, and Lance Parsons.
- If the QAPP must be amended due to field conditions, schedule changes, or analytical problems (not meeting required QLs, etc.), the changes must be approved first by Debbie Leighty, then Tom Brent, and finally by Peter Ramanauskas before future work can proceed under the amendment.

Worksheet #6
PERSONNEL RESPONSIBILITIES AND QUALIFICATIONS TABLE

NAME	TITLE	ORGANIZATIONAL AFFILIATION	RESPONSIBILITIES	EDUCATION AND EXPERIENCE QUALIFICATIONS
Lance Parsons	General Manager	TolTest, Inc.	Reports directly to NSWC Crane Officer In Charge of Construction	A.A. General Studies, 13 years combined experience in construction and environmental remediation, 6 years field supervision and management.
Peter Chevalier	Senior Project Manager	TolTest, Inc.	Ultimately responsible for the delivery of all reports.	M.S. Natural Resources, 14 years experience.
Debbie Leighty	Project Manager/Site Supervisor	TolTest, Inc.	Manages project – coordinates between lead agency and subcontractor.	B.S. Environmental Science and Management, 9 years of experience.
John Lyttle	QA Officer/HSO	TolTest, Inc.	QA Oversight. Oversees H&S for field activities	USACE Quality Control Management for Contractors Course, 9 years combined experience in construction and environmental remediation and QC supervision.
Jennifer Kurek	Data Validator	TolTest, Inc.	Validate Data	B.S. Environmental Science, 5 years of experience.

PERSONNEL RESPONSIBILTIES AND QUALIFICATIONS TABLE (CONTINUED)

NAME	TITLE	ORGANIZATIONAL AFFILIATION	RESPONSIBILITIES	EDUCATION AND EXPERIENCE QUALIFICATIONS
Robert Harris	Laboratory Director	Southwest Laboratory of Oklahoma, Inc.	Sample Analysis	B.S. Microbiology, 26 years of experience.
Randy Staggs	Laboratory Project Manager	Southwest Laboratory of Oklahoma, Inc.	Sample Analysis.	B.S. Biology, 20 years of experience.
Chuck Hoover	Laboratory QA Officer	Southwest Laboratory of Oklahoma, Inc.	Sample Analysis.	B.A. Biology/Chemistry, 22 years of experience.

Worksheet #8

PROJECT CONTRACT NEGOTIATION MEETING ATTENDANCE SHEET

EPA Regulation Program: RCRA FIFRA TSCA CERCLA DW CWA CAA **Program: Brownfields, NPDES, etc._____** **Projected Date(s) of Sampling:_____** **Project Manager:_____**	**Site Name: PCB Capacitor Burial Pole Yard** **Site Location: NSWC Crane, IN** **CERCLA Site/Spill Identifier No. 01_____** **Other Site Number/Code:_____** **Phase: ERA SA/SI pre-RI RI (phase 1, etc.) FS RD RA post-RA (circle one)** **Other phase:_____**

Date of Meeting: August 29, 2002
Meeting Location:

Name	Title	Affiliation	Phone #	Project Role
Terry Mahoney		NSWC Crane		
Debbie Dills		NSWC Crane		
Lance Parsons		TolTest, Inc.		
Peter Chevalier		TolTest, Inc.		
Bill Gates		NAVFACENGCOM Southern Division		

Meeting Purpose: _____

Comments: _____

Worksheet #9a
PROJECT DESCRIPTION

PROBLEM DEFINITION/SITE HISTORY AND BACKGROUND
SWMU 17 PCB Capacitor Burial/ Pole Yard has historically been used to store capacitors, transformers, and utility poles. It has been reported that capacitors were buried at this site. Soil was initially sampled for PCBs in 2001. Tetra Tech NUS (TtNUS) prepared, and the U.S. EPA Region 5 approved, a Quality Assurance Project Plan (QAPP) for additional soil sampling to delineate PCB contamination and for a geophysical survey to determine potential buried capacitor locations. TtNUS implemented the QAPP in 2002 and issued a report identifying the extent of PCB soil contamination and the most likely locations where capacitors were buried. [TtNUS RFI, 2002]

PROJECT DESCRIPTION AND SCHEDULE
Project Overview
The objective of this work is to remove and dispose of PCB contaminated soil, remove and dispose of buried capacitor(s), decontaminate and reinstall pole support racks, and restore the site to it's original condition. Pole support racks are metal braces which are used to keep poles from being placed directly on the ground. Soil will be removed to the 1-ppm PCB cleanup level, in order to cause the least interference with NSWC Crane operations and to protect existing work from damage and replace that which is damaged. Environmental protection, health and safety, and quality control will be maintained throughout the project.

TolTest, Inc. will be responsible for implementing this phase of the program, which will contain the following elements:

- Soil Excavation and Disposal (≥25 ppm PCB)
  - Excavate and dispose ≥25-ppm PCB contaminated surface soil (0 – 2 feet) as delineated in the TtNUS report. In order to minimize quantity of soil for disposal, excavation will be accomplished in one-foot increments.
  - Use PCB field screening kits to determine extent of excavation.
  - Take confirmatory (Post-Remediation Verification) samples. 10% of samples with less than 25 ppm PCBs will be sent to the laboratory for analysis.
  - Backfill excavation.
  - Profile waste and procure disposal site for NSWC Crane approval.
  - Manifest waste soil for Crane signature.
- Soil Excavation and Disposal (≥1 ppm PCB)
  - Excavate and dispose ≥1-ppm PCB contaminated surface soil (0 – 2 feet) as delineated in TtNUS report and subsurface soil (2 – 4 feet). In order to minimize quantity of soil for disposal, excavation will be accomplished in one-foot increments.
  - Use PCB field screening kits to determine extent of excavation.
  - Take confirmatory (Post-Remediation Verification) samples. 100% of samples with less than 1 ppm PCBs will be sent to the laboratory for analysis. If all of the samples with less than 1 ppm PCBs are not in agreement with the field results, the area will be resampled and verification sampling will be repeated with all verification samples going to the laboratory. Excavations will not be

backfilled until Post-Remediation Verification sampling confirms cleanup to 1 ppm or below.
  - Backfill excavation.
  - Profile waste and procure disposal site for NSWC Crane approval.
  - Manifest waste soil for Crane signature.

- Capacitor Excavation and Disposal
  - Excavate geophysical anomalies no greater than twelve feet deep as identified in TtNUS report. If capacitors are not found, backfill with excavated soil. If capacitors are found:
  - Remove and dispose capacitors.
  - Use PCB field screening kits to determine if soils are contaminated, and to what level (or concentration).
  - Remove and dispose of contaminated soil.
  - Sample excavation using PCB field screening kits to determine extent of excavation. Remove and dispose ≥25 ppm PCB contaminated soil.
  - Take confirmatory (Post-Remediation Verification) samples for laboratory analysis.
  - Backfill excavation.
  - Profile waste and prepare for transport to disposal site.
  - Manifest waste for Crane signature.
- Pole Support Rack Decontamination and Relocation
  - Decontaminate pole support racks.
  - Remove and reinstall pole support racks at a location to be determined by NSWC Crane.

Contaminants of Concern

PCBs are the key target parameters for the remediation at SWMU 17. Capacitors and transformers stored at the PCB Capacitor Burial Pole Yard contained PCBs, which have leaked onto the ground. Capacitors reportedly buried at SWMU 17 also contained PCBs. Soil contamination may also have come from storage of utility poles that might have contained PCBs as a result of burst transformers, or perhaps from "greasing" the pole supports with PCB contaminated oil.

Sampling Tasks

1. Field screening with EnSys kits to evaluate the concentration of PCBs in the soil.
2. Post-Remediation Verification samples will be taken to ensure that cleanup has occurred based on the guidelines described in the TSCA regulations.
3. Soil sampling to delineate a potential PCB impacted area located in a drainage ditch.
4. PCB-impacted soil and decontamination water characterization.

System Designs

Sampling designs from the approved SWMU 17 TtNUS QAPP and the TolTest Work Plan will be used.

Analytical Tasks

Southwest Labs, Inc. will utilize a fixed-base laboratory analysis used to estimate PCB concentrations in surface and subsurface soils because the laboratory analysis allows for the lowest detection limit and allows for verifying the PCB Aroclor of interest.

Data Verification and Validation Tasks

1. Test kits, which are PCB Aroclor specific, and fixed-base laboratory analysis will be used for verification sampling during remediation activities.
2. A fixed-base laboratory will be used for final verification analysis of "clean" samples.
3. The overall verification strategy assumes that PCBs will be present that yield a positive response with the test kit.
4. Southwest Labs, Inc. will verify that all data are complete for samples received. All data package deliverables requirements will be met.
5. Data will be validated by TolTest, Inc. using National Functional Guidelines for Evaluating Environmental Analyses. Achievement of all project-specific measurement performance criteria (MPC) and data validation criteria (DVC) will be evaluated during the data validation, and the analytical measurement error will be assessed. A Data Validation Report will be produced for each Sample Delivery Group.

Quality Control Activities

1. SOPs will be implemented in all phases of this project.
2. Field and laboratory QC samples will be analyzed routinely to evaluate overall data quality. For more information, refer to Worksheets #22a and #24a.

Quality Assurance Assessments

Random QA audits will be completed at all phases of the field operations. QA plans and procedures will be reviewed and approved by TolTest Project QA Officer, TolTest Regional Manager, Lead Organization Project Officer and EPA. QA technical assistance will be provided to project staff. Data generated during the course of the field investigations will be maintained in hard copy form in the Administrative Records at NSWC Crane.

Data Usability Assessments

Validated data and all related field logs/notes/records will be reviewed to assess total measurement error and determine overall usability of the data for project purposes. Data limitations will be determined and data will be compared to Project Quality Objectives and required Action Limits. Corrective action will be initiated, as necessary. Final data will be placed in a database, with any necessary qualifiers, and tables, charts, and graphs will be generated.

Records and Reports

1. All samples collected will have locations documented, records of each sample collected in notebooks, and all field measurements documented in notebooks. COC's, air bills, and sample logs will be prepared and retained for each sample.
2. A copy of the finalized QAPP will be retained in a central file area.

Worksheet #9b

CONTAMINANTS OF CONCERN AND OTHER TARGET ANALYTES TABLE (REFERENCE LIMIT AND EVALUATION TABLE)

Medium/Matrix: Soil
Matrix Code (from DQO Summary Form):
Analytical Parameter: Appendix IX PCBs
Concentration Level: Low
Field Analytical or Fixed Laboratory Method/SOP1: SW-846 Method 8082

Analyte	CAS Number	Project Action Limit (mg/Kg) (dry weight)	Project Quantitation Limits (mg/kg) (dry weight)	Analytical Method PQLs (mg/kg)
Aroclor-1016	12674-11-2	1.0	1.0	0.072
Aroclor-1221	11104-28-2	1.0	1.0	0.078
Aroclor-1232	11141-16-5	1.0	1.0	0.039
Aroclor-1242	53469-21-9	1.0	1.0	0.045
Aroclor-1248	12672-29-6	1.0	1.0	0.042
Aroclor-1254	11097-69-1	1.0	1.0	0.033
Aroclor-1260	11096-82-5	1.0	1.0	0.060

CONTAMINANTS OF CONCERN AND OTHER TARGET ANALYTES TABLE (REFERENCE LIMIT AND EVALUATION TABLE) (Continued)

Medium/Matrix: Decontamination Water
Matrix Code (from DQO Summary Form):
Analytical Parameter: Appendix IX PCBs
Concentration Level: Low
Field Analytical or Fixed Laboratory Method/SOP1: SW-846 Method 8082

Analyte	CAS Number	Project Action Limit (mg/l)	Project Quantitation Limits (mg/l)	Analytical Method PQLs (mg/l)
Aroclor-1016	12674-11-2	3.0 ppm	1.0	0.001
Aroclor-1221	11104-28-2	3.0 ppm	1.0	0.002
Aroclor-1232	11141-16-5	3.0 ppm	1.0	0.003
Aroclor-1242	53469-21-9	3.0 ppm	1.0	0.001
Aroclor-1248	12672-29-6	3.0 ppm	1.0	0.001
Aroclor-1254	11097-69-1	3.0 ppm	1.0	0.001
Aroclor-1260	11096-82-5	3.0 ppm	1.0	0.002

Worksheet #9c
FIELD QUALITY CONTROL SAMPLE SUMMARY TABLE

Medium/ Matrix	Analytical Parameter	Concentration Level	Analytical Method/ SOP Reference	No. of Sampling Locations[1]	No. of Field Duplicate Pairs	Organic		No. of Equip. Blanks	No. of Cooler Tem. Blanks	Total No. of Samples to Lab
						No. of MS	No. of MSD			
Soil	Appendix IX PCBs	Low	SW-846 Method 8082	10	1/batch	1/batch	1/batch	1/batch	1/cooler	14
Soil	Appendix IX-PCBs	Low	SW-846 Method-8082	3	1/batch	1/batch	1/batch	1/batch	1/cooler	7
Decon Water	Appendix IX-PCBs	Low	SW-846 Method-8082	20	1/batch of 20 or less	1/batch of 20 or less	1/batch of 20 or less	1/batch of 20 or less	1/cooler	25

[1]If samples will be collected at different depths at the same location, count each discrete sampling depth as a separate sampling location/station.

Worksheet #9d
ANALYTICAL SERVICES TABLE

Medium/ Matrix	Analytical Parameter	Concentration Level	Analytical/Sample Cleanup and Extraction Method/ SOP	Data Package Turnaround Time	Laboratory/ Organization (Name and Address: Contact Person and Telephone Number)	Backup Laboratory/ Organization (Name and Address: Contact Person and Telephone Number)
Soil	Appendix IX PCBs (Reported as Aroclors)	Low	Lab SOP SW-846 Method 8082	21 days	Southwest Laboratory of Oklahoma, Inc. 1700 West Albany Broken Arrow, OK Randy Staggs 918-251-2858	None
Decon Water	Appendix IX PCBs (Reported as Aroclors)	Low	Lab SOP SW-846 Method 8082	21 days	Southwest Laboratory of Oklahoma, Inc. 1700 West Albany Broken Arrow, OK Randy Staggs 918-251-2858	None

Worksheet #10
PROJECT SCHEDULE TIMELINE TABLE

Activities	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
	Anticipated Date(s) of Initiation	Anticipated Date of Completion		
Select General Contractor/Laboratory		9-6-02		
Prepare Internal Draft Work Plan	9-6-02	10-6-02		
Prepare Draft Work Plan	10-13-02	10-28-02		
Prepare Final Work Plan	12-12-02	12-27-02		
Fieldwork	1-11-03	1-26-03		
Prepare Internal Draft IMR	1-26-03	3-27-03		
Prepare Draft IMR	4-11-03	4-26-03		
Prepare Final IMR	6-10-03	6-25-03		

Worksheet #11
MEASUREMENT PERFORMANCE CRITERIA TABLE

Medium/ Matrix	Soil					
Analytical Parameter	Appendix IX PCBs					
Concentration Level	Low					
Sampling Procedure	**Analytical Method/ SOP**	**Data Quality Indicators (DQIs)[1]**	**Measurement Performance Criteria**		**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
S-7 and S-10	L-1	Percent Recovery	Accuracy/Bias	Recovery = 80 – 120%	LSC	A
		Relative Percent Difference	Precision	RPD = 0 – 30%	LCS	A
		Percent Recovery	Accuracy/Bias	Recovery = 80 – 120%	MS/MSD	A
		Relative Percent Difference	Precision	RPD = 0 – 30%	MS/MSD	A
		Percent Recovery	Accuracy/Bias	Recovery = 47 – 125%	Surrogate	A
		Relative Percent Difference	Precision	RPD = 0 – 35%	Blanks	
		Relative Percent Difference	Precision	RPD +/- 35%	Field Duplicates	A

[1]Data Quality Indicators (a.k.a. PARCC parameters, i.e., precision, accuracy/bias, sensitivity, data completeness, comparability).

MEASUREMENT PERFORMANCE CRITERIA TABLE (Continued)

Medium/ Matrix	Decon Water					
Analytical Parameter	Appendix IX PCBs					
Concentration Level	Low					
Sampling Procedure	**Analytical Method/ SOP**	**Data Quality Indicators (DQIs)[1]**	**Measurement Performance Criteria**		**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
S-8	L-1	Percent Recovery	Accuracy/Bias	Recovery = 80 – 120%	LCS	A
		Relative Percent Difference	Precision	RPD = 0 – 30%	LCS	A
		Percent Recovery	Accuracy/Bias	Recovery = 80 – 120%	MS/MSD	A
		Relative Percent Difference	Precision	RPD = 0 – 30%	MS/MSD	A
		Percent Difference	Accuracy/Bias	Recovery = 34 – 126%	Surrogate	A
		Relative Percent Difference	Precision	RPD = 0 – 35%	Blanks	
		Relative Percent Difference	Precision	RPD +/- 35%	Field Duplicates	A

[1]Data Quality Indicators (a.k.a. PARCC parameters, i.e., precision, accuracy/bias, sensitivity, data completeness, comparability).

Worksheet #12a
SAMPLING DESIGN AND RATIONALE

SAMPLING PROCESS DESIGN

Sampling Design Rationale

Investigative soil sampling will consist of collecting surface samples (0 – 2') and subsurface samples (2 – 4') from six different areas within a drainage ditch located inside the geophysical survey area of the SWMU 17 site. Sampling segment boundaries were selected based on historical sampling results in the area, which proved to be inconclusive. The drainage ditch is located to the north and to the extreme west of both Building 357 and the geophysical survey area. A survey will be completed for all new sampling locations. All samples will be collected in accordance with SOP S-7, included in Attachment 1. The soil borings will be collected by hand auger drilling, which will be done manually advancing a 3-inch diameter stainless steel bucket bit downward into the ground to the desired depth.

Post-Remediation Verification Sampling will be completed in order to ensure that cleanup has occurred based on the guidelines described in the TSCA regulations (40 CFR 761 Subpart O). Ten percent of samples with less than 1 ppm of PCBs, as indicated by the field analysis, will be sent to Southwest Laboratory, Inc. for analysis. Sampling grids will include the following: The verification grid will be aligned with magnetic north; A composite sample will be composed of nine or less sample aliquots; Individual sample aliquots will represent no more than 25 square feet of exposed excavation area each; A minimum of three composite samples will be required to assess an individual, discreet excavation; and Only one composite sample will represent a given area. Composite samples will not have overlapping areas. All samples will be collected in accordance with SOP S-7, included in Attachment 1. The soil borings will be collected by hand auger drilling, direct-push technology, or split-barrel samples, which will be done manually advancing a 3-inch diameter stainless steel bucket bit downward into the ground to the desired depth.

Field investigations and remediation will generate potentially contaminate wastes. Based on the activities and types of contaminants assumed to be present, the residues should not represent a significant risk to human health or the environment when properly managed. Management of residues will be performed as follows: Disposable PPE/equipment will be decontaminated, double-bagged, and placed in trash receptacles at the facility. Decontamination fluids will be collected and stored onsite in 55-gallon drums. As per SOP S-8, the decontamination fluids may be discharged into the NSWC-permitted sanitary sewer system if PCB concentrations are less than 3 parts per billion (ppb). Samples of decontamination fluid will be analyzed by the laboratory in order to ascertain the fate of the wastes.

Samples will be shipped on ice to Southwest Laboratories within 12 hours of collection.

Worksheet #12b

SAMPLING LOCATIONS AND SAMPLING AND ANALYSIS METHOD/SOP REQUIREMENTS TABLE

Sampling Location [1,2]	Location ID Number	Medium/ Matrix	Depth (units)	Analytical Parameter	Concentration Level	Number of Samples (identify field duplicates and replicates)	Sampling SOP	Analytical Method/ SOP	Sample Volume	Containers (number, size and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/ analysis)
Investigative	1	Soil	0 – 4'	Appendix IX PCB	Low	13	S-7	SW-846 Method 8082	30 g	125 ml wide mouth glass with Teflon-lined cap	Ice, 4°C	14 days for extraction, 40 for analysis
Verification[3]	2	Soil	0 – 12"	Appendix IX PCB	Low	6	S-10	SW-846 Method 8082	30 g	125 ml wide mouth glass with Teflon-lined cap	Ice, 4°C	14 days for extraction, 40 for analysis
Characterization	3	Water	N/A	Appendix IX PCB	Low	24	S-8	SW-846 Method 8082	2 x 1000 ml AG	G, Teflon-lined Cap	Ice, 4°C	7 days for extraction, 40 for analysis

[1]Indicate critical field sampling locations with "1".
[2]Indicate background sampling locations with "2".
[3]Analysis performed following an investigation which has resulted in soil excavation.

Worksheet #13
PROJECT SAMPLING SOP REFERENCE TABLE

Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Identification	Modified for Project Work Y or N
S-1	Sample Labeling (PCB75110.01-01)	TolTest	N/A	N
S-2	Sample Identification Nomenclature (PCB75110.01-02)	TolTest	N/A	N
S-3	Sample Custody and Documentation of Field Activities (PCB75110.01-03)	TolTest	N/A	N
S-4	Borehole Advancement and Soil Coring Using Direct Push Technology (PCB75110.01-04)	TolTest	PID Geoprobe or Equivalent DPT Equipment	N
S-5	Calibration and Use of Photo ionization Detector (PCB75110.01-05)	TolTest	PID	N
S-6	Borehole and Soil Sample Logging (PCB75110.01-06)	TolTest	PID	N
S-7	Surface and Subsurface Soil Sampling (PCB75110.01-07)	TolTest	PID Geoprobe Sampling Equipment	N
S-8	Management of Investigation-Derived Waste (PCB75110.01-08)	TolTest	N/A	N
S-9	Decontamination of Field Sampling Equipment (PCB75110.01-09)	TolTest	N/A	N
S-10	Soil Sample Compositing (PCB75110.01-10)	TolTest	PID Sampling Equipment	N
S-11	Sample Preservation, Packaging, and Shipping (PCB75110.01-11)	TolTest	N/A	N
S-12	Use of Immunoassay Test Kit for PCBs (PCB75110.01-12)	TolTest	Immunoassay Kit	N

Worksheet #14
FIELD SAMPLING EQUIPMENT CALIBRATION TABLE

EQUIPMENT	PROCEDURE	FREQUENCY OF CALIBRATION	ACCEPTANCE CRITERIA	CORRECTIVE ACTION (CA)	PERSON RESPONSIBLE FOR CA	SOP REFERENCE
PID	Routine Calibration	Prior to each use	Alarms do not activate	Repair	QA/QC Representative	S-5
PID	Factory Inspection and Calibration	Once a year, or when malfunctioning	Factory-approval	Repair	QA/QC Representative	S-5
Immonoassay Kit	Routine Calibration	Prior to each use	Results within specified ranges	Do not use	QA/QC Representative	S-12
Immunoassay Kit	Factory Inspection and Calibration	Upon purchase	Factory approval	Do not use. Return to manufacturer	QA/QC Representative	S-12

Worksheet #15
FIELD EQUIPMENT MAINTENANCE, TESTING, AND INSPECTION TABLE

Sampling Equipment/ Instrument	Inspection Activity	Responsible Person	Frequency	Acceptance Criteria	Corrective Action
Field Equipment	Check engine oil	Operator	Prior to each days use	At full level	Fill
	Check cooling water discharge	Operator	Prior to each days use	Cooling water is discharging	Clear debris/replace/fill pump
	Check fuel level	Operator	Prior to each days use	Enough for days activities/return	Fill tank
	Check lights	Operator	Prior to each days use	Working	Replace bulb/repair wiring
	Check tires	Operator	Prior to each days use	At full level	Repair/fill

Worksheet #16
SAMPLE HANDLING FLOW DIAGRAM

Sample Collection:
Debbie Leighty

↓

Sample Packing:
Debbie Leighty
Coordination of Shipment:
Debbie Leighty

↓

Type of Shipment: Overnight
Carrier: FedEx

↓

Sample Analysis:
Sample Analysis: Southwest Labs, Inc.
Sample Receipt: Randy Staggs
Sample Custody & Storage: Randy Staggs
Sample Processing: Randy Staggs
Sample Preparation: Randy Staggs
Sample Determinative Analysis: Randy Staggs

↓

Sample Archival
Field Sample Storage (No. of days from sample collection): See worksheet 12a
Sample Extract/Digestate Storage (No. of days from extraction/digestion): See worksheet 12a

↓

Sample Disposal:
TBD by Randy Staggs
Southwest Labs, Inc.

SAMPLE CUSTODY

Sample custody, or chain-of-custody, protocols are in three parts (1) sample collection, (2) laboratory analysis, and (3) final evidence files.

A sample or evidence file is considered under custody if:

- Sample or file is in possession;
- Sample or file is in view; and
- Sample or file is placed in a designated secure area after being properly sealed to prevent tampering.

Field Chain-of-Custody Procedures
The sample packaging and shipment procedures summarized below ensure that the samples will arrive at the laboratory with the chain-of-custody intact. The protocols for specific sample numbering and other sample designations are included in Section 4.6 of the Work Plan.

Field Procedures
The field sampler will be personally responsible for the care and custody of the samples until the samples are transferred or properly dispatched. As few people as possible will handle the samples.

All sample bottles will be tagged or labeled with sample identification numbers and locations, including time and date of sample collection. Sample tags or labels will be completed for each sample using permanent, waterproof ink either prior to or immediately after sample collection.

The Project Manager will review all field activities to determine whether proper custody procedures were followed during the fieldwork and decide if additional samples are required.

Field Logbooks/Documentation
The field logbook will provide the means of recording data collection activities performed. As such, logbook entries will be described in as much detail as possible so that particular site activities could be re-constructed without reliance on memory.

Field logbooks will be bound logbooks, field survey books or notebooks. Logbooks will be assigned to field personnel, but will be stored in the document control center when not in use. A project-specific document number will identify each logbook. The title page of each logbook will contain the following information:

- Person to whom the logbook is assigned;
- Logbook number;
- Project name;
- Project start data; and
- Project end date.

Entries into the logbook will contain a variety of information. The beginning of each entry will include: the date, start time, weather conditions, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry. The names of visitors to the site (including additional field sampling or investigative team personnel), and the purpose of their visit will also be recorded in the field logbook.

Measurements made and samples collected will be recorded in the field logbook. All entries will be made in ink and no erasures will be made. If an incorrect entry is made, the incorrect information will be crossed-out with a single strike mark and initialed. Whenever a sample is collected, or a measurement is made, a detailed description of the location of the station will be recorded in the logbook. The number of photographs taken at the station, if any, will also be noted. The logbook will identify all equipment used to make measurements, along with the date of calibration.

Samples will be collected in accordance with the sampling procedures documented in the Field Sampling Plan. The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth of sample collection, volume, and the number of sample containers. The corresponding sample identification number will be prominently listed.

Transfer of Custody and Shipment Procedures
The following procedures will be incorporated for the transfer of sample custody and sample shipment:

Samples are accompanied by a properly completed chain-of-custody form (see page 37). The sample identification numbers and locations will be listed on the chain-of-custody record. The custody record will be signed by the sampler. The chain-of-custody form will document the transfer of guardianship of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage area. Upon transferring the possession of samples, the individuals relinquishing the samples will sign, date, and note the time on the custody form.

Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in each sample cooler. Shipping coolers will be secured with strapping tape and tamper-proof custody seals (see page 36) for shipment to the laboratory. The tamper-evident custody seal will be attached to the front right and back left of the cooler. The custody seals are covered with clear plastic tape. The cooler will be strapped shut with strapping tape in at least two locations.

If the samples are sent by common carrier, a bill of lading will be used. Receipts of bills of lading will be retained as part of the permanent documentation. If sent by mail, the package will be registered with return receipt requested.

Commercial carriers are not required to sign off on the custody form as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact.

Laboratory Chain of Custody Procedures
Laboratory custody procedures for sample receiving and log in; sample storage; tracking during sample preparation and analysis; and storage of analytical data are described below:

A chain-of-custody form will accompany samples submitted to the lab. The chain-of-custody forms will be completed and sealed within the sample

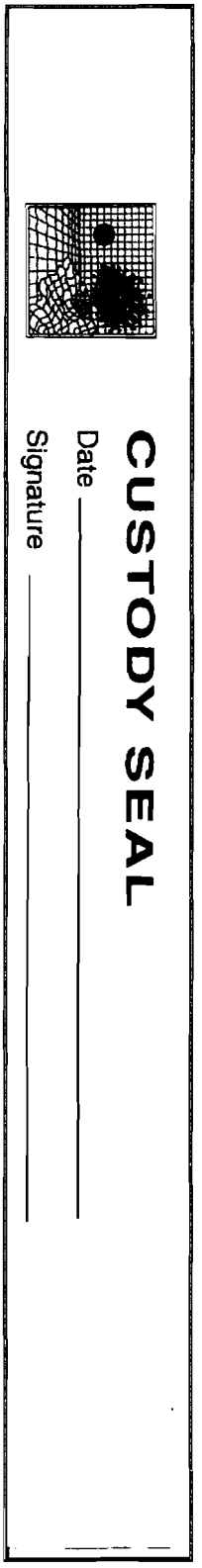
transport container, which will be opened and examined by the Laboratory Sample Custodian. The Laboratory Sample Custodian will ensure that all entries on the chain-of-custody form correspond with the sample label. If discrepancies are noted by the Laboratory Sample Custodian, the PM will be contacted to resolve any conflicting information.

Evidentiary documentation procedures will be implemented by the Laboratory. The designated Laboratory Sample Custodian will receive and document all samples submitted to the Laboratory. The Laboratory Custodian will examine the condition, preservation, and accompanying documentation of all submitted samples prior to approval and formal acceptance by the Laboratory. Any sample, preservation, or documentation discrepancies (i.e., broken sample container, improper preservation, inadequate sample volume, or poor documentation) will be resolved before the sample is approved and formally accepted for analyses. All required acceptance data will be recorded and documented in the Laboratory Sample Log and Laboratory Computerized Data Management System. The sample will be labeled with Laboratory identification information and placed in the secure sample storage area prior to distribution to the appropriate analyst(s).

Once the sample has been officially entered into the Laboratory computer system, the computer generates individual sample sheets. These sample sheets contain all pertinent information relevant to the sample. The sample record will be put into the Sample Control Logbook, which is located in the Sample Receiving Area. The analyst(s) will sign out samples from the Sample Receiving Area by entering their initials, date, and time of sample removal into the logbook. The sample will be taken to the appropriate laboratory section and logged into the analyst's Sample Control Record. Any time the sample or extract is removed from or returned to the refrigerator, the pertinent information (analyst initials, date, and time) will be recorded into the logbook. The sample or extract will remain in the refrigerator or storage area until it is time to dispose of it. At that time, disposal information will also be recorded on the Sample Control Record.

Final Evidence Files Custody Procedures
The evidence files for the project are maintained at the TolTest, Inc. office. The content of the evidence file will include all relevant records, reports, correspondence, logs, field logbooks, laboratory sample preparation and analysis logbooks, data package, pictures, subcontractor reports, chain-of-custody records, data review reports, etc. The evidence file will be under custody of the contractor project manager in a locked, secured area. Evidence files of analytical data will also be retained by the selected contract laboratory for a minimum of seven years.

SAMPLE CUSTODY SEAL



SAMPLE CHAIN-OF-CUSTODY RECORD

TOLTEST, INC.

1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186; Voice (419) 241-7175, Fax (419) 321-6259
Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304; Voice (419) 241-7175, Fax (419) 241-1808
Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other _____

Chain of Custody Record

40058 Page _____ of _____

Project No.:	Client:
P.O. No.:	Project/Location:
Project Mgr.:	Sampler's Name
Phone No.	Sampler's Signature

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	Parameters								Preserved Yes/No	LAB USE ONLY Lab #
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time

LAB USE ONLY

Were samples delivered ☐ in person ☐ by courier
Were samples preserved ☐ in field ☐ in lab ☐ N/A
Temp of samples _____ °C
Did samples arrive intact and sealed? ☐ yes ☐ no ☐ N/A
Were proper containers used? ☐ yes ☐ no
Was container labeled properly for contents? ☐ yes ☐ no
Were samples packaged properly for type of material? ☐ yes ☐ no
Was shipping label completed properly per regulations? (49 CFR 170, etc.) ☐ yes ☐ no
Comments: _____

TAT _____

Distribution: Original plus one accompanies shipment (white and yellow); copy to coordinator field files (pink)

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Worksheet #17
FIELD ANALYTICAL METHOD/SOP REFERENCE TABLE

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Originating Organization	Analytical Parameter	Instrument	Organization Performing Field Analysis	Modified for Project Work Y or N
F-1	PCB75110.01-12	Screening	TolTest	PCB	PCB EnSys Soil Test Kit	TolTest	N

Worksheet #18
FIELD ANALYTICAL INSTRUMENT CALIBRATION TABLE

Instrument	Activity	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	Method/SOP Reference
PCB EnSys Soil Test Kit	See SOP F-1				Debbie Leighty	S-12

Worksheet #19

FIELD ANALYTICAL INSTRUMENT/EQUIPMENT MAINTENANCE, TESTING, AND INSPECTION TABLE

Instrument	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	Method/ SOP Reference
PCB EnSys Soil Test Kit	See SOP F-1						Debbie Leighty	S-12

Worksheet #20
FIXED LABORATORY ANALYTICAL METHOD/SOP REFERENCE TABLE

Reference Number	Fixed Laboratory Performing Analysis	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Parameter	Instrument	Modified for Project Work Y or N
L-1	Southwest Laboratory of Oklahoma, Inc.	Analysis of PCB's by GC, SW-846 Method 8082	Definitive	Aroclors/PCBs	GC/ECD	N

Worksheet #21

FIXED LABORATORY INSTRUMENT MAINTENANCE AND CALIBRATION TABLE

Instrument	Activity	List Maintenance, Testing and Inspection Activities	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	Method/ SOP Reference
GC/ECD	Aroclor/PCB Analysis	Check connections, replace disposables, break out instrument, recondition column, and perform leak tests.	Initial Calibration (ICAL) after instrument set up. Initial Calibration Verification (ICV) following ICAL, Continuing Calibration Verification (CCV) daily, every 12 hours or every 10 samples and at end of every analytical sequence.	% RSD ≤ 20[1]	Inspect system; correct problems; re-run calibration and affected samples.	Chuck Hoover	Method 8000B

[1] In those instances where the RSD for one or more analytes exceeds 20%, the initial calibration may still be acceptable for mean calibration factor use if the following conditions are met: 1) The mean of the RSD values for all analytes in the calibration is ≤ 20%. The mean RSD is calculated by summing the RSD value for each analyte and dividing by the total number of analytes. If no analyte has an RSD above 20%, then the mean RSD calculation need not be performed. 2) The mean RSD criterion applies to all analytes in the standard, regardless of whether or not they are of interest for a specific project. In other words, if the target analyte is part of the calibration standard, its RSD value is included in the evaluation. 3) The data user must be provided with either a summary of the initial calibration data or a specific list of those Aroclors for which the RSD exceeds 20% and the results of the mean RSD calculation. NOTE: When using the average % RSD no individual Aroclor may have a % RSD greater than 30% and any Aroclor that has a % RSD greater than 20% must have this problem noted in the narrative associated with the samples.

Worksheet #22a
FIELD SAMPLING QC TABLE

Sampling SOP*	S-7/S-10
Medium/Matrix	Soil
Analytical Parameter1	Aroclors/PCB
Concentration Level	1 ppm
Analytical Method/SOP Reference	L-1
Sampler's Name	Debbie Leighty
Field Sampling Organization	TolTest
No. of Sample Locations	Unknown at this time

Field QC	Frequency/ Number	Method/ SOP QC Acceptance Limits2	Corrective Action (CA)	Person(s) Responsible for CA	Data Quality Indicator (DQI)	Measurement Performance Criteria3
Equipment Blanks/ Rinsate Blanks	1 per batch of 20 or less	Below QL	Potential cross contamination. Evaluate need to qualify associated data.	Crane PM and U.S. EPA PM	Contamination	Accuracy/Bias
Cooler Temperature Blanks	1 per cooler shipment				Preservation	Accuracy/Bias
Field Duplicate Pairs	1 per batch of 20 or less	±35% RPD	Evaluate data to see if re-analysis is necessary. Evaluate site to determine if heterogeneous.	Crane PM and U.S. EPA PM	Precision	Precision

FIELD SAMPLING QC TABLE (continued)

Sampling SOP*	S-8
Medium/Matrix	Water
Analytical Parameter1	Aroclors/PCB
Concentration Level	1 ppb
Analytical Method/SOP Reference	L-1
Sampler's Name	Debbie Leighty
Field Sampling Organization	TolTest
No. of Sample Locations	Unknown at this time

Field QC	Frequency/ Number	Method/ SOP QC Acceptance Limits2	Corrective Action (CA)	Person(s) Responsible for CA	Data Quality Indicator (DQI)	Measurement Performance Criteria3
Equipment Blanks/ Rinsate Blanks	1 per batch of 20 or less	Below QL	Potential cross contamination. Evaluate need to qualify associated data.	Crane PM and U.S. EPA PM	Contamination	Accuracy/Bias
Cooler Temperature Blanks	1 per cooler shipment				Preservation	Accuracy/Bias
Field Duplicate Pairs	1 per batch of 20 or less	±35% RPD	Evaluate data to see if re-analysis is necessary. Evaluate site to determine if heterogeneous.	Crane PM and U.S. EPA PM	Precision	Precision

Worksheet #24a

FIXED LABORATORY ANALYTICAL QC SAMPLE TABLE

Medium/ Matrix	Soil
Sampling SOP	S-7/S-10
Analytical Parameter	Aroclor/PCB
Concentration Level	1 ppm
Analytical Method/ SOP Reference	L-1
Laboratory Name	Southwest Labs, Inc.
No. of Sample Locations	Unknown at this time

Laboratory QC:	Frequency/ Number	Method/ SOP QC Acceptance Limits	Corrective Action (CA)	Person(s) Responsible for CA	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	1 per batch of 20 or less	< PQL - > 10x blank concentration > PQL - > 10x absolute value of the preparation blank	All samples associated with the blank must be re-digested and re-analyzed for that analyte.	Chuck Hoover	Contamination	Accuracy/Bias
Instrument Blank	1 per batch of 20 or less	< PQL		Chuck Hoover	Contamination	Accuracy/Bias
Laboratory Duplicate	1 per batch of 20 or less	80 – 120% Recovery		Chuck Hoover	Precision	Precision
Laboratory Matrix Spike	1 per batch of 20 or less	MS Recovery 80 – 120%	If LCS recoveries are within acceptance criteria, matrix interference may be suspected. Flag MS/MSD recoveries outside limits with an "*" and narrate all outliers.	Chuck Hoover	Bias	Bias
Matrix Spike Duplicates	1 per batch of 20 or less	MS Recovery 80 – 120%	If LCS recoveries are within acceptance criteria, matrix interference may be suspected. Flag MS/MSD recoveries outside limits with an "*" and narrate all outliers.	Chuck Hoover	Precision and Bias	Precision and Bias
LCS	1 per batch of 20 or less	LCS Recovery 80 – 120%	If spike recovery is above QC limits, evaluate against all sample results. If the constituent(s) are not detected in any sample, narrate outliers. If any sample the constituent detected, re-analyze LCS. If problem persists, re-extract and re-analyze LCS and all associated samples. If LCS is below QC criteria, re-analyze LCS. If problem persists, re-extract and re-analyze LCS and all associated samples..	Chuck Hoover	Bias	Bias

FIXED LABORATORY ANALYTICAL QC SAMPLE TABLE (continued)

Medium/ Matrix	Decon Water
Sampling SOP	S-8
Analytical Parameter	Aroclor/PCB
Concentration Level	1 ppm
Analytical Method/ SOP Reference	L-1
Laboratory Name	Southwest Labs, Inc.
No. of Sample Locations	Unknown at this time

Laboratory QC:	Frequency/ Number	Method/ SOP QC Acceptance Limits	Corrective Action (CA)	Person(s) Responsible for CA	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	1 per batch of 20 or less	< PQL - > 10x blank concentration > PQL - > 10x absolute value of the preparation blank	All samples associated with the blank must be re-digested and re-analyzed for that analyte.	Chuck Hoover	Contamination	Accuracy/Bias
Instrument Blank	1 per batch of 20 or less	< PQL		Chuck Hoover	Contamination	Accuracy/Bias
Laboratory Duplicate	1 per batch of 20 or less	80 – 120% Recovery		Chuck Hoover	Precision	Precision
Laboratory Matrix Spike	1 per batch of 20 or less	MS Recovery 80 – 120%	If LCS recoveries are within acceptance criteria, matrix interference may be suspected. Flag MS/MSD recoveries outside limits with an "*" and narrate all outliers.	Chuck Hoover	Bias	Bias
Matrix Spike Duplicates	1 per batch of 20 or less	MS Recovery 80 – 120%	If LCS recoveries are within acceptance criteria, matrix interference may be suspected. Flag MS/MSD recoveries outside limits with an "*" and narrate all outliers.	Chuck Hoover	Precision and Bias	Precision and Bias
LCS	1 per batch of 20 or less	LCS Recovery 80 – 120%	If spike recovery is above QC limits, evaluate against all sample results. If the constituent(s) are not detected in any sample, narrate outliers. If any sample the constituent detected, re-analyze LCS. If problem persists, re-extract and re-analyze LCS and all associated samples. If LCS is below QC criteria, re-analyze LCS. If problem persists, re-extract and re-analyze LCS and all associated samples..	Chuck Hoover	Bias	Bias

Worksheet #25
NON-DIRECT MEASUREMENTS CRITERIA AND LIMITATIONS TABLE

Non-Direct Measurement (Secondary Data)	Data Source (Originating Organization, Report Title and Date)	Data Generator(s) (Originating Org., Data Types, Data Generation/ Collection Dates)	How Data Will Be Used	Limitations on Data Use
QAPP	Tetra Tech NUS, Inc.; Quality Assurance Project Plan for PCB Capacitor Burial/Pole Yard Solid Waste Management Unit (SWMU) 17/04 Resource Conservation and Recovery Act Facility Investigation and Verification of Removal	Tetra Tech NUS, Inc.; Procedures for investigation/verification sampling to be conducted for the RFI.	Historical information.	No qualitative or quantitative comparisons will be performed using this data.
RFI	Tetra Tech, NUS, Inc.; RFI for PCB Capacitor Burial/Pole Yard SWMU 17	Tetra Tech NUS, Inc.; Locations/results of sampling events.	Historical information. Will show us where to excavate and complete additional investigational sampling.	No qualitative or quantitative comparisons will be performed using this data.

Worksheet #26
PROJECT DOCUMENTS AND RECORDS TABLE

Sample Collection Records	Field Analysis Records	Fixed Laboratory Records	Data Assessment Records
Field Notes (Log Books)	Sample Receipt, Custody and Tracking Records	Sample receipt, COC and lab tracking records	Field Sampling Audit Checklist
Chain-of-Custody Records	Sample Preparation Logs	Lab case narrative, sample results	Lab Reports
Air Bills	Equipment maintenance, testing, inspection and calibration logs	Run logs, calibration records, raw data, QA/QC results	Data Validation Report
Custody Seals	Corrective action forms		
	Reported Field Sampling Results		
	Sample Disposal Records		

Worksheet #27a

Assessment and Response Actions

The sampling event is anticipated to take place between the periods of 1-11-03 to 1-26-03. The TolTest QA/QC Representative will audit sampling activities during the first day of sampling. If problems are observed, the QA/QC Representative will request a documented corrective action response and follow-up to ensure that corrective actions are effective. In addition, depending upon the problems identified, the QA/QC Representative may perform additional evaluations later in the sampling program.

Analysis of samples is projected to begin in January 2003. If problems are observed, the QA/QC Representative will request a documented corrective action response and follow-up to ensure that corrective actions are effective prior to the start up of sampling. If the corrective actions are not taken or if they are not acceptable to the QA/QC Representative, the case team will be notified promptly. The case team will then adjust the sampling schedule and, if necessary, obtain the services of another laboratory.

Worksheet #27b
PROJECT ASSESSMENT TABLE

Assessment Type	Frequency	Internal or External (I/E)	Organization Performing Assessment	Person(s) Responsible for Performing Assessment, Title and Organizational Affiliation	Person(s) Responsible for Responding to Assessment Findings, Title and Organizational Affiliation	Person(s) Responsible for Identifying and Implementing Corrective Actions (CA), Title and Organizational Affiliation	Person(s) Responsible for Monitoring Effectiveness of CA, Title and Organizational Affiliation
Field Sampling Audit	1	I	NSWC Crane	John Lyttle, Project QA Officer, TolTest, Inc.	Lance Parsons, RM, TolTest, Inc.	Lance Parsons, RM, TolTest, Inc.	John Lyttle, Project QA Officer, TolTest, Inc.
Laboratory Audit	1	E	NFESC	Pati Moreno, Navy Installation Restoration Program, NFESC	Lab QA Officer, Southwest Laboratory of Oklahoma, Inc.	Navy Facilities Engineering Service Center	Lab QA Officer, Southwest Laboratory of Oklahoma, Inc.
Data Usability	Each sample group	E	TolTest, Inc.	Jennifer Kurek, TolTest, Inc.	Debbie Leighty, TolTest, Inc.	Debbie Leighty, TolTest, Inc.	Debbie Leighty, TolTest, Inc.
Data Validation	Each data package	E	TolTest, Inc.	Jennifer Kurek, TolTest, Inc.	Debbie Leighty, TolTest, Inc.	Debbie Leighty, TolTest, Inc.	Debbie Leighty, TolTest, Inc.
Lab Validation	Each sample data group	I	Southwest Labs, Inc.		Randy Staggs, Southwest Labs, Inc.	Randy Staggs, Southwest Labs, Inc.	Randy Staggs, Southwest Labs, Inc.
Guidance Conformance	1	I	TolTest, Inc.	John Lyttle, Project QA Officer, TolTest, Inc.	Debbie Leighty TolTest, Inc.	Debbie Leighty, TolTest, Inc.	John Lyttle, Project QA Officer, TolTest, Inc.
SOP Conformance	1	I	TolTest, Inc.	John Lyttle, Project QA Officer, TolTest, Inc.	Debbie Leighty TolTest, Inc.	Debbie Leighty TolTest, Inc.	John Lyttle, Project QA Officer, TolTest, Inc.
SOP Implementation	1	I	TolTest, Inc.	John Lyttle, Project QA Officer, TolTest, Inc.	Debbie Leighty TolTest, Inc.	Debbie Leighty TolTest, Inc.	John Lyttle, Project QA Officer, TolTest, Inc.
Acceptance Criteria Audit	1	I	TolTest, Inc.	John Lyttle, Project QA Officer, TolTest, Inc.	Debbie Leighty TolTest, Inc.	Debbie Leighty TolTest, Inc.	John Lyttle, Project QA Officer, TolTest, Inc.

Worksheet #28
QA MANAGEMENT REPORTS TABLE

Type of Report	Frequency (daily, weekly, monthly, quarterly, annually, etc.)	Project Delivery Date(s)	Person(s) Responsible for Report Preparation, Title, and Organizational Affiliation
Field Sampling Technical Systems Audit Report	1 at startup of sampling	1-11-03	John Lyttle, QAO, TolTest, Inc.
Fixed Laboratory Technical Systems Audit Report	1 prior to sampling startup	1-11-03	John Lyttle, QAO, TolTest, Inc.
Data Usability Assessment Report	1 after all data are generated and validated	3-27-03	Jennifer Kurek, TolTest, Inc.
Interim Measures Report	1 after QA Management Reports and Risk Assessment completed	3-27-03	Debbie Leighty, PM, TolTest, Inc.

Worksheet #29a
DATA VERIFICATION/VALIDATION PROCESS TABLE

Verification/ Validation Task	Description	Internal/External (I/E)	Responsible for Verification/ Validation (Name, Organization)
Data usability assessment	Determine data meet project requirements	E	Jennifer Kurek, TolTest, Inc.
Data completeness	Determine data analysis are in accordance with analytical method and Lab SOP	E	Jennifer Kurek, TolTest, Inc.
Data correctness	Determine data results are accurate	E	Jennifer Kurek, TolTest, Inc.
Data conformance	Determine data deliverables meet project specifications as listed in project AQPP	E	Jennifer Kurek, TolTest, Inc.

Worksheet #29b

DATA VERIFICATION/VALIDATION SUMMARY TABLE

Medium/ Matrix	Analytical Parameter	Concentration Level	Verification/ Validation Criteria	Data Verifier/ Validator (Title and organizational affiliation)	Responsibility for Data Verification/ Validation (Title and organizational affiliation)
Soil	Aroclors/PCBs	Low	Check QC elements of this QAPP (Fixed Lab) and SW-846 Method 8082 Full Data Validation Data reduction	Jennifer Kurek, TolTest, Inc.	Jennifer Kurek, TolTest, Inc.
Decon Water	Aroclors/PCBs	Low	Check QC elements of this QAPP (Fixed Lab) and SW-846 Method 8082 Full Data Validation Data reduction	Jennifer Kurek, TolTest, Inc.	Jennifer Kurek, TolTest, Inc.

Worksheet #30

DATA USABILITY ASSESSMENT

The Data Usability Assessment will be performed by a team of personnel at TolTest, Inc. Debbie Leighty, Project Manager, will be responsible for information in the Usability Assessment. She will also be responsible for assigning task work to the individual task members who will be supporting the Data Usability Assessment. Note that the Data Usability Assessment will be conducted on validated data. After the Data Usability Assessment has been performed, the results of the Data Usability Assessment will be presented in the final project report. The following items will be assessed and conclusions drawn based on their results:

Precision – Results of all laboratory duplicates for Aroclors will be presented separately in tabular format for each analysis. The relative percent difference (RPD) will be calculated for each analyte whose original and duplicate values are both greater than or equal to the quantitation limit. The RPDs will be checked against the measurement performance criteria presented on Worksheet #11. The RPDs exceeding criteria will be identified on the tables. Additionally, the RPD of each analyte will be averaged across all duplicate pairs whose original and duplicate values are both greater than or equal to the quantitation limit, and the combined overall average RPD for each analysis will be calculated for the laboratory duplicates. A discussion will follow summarizing the results of the laboratory precision. Any conclusions about the precision of the analyses will be drawn and any limitations on the use of the data will be described.

Accuracy/Bias Contamination – Results for all laboratory method blanks and instrument blanks will be presented separately in tabular format for each analysis for Aroclors. The results for each analyte will be checked against the measurement performance criteria presented on Worksheet #11. Results for analytes that exceed criteria will be identified on the tables. A discussion will follow summarizing overall accuracy/bias. Any conclusions about the overall accuracy/bias of the analyses will be drawn and any limitations on the use of the data will be described.

Sensitivity – Results for all laboratory-fortified blanks will be presented separately in tabular format for each analysis for Aroclors. The results of each analyte will be checked against the measurement performance criteria presented on Worksheet #11 and cross-checked against the quantitation limits presented on Worksheet #9b. Results for analytes that exceed criteria will be identified on the tables. A discussion will follow summarizing the results of the laboratory sensitivity. Any conclusions about the sensitivity of the analyses will be drawn and any limitations on the use of the data will be described.

Representativeness – Although sample size somewhat limits the statistical confidence for applying contaminant levels to the entire population, it does conform to currently accepted methods.

Comparability – The results of this study will be used as a benchmark for determining comparability for data collected during any potential future sampling events using the same or similar sampling and analytical SOPs.

Reconciliation – Each of the Project Quality Objectives (PQOs) presented on Worksheet #11 will be examined to determine if the objective was met. This examination will include a combined overall assessment of the results of each analysis to an objective. Each analysis will first be evaluated separately in terms of the major impacts observed from the Data Validation, Data Quality Indicators, and measurement performance criteria assessments. Based on the results of these assessments, the quality of the data will be determined. Based on the quality determined, the usability of the data for each analysis will be determined. Based on the combined usability of the data from all analyses for an objective, it will be determined if the PQO was met and whether project action limits were exceeded. The final report will include a summary of all the points that went into the reconciliation of each objective. As part of the reconciliation of each objective, conclusions will be drawn and any limitations on the usability of any of the data will be described.

ATTACHMENT 1

TOLTEST
STANDARD OPERATING PROCEDURES
(SOPs)

STANDARD OPERATING PROCEDURE
NUMBER PCB75110.01-01

SAMPLE LABELING

1.0 PURPOSE

This Standard Operating Procedure (SOP) describes the procedures to be used for labeling and tagging sample containers at the SWMU 17 site at NSWC Crane, IN. Sample labels and tags are used to document the sample ID, date, time, analysis to be performed, preservative, matrix, sampler, and the analytical laboratory. A sample label and a sample tag will be attached to each sample container. The label and tag for each container will contain identical information.

2.0 REQUIRED FIELD FORMS AND EQUIPMENT

Writing utensil
Disposable medical-grade gloves (e.g., latex, Nitrile)
Sample log sheets
Required sample containers: All sample containers for analysis by fix-based laboratories will be supplied and deemed certified clean by the laboratory.
Preprinted sample labels and sample tags
Chain-of-custody (COC) records
Sealable polyethylene bags
Heavy-duty cooler
Ice

3.0 PROCEDURES

1. The following information will be printed on the labels and tags prior to field activities.

    - Project number (PCB 75110.01)
    - Project Location (SWMU 17, NSWC Crane)
    - Sample ID
    - Preservative
    - Analysis to be performed
    - Matrix type
    - Laboratory name

2. Preprinted sample labels and tags will be prepared prior to mobilizing to the field. Check to determine if:

    - One sample label and tag exists for each sample container that is to be collected for all media during the field activities.
    - The information printed on each tag and label is correct.
    - Extra blank labels and tags are brought to the site in case additional environmental samples or QA samples are collected that are not anticipated in the QAPP. Additional blank labels and tags should also be brought to the site in case a sample container is broken or some of the preprinted labels or tags are accidentally lost before attached to a container.

3. Once at the field site, sample containers should have labels affixed before sampling activities begin.

4. Select the labeled containers that are appropriate for a given sample and fill in the date, time, and sampler's initials just before sampling begins. Use a black waterproof marker or pen.

5. Fill the appropriate containers with sample material. Securely close the container lids without over tightening.

6. Write the same date, time, and sampler's initials on the sample tag as written on the label.

7. Place the sample container in a Ziploc plastic bag and place in a cooler containing ice.

8. Fill in appropriate information on the sample Collection Log form and the COC form.

Example sample labels and tags are attached at the end of this SOP

4.0 ATTACHMENTS

4.1 Example Sample Label and Tag

ATTACHMENT 1
Example Sample Label and Tag

I-CHEM

CLIENT/SOURCE	☐GRAB ☐COMPOSITE
SITE NAME	DATE/TIME
SAMPLE #	PRESERVATIVE
ANALYSIS	COLL. BY

STANDARD OPERATING PROCEDURE
NUMBER PCB75110.01-02

SAMPLE IDENTIFICATION NOMENCLATURE

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to establish a consistent sample nomenclature system that will facilitate subsequent data management at the SWMU 17 site at NSWC Crane, IN. The sample nomenclature system has been devised such that the following objectives can be attained:

- Sorting of data by site, location, or matrix
- Maintenance of consistency (field, laboratory, and database sample numbers)
- Accommodation of all project-specific requirements
- Accommodation of laboratory sample number length constraints
- Ease of identification and direct link to site and year

The NSWC Crane Environmental Protection Department must approve any deviations from this procedure.

2.0 REQUIRED FIELD FORMS AND EQUIPMENT

Pen with indelible ink
Sample tags
Sample container labels

3.0 SAMPLE IDENTIFICATION NOMENCLATURE

3.1 Monitoring Samples

All site characterization and verification samples collected at NSWC Crane will be properly labeled with a sample label affixed to the sample container and a tag tied around the neck of the sample container. Each sample will be assigned a unique sample tracking number. The sample tracking number will consist of a four-or five-segment alphanumeric code that identifies the SWMU 17 site, sample type, and location. For soil samples, the final four tracking numbers will identify the depth at which the soil or sediment sample was collected.

The alphanumeric coding to be used in the NSWC Crane sample system is explained in the diagram and the subsequent definitions:

NN	AA	A or N 2 to 7-Characters	NNNN Soils and Sediment only
SWMU or Site Number	Sample Type	Location	Depth Interval

Character Type:

A = Alpha
N = Numeric

SWMU or Site Number:

17 = PCB Capacitor Burial/Pole Yard

Sample Type:

	Site Characterization		Verification Sampling
SB -	Soil Boring Sample	EW -	Excavation Sidewall Sample
SS -	Surface Soil Sample	FL -	Floor Sample

Location:
The sample location code is: 1) the soil proposed sample location, 2) Northing and Easting value (N_E_), 3) excavation number (X). The location code for each sample is listed.

Depth Interval, Soil and Sediment only:
The depth code is used to note the depth, below ground surface (bgs), at which a soil or sediment sample is collected. The first two numbers of the four-number code specify the top interval and the third and fourth specify the bottom, feet bgs (soil) and inches bgs (sediment) of the sample. The depths will be noted in whole numbers only. Further detail, if needed, will be recorded on the sample log sheet, boring log, logbook, etc.

Depth (for soils, in feet bgs)
0002 = soil collected from 0 to 2 feet bgs
0204 = soil collected from 2 to 4 feet bgs

3.1.1 Examples of Sample Nomenclature for Site Characterization Samples

A surface soil sample collected from soil boring 5 at the PCB Capacitor Burial/Pole Yard at the 0- to 2-foot interval would be designated as 17SS050002.

A subsurface soil sample from the same soil boring 5 at an interval of 2- to 4-feet bgs would be designated as 17SB050204.

3.1.2 Examples of Sample Nomenclature for Verification Sampling

a) For sites where the width of the excavation is greater than the depth – Surficial

Example 1: 17 FL E 670 N 530 D0002
A floor soil sample (at 2-feet below original grade) taken from sampling grid node E 670 and N 530.

E represents Easting. N represents Northing.

b) For sites where the width of the excavation is less than the depth – pit excavating

Example 1: 17 EW X 01 N1 0005
A soil sample taken from the excavation sidewall (EW) of excavation (X) 1's northern wall, 5 feet below original grade. Subsequent samples taken from the northern wall will be N2, N3, N4, etc.

Attachment 1 shows proposed sample nomenclature procedures applied to hypothetical excavations at Site 17. Attachment 2 shows same field notes for documenting PCB verification samples.

3.2 Field Quality Assurance/Quality Control (QA/QC) Sample Nomenclature

Field QA/QC samples are described in the IM WP and QAPP. They will be designated using a different coding system. The QC code will consist of a three- to four-segment alphanumeric code that identifies the sample QC type, the date the sample was collected, and the number of this type of QC sample collected on that date.

AA	NNNNNN	NN
QC Type	Date	Sequence Number (per day)

The QC types are identified as:

TB = Trip Blank
RB = Rinsate Blank (Equipment Blank)
FD = Field Duplicate
AB = Ambient Conditions Blank
SB = Source Water Blank

The sampling time recorded on the chain-of-custody form, labels, and tags for duplicate samples will be 0000 so that the samples are "blind" to the laboratory. Notes detailing the sample number, time, date, and type will be recorded on the sample log sheets and will document the location of the duplicate sample (sample log sheets are not provided to the laboratory).

3.2.1 Examples of Field QA/QC Sample Nomenclature

The third duplicate of the day taken of a subsurface soil sample collected on November 17, 2003 would be designated as FD 11170303.

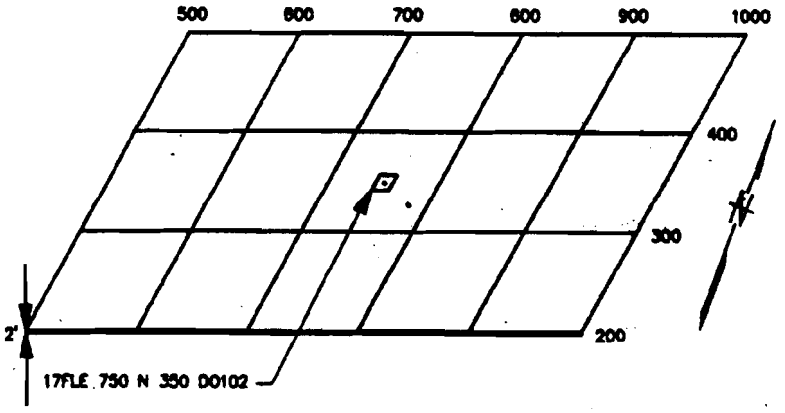
The only rinsate blank collected on November 17, 2003 would be designated as RB11170301

4.0 ATTACHMENTS

4.1 Sample Nomenclature Applied to Hypothetical Excavations at the SWMU 17 site

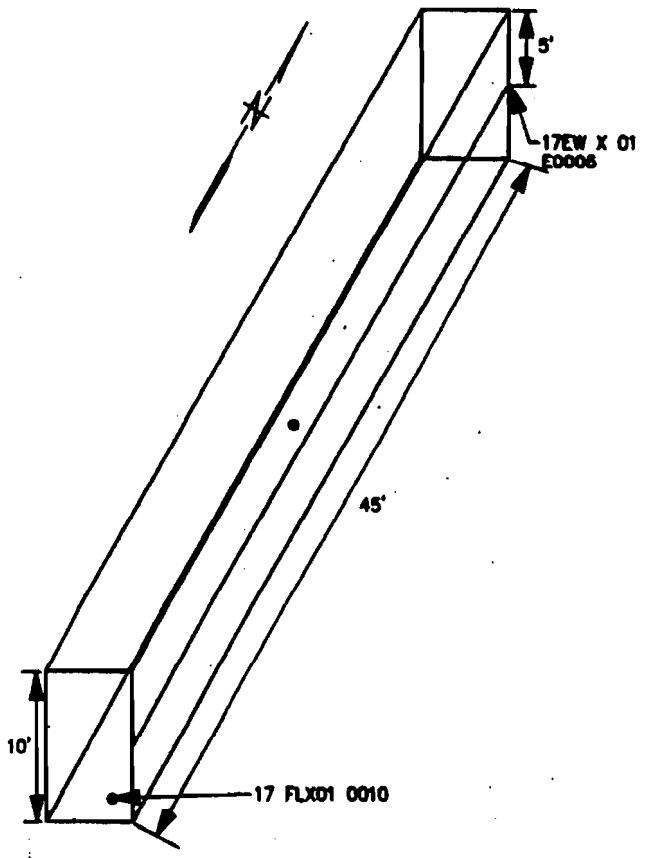
4.2 Example Field Notes

ATTACHMENT 1
Sample Nomenclature Applied to Hypothetical Excavations at the SWMU 17 Site
(Verification Sampling Only)



SURFICIAL EXCAVATIONS
(WIDTH IS GREATER THAN DEPTH)

EXCAVATION #01



PIT EXCAVATIONS
(WIDTH IS LESS THAN DEPTH)

ATTACHMENT 2
Example Field Notes

Composite Sample 17Ewx01 E0005

Sample represents nine sample aliquots evenly spaced over a grid that is from 0 to 5 feet below grade on the eastern side of the pit excavation. The composite sample name was written on survey pin flags and located at ground surface in proximity to the excavation sidewall.

Composite Sample 17FLE750 N350 D0102

Sample represents nine sample aliquots evenly spaced over a 225-square-foot (20.25 square meter) grid. The center of the grid is at E75 N350. The sample was taken from 1 to 2 feet below original grade.

STANDARD OPERATING PROCEDURE
NUMBER PCB75110.01-03

SAMPLE CUSTODY AND DOCUMENTATION OF FIELD ACTIVITIES

1.0 PURPOSE

This Standard Operating Procedure (SOP) establishes the procedures for sample custody and documentation of field sampling and field analyses activities for the SWMU 17 site at NSWC Crane, IN.

2.0 REQUIRED FIELD FORMS AND EQUIPMENT

The following logbooks, forms, and labels, are required.

Site logbook
Field logbook
Sample label
Chain-of-custody (COC) form
Custody seals
Equipment Calibration Log
Monitoring Well Inspection Form
Water Level Measurement Form
Low-Flow Purge Data Sheet
Ground Water Sample Log Sheet
Surface Water Sample Log Sheet

3.0 PROCEDURES

This section describes custody and documentation procedures. All entries made into the logbooks, custody documents, logs, and log sheets described in this SOP must be made in indelible ink (black is preferred). No erasures are permitted. If an incorrect entry is made, the entry will be crossed out with a single strike mark, initialed, and dated.

3.1 Site Logbook

The site logbook is a hardbound, paginated, controlled-distribution record book in which all major on-site activities are documented. At a minimum, the following activities/events shall be recorded (daily) in the site logbook:

- All field personnel present
- Arrival/departure of site visitors
- Arrival/departure of equipment
- Start or completion of sampling activities
- Daily on-site activities performed each day
- Sample pickup information
- Health and safety issues
- Weather conditions

The site logbook is initiated at the start of the first on-site activity (e.g., site visit or initial reconnaissance survey). Entries are to be made for every day that on-site activities take place.

The following information must be recorded on the cover of each site logbook:

- Project name

- Project number
- Book number
- Start date
- End date

Information recorded daily in the site logbook need not be duplicated in other field notebooks but must summarize the contents of these other notebooks and refer to specific page locations in these notebooks for detailed information (where applicable). At the completion of each day's entries, the site logbook must be signed and dated by the project manager (PM).

3.2 Field Logbooks

The field logbook is a separate dedicated notebook used by field personnel to document his or her activities in the field. This notebook is hardbound and paginated.

3.3 Sample Labels

Adhesive sample container labels must be completed and applied to every sample container. Information on the label includes the project name, location, sample number, date, time, preservative, analysis, matrix, sampler's initials, and the name of the laboratory performing the analysis.

3.4 Chain-of-Custody Form

The COC Form is a multi-part form that is initiated as samples are acquired and accompanies a sample (or group of samples) as it is transferred from person to person. Each COC is numbered. This form must accompany any samples collected for laboratory chemical analysis. A copy of a blank COC form is attached at the end of this SOP.

The PM must include the name of the laboratory in the "Remarks" section to ensure that the samples are forwarded to the correct location. If more than one COC is necessary for any cooler, the PM will indicate, "Page __ of __" on each COC. The original (top) signed copy of the COC form will be placed inside a large Ziploc-type bag and taped inside the lid of the shipping cooler. Once the samples are received at the laboratory, the sample custodian will check the contents of the cooler(s) against the enclosed COC(s). Any problems are noted on the enclosed COC form (bottle breakage, discrepancies between the sample labels, COC form, etc.) and will be resolved through communication between the laboratory point-of-contact and the PM. The COC form is signed and retained by the laboratory and becomes part of the sample's corresponding analytical data package.

3.5 Custody Seal

The Custody Seal is an adhesive-backed label with a number on each seal. It is part of the COC process and is used to prevent tampering with samples after they have been collected in the field and sealed in coolers for transit to the laboratory. The Custody Seals are signed and dated by the samplers and affixed across the opening edges of each cooler (two seals per cooler) containing environmental samples. The laboratory sample custodian will examine the Custody Seal for evidence of tampering and will notify the PM if evidence of tampering is observed.

3.6 Equipment Calibration Log

The Equipment Calibration Log is used to document calibration of measuring equipment (e.g., multi-parameter water-quality meter) used in the field. The Equipment Calibration Log documents that the manufacturer's instructions were followed for calibration of the equipment, including frequency and type of standard or calibration device. An Equipment Calibration Log must be

maintained for each electronic measuring device requiring calibration. Entries must be made for each day the equipment is used.

3.7 Soil Sample Log Sheet

The Soil and Sediment Sample Log Sheets are used to document the sampling of soils. This sheet is used in conjunction with SOP PCB75110.01-07.

4.0 ATTACHMENTS

4.1 COC Record

ATTACHMENT 1
COC Record

TOLTEST INC.
1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186, Voice (419) 241-7175, Fax (419) 321-6359
Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43604-1304, Voice (419) 241-7175, Fax (419) 241-1808
Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other ____

Chain of Custody Record

40058 Page ____ of ____

Project No.:
P.O. No.:
Client:
Project/Location:
Project Mgr.:
Sampler's Name
Phone No.
Sampler's Signature

Item No.	Sample ID	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Parameters	Preserved Yes/No	Lab #
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

Total No. of Containers

LAB USE ONLY

Item No.	Relinquished By	Date / Time	Received By	Date / Time

Were samples delivered ☐ in person ☐ by courier
Were samples preserved ☐ in field ☐ in lab ☐ N/A
Temp of samples ____ °C
Did samples arrive intact and sealed? ☐ yes ☐ no ☐ N/A
Were proper containers used? ☐ yes ☐ no
Was container labeled properly for contents? ☐ yes ☐ no
Were samples packaged properly for type of material? ☐ yes ☐ no
Was shipping label completed properly per regulations? (49 CFR 170, etc.) ☐ yes ☐ no
Comments: ____

TAT ____

Distribution: Original plus one accompanies shipment (white and yellow); copy to coordinator field files (pink)

Rev. 4/98

STANDARD OPERATING PROCEDURE
NUMBER PCB75110.01-04

BOREHOLE ADVANCEMENT AND SOIL CORING USING DIRECT PUSH TECHNOLOGY

1.0 PURPOSE

This Standard Operating Procedure (SOP) describes the procedures for collecting surface and subsurface soil cores from unconsolidated overburden materials using direct-push technology (DPT) for the SWMU 17 site at NSWC Crane, IN. For this investigation, a Geoprobe® rig with a Macrocore Sampler will be the type of DPT used.

2.0 REQUIRED FIELD FORMS AND EQUIPMENT

Cut-resistant non-latex impermeable gloves
Cotton gloves
Disposable medical-grade gloves (e.g., latex, Nitrile)
Writing utensil
Boring log sheets: A copy of this form is included in SOP PCB75110.01-06
Photoionization detector (PID) (see SOP PCB75110.01-05)
Geoprobe® or equivalent DPT equipment
Geoprobe® Macrocore Sampler or equivalent
Geoprobe® Sampling Kit or equivalent
Clear acetate liners: one new liner for each soil core
Required decontamination materials (see SOP PCB75110.01-09)
Bentonite pellets

3.0 BOREHOLE ADVANCEMENT AND SOIL SAMPLING USING A GEOPROBE®

DPT will be employed to collect soil cores. DPT refers to sampling tools and sensors that are driven directly into the ground without the use of conventional rotary drilling equipment. DPT typically utilizes hydraulic pressure and/or percussion hammers to advance the sampling tools. Geoprobe® is a manufacturer of a hydraulically powered, percussion/probing machine utilizing DPT to collect subsurface environmental samples. This type of rig with a Macrocore Sampler will be used at the SWMU 17 site to collect soil cores.

1. Clear the area to be sampled of any surface debris (herbaceous vegetation, twigs, rocks, litter, etc.).

2. Place a new clear acetate liner in the detachable Macrocore core barrel and attach coring device to the Geoprobe® rig.

3. Drive Macrocore sampler (lined with acetate) into the ground to a depth of 2 feet using hydraulic pressure. The 0- to 2-foot depth soil interval is considered to be the surface soil.

4. Retract the sampler from the borehole and remove the acetate liner and the soil core from the Macrocore barrel.

5. Attach the metal trough from the Geoprobe® Sampling Kit firmly to the tail gate of a vehicle. If a vehicle with a tailgate is not available, secure the trough on another suitable surface.

6. Place the acetate liner containing the soil core in the trough.

7. While wearing cut-resistant gloves (constructed of non-latex over cotton), cut the acetate liner through its entire length using the double-bladed knife that accompanies the Geoprobe® Sampling Kit. Then remove the strip of acetate from the trough to gain access to the

collected soils. **CAUTION:** Do not attempt to cut the acetate liner while holding it in your hand.

8. Scan the entire length of the soil core for volatile organic compounds (VOCs) using the PID. Record the specific depth interval and the associated PID reading on the Boring Log Sheet.

9. Log the soil core on the Boring Log Sheet (see SOP PCB75110.01-06).

10. Place the soil core in a stainless-steel mixing bowl, homogenize, and collect the remainder of the soil sample aliquots, as described in SOP PCB75110.01-07.

11. Repeat steps 2 through 10 for the next depth intervals.

12. The depth to bedrock should be recorded on the Boring Log, and the estimated moisture content of the soil and the presence or absence of water in the boring should be noted.

13. If readings from the PID are all at background levels below field screening criteria, then excess soil core materials will be returned to the hole and tamped. If insufficient soil is available to fill the hole to the ground surface, then bentonite pellets mixed with the soil will be used to backfill the hole.

14. If screening instruments indicate that contaminants may be present in the soil materials, then all excess soil core materials will be placed in a plastic bag (or drum if larger quantities). The bag will be tagged identifying the location and depths from where the soils came and the date. The bag will then be placed in a 55-gallon drum and stored on-site until laboratory analyses of the soil are completed and classification of the soil waste materials can be determined (see SOP PCB75110.01-08).

15. If soil materials from the boring are suspected of being contaminated (see 3.14 above), the soil boring will be backfilled with bentonite pellets up to the ground surface.

16. Decontaminate all soil sampling equipment in accordance with SOP PCB75110.01-09 prior to collecting the next sample.

STANDARD OPERATING PROCEDURE
NUMBER PCB75110.01-05

CALIBRATION AND USE OF PHOTOIONIZATION DETECTOR

1.0 PURPOSE

This Standard Operating Procedure (SOP) establishes procedures for the maintenance, calibration, and use of a photoionization detector. The Photovac 2020 Photoionization Air Monitor (hereafter referred to as the "2020".) will be used during the investigation at the SWMU 17 site at NSWC Crane, IN. The procedures for its use are discussed in detail in the following sections.

2.0 GLOSSARY

Electron-volt (eV) – A unit of energy equal to the energy acquired by an electron when it passes when it passes through a potential difference of 1 volt in a vacuum.

Intrinsically Safe (I.S.) – Based on wiring, configuration, design, operation, gasketing, construction, this instrument may be employed within locations where flammable gases and/or vapors may exist.

Ionization Potential (I.P.) – The energy required to remove an electron from a molecule yielding a positively charged ion and a negatively charged free electron. The instrument measures this energy level.

Photoionization Detector (PID) – The PID is employed as the general reference to air monitors of this type. PID's detection method employs ultraviolet (UV) radiation as an energy source. As air and contaminants are drawn through the ionization chamber, the UV light source causes the contaminant with ionization potentials equal to or less than the UV source to break into positive and negatively charge ions. The created ions are subjected to an electrostatic field. The voltage difference is measured in proportion to the calibration reference and the concentration of the contaminant.

UV Radiation Lamp – UV radiation is the energy source employed by the instrument to ionize collected sample gas streams. The UV lamp source is required to be equal to or greater than the ionization potential of the substance drawn through the instrument in order to create separate ionized species.

3.0 REQUIRED EQUIPMENT

Pen
Equipment Calibration Form
PID
Isobutylene calibration gas (i.e., span gas)
Regulator

4.0 PROCEDURES

4.1 Principle of Operation

The 2020 portable photoionizer detects many organic (and a few inorganic) species. The basis for detection of this instrument is the ionization of components in gaseous streams. The incoming gas molecules are subjected to UV radiation, which is energetic enough to ionize many compounds associated with industrial activities. Molecules are transformed into charged-ion pairs, creating a current between two electrodes. Each molecule has a characteristic ionization

potential, which is the energy required to remove an electron from the molecule, yielding a positively charged ion and a free electron. The instrument measures this energy level.

This instrument measures the concentration of airborne photoionizable gases and vapors and automatically displays and records these concentrations. It does not distinguish between individual substances. Readings that are displayed represent the total concentration of all photoionizable chemicals present in the sample. This instrument is factory-set to display concentration in units of ppm or mg/m^3. The meter display updates itself once per second.

The 2020 also performs short-term exposure limit (STEL), time-weighted average (TWA), and peak calculations. The user can view any of these results, but only one mode may be viewed at a time.

The 2020 has six keys for alphanumeric entry and for accessing multiple functions. The keys are used to set up and calibrate 2020. They allow the user to manipulate the concentration data in various ways.

All information entered with the keys and stored in the 2020's memory is retained when the instrument is switched off. The clock and calendar continue to operate and do not need to be set each time the 2020 is turned on.

4.1.1 Displays

The 2020 has a meter display for reporting detected concentration and a display used for status/information to guide the user through configuration options. All functions of the 2020 will be controlled or reported using one of these displays.

4.1.1.1 Meter Display

The meter display is four digits. It will always be used for reporting detected concentration. When the detector and pump are off, the meter display will be blank.

In order to accommodate the range of concentrations the 2020 can detect, the meter reading will be reported using one of two resolutions. A resolution of 0.1 will be used for concentrations below 100 ppm, and a resolution of 1 will be used for concentrations above 100 ppm.

4.1.1.2 Status Display

The status display is a two line by 16-character display. The top line is used to display status/information and prompts the user for inputs. The bottom line is used for soft key names. Up to three names can be displayed for the three soft keys. If a name does not appear for a soft key, then the soft key has no associated function.

4.1.2 Keys

4.1.2.1 Fixed Keys

The three round keys below the soft keys each have a fixed function. The first key is the ON/OFF key, the middle key is the EXIT key, and the last key is the ENTER key.

The ON/OFF key is used to both turn power on and off. To turn on the 2020, press the ON/OFF key. To turn the power off, press the ON/OFF key and hold it down for 2 seconds, and then release it. This is done to prevent accidental power off.

The EXIT key provides a way of returning to the default display. In the functional map, the soft keys allow the user to advance and the EXIT key provides a way to go back. If the user is at the initial entry of the menu, EXIT will return to the default display.

The ENTER key has a context sensitive function. When operating or navigating through the function map, the ENTER key is used to exit the functions and return to the default display. When entering data such as a name, number, date, or time, ENTER is used to confirm the entry.

4.1.2.2 Soft Keys

The three soft keys on the 2020 are located directly below the status display. Each key has varying functions for configuring the 2020, editing the data logger, and controlling the display. Because only three soft keys are available, each function is broken down into a path.

4.1.2.3 Entering Text With the Soft Keys

For all information that the user must enter, the left, center, and right soft keys correspond to the up, down, and right arrow.

The up and down arrows are used to change the character highlighted by the cursor. The right arrow is used to advance the cursor to the next character on the right. When the cursor is advanced past the right most character, it wraps around to the first character again. To accept the changes, press the ENTER key. To ignore the change, press EXIT.

Formatting characters, such as the colon (:) in the time, the decimal (.) in a concentration, and the slash (/) in the date, are skipped when advancing the cursor.

All inputs are an eight-character input, which is displayed on the right side of the top line of the status display. The prompt, describing the input, occupies the left half of the top line. The soft keys are defined on the bottom line of the status display.

4.2 Default Display

The meter display shows the detected concentration. The resolution of the display changes with the magnitude of the reading. A reading of 0 to 99.9 will be displayed with a resolution of 0.1 ppm. A reading greater than 99.9 will be shown with a resolution of 1 ppm or 1 mg/m^3. The meter will display concentrations up to 2,000 ppm or 2(99) mg/m^3.

The status display is used to display the instrument status, date, time, units, and active soft keys. The default display provides the following information: instrument status, current detected concentration, time, date, and measurement units. The status display toggles between showing time and units and then the date.

When the display mode is MAX, the date and time correspond to the date and time the MAX concentration was recorded. In TWA mode, the time represents the number of hours and minutes during which the TWA has been accumulating. For PEAK and STEL monitoring, the date and time correspond to the current date and time.

4.3 Monitoring

4.3.1 Instrument Status

The instrument status is shown on the left of the first line of the status display and on the Table and Graph outputs. Each status has a priority assigned to it. If more than one status is in effect, then the status with the highest priority is displayed until the condition is corrected or until the option is turned off.

4.3.2 Alarms

While operating the instrument, any one of three alarm conditions can occur. To accurately identify the source of the alarm, each type of alarm has been given a unique status.

In addition to the status, the 2020 also has an audible alarm and a visual alarm LED. To conserve power, the 2020 alternates between these two alarm indicators, rather than operating both concurrently. Different alarms are identified by the frequency at which the 2020 alternates, as follows: PEAK alarm – 5 times per second; STEL alarm – 2.5 times per second; and TWA alarm – 1.25 times per second.

The left soft key is used for acknowledging alarms and is labeled "Ack." If no alarm exists, then the "Ack" key is not shown. To clear the alarm, press the "Ack" key. Once acknowledged, the alarm indicators are cleared. The alarm status will remain until the alarm condition clears.

The 2020 updates the peak concentration once every second. Following every update, the peak concentration is compared to the peak alarm level, and, if exceeded, an alarm is triggered.

If a 15-minute average concentration exceeds the selected STEL, a STEL alarm is generated. The TWA alarm is generated when the current average concentration over an 8-hour period, since the TWA was last cleared, has exceeded the TWA exposure limit.

During calibration, all alarms are disabled. Once the calibration in complete, the alarms are re-enabled.

4.4 STEL, TWA, MAX, and PEAK Operation

The 2020's meter display can be configured to show one of four values: STEL, TWA, PEAK, and MAX.

4.4.1 STEL Mode

The STEL mode displays the concentration as a 15-minute moving average. The 2020 maintains 15 samples, each representing a 1-minute averaging interval.

Once every minute, the oldest of the 15 samples is replaced with a new 1-minute average. This moving average provides a 15-minute average of the last 15 minutes with a 1-minute update rate. Because the average is calculated using 15 one-minute averages, the meter display will only update once very minute.

The STEL is set to zero each time the instrument is turned on. Because STEL is a 15-minute moving average, there is no need to clear or reset the STEL.

STEL calculations are always being performed by the 2020. The user can display the results of the calculations by selecting "STEL" as the Display mode.

4.4.2 TWA Mode

The TWA accumulator sums concentrations every second until 8 hours of data have been combined. If this value exceeds the TWA alarm setting, a TWA alarm is generated. The TWA is not calculated using a moving average. Once 8 hours of data have been summed, the accumulation stops. In order to reset the TWA accumulator, press the "Clr" key.

This sum will only be complete after 8 hours, so the meter displays the current sum divided by 8 hours. While in TWA mode, the time on the status display will show the number of minutes and

hours of data that TWA has accumulated. When this reaches 8 hours, the 2020 stops accumulating data and the TWA is complete.

TWA calculations are always being performed by the 2020. The user can display the results of the calculations by selecting TWA as the Display mode.

4.4.3 MAX Mode

The MAX mode displays the maximum signal, with the date and time that it was recorded. The 2020 continues to log data according to the selected averaging interval, but only the maximum detected concentration is displayed on the meter display.

The right soft key is used to clear the meter when displaying MAX. The "Clr" key only affects the reading that the meter is displaying. For example, if you display the MAX reading and the user presses "Clr", only the MAX value is cleared. The TWA is still accumulating in the background.

4.4.4 PEAK Mode

The PEAK mode displays the current detected concentration. The reading is updated once a second. In the background, the 2020 data logger is sampling the concentration and measuring minimum, maximum, and average concentrations for the selected averaging interval. At the end of every interval, one entry is placed in the data logger until the data logger is full. For PCB75110.01, the instrument should be operated in this mode. Operation within the other specialized modes is the responsibility of the HSO.

4.5 Set Functions

Set functions are used to set up the 2020. There are three functions that can be set on the 2020: Pump, Clock, and Calibration.

4.5.1 Pump

The Pump function is used to control the pump. After Set Pump is selected, the 2020 responds by displaying the new pump status.

The detector is also turned off when the pump is turned off. This prevents the detector from being damaged when there is no sample flowing through the detector.

When the pump and the detector are off, the meter display will be blank. Turn the pump and detector off when concentration measurements are not necessary, and the 2020 will only be used for reviewing data or generating reports. By operating the instrument with the pump and detector off when they are not needed, the user will conserve the lives of the battery and UV lamp.

To set the pump:

1. Press the ENTER key. The top line of the status display changes to "Select". The bottom line displays three soft key names: "Set", "Log", and "Disp".

2. Press the soft key below "Set".

3. The names of the soft keys change to reflect the Set options. The display now shows three devices that can be set: "Clock", "Pump", and "Cal". Press the "Pump" key.

4. The 2020 turns the pump off. If the pump was off, pressing, "Pump" will turn the pump on.

5. A message will be displayed to show the status of the pump. The 2020 reverts back to the previous menu after a few seconds.

6. To return to the default display, press the ENTER key.

4.5.2 Clock

The Clock function is used to set both the current date and time.

To set the clock:

1. Press the ENTER key.

2. Press the "Set" key.

3. When the names of the soft keys change, press the "Clock" key. The up and down arrows are used to change the character underlined by the cursor. The right arrow is used to advance the cursor to the next character on the right. When the cursor is advanced past the right-most character, it wraps around to the first character again. Formatting characters, such as the colon (:) in the time and the slash (/) in the date, are skipped when advancing the cursor.

4. User the "arrow keys" to enter the correct time. The time is formatted as Hour:Minute:Second.

5. Press the ENTER key to confirm the time and move to the date option.

6. When setting the date, the 2020 prompts the user for the current date, formatted as Year/Month/Day. Use the "arrow keys" to enter the correct date.

7. Press the ENTER key to confirm the date and return to the Set options. The user can wait for the display to timeout or press ENTER to return to the default display.

4.5.3 Calibration (Cal)

"Cal" allows you to setup and calibrate the 2020. There are three options under the Cal function: "Zero", "Span", and "Mem".

A calibration memory consists of a name, a response factor, and PEAK, TWA, and STEL alarm levels.

The "Zero" and "Span" keys are covered in detail in the manufacturer's operations manual for the instrument.

To edit the calibration memory, select "Mem" and then "Chng". The 2020 prompts with two new soft keys: "User" and "Lib".

4.5.4 Library (Lib)

Library selections simplify Cal Memory programming and provide standard response factors for approximately 70 applications. "Lib" allows the user to select an entry from a pre-programmed library. The name, response factor, and three alarm levels are all set from the library. To select a library entry to program the selected Cal Memory:

1. Select "Set", "Cal", "Mem", "Chng", and "Lib".

2. Use the "Next" and "Prev" keys to scroll through the list. See the manufacturer's manual Appendix 8.7 for a list of the library entries.

4.6 Preparing for Field Operations with the Photovac 2020

Turning The 2020 On:

1. Turn the 2020 on by pressing the ON/OFF key.

2. The 2020 will display the software version number. Wait for the 2020 to proceed to the default display.

3. Allow 10 minutes for the instrument to warm up and stabilize.

4. Press the Enter Key. The default display will provide three soft key selections: "Set", "Log", and "Display".

5. Press "Set". From this option, three other soft key selections will be offered: "Pump", "Clock", and "Cal".

6. Press "Cal". This will begin the calibration sequence. The first selection is to Zero the instrument.

7. Press Enter; zeroing will begin. (Note: When employing zero gas, attach and activate zero gas supply at this time.)

8. The next selection offered will be Span. Press Enter, at which time the concentration will be requested. The isobutylene calibration gas employed under general service will be marked on the side of the container. User the soft keys to toggle into position and to log the concentration. Once the concentration is logged, press "Enter". The direction on the status display will indicate spanning. At this time, hook up the span gas with a regulator to the 2020 and open it to supply enough flow to elevate the flow rate indicator to the green indicator line (1.8 inch from the rest position).

9. Once spanning is complete, the alarms, which have been disabled during calibration, will activate, indicating that calibration is complete.

10. Document this calibration procedure using a Document of Calibration form (included in Appendix A).

This instrument is ready for general-purpose application.

Calibration is to be performed daily or prior to each use in accordance with this section.

4.7 Maintenance and Calibration Schedule

Function	Frequency
Routine Calibration	Prior to each use
Factory Inspection and Calibration	Once a year, or when malfunctioning
Wipe Down the Outer Casing of the Unit	After each use
Clean UV Light Source	Every 24 hours of operation
Sample Inlet Filter	Change on a weekly basis or as required by level of use
Battery charging	After each use
Clean ionization chamber	Monthly

4.7.1 Cleaning the UV Light Source Window

1. Turn the FUNCTION switch to the OFF position. Use the 2020 multi-tool and remove the lamp housing cover. CAUTION: The UV lamp is delicate and expensive; handle carefully.

2. Tilt the lamp housing with one hand over the opening, and slide the lamp out of the housing.

3. The lamp window may now be cleaned with any of the following compounds using lens paper:

- 11.7 eV lamp – dry aluminum oxide powder (3.0 micron powder)

- All other lamps – HPLC grade methanol

4. Following cleaning, reassemble by first sliding the lamp back into the lamp housing. Replace the o-ring as necessary, reinstall the lamp housing cover, and tighten it using the 2020 multi-tool. (Do not over tighten.)

5. Recalibrate the instrument as per Section 4.6.

4.7.2 Cleaning the Ionization Chamber

1. Turn the FUNCTION switch to the OFF position and remove the lamp housing cover and lamp as per Section 4.7.1.

2. Using a gentle jet of compressed air, gently blow out any dust or dirt.

3. Following cleaning, reassemble by first sliding the lamp back into the lamp housing. Replace the 0-ring as necessary, reinstall the lamp housing cover, and tighten it using the 2020 multi-tool. (Do not over tighten).

4. Recalibrate the instrument as per Section 4.6.

4.8 Instrument Advantages

The 2020 is easy to use in comparison to many other types of monitoring instrumentation. Its detection limit range is in the low parts-per-million range. Response rapidly reaches 90 percent scale of the indicated concentration (less than 3 seconds for benzene). This instrument's automated performance covers multiple monitoring functions simultaneously, incorporating data logging capabilities.

4.9 Limitations of the Photovac 2020 Photoionization Monitor

- Because the 2020 is a nonspecific total gas/vapor detector, it cannot be used to identify unknown chemicals; it can only quantitate them in relationship to a calibration standard (relative response ratio).
- For appropriate application of the 2020, ionization potentials of suspected contaminants must be known.
- Because the types of compounds that the 2020 can potentially detect are only a fraction of the chemicals possibly present at a hazardous waste site or incident, a background or zero reading on this instrument does not necessarily signify the absence of air contaminants.
- The 2020 instrument can only monitor certain vapors and gases in air. Many nonvolatile liquids, toxic solids, particulates, and other toxic gases and vapors cannot be detected.
- PIDs are generally no specific. Their response to different compounds is relative to the calibration gas used. This is referred to as relative response ration. Instrument readings may be higher or lower than the true concentration. This can be an especially serious problem when monitoring for total contaminant concentrations if several different compounds are being detected at once.
- The 2020 is a small, portable instrument that cannot be expected to yield results as accurately as laboratory instruments.

4.9.1 Variables Affecting Monitoring Data

Monitoring a hazardous waste site environment can pose a significant challenge in assessing airborne concentrations and the potential threats to site personnel. Several variables may influence both dispersion and the instrument's ability to detect actual concentrations. Some of the variables, which may impact these conditions, are as follows:

- Temperature – Changes in temperature or pressure will influence volatization and affect airborne concentrations. Additionally, an increase or decrease in temperature ranges may have an adverse effect on the instrument's ability to detect airborne concentrations.
- Humidity – Excessive levels of humidity may interfere with the accuracy of monitoring results.
- Rainfall – Through increased barometric pressure and water, rainfall may influence dispersion pathways affecting airborne emissions.
- Electromagnetic interference – High voltage sources, generators, and other electrical equipment may interfere with the operation and accuracy of direct-reading monitoring instruments.

5.0 TROUBLESHOOTING

5.1 Fault Messages

When the "Fault" status is displayed, the 2020s operation is compromised.

Fault 1: Signal from zero gas is too high.

Cause: If another fault occurred while the 2020 was setting its zero point, then this fault is displayed.
Action: Ensure no faults are occurring and calibrate the 2020 again.

Cause: Sample line, sample probe, or fittings are contaminated before the detector.
Action: Clean or replace the sample line, sample prove, or the inlet filter.

Cause: Span gas and zero air are switched.
Action: Ensure clean air is used to zero the 2020. If you are using gas bags, mark the calibration and zero gas bags clearly.

Cause: Ambient air is contaminated.
Action: If unsure about the quality of ambient air, use a supply of commercial zero-grade air to zero the 2020.

Fault 2: Signal from span gas is too small.

Cause: Operator may have switched the span gas and zero air.
Action: Ensure clean air is used to zero the 2020. If you are using gas bags, mark the calibration and zero gas bags clearly.
Action: Ensure the span gas is of a reliable concentration.

Cause: UV lamp window is dirty. (*Note: Do not remove the detector lamp in a hazardous location.*)
Action: Clean the UV lamp window.

Cause: UV lamp is failing. (*Note: Do not remove or replace the detector lamp in a hazardous location.*)
Action: Install a new UV lamp.

Cause: Incompatible application.
Action: The concentration and sample gas are incompatible for use with the 2020.

Fault 3: UV lamp fault. UV lamp has not started.

Cause: The UV lamp has not started immediately.
Action: This fault may be seen momentarily when the 2020 is first turned on. Allow 30 to 60 seconds for the UV lamp to start and the fault to clear.

Cause: The UV lamp serial number label is blocking the photocell. (*Note: Do not remove or replace the detector lamp in a hazardous location.*)
Action: If using a UV lamp with a white serial number label, it is possible that the label is blocking the photocell. Rotate the lamp approximately 90 degrees and then try to start the 2020 again. If the fault persists, replace the lamp.

Cause: The UV lamp is not installed. (*Note: Do not remove or replace the detector lamp in a hazardous location.*)
Action: Install a UV lamp.

Cause: The UV lamp has failed. (*Note: Do not remove or replace the detector lamp in a hazardous location.*)
Action: Install a new UV lamp.

Cause: There is an Electronic problem.
Action: If a new UV lamp still generates this fault, then contact the Photovac Service Department.

Fault 4: Pump current too low or too high.

Cause: If the pump sounds labored, then the pump is operating beyond normal operating parameters.
Action: Check for an obstruction in the sample line. Make sure sample line, sample probe, or inlet filter are not plugged. (*Note: Do not replace the inlet filter in a hazardous location.*)
Action: Replace the inlet filter.
Action: Ensure the sample outlet, located on the underside of the 2020, is not obstructed.

Cause: The UV lamp is too wide, causing flow to be restricted. (*Note: Do not remove or replace the detector lamp in a hazardous location.*)
Action: If using a UV lamp with a white serial number label, it is possible that the lamp is too wide for the lamp holder. Contact the TolTest equipment manager.

Cause: The 2020 has been exposed to a solvent that can pass through the inlet filter and liquid has been aspirated.
Action: Contact the TolTest equipment manager.

Cause: The pump has failed.
Action: Contact the TolTest equipment manager.

5.2 Specific Problems

Problem: Very low or no instrument response detected, yet compounds are known to be present.

Cause: The 2020 has not been calibrated properly.
Action: Ensure the calibration gas is of a reliable concentration and then calibrate the instrument as outlined in Section 4.6 of the User's Manual. After the instrument has been calibrated, sample the bag of calibration gas. A reading equivalent to the calibration gas should be displayed. If not, contact the TolTest equipment manager. (*Note: Do not remove or recharge the battery pack in a hazardous location.*)
Action: Disconnect the battery charger before calibrating the 2020.

Cause: Calibration memories have not been programmed correctly.
Action: Replace the battery pack and reset the time and date. Ensure that the 2020 has been turned off before removing the battery pack.

Cause: The 2020 has been used for 3 months or more and the internal battery (not the external battery pack) has discharged. (*Note: Do not remove or recharge the battery pack in a hazardous location.*)
Action: Connect the 2020 to the AC adapter and turn the 2020 on. Turn the pump off. While the 2020 is running, the internal battery is charging. Leave the instrument running for approximately 24 hours.

Problem: Instrument status shows "Over".

Cause: High concentrations of gases and vapors will cause a rapid change in signal level. The detector and associated electronics may become temporarily saturated.
Action: Wait a few seconds for the status to return to normal. PIDs are designed to detect relatively low concentrations of gases and vapors. Exposure to very high concentrations may result in a very high or maximum response.

Cause: The detector has become saturated.

Action: Move the 2020 to a location where it can sample clean air. Sample clean air until the reading stabilizes around 0.
Cause: Detector has been short circuited by foreign matter in the detector cell. (*Note: Do not service the 2020 in a hazardous location.*)
Action: Do not touch the wire grid inside the detector cell. Use a gentle jet of compressed air to remove any dust or dirt in the detector cell.

Warning: Do not insert any object, other than the UV lamp, into the lamp holder.

Cause: There is an undetermined problem.
Action: Contact the TolTest equipment manager.

Problem: Display is blank.

Cause: Battery pack is critically low. (*Note: Do not remove or recharge the battery pack in a hazardous location.*)
Action: Replace the battery pack or connect the 2020 to the AC adapter.

Cause: The battery pack is not connected to the instrument correctly.
Action: Ensure the battery pack connector is securely attached to the connector on the 2020.

Cause: There is an undetermined problem.
Action: Reset the 2020. Leave the instrument on while you disconnect the battery pack. This will reset the instrument. Reconnect the battery pack and close the battery hatch. Turn on the 2020; set the time and date and program all the calibration memories to be used.
Action: Contact the TolTest equipment manager.

Problem: Sample flow rate is less than 300 ml/min.

Cause: The inlet filter is plugged. (*Note: Do not replace the inlet filter in a hazardous location.*)
Action: Replace the inlet filter.

Cause: The inlet filter has not been installed properly.
Action: Ensure that the inlet filter has been installed correctly.

Cause: The UV lamp is too long, causing flow to be restricted. (*Note: Do not remove or replace the detector lamp in a hazardous location.*)
Action: If a UV lamp with a white serial number label is in use, it is possible that the lamp is too long for the lamp holder. Replace the lamp and contact the TolTest equipment manager.

Cause: The UV lamp is too wide, causing flow to be restricted.
Action: If a UV lamp with a white serial number label is in use, it is possible that the lamp is too wide for the lamp holder. Contact the TolTest equipment manager.

Cause: The 2020 has been exposed to a solvent that can pass through the inlet filter and liquid has been aspirated.
Action: Contact the TolTest equipment manager.

Cause: Sample outlet is obstructed.
Action: Ensure the sample outlet is not obstructed in any way.

Cause: Pump has been damaged.
Action: Contact the TolTest equipment manager.

Problem: Liquid has been aspirated.

Cause: The 2020 has been exposed to a solvent that can pass through the inlet filter.
Action: Contact the TolTest equipment manager.

Problem: Corrosive gases and vapors have been sampled.

Cause: The 2020 has been exposed to corrosive gases and vapors.
Action: Corrosive gases and vapors can affect the electrodes within the detector, as well as the lamp window. Prolonged exposure to corrosive materials may result in permanent fogging or etching of the window. If the 2020 is exposed to corrosive material, contact the TolTest equipment manager.

6.0 SHIPPING

The 2020 may be shipped as cargo or carried on as luggage if there is no calibration gas cylinder accompanying the kit. When shipping or transporting the calibration gas, a Hazardous Air bill must be completed.

7.0 REFERENCES

Photovac 2020 Photoionization Monitor User's Manual, 1995.

8.0 ATTACHMENTS

8.1 Equipment Calibration Log

ATTACHMENT 1
Equipment Calibration Log

TOLTEST INC.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: _____ INSTRUMENT NAME/MODEL: _____

SITE NAME: _____ MANUFACTURER: _____

PROJECT NO.: _____ SERIAL NUMBER: _____

Date Of Calibration	Instrument ID Number	PERSONAL Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks And Comments
			Pre-Calibration	Post-Calibration	Pre-Calibration	Post-Calibration		

STANDARD OPERATING PROCEDURE
NUMBER PCB75110.01-06

BOREHOLE AND SOIL SAMPLE LOGGING

1.0 PURPOSE

This Standard Operating Procedure (SOP) describes the standard procedures and technical guidance on the logging of soil cores collected at the SWMU 17 site at NSWC Crane, IN.

2.0 FIELD FORMS AND EQUIPMENT

Knife
Ruler (marked in tenths and hundredths of feet)
Boring log: An example of this form is attached.
Photoionization detector (PID) (see SOP PCB75110.01-05)
Writing utensil

3.0 RESPONSIBILITIES

A field geologist or engineer is responsible for supervising all boring activities and assuring that each borehole is properly and completely logged.

4.0 PROCEDURES FOR BOREHOLE AND SAMPLE LOGGING

To maintain a consistent classification of soil, it is imperative that the field geologist understands and accurately uses the field classification system described in this SOP. This identification is based on visual examination and manual tests.

4.1 Unified Soil Classification System (USCS) Classification

Soils are to be classified according to the Unified Soil Classification System (USCS). This method of classification is detailed in Figure 1 (attached to this SOP).

This method of classification identifies soil types on the basis of grain size and cohesiveness.

Fine-grained soils, or fines, are smaller than the No. 200 sieve and are of two types: silt (M) and clay (C). Some classification systems define size ranges for these soil particles, but, for field classification purposes, they are identified by their respective behaviors. Organic material (O) is a common component of soil but has no distinguishable size range; it is recognized by its composition. The careful study of the USCS will aid in developing the competence and consistency necessary for the classification of soils.

Coarse-grained soils will be divided into categories: rock fragments, sand, or gravel. The terms "sand" and "gravel" not only refer to the size of the soil particles but also to their depositional history. To insure accuracy in description, the term "rock fragments" will be used to indicate angular granular materials resulting from the breakup of rock. The sharp edges typically observed indicate little or no transport from their source area, and therefore the term provides additional information in reconstructing the depositional environment of the soils encountered. When the term "rock fragments" is used still, it will be followed by a size designation such as "(1/4 inchϕ - ½ inchϕ)" or "coarse-sand size" either immediately after the entry or in the remarks column. The USCS classification would not be affected by this variation in terms.

4.2 Color

Soil colors will be described utilizing a single color descriptor preceded, when necessary, by a modifier to denote variations in shade or color mixtures. A soil could therefore be referred to as "gray" or "light gray" or "blue-gray". Because color can be utilized in correlating units between sampling locations, it is important for color descriptions to be consistent from one boring to another.

Colors must be described while the sample is still moist. Soil samples will be broken or split vertically to describe colors. Samplers tend to smear the sample surface, creating color variations between the sample interior and exterior.

The term "mottled" will be used to indicate soils irregularly marked with spots of different colors. Mottling in soils usually indicates poor aeration and lack of good drainage.

4.3 Relative Density and Consistency

To classify the relative density and/or consistency of a soil, the geologist is to first identify the soil type. Granular soils contain predominantly sands and gravels. They are noncohesive (particles do not adhere well when compressed). Finer-grained soils (silts and clays) are cohesive (particles will adhere together when compressed).

Granular soils are given the USCS classifications GW, GP, GM, SW, SP, SM, GC, or SC (see Figure 1).

The consistency of cohesive soils is determined by performing field tests and identifying the consistency as shown in the following table.

CONSISTENCY FOR COHESIVE SOILS

Consistency	Standard Penetration Resistance (Blows per Foot)	Unconfined Compressive Strength (Tons/Sq. Foot by pocket penetration)	Field Identification
Very soft	0 to 2	Less than 0.25	Easily penetrated several inches by fist
Soft	2 to 4	0.25 to 0.50	Easily penetrated several inches by thumb
Medium stiff	4 to 8	0.50 to 1.0	Can be penetrated several inches by thumb with moderate effort
Stiff	8 to 15	1.0 to 2.0	Readily indented by thumb but penetrated only with great effort
Very stiff	15 to 30	2.0 to 4.0	Readily indented by thumbnail
Hard	Over 30	More than 4.0	Indented with difficulty by thumbnail

Cohesive soils are given the USCS classifications ML, MH, CL, CH, OL, or OH (see Figure 1).

The consistency of cohesive soils is determined by hand by determining the resistance to penetration by the thumb. The thumb determination methods are conducted on a selected sample of the soil, preferably the lowest 0.5-foot of the sample. The sample will be broken in half

and the thumb pushed into the end of the sample to determine the consistency. Do not determine consistency by attempting to penetrate a rock fragment. If the sample is decomposed rock, it is classified as a soft decomposed rock rather than a hard soil. One of the other methods will be used in conjunction with it. The designations used to describe the consistency of cohesive soils are shown in the above-listed table.

4.4 Weight Percentages

In nature, soils comprise particles of varying size and shape and are combinations of the various grain types. The following terms are useful in the description of soil:

Terms of Identifying Proportion of the Component	Defining Range of Percentages by Weight
Trace	0 – 10 percent
Some	11 – 30 percent
Adjective form of the soil type (e.g., "sandy")	31 – 50 percent

Examples:

- Silty fine sand: 50 to 69 percent fine sand, 31 to 50 percent silt.
- Medium to coarse sand, some silt: 70 to 80 percent medium to coarse sand, 11 to 30 percent silt.
- Fine sandy silt, trace clay: 50 to 68 percent silt, 31 to 49 percent fine sand, 1 to 10 percent clay.
- Clayey silt, some coarse sand: 70 to 89 percent clayey silt, 11 to 30 percent coarse sand.

4.5 Moisture

Moisture content is estimated in the field according to four categories: dry, moist, wet, and saturated. In dry soil, there appears to be little or no water. Saturated samples obviously have all the water they can hold. Moist and wet classifications are somewhat subjective and often are determined by the individual's judgment. A suggested parameter for this would be calling a soil wet if rolling it in the gloved hand or on a porous surface liberates water (i.e., dirties or muddles the surface). Whatever method is adopted for describing moisture, it is important that the method used by an individual remains consistent throughout an entire field activity.

4.6 Classification of Soil Grain Size for Chemical Analysis

To determine the gross grain size classification (e.g., clay silt, and sand) from the USCS classification described above, the following table will be used.

Gross Soil Grain Size Classification	USCS Abbreviation	Description
Clay	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	CH	Inorganic clays of high plasticity, fat clays
	OH	Organic clays of medium to high plasticity, organic silts
Silt	ML	Inorganic silts and very fine sands, rock four, silty or clayey fine sands with slight plasticity
	OL	Organic silts and organic silty clays of low plasticity
	MH	Inorganic silts, micaceous or diatomaceous fine sand or silty soils
Sand	SW	Well graded sands, gravelly sands, little or no fines
	SP	Poorly graded sands, gravelly sands, little or no fines
	SM	Silty sands, sand-silt mixtures
	SC	Clayey sands, sand-clay mixtures

4.7 Summary of Soil Classification

In summary, soils will be classified in a similar manner by each geologist or engineer at a project site. The hierarchy of classification is as follows:

- Density and/or consistency
- Color
- Plasticity (Optional)
- Soil types
- Moisture content
- Other distinguishing features
- Grain size
- Depositional environment

5.0 ATTACHMENTS

5.1 Figure 1 – Unified Soil Classification System

5.2 Boring Log

ATTACHMENT 1
Figure 1 - Unified Soil Classification System

Unified Soil Classification System

Field Guide

Coarse Grained Soils (more than half of soil > No. 200 sieve)	Gravels (More than half of coarse fraction > no. 4 sieve size)	GW	Well graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly graded gravels or gravel-sand mixtures, little or no fines
		GM	Sandy gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-silt mixtures
	Sands (More than half of coarse fraction < no. 4 sieve size)	SW	Well graded sands or gravelly sands, little or no fines
		SP	Poorly graded sands or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures
		SC	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
Fine Grained Soils (more than half of soil < No. 200 sieve)	Silts and Clays LL = < 50	ML	Inorganic silts and very fine sands, rock flour, silty fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays LL = > 50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic silts of high plasticity, fat clays
		OH	Organic clays of high plasticity, organic silty clays, organic silts
Highly Organic Soils		Pt	Peat and other highly organic soils

Grain Size Chart

Classification	Range of Grain Sizes	
	U.S. Standard Sieve Size	Grain Size In Millimeters
Boulders	Above 12"	Above 305
Cobbles	12" to 3"	305 to 76.2
Gravel	3" to No. 4	76.2 to 7.76
coarse	3" to 3/4"	76.2 to 4.76
fine	3/4" to No.4	19.1 to 4.76
Sand	No. 4 to No. 200	4.76 to 0.074
coarse	No.4 to No. 10	4.76 to 2.00
medium	No. 10 to No. 40	2.00 to 0.420
fine	No. 40 to No. 200	0.420 to 0.074
Silt and Clay	Below No. 200	Below 0.074

Relative Density (SPT)

SANDS AND GRAVELS	BLOWS/FOOT
VERY LOOSE	0 – 4
LOOSE	4 – 10
MEDIUM DENSE	10 – 30
DENSE	32 – 50
VERY DENSE	OVER 50

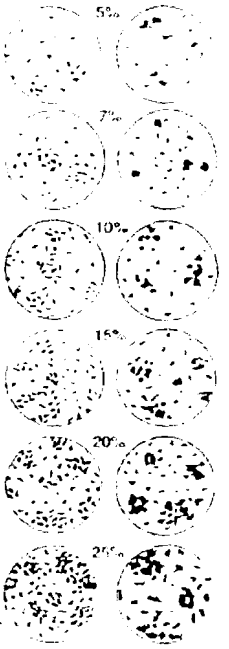
Consistency (SPT)

SILTS AND CLAYS	BLOWS/FOOT
VERY SOFT	0 – 2
SOFT	2 – 4
MEDIUM STIFF	4 – 8
STIFF	8 – 16
VERY STIFF	16 – 22
HARD	OVER 32

Group Symbols Chart

				Group Symbol		Group Name
GRAVEL % gravel > % sand	5% fines	Well-graded		GW	<15% sand	Well-graded gravel
					15% sand	Well-graded gravel with sand
		Poorly-graded		GP	<15% sand	Poorly graded gravel
					15% sand	Poorly graded gravel with sand
	10% fines	Well-graded	fines = ML or MH	GW-GM	<15% sand	Well-graded gravel with silt
					15% sand	Well-graded gravel with silt and sand
			fines = CL or CH	GW-GC	<15% sand	Well-graded gravel with clay
					15% sand	Well-graded gravel with clay and sand
		Poorly-graded	fines = ML or MH	GP-GM	<15% sand	Poorly graded gravel with silt
					15% sand	Poorly graded gravel with silt and sand
			fines = CL or CH	GP-GC	<15% sand	Poorly graded gravel with clay
					15% sand	Poorly graded gravel with clay and sand
	15% fines		fines = ML or MH	GM	<15% sand	Silty gravel
					15% sand	Silty gravel with sand
			fines = CL or CH	GC	<15% sand	Clayey gravel
					15% sand	Clayey gravel with sand
SAND % sand > % gravel	5% fines	Well-graded		SW	<15% gravel	Well-graded sand
					15% gravel	Well-graded sand with gravel
		Poorly-graded		SP	<15% gravel	Poorly graded sand
					15% gravel	Poorly graded sand with gravel
	10% fines	Well-graded	fines = ML or MH	SW-SM	<15% gravel	Well-graded sand with silt
					15% gravel	Well-graded sand with silt and gravel
			fines = CL or CH	SW-SC	<15% gravel	Well-graded sand with clay
					15% gravel	Well-graded sand with clay and gravel
		Poorly-graded	fines = ML or MH	SP-SM	<15% gravel	Poorly graded sand with silt
					15% gravel	Poorly graded sand with silt and gravel
			fines = CL or CH	SP-SC	<15% gravel	Poorly graded sand with clay
					15% gravel	Poorly graded sand with clay and gravel
	15% fines		fines = ML or MH	SM	<15% gravel	Silty sand
					15% gravel	Silty sand with gravel
			fines = CL or CH	SC	<15% gravel	Clayey sand
					15% gravel	Clayey sand with gravel

Group Symbol				Group Name
CL	<30% plus No. 200	<15% plus No. 200		Lean clay
		15-25% plus No. 200	% sand > % of gravel	Lean clay with sand
			% sand < % of gravel	Lean clay with gravel
	30% plus No. 200	% sand > % of gravel	<15% gravel	Sandy lean clay
			15% gravel	Sandy lean clay with gravel
		% sand < % of gravel	<15% sand	Gravelly lean clay
			15% sand	Gravelly lean clay with sand
ML	<30% plus No. 200	<15% plus No. 200		Silt
		15-25% plus No. 200	% sand > % of gravel	Silt with sand
			% sand < % of gravel	Silt with gravel
	30% plus No. 200	% sand > % of gravel	<15% gravel	Sandy Silt
			15% gravel	Sandy Silt with gravel
		% sand < % of gravel	<15% sand	Gravelly silt
			15% sand	Gravelly silt with sand
CH	<30% plus No. 200	<15% plus No. 200		Fat clay
		15-25% plus No. 200	% sand > % of gravel	Fat clay with sand
			% sand < % of gravel	Fat clay with gravel
	30% plus No. 200	% sand > % of gravel	<15% gravel	Sandy fat clay
			15% gravel	Sandy fat clay with gravel
		% sand < % of gravel	<15% sand	Gravelly fat clay
			15% sand	Gravelly fat clay with sand
MH	<30% plus No. 200	<15% plus No. 200		Elastic silt
		15-25% plus No. 200	% sand > % of gravel	Elastic silt with sand
			% sand < % of gravel	Elastic silt with gravel
	30% plus No. 200	% sand > % of gravel	<15% gravel	elastic silt
			15% gravel	elastic silt with gravel
		% sand < % of gravel	<15% sand	elastic silt
			15% sand	elastic silt with sand
OL/OH	<30% plus No. 200	<15% plus No. 200		Organic soil
		15-25% plus No. 200	% sand > % of gravel	Organic soil with sand
			% sand < % of gravel	Organic soil with gravel
	30% plus No. 200	% sand > % of gravel	<15% gravel	Sandy organic soil
			15% gravel	Sandy organic soil with gravel
		% sand < % of gravel	<15% sand	Gravelly organic soil
			15% sand	Gravelly organic soil with sand



ATTACHMENT 2
Boring Log

TOLTEST, INC.

BORING LOG

Page ___ of ___

PROJECT NAME: _____ **BORING NO.:** _____
PROJECT NUMBER: _____ **DATE:** _____
DRILLING COMPANY: _____ **GEOLOGIST:** _____
DRILLING RIG: _____ **DRILLER:** _____

Sample No. And Type Of ROD	Depth (FL) or Run No.	Blows / 6" or ROD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/FL) or Screened Interval	MATERIAL DESCRIPTION			USCS *	Remarks	PID/PID Reading (ppm)			
					Soil Density, Consistency, Or Rock Hardness	Color	Material Classification			SAMPLE	SAMPLER	BOREHOLE **	DRILLER **

* When rock coring, enter rock brokenness.
** Include monitor reading in 6 foot intervals at borehole. Increase reading frequency if elevated response read.

Remarks: _____
_____
_____
_____

Drilling Area Background (ppm): [ ]

Converted to Well: Y or N Well ID# _____

STANDARD OPERATING PROCEDURE
NUMBER PCB75110.01-07

SURFACE AND SUBSURFACE SOIL SAMPLING

1.0 PURPOSE

This Standard Operating Procedure (SOP) describes the procedures to be used for surface and subsurface soil sampling using direct-push technology (DPT), hand augers or split-barrel samplers during field activities at the SWMU 17 at NSWC Crane, IN.

2.0 REQUIRED FIELD FORMS AND EQUIPMENT

Writing utensil with indelible ink
Disposable medical-grade gloves (i.e., latex, Nitrile)
Boring log
Field Sampling Records
Stainless steel mixing bowls
Stainless-steel trowel or soupspoon
Hand auger
EnCore handle and samplers
Required sample containers: All sample containers including shipping coolers for analysis by fix-based laboratories will be supplied and deemed certified clean by the laboratory.
Required decontamination materials
Chain-of-custody (COC) records
Required personnel protective equipment (PPE)
Photoionization detector (PID) (see SOP PCB75110.01-05)
Wooden stakes or pin flags
Sealable polyethylene bags
Heavy-duty cooler
Ice
Razor knife
Geoprobe and sampling equipment
Sample labels and tags

3.0 COLLECTION OF OTHER SOIL SAMPLE ALIQUOTS

Note: A surface soil sample is collected from the 0- to 2-feet depth (i.e., one core length). Additional subsurface soil samples each consist of two 2-foot core segments.

1. The soil interval will be composited and used to fill the remainder of the sample containers. Any surface debris (e.g., herbaceous vegetation, twigs, rocks, litter, etc.) should first be removed from the top of the surface soil core. For other core intervals, the top 2 inches of each core should be discarded because it often material scraped from the side of the borehole and not fresh material; from the bottom of the borehole.

2. Slide the remaining core material out of the acetate liner and into a clean, decontaminated stainless-steel mixing bowl. Mix the soil thoroughly with a stainless-steel spoon and remove gravel, large pebbles, and other coarse materials.

3. Complete all required information on the sample labels (see SOP PCB75110.01-01).

4. Fill in all required information on the sample tag and secure the tag to the sample container.

5. Place the sample container in a Ziploc plastic bag and seal shut. Place the bag in a cooer containing ice and cool to 4 ± 2°C.

6. Record the required information on the Field Sampling Record and the COC form.

4.0 PACKAGING AND SHIPPING OF SAMPLES

Samples will be packaged and shipped according to SOP PCB75110.01-11

5.0 ATTACHMENTS

5.1 Field Sampling Record

ATTACHMENT 1
Field Sampling Record

FIELD SAMPLING RECORD

Project Site Name _____
Project Number _____

- ❑ Surface Soil
- ❑ Subsurface Soil
- ❑ Sediment
- ❑ Other: _____
- ❑ QA Sample Type: _____

Sample ID# _____
Sample Location _____
Purpose _____
Sampled by _____
COC# _____

Type of Sample:
- ❑ Low Concentration
- ❑ High Concentration

Grab Sample Data

Date:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time:			
Weather Conditions:			
Method:			
Equipment:			
Monitor Readings (Range in ppm):			

Composite Sample Data

Date	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time:			
Weather Conditions:			
Method:			
Equipment:			
Monitor Readings (Range in ppm):			
Date			
Time:			
Weather Conditions:			
Method:			
Equipment:			
Monitor Readings (Range in ppm):			
Date			
Time:			
Weather Conditions:			
Method:			
Equipment:			
Monitor Readings (Range in ppm):			

Sample Collection Information

Analysis	Container Requirements	Collected	Other

Observation/Notes

Lithology	Sedimentologic Features	Evidence of Contamination	Misc.

Circle if Applicable

MS/MSD Duplicate ID#

Signature(s)

STANDARD OPERATING PROCEDURE
NUMBER PCB75110.01-08

MANAGEMENT OF INVESTIGATION-DERIVED WASTE

1.0 PURPOSE

This Standard Operating Procedure (SOP) describes how investigation-derived waste (IDW) will be collected, segregated, classified, and managed during the field investigations at the SWMU 17 site at NSWC Crane, IN. The following types of IDW will be generated during this investigation:

- Excess soil and rock materials remaining from subsurface drilling activities
- Decontamination solutions
- Personal protective equipment (PPE) and clothing
- PCB field test kits
- Miscellaneous trash and incidental items

2.0 REQUIRED FIELD FORMS AND EQUIPMENT

Health and safety equipment (with PPE)
Decontamination equipment
Field logbook and indelible ink pen
Plastic sheeting and/or tarps
55-gallon drums with sealable lids
IDW labels for drums
Wastewater container tanks
Plastic garbage bags

3.0 PROCEDURES

Management of IDW includes the collection, segregation, temporary storage, classification, final disposal, and documentation of the waste-handling activities.

3.1 Liquid Wastes

Liquid wastes that will be generated during the site activities include decontamination solutions from drilling and sampling equipment and solutions from PCB test kits. As they are collected, the drilling fluids wastewaters will be placed in a 300-gallon (or smaller) portable container attached to a truck. Whenever the container is full, a sample will be collected and analyzed for total PCBs by a fixed-base laboratory. If the PCB concentration is less than 3 parts per billion (ppb) it will be transported to a central location at NSWC Crane adjacent to a Crane-designated sanitary sewer manhole. The water in the portable container will be discharged to the sewer by gravity draining. If the PCB concentration is not less than 3 ppb the contents of the container will be taken to an off-site wastewater treatment facility for treatment or disposal in accordance with TSCA regulations.

An accurate record will be kept by the PM of all wastewaters that have been placed in the large holding tank. At a minimum, this information will include:

- The location and type of each water that has been placed in the tank (e.g., decon water from rig)
- The quantity of water from each source
- The date the wastewater was generated
- The date and time the wastewater was placed in the tank
- The person(s) present when the wastewaters were discharged to the sewer.

All free liquids from the PCB field test kits will be placed in a disposal vessel and turned over to NSWC Crane personnel for disposal.

3.2 Drill Cuttings and Cores

As cuttings are removed from borings, they will be screened for VOC's. If these results do not show above-background levels of VOCs, the cuttings materials will be mixed with bentonite and returned to the borehole when sampling activities in the hole are completed or spread on the ground in the area of the borehole. The backfill materials will be tamped as they are placed in the hole to increase density and reduce permeability of the backfill material.

If any soil materials from a screened borehole interval show evidence of PCB contamination (based on the field screening results compared to the 1 mg/kg TSCA standard for project completion decisions, and the 25 mg/kg standard for disposal decisions), then the soil material from the screened interval will be placed in a plastic trash bag (or directly in a drum if a larger quantity) and the bag will be tagged. Information included on the tag will consist of the hole from which the material came, the depth interval from which the material came, the date, and the name of the person filling out the tag. The bag will then be placed in a 55-gallon drum and sealed (more than one bag may be placed in a drum). The waste drums will be stored on site temporarily until laboratory results have been received concerning the soil samples that were collected from the suspect borehole. If the results indicate that no contamination is present in the soil samples, then the soils will disposed on site. If the levels of contamination of any of the samples from a borehole exceed the 1 mg/kg standard, then all excess soil from the borehole will be considered as RCRA-hazardous and disposed off site in accordance with RCRA waste disposal regulations. Alternatively, the toxicity characteristic leaching procedure may be conducted for any constituent that could exceed the toxicity characteristic (TC) limits based on total concentrations. In the event tests show that the soils exceed TC limits, the soil will be considered a hazardous waste and disposed in accordance with RCRA waste disposal regulations.

Cuttings from well borings will be handled in the same manner as soil boring cuttings.

3.3 DPT Sample Liners and Incidental Trash

All DPT sample liners and incidental trash materials (e.g., wrapping or packing materials from supply cartons, waste paper, solid wastes from PCB test kits) will be decontaminated (if contaminated), double-bagged, securely tied shut, and placed in a designated waste receptacle at NSWC Crane.

STANDARD OPERATING PROCEDURE
NUMBER PCB75110.01-09

DECONTAMINATION OF FIELD SAMPLING EQUIPMENT

1.0 PURPOSE

This Standard Operating Procedure (SOP) establishes the procedures to be followed when decontaminating non-dedicated field sampling equipment during the field investigations at the SWMU 17 site at NSWC Crane, IN.

2.0 REQUIRED FIELD FORMS AND EQUIPMENT

Waterproof pens
Non-latex rubber or plastic gloves
Cotton gloves
Field logbook
Potable water
Deionized water
Liquinox detergent
Isopropanol
Brushes, spray bottles, paper towels, etc.
55-gallon drum or other container to collect and transport decontamination fluids

3.0 DECONTAMINATION PROCEDURES

1. Don non-latex and/or cotton gloves and decontaminate sampling equipment (in accordance with the following steps) prior to field sampling and between samples.

2. Rinse the equipment with potable water. Rinsing may be conducted by spraying with water from a spray bottle or by dipping. Collect the potable water rinsate into a container.

3. Wash the equipment with a solution of Liquinox detergent. Prepare the Liquinox wash solution in accordance with the instructions on the Liquinox container. Collect the Liquinox wash solution into a container. Use brushes or sprays as appropriate for the equipment. If oily residue has accumulated on the sampling equipment, remove the residue with an Isopropanol wash and repeat the Liquinox wash.

4. Rinse the equipment with potable water. Rinsing may be conducted by spraying with water from a spray bottle or by dipping. Collect the potable water rinsate into a container.

5. Rinse the equipment with deionized water. Rinsing may be conducted by spraying with water from a spray bottle or by dipping. Collect the deionized water rinsate into a container.

6. Remove excess water by air drying, shaking, or wiping with paper towels as necessary.

7. Document decontamination by recording it in the field logbook.

8. Containerized decontamination solutions will be managed in accordance with the procedures described in SOP PCB75110.01-08.

STANDARD OPERATING PROCEDURE
NUMBER PCB75110.01-10

SOIL SAMPLE COMPOSITING

1.0 PURPOSE

This Standard Operating Procedure (SOP) describes procedures to be followed for the collection of composite soil samples for PCB analysis at the SWMU 17 site at NSWC Crane, IN. The procedures are based on 40 CFR 761.289. Although several methods of composite sampling for cleanup verification are presented in 40 CFR 761.289, this SOP will describe a single method that appears to be most applicable to this project.

Application

Compositing is a method of combining several samples of a specified bulk PCB remediation waste into a single chemical analysis. Composite samples must be from the same waste material. It is anticipated that the site will be characterized by soil contaminated with PCBs that are not present as oils. It is also anticipated that the soil types encountered at this site will lack variability (e.g., clays versus gravels). If variations to these assumptions are encountered, additional composite samples will be necessary to characterize the materials.

2.0 REQUIRED FIELD FORMS AND EQUIPMENT

Writing utensil with indelible ink
Disposable medical-grade gloves (i.e., latex, Nitrile)
Field Sampling Records
Stainless steel mixing bowls
Stainless-steel trowel or soupspoon
Required sample containers: All sample containers including shipping coolers for analysis by fix-based laboratories will be supplied and deemed certified clean by the laboratory.
Required decontamination materials
Chain-of-custody records
Required personal protective equipment
Photoionization detector (see SOP PCB75110.01-05)
Wooden stakes or pin flags
Sealable polyethylene bags
Heavy-duty cooler
Ice
Razor knife
Sampling equipment
Surveyor's measurement tape
Sample labels and tags

3.0 PROCEDURES

The procedures for composite sampling at surficial sites for verification sampling are described below. Sampling of pit locations is addressed exclusively in the work plan because these samples present a physical hazard during sample collection.

1. Across the entire site, map out a sampling grid that is oriented parallel to magnetic north. A minimum of two persons are necessary to lay out this grid, one to operate the theodolite or transit and one to insert the survey pins. Use a theodolite or transit to ensure that the grid lines are straight. Insert pin flags every 1.5 meters in both the Northern and Eastern directions to create the sampling grid. The grid spacing will produce numerous cells that are 1.5 meters by 1.5 meters. For each composite sample, a three-cell by three-cell area (20.25

square meters) should be constructed. This will produce a composite sample area with nine cells.

At a minimum, three composite samples are necessary to characterize a remediation area. The area contained by this sampling grid will need to be large enough to accommodate the collection of three separate composite samples for adequate site characterization. For sites that have too little surface area to collect three composite samples from the grid, the grid spacing should be reduced to less than 1.5 meters to allow for the three-sample minimum.

2. After the measured grid is mapped (laid out) in the field, each sample should be represented by a three- by three-square of cells (i.e., nine cells total). Each of the nine cells will have an aliquot of sample collected from them.

   The composite sample is produced from nine sample aliquots that are collected at equal depths and contain equal soil volumes. Each aliquot must be collected from the same type of remediation waste or soil type. The sample from any of the sampled grids should not be represented in another composite sample. Assure that composite sample areas and individually analyzed samples completely overlie the entire cleanup site.

3. Thoroughly mix equal portions of soil sample from the nine different locations for each sample grid in a decontaminated stainless steel mixing bowl, following the steps in SOP PCB75110.01-07.

4. Follow procedures in SOP PCB75110.01-11 for shipment of samples.

STANDARD OPERATING PROCEDURE
NUMBER PCB75110.01-11

SAMPLE PRESERVATION, PACKAGING, AND SHIPPING

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to describe the procedure for sample preservation, packaging, and shipping to be used in handling environmental samples obtained for chemical analysis at the SWMU 17 site at NSWC Crane, IN.

The NSWC Crane Environmental Protection Department must approve any deviations from this procedure.

2.0 REQUIRED FIELD FORMS AND EQUIPMENT

Shipping labels
Custody seals
Chain-of-Custody (COC) forms
Sample containers with preservatives: All sample containers for analysis by fixed-base laboratories will be supplied and deemed certified clean by the laboratory.
Sample shipping containers (coolers): All sample shipping containers are supplied by the laboratory.
Packaging material: Bubble wrap, Ziploc bags, strapping tape, etc.
Temperature blank

3.0 PROCEDURES FOR SAMPLE PRESERVATION, PACKAGING, AND SHIPPING

1. The laboratory provides sample containers that are certified clean for the analytical parameter for which the sample is to be analyzed. All samples will be held, stored, and shipped at 4°C ± 2°C. This will be accomplished through refrigeration (used to hold samples prior to shipment) and/or ice.

2. The sampler will maintain custody of the samples until the samples are relinquished to another custodian or to the common carrier.

3. Check that the sample container is properly identified on the label and tag, the lid securely fastened, and the container sealed in a Ziploc bag.

4. Place the sample container into a bubble wrap shipping bag and seal the bag using the self-sealing, pressure-sensitive tape supplied with the bag.

5. Inspect the insulated shipping cooler. Check for any cracks, holes, broken handles, etc. If the cooler has a drain plug, make certain it is sealed shut. If the cooler is questionable for shipping, the cooler must be discarded.

6. Place the sample container into a shipping cooler in an upright position (all containers will be upright for shipment). Continue filling the cooler with samples and packing material until the cooler is full and the movement of the sample containers is limited.

7. Place a temperature blank in the cooler.

8. Fill the voids in between the bubble wrap shipping bags with ice and continue filling the cooler with ice to the top, using a minimum of 8 pounds of ice for a medium-size cooler.

9. Complete a COC form. List on the COC form each sample bottle contained in the cooler. Include the air bill number on the COC form. Use a ballpoint pen and make sure that all the carbon forms are legible.

10. Place the original (top) signed copy of the COC form inside a large Ziploc bag. Tape the bag to the inside of the lid of the shipping cooler.

11. Close the cooler and seal the cooler with approximately four wraps of strapping tape at each end of the cooler. Prior to wrapping the last wrap of strapping tape, apply a signed and dated custody seal to each side of the cooler (a total of four signed custody seals must be used per cooler). Cover the custody seal with the last wrap of tape. This will provide a tamper-evident custody seal system for the sample shipment.

12. Affix a shipping label to the top of the cooer containing all of the shipping information. Overnight (e.g., FedEx Priority Overnight) courier services will be used for all sample shipments. Include the air bill number on the COC.

13. All samples will be shipped to the laboratory no more than 72 hours after completion of sampling. Under no circumstances will sample holding times be exceeded for hold times.

STANDARD OPERATING PROCEDURE
NUMBER PCB75110.01-12

USE OF IMMUNOASSAY TEST KIT FOR PCBS

1.0 PURPOSE

This Standard Operating Procedure (SOP) describes the procedures to be followed for the field analysis of soil samples for PCBs at the SWMU 17 site at NSWC Crane, IN. The rationale for this SOP is to ensure that the field analysis follows good laboratory practices in generating field results. Manufacturer's recommendations will be precisely followed in lieu of this SOP. A form has been created per the manufacturer's recommendations and all procedures will be recorded in full in order to maintain complete documentation. The form is included as Attachment 1.

2.0 REQUIRED FIELD FORMS AND EQUIPMENT

Writing utensil with indelible ink
Bound and paginated notebook
PCB EnSys 12T Soil Test Kit, SDI Part # 7020301
PCB Soil Sample Extraction Kit, SDI Part # 7020301EA
PCB EnSys 12T Accessory Kit Rental, SDI Part # 6997020
PCB Custom Soil QC Standard for PCB 1260 @ 1/25 mg/kg, Environmental Resource Associates

3.0 PROCEDURES

1. Test Preparation
    - Label all Eppendorf repeater tips. Tips can be reused for future analyses. Label the first 5mL tip "A", the second 5mL tip "B" and the third tip "Stop".
    - Label the 12.5 mL tip "Buffer".
    - Open PCB Standard ampule by slipping ampule cracker over top, and then breaking tip at scored neck. Transfer solution to empty vial with Bulb Pipets.
    - Label vial with current date. Standard is usable for 2 weeks. Always cap tightly when finished using standard.
2. Weigh Sample
    - Place unused weigh boat on pan balance.
    - Press ON/MEMORY button on pan balance. Balance will beep and display 0.0.
    - Weigh out 10 +/- 0.1 grams of soil.
    - If balance turns off prior to completing weighing, use empty weigh boat to retare, then continue.
3. Extract PCBs
    - Uncap extraction jar and place on a flat surface. Without contacting solvent puncture foil seal with ampule cracker or sharp object. Peel the remainder of the seal off extraction jar.
    - Using wooden spatula, transfer 10 grams of soil from weigh boat into extraction jar.
    - Recap extraction jar tightly and shake **vigorously** for one minute.
    - Allow to settle for one minute.
    - Repeat steps for each sample to be tested.
4. Filter Sample
    - Disassemble filtration plunger from filtration barrel.
    - Insert bulb pipet into top (liquid) layer in extraction jar and draw up sample. Transfer **at least** ½ bulb capacity into filtration barrel. **Do not use more than one full bulb.**
    - Repeat steps for each sample to be tested.
5. Dilute Samples and Standards
    - Set the Eppendorf Repeater on 4, assemble the "Buffer" tip and fill with Buffer.

- Dispense 1 mL of Buffer into each glass buffer tube.
- Open 1 and 10 ppm dilution ampules by slipping ampule cracker over top, and then breaking top at scored neck.
- Withdraw 60 uL of filtered sample using mechanical pipet and dispense below the liquid level in "1 ppm" dilution ampule. Gently shake ampule from side to side for 5 seconds to mix thoroughly.
- Withdraw 60 uL from the "1 ppm" dilution ampule using mechanical pipet and dispense below the liquid level in "10 ppm" dilution ampule. Gently shake ampule from side to side for 5 seconds to mix thoroughly.
- Transfer 60 uL from each dilution ampule into glass buffer tubes. Always wipe tip after dispensing into buffer tube.
- Change pipet tip and repeat step four through step six for each sample.
- Assemble new pipet tip on mechanical pipet and transfer 60 uL from Standard vial into two glass buffer tubes. Immediately replace cap on PCB Standard vial.
- Shake all glass buffer tubes for 5 seconds.

6. Transfer from Dilution Tube to Antibody Coated Tube
    - Set timer for 10 minutes.
    - Working left to right in the workstation:
        - Fit all antibody coated tubes firmly on top of all corresponding glass buffer tubes.
        - Start timer and immediately invert all connected tube pairs so that the liquid is poured into the antibody coated tubes. Return the tube pairs to the appropriate workstation row making sure the larger (antibody coated) tube is on the bottom.
    - Invert all tube pairs several more times making sure the pair is returned to the workstation with the larger (antibody coated) tube on the bottom.
    - Disconnect and discard the smaller (dilution) tubes. It is not important to worry about drops of liquid adhering to lips of tubes.
    - Place conjugate tubes behind antibody tubes in workstation. Remove grey caps and discard.
7. Transfer of Conjugate to Antibody Coated Tubes
    - AFTER 10 MINUTES, IMMEDIATELY:
        - Set timer for 5 minutes.
        - Working left to right in the workstation:
            - **Start timer and immediately:**
            - Dissolve the conjugate pellets by horizontally connecting the antibody coated tubes and conjugate tubes and **tilt the liquid up to pour it onto the conjugate.**
        - Return the connected tubes to the appropriate workstation row making sure **the larger (antibody coated) tube is on the bottom. It is important that this step is completed within one minute for all tubes.**
        - In order to adequately mix solution, **invert** all connected tube pairs **several more times** making sure that the pair is returned to the workstation with the larger (antibody coated) tube on the bottom.
        - Disconnect and discard the conjugate tubes. It is not important to worry about the loss of liquid adhering to lip of tubes.
8. Wash
    - After the 5 minute incubation, empty antibody coated tubes into liquid waste container.
    - Wash antibody coated tubes by vigorously filling and emptying a total of 4 times.
    - Tap antibody coated tubes upside down on paper towels to remove excess liquid. Residual foam in the tubes will not interfere with test results.
    - Note: When running up to 12 antibody coated tubes, tubes can be washed in two groups – one group immediately following the other group.
9. Color Development

- Set the Eppendorf Repeater on 2, assemble the "A" tip and fill with Substrate A (TMB, yellow label).
- Dispense once (200 uL) into each antibody coated tube.
- Set timer for exactly 2 ½ minutes.
- Assemble "B" tip, fill with Substrate B, start timer, and dispense once (200 uL H_2O_2, green label) into each antibody coated tube.
- Shake all tubes for 5 seconds. Solution will turn blue in some or all antibody coated tubes.
- Assemble "Stop" tip, fill with Stop Solution (red label), and stop reaction at end of 2 ½ minutes by dispensing once (200 uL) into each antibody coated tube.

10. Select Standard
    - Wipe outside of all antibody coated tubes.
    - Place both Standard tubes in photometer.
    - Switch tubes until the photometer reading is negative or zero. Record reading. **If reading is greater than – 0.3 in magnitude (reading is less than or lower than – 0.3). results are outside QC limits. Retest the sample(s).**
        - QC Check – If the photometer reading (with both Standard tubes) is **–0.34 o4 0.34**, results are outside the QC limits, and the samples should be retested. If the photometer reading (with both Standard tubes) is **–0.27 or 0.27**, results are within the QC limits, and testing may proceed.
    - Remove and discard tube in right well. The tube in the left well is the conservative standard.
11. Measure Sample
    - Place 1 ppm tube in right well of photometer and record reading. If photometer reading is negative or zero, PCBs are present. If photometer reading is positive, concentration of PCBs is less than 1 ppm.
    - Place 10 ppm tube in right well of photometer and record reading. If photometer reading is negative or zero, PCBs are present. If photometer reading is positive, concentration of PCBs is less than 10 ppm.
12. For a disposal standard of 25 mg/kg: In addition to the standard provided with each kit, a standard of 25 mg/kg should also be extracted and analyzed with each analytical batch of up to 20 samples. Samples that develop less color than the 25-mg/kg standard are interpreted as containing 25 mg/kg or greater of PCBs. Samples that develop more color than the 25 mg/kg standard are interpreted as containing less than 25 mg/kg of PCBs.
13. For a clean up standard of 1 mg/kg: In addition to the standard provided with each kit, a standard at 1 mg/kg should also be extracted and analyzed with each analytical batch of up to 20 samples. Samples that develop less color than the 1 mg/kg standard are interpreted as containing 1 mg/kg or greater of PCBs. Samples that develop more color than the 1 mg/kg standard are interpreted as containing less than 1 mg/kg of PCBs.

4.0 QUALITY CONTROL

Standard precautions for maintaining quality control:

- Do not use reagents or test tubes from one Test System with reagents or test tubes from another Test System.
- Do not use the Test System after any portion has passed its expiration date.
- Do not attempt the test using more than 12 antibody coated tubes (two of which are Standards) at the same time.
- Do not exceed incubation periods prescribed by the specific steps.
- Always follow the procedure in the user's guide.
- Use EPA Method 8082, or CFR 40.136, Appendix A, Method 680 to confirm results.

5.0 STORAGE AND HANDLING PRECAUTIONS

- Wear protective gloves and eyewear.

- Store kit at room temperature and out of direct sunlight (less than 80°F).
- Keep aluminized pouch (containing unused antibody coated tubes) sealed when not in use.
- If Stop Solution or liquid from the extraction jar comes into contact with eyes, wash thoroughly with cold water and seek immediate medical attention.
- Standard Solution contains PCBs. Test samples may contain PCBs. Handle with care.

6.0 ON-SITE QUALITY CONTROL/QUALITY ASSURANCE

1. Prior to Testing Samples
   - Carefully follow the instructions in the User's Guide included with every test kit. This is the key element in obtaining accurate results. In addition, store your unused test kits at room temperature and do not use them past their expiration date (see label on each test kit).
2. Internal Test QC
   - Two standards are analyzed with each sample to provide internal test system quality control. With both standards inserted in the photometer, a valid test is indicated when the magnitude of the displayed number (irrespective of the sign, + or -) is less than the value given in the User's Guide. Test runs resulting in a greater number should be repeated to ensure valid conclusions.
3. QA/QC
   - The validity of field test results can be substantially enhanced by employing a modest, but effective QA/QC plan. The following recommendations have been developed based on the data quality principles established by the U.S.EPA. At a minimum, each principle will be employed during all field testing activities.
     - **Sample Documentation** – All samples will be documented to include the following: Date/time of sampling; Sampler's signature; Brief description of sample(s) appearance; Sample numbers; Sampling location(s), including detailed sketch; and Number and type of sampling containers prepared at each location and corresponding analytical method(s) to be used.
     - **Field analysis documentation** – All samples will be documented to include the following: Raw data; Calibration; Calculations; and Final results of field analysis for all samples screened (including QC samples).
     - **Method calibration** – This is an integral part of the EnSys immunoassay tests; a duplicate calibration will be performed for each set of samples tested. The instructions in the User's Guide will be used for proper techniques.
     - **Method blank** – Methanol will be analyzed from the extraction jar.
     - **Site-specific matrix background field analysis** – For each set of samples tested, an uncontaminated sample from the site matrix will be collected and field analyzed to document the matrix effect.
     - **Duplicate sample field analysis** – At least one of every 20 samples will be analyzed in duplicate to document the method of repeatability.
     - **Confirmation of field analysis** – 10 percent of samples with less than 25 ppm of PCBs, and 100 percent of samples with less than 1 ppm of PCBs, as indicated by the field analysis, will be sent to Southwest Laboratory of Oklahoma, Inc. (SW Labs) for analysis. If the verification samples with less than 25 ppm PCBs are not in agreement with the field results, all verification samples will be sent for lab analysis. If all of the samples with less than 1 ppm PCBs are not in agreement with the field results, the area will be resampled and verification sampling will be repeated until they are in complete agreement. Chain of custody and other documentation used will be maintained in this file.
     - **Performance evaluation sample field analysis (optional, but strongly recommended)** – A performance evaluation sample will be field analyzed daily to document method/operator performance.

- **Matrix spike field analysis (optional)** – A matrix spike will be field analyzed for each set of samples tested in order to document the matrix effect on analyte measurement.

7.0 CALIBRATION OF MICROPIPETTORS

1. Purpose - Good Laboratory Practice dictates that all equipment used for the generation measurement or assessment of data shall be adequately tested, calibrated and/or standardized. A procedure describing a pipette calibration method, records of test performance and repairs should be available for laboratory personnel. This procedure describes a method for evaluating the accuracy and precision of micropipettes used for immunoassay.
2. Materials – Fixed volume, adjustable or variable volume, or repeating volume pipettes with dispensing volumes in the range of 100 to 1000 uL; analytical balance; weighing boat; distilled or deionized water.
3. Procedural Notes – Assign a unique identifier code to each pipette and label each with an indelible marker. Establish data logs for routine recording of testing data and historical performance assessment. Record the identifier code, the pipette manufacturer's model number and the serial number in the logbook. Record any maintenance and repair activity in the logbook. Accuracy and precision specifications given by the manufacturer can be used to evaluate pipette performance until the laboratory can establish its own (see "Expected Results") A testing frequency for this protocol should be established as part of the laboratory standard operating procedures. Monthly testing is recommended for micropipettes in use on a daily basis.
4. Test Protocol
   - Fill a beaker with distilled water.
   - Tare a weigh boat on the analytical balance.
   - Select the pipet volume to be tested.
   - Attach the appropriate pipet tip or syringe (if repeat volume pipet) to the pipette and wet the tip by withdrawing and dispensing several volumes of distilled water in the beaker.
   - Deliver one aliquot of water to the weigh boat and record the weight.
   - Leave this weigh boat in place and tare again. Repeat steps #5 and 6 nine times.
   - Calculate the mean, standard deviation and coefficient of variation (or RSD) for the ten weights and records on the worksheets.
   - Compare results with established specifications (see "Expected Results") for mean weight (accuracy) and % CV (precision).
5. Maintenance and Repair – Pipettes that do not meet specifications should be disassembled and cleaned thoroughly. If necessary, the seals should be replaced according to the manufacturer's instructions. After this is done repeat the test procedure. Pipettes which remain out of specification should be removed from service and submitted to the manufacturer for repair.
6. Expected Results – Pipette manufacturers often will provide technical data showing the degree of inaccuracy and imprecision for their products but each laboratory should collect sufficient data to establish its own specifications. The following ranges are given as guidelines for specifications based on a data set of 100 replicates of the test protocol described above for each micropipette volume.

PIPETTOR TYPE*	TEST VOLUME	MEAN WEIGHT RANGE **	MAXIMUM %CV
Fixed or adjustable	100 uL	98 – 102	0.5
Fixed or adjustable	200 uL	196 – 200	0.5
Fixed or adjustable	250 uL	245 – 251	0.5
Repeat	250 uL	243 – 253	0.8
Repeat	500 uL	492 – 500	0.4
Repeat	1000 uL	986 – 998	0.3

*Eppendorf pipettes were used to generate this data.
**(ug water weight) The mean weight for each pipette volume is lower than 1.00 ug/uL times the test volume. This may be due to evaporation of dispensed water before weighing or specific gravity of water at room temperature slightly less than 1.00 ug/uL.

Precision (%CV) is considered the more important performance criteria than accuracy for micropipettes used in immunoassay.

ATTACHMENT 1
Immunoassay Test Kit Field Sampling QA/QC Record

[redacted]

Project Site Name _____
Project Number _____

Sample ID# _____
Sample Location _____
Purpose _____
Sampled by _____
COC# _____

- ☐ Soil
- ☐ Sediment
- ☐ Water
- ☐ Other: _____
- ☐ QA Sample Type: _____

Sample Data

Date:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.) & Sketch
Time:			
Weather Conditions:			
Method:			
Equipment:			
Monitor Readings (Range in ppm):			

Field Analysis

Raw Data:

Calibration:

Calculations:

Final Results:

Sample Collection Information

Analytical Method	Container Type	# Collected	Other

Observation/Notes

Lithology	Sedimentologic Features	Evidence of Contamination	Misc.

Circle if Applicable

MS/MSD	Duplicate ID#

Signature(s)

ATTACHMENT 2

SOUTHWEST LABS
STANDARD OPERATING PROCEDURES
(SOPs)

1.0 SCOPE AND APPLICATION

1.1 This method is designed to determine the concentrations of various polychlorinated biphenyls (PCBs) as Aroclors™ or individual PCB congeners in extracts from solid and liquid matrices. The method is based on EPA SW-846 methods 8000B and 8082 for analysis and methods 3500B, 3510C, 3520C, 3540C, 3550B, 3580A, 3600C, 3660B, and 3665A for extraction and cleanup. The method can be used to determine analyte concentrations of PCBs in the parts per billion (ppb) range in water and soil matrices. Test codes encompassed by this method include GC601, 602, 610 and GC699. A project-specific addendum (Attachment 8) for BB&L's Kalamazoo Project is provided. See Attachment 8 for details.

1.2 A large number of compounds will give response in the electron capture detector (ECD) using this method. Tables 1, 2, and 3 represent the compounds that may be analyzed by this method.

TABLE 1
Aroclor Target Compound List

ANALYTE	CAS #
Aroclor 1016	12674-11-2
Aroclor 1221	11104-28-2
Aroclor 1232	11141-16-5
Aroclor 1242	53469-21-9
Aroclor 1248	12672-29-6
Aroclor 1254	11097-69-1
Aroclor 1260	11096-82-5

TABLE 2
PCB Congener Target Compound List

ANALYTE	CAS #	IUPAC#
2-Chlorobiphenyl	2051-60-7	1
2,3-Dichlorobiphenyl	16605-91-7	5
2,2',5-Trichlorbiphenyl	37680-65-2	18
2,4',5-Trichlorobiphenyl	16606-02-3	31
2,2'3,5'-Tetrachlorobiphenyl	41464-39-5	44
2,2',5,5'-Tetrachlorbiphenyl	35693-99-3	52
2,3',4,4'-Tetrachlorobiphenyl	32598-10-0	66
2,2',3,4,5'-Pentachlorobiphenyl	38380-02-8	87
2,2',4,5,5'-Pentachlorobiphenyl	37680-73-2	101
2,3,3',4',6-Pentachlorobiphenyl	38380-03-9	110
2,2',3,4,4',5'-Hexachlorobiphenyl	35065-28-2	138
2,2',3,4,5,5'-Hexachlorobiphenyl	52712-04-6	141
2,2',3,5,5',6-Hexachlorobiphenyl	52663-63-5	151
2,2'-4,4'-5,5'-Hexachlorobiphenyl	35065-27-1	153
2,2',3,3',4,4',5-Heptachlorobiphenyl	35065-30-6	170
2,2',3,4,4',5,5'-Heptachlorobiphenyl	35065-29-3	180
2,2',3,4,4',5',6-Heptachlorobiphenyl	52663-69-1	183
2,2',3,4',5,5',6-Heptachlorobiphenyl	52663-68-0	187
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	40186-72-9	206

Table 3
Extended List Aroclor Target Compounds

ANALYTE	CAS #
Aroclor 1262	37324-23-5
Aroclor 1268	11100-14-4

1.3 This method utilizes wide bore capillary columns (0.53 mm ID) or narrow bore capillary (0.32 or 0.25mm ID) columns for both the quantitation and confirmation analyses. There are no method deviations from those referenced in Section 13.0.

1.4 See the Redbook for most current quantitation limits (QLs).

2.0 METHOD SUMMARY

2.1 Continuous liquid-liquid or separatory funnel extraction procedures are employed for the extraction of aqueous samples. Sonication or Soxhlet extraction is required for soil/sediment samples. Both neat and diluted organic liquids may be analyzed by direct injection (Method 3580A, Waste Dilution). All samples go through sulfuric acid cleanup by method 3665.

Continuous liquid-liquid extraction is not a recommended sample preparation method for Method 8082 analyses. Chlorinated compounds may be de-chlorinated. Therefore, method 3510C is recommended for 8082 analyses. Method 3520C, however, may be used in certain instances if pre-approved by management.

2.2 Samples are routinely analyzed on 2 columns of different stationary phases simultaneously to expedite the confirmation of target analytes. All calibration criteria apply to both columns independently. The lower analytical result (between the 2 columns) is routinely reported unless there is apparent evidence of negative matrix interference.

2.3 Columns are calibrated using the external calibration procedure with 5 concentrations of the analytes covering the working linear range of the ECD detectors beginning from the level of quantitation or below. Calibration criteria specified in method 8000B are followed (unless otherwise specified).

2.4 Calibration verification standards are analyzed each 12-hour shift (not to exceed 20 samples) and before the start of an analysis sequence so that they bracket the samples.

2.5 A method blank, laboratory control spike, and a matrix spike/matrix spike duplicate must be prepared for all batches of 20 samples or less.

3.0 HEALTH AND SAFETY

3.1 The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for

maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of Material Safety Data Sheets (MSDS) is available to all personnel involved in chemical analysis.

3.2 PCBs have been tentatively classified as known or suspected, human or mammalian carcinogens. Primary standards of these toxic compounds must be prepared in a hood. A NIOSH/MESA approved toxic gas respirator must be worn when the analyst handles high concentrations of these toxic compounds.

3.3 Caution should be taken when working with all sample extracts and calibration standards. Samples are of unknown origin and should be considered hazardous. Many of the spiking solutions used, along with chlorinated solvents, are considered carcinogens. Concentrated acids and bases, if not handled properly, can cause severe burns.

3.4 Gloves should be used for the manipulation of all sample extracts and calibration standards and during the preparation of all acid and base solutions. Wear personal protective equipment (PPE) and goggles or face shield when warranted. See the standard operating procedure for "Laboratory Safety Plan", SWL-GA-111 for detailed safety procedures.

4.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

4.1 Sample Extraction

4.1.1 Aqueous samples must be extracted within 7 days of collection. Solid samples must be extracted within 14 days of collection.

4.1.2 Extracts must be stored under refrigeration at 4°C (±2°C) and analyzed within 40 days of extraction.

4.2 Sample Storage

4.2.1 The samples must be protected from light and refrigerated at 4°C (±2°C) from the time of receipt until 60 days after delivery to the client of a complete, reconciled sample data package. After 60 days the samples may be disposed of in a manner that complies with all applicable regulations.

4.2.2 The sample must be stored in an atmosphere demonstrated to be free of all potential contaminants.

4.2.3 Samples, sample extracts, and standards must be stored separately.

4.3 Sample Extract Storage

4.3.1 Sample extracts must be protected from light and stored at 4°C (±2°C) until 365 days after delivery to the client of a complete data package.

4.3.2 Sample extracts must be stored in an atmosphere demonstrated to be free of all potential contaminants.

4.3.3 Samples, sample extracts, and standards must be stored separately.

4.4 All containers should be glass jars or bottles with Teflon lids. A minimum of one liter is required for aqueous samples. A minimum of 80g is required for soil samples (125-mL glass jar).

5.0 INTERFERENCES AND POTENTIAL PROBLEMS

5.1 Sources of interference in this method can be grouped into three broad categories: contaminated solvents, reagents or sample processing hardware; contaminated GC carrier gas, parts, column surfaces or detector surfaces; and the presence of co-eluting compounds in the sample matrix to which the ECD will respond. Knowledge of good laboratory practices is assumed, including steps to be followed in routine testing and cleanup of solvents, reagents and sample processing hardware, and instrument maintenance. The discussion that follows focuses on sources of interference associated with the sample matrix and compound classes that represent common sources of interference, particularly phthalate esters, organosulfur compounds, lipids, and waxes. Interferences co-extracted from the samples will vary considerably from sample to sample. While general cleanup techniques are referenced or provided as part of this method, unique samples may require additional cleanup approaches to achieve desired degrees of discrimination and quantitation.

5.2 Interferences by phthalate esters introduced during sample preparation can pose a major problem in pesticide determinations. These materials may be removed prior to analysis using sulfuric acid/permanganate cleanup (3665). Common flexible plastics contain varying amounts of phthalate esters that are easily extracted or leached from such materials during laboratory operations. Cross-contamination of clean glassware routinely occurs when plastics are handled during extraction steps, especially when solvent-wetted surfaces are handled. Interferences from phthalate esters can best be minimized by avoiding contact with all plastic materials and checking all solvents and reagents for phthalate contamination. Exhaustive cleanup of solvents, reagents and glassware may be required to eliminate background phthalate ester contamination.

5.3 The presence of elemental sulfur will result in large peaks that interfere with the detection of later eluting organochlorine pesticides. Method 3660 is suggested for removal of sulfur.

5.4 Differing Aroclor mixtures will co-elute to some degree. Care must be taken to choose non-coeluting peaks for quantitation, (if possible).

5.5 If oven drying of glassware used for PCB analysis is employed, special care must be taken. PCBs are readily volatilized in the oven and spread to other glassware. Therefore, do not dry glassware from samples containing high concentrations of PCBs with glassware that may be used for trace analyses.

6.0 EQUIPMENT/APPARATUS

6.1 Gas chromatograph — Analytical system complete with gas chromatograph suitable for split-splitless injection and all required accessories including syringes, analytical columns, gases, electron capture detector, and recorder/integrator or data system.

6.1.1 HP 5890 Gas Chromatograph with ECD detector(s) and a 7673 autosampler. The autosampler must be capable of 1 µL or 2 µL injections. The carrier gas should be ultra pure helium or hydrogen, and the makeup gas (detector gas) should be ultra pure nitrogen or 5% methane/95% argon.

The following column pairs are recommended:

Column pair 1 — DB-17MS, DB-XLB fused silica capillary columns, 0.25mm ID x 30m, 0.25um film thickness.

Column pair 2 — RTX CLPesticides, 30m x 0.32mm ID, 0.5um film thickness, or 15m x 0.25mm ID, 0.25 film thickness, RTX CLPesticides II, 30m x 0.32mm ID, 0.25um film thickness, or 15m x 0.25mm ID, 0.25um film thickness.

Column pair 3 — DB17/1701P, 30m x 0.32mm ID, 0.25um film thickness.

7.0 REAGENTS

7.1 Reagent or pesticide grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

7.2 All gases (i.e., carrier, auxiliary, etc.) should be at least high purity grade.

7.3 Standards preparation:

Prepare individual stock standard solutions in n-hexane or iso-octane at the following concentrations every six months, or sooner if the solution has degraded or concentrated (Assign log numbers to each of the solutions and log them into the Standards Log Book; see Standard Operating Procedure for "Standards Receipt, Traceability, and Preparation", SWL-OP-202).

7.3.1 Stock Standard Solutions - Individual solutions are obtained from AccuStandard or equivalent supplier at concentrations of 1000µg/mL in hexane.

7.3.1.1 Concentrated and certified standard mixtures can be obtained from several sources. For example, Restek and Supelco supply the Aroclor mixtures. It is recommended that these be used for traceability purposes. Stock standard solutions can then be diluted directly from the concentrates.

7.3.1.2 The surrogate standards tetrachloro-m-xylene and decachlorobiphenyl are added to all standards, samples and blanks.

7.3.1.3 Stock standard solutions must be kept refrigerated at 4°C (±2°C) for no longer than 6 months.

7.3.2 Prepare solutions of the calibration standards for Aroclors 1016/1260 and/or PCB congeners at 5 concentration levels beginning at the quantitation limit and spanning the linear working range of the detector. See Tables 4 and 5 for the solution concentrations. See Table 6 for the extra Aroclor compounds. Calibration standards must remade at least every 6 months, or verified against new standards before use.

Table 4
Aroclor Calibration Standards — Low Point Concentration ng/mL (Level 1)

Aroclor Mixtures	Low Point Concentration ng/mL (Level 1)
AR1016	100
AR1221	100
AR1232	100
AR1242	100
AR1248	100
AR1254	100
AR1260	100

Table 5
PCB Congener Mixture — Low Point Concentration ng/mL (Level 1)

PCB Congener Mixture	Low Point Concentration ng/mL (Level 1)
2-Chlorobiphenyl	10
2,3-Dichlorobiphenyl	2
2,2',5-Trichlorbiphenyl	2
2,4',5-Trichlorobiphenyl	2
2,2'3,5'-Tetrachlorobiphenyl	2
2,2',5,5'-Tetrachlorbiphenyl	2
2,3',4,4'-Tetrachlorobiphenyl	2
2,2',3,4,5'-Pentachlorobiphenyl	2
2,2',4,5,5'-Pentachlorobiphenyl	2
2,3,3',4',6-Pentachlorobiphenyl	2
2,2',3,4,4',5'-Hexachlorobiphenyl	2
2,2',3,4,5,5'-Hexachlorobiphenyl	2
2,2',3,5,5',6-Hexachlorobiphenyl	2
2,2'-4,4'-5,5'-Hexachlorobiphenyl	2
2,2',3,3',4,4',5-Heptachlorobiphenyl	2
2,2',3,4,4',5,5'-Heptachlorobiphenyl	2
2,2',3,4,4',5',6-Heptachlorobiphenyl	2
2,2',3,4',5,5',6-Heptachlorobiphenyl	2
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	2

Table 6
Extended List Mixture — Low Point Concentration ng/mL (Level 1)

Extended List Mixture	Low Point Concentration ng/mL (Level 1)
AR1262	100
AR1268	100

Prepare all solutions in hexane or isooctane. Keep stored at 4°C (±2°C) no longer than 6 months.

7.3.3 Spiking Solutions:

7.3.3.1 Surrogate Solution

The surrogates, Tetrachloro-m-xylene and Decachlorobiphenyl, are added to all standards, samples, matrix spikes, and blanks. Prepare a surrogate spiking solution of 0.2 µg/mL of each of the two compounds in acetone or methanol. The solution should be checked frequently for stability. The solution must be replaced after six months, or sooner, if comparison with quality control check-samples indicates a problem.

CAUTION: Analysts must allow all spiking solutions to equilibrate to room temperature before use.

7.3.3.2 Aroclor Matrix Spiking Solution

7.3.3.2.1 Prepare a spiking solution in methanol (acetone produces interfering aldol-condensation products) that contains the Aroclors or PCB congeners in the concentrations specified in Tables 7 and 8.

Table 7
Matrix Spiking Solution (µg/mL)

ANALYTE	Concentration (µg/mL)
Aroclor 1016	9.0
Aroclor 1260	9.0

Table 8
PCB Congener Matrix Spiking Solution (µg/mL)

ANALYTE	CONCENTRATION (µg/mL)
2-Chlorobiphenyl	0.40
2,3-Dichlorobiphenyl	0.08
2,2',5-Trichlorbiphenyl	0.08
2,4',5-Trichlorobiphenyl	0.08
2,2'3,5'-Tetrachlorobiphenyl	0.08
2,2',5,5'-Tetrachlorbiphenyl	0.08
2,3',4,4'-Tetrachlorobiphenyl	0.08
2,2',3,4,5'-Pentachlorobiphenyl	0.08
2,2',4,5,5'-Pentachlorobiphenyl	0.08
2,3,3',4',6-Pentachlorobiphenyl	0.08
2,2',3,4,4',5'-Hexachlorobiphenyl	0.08
2,2',3,4,5,5'-Hexachlorobiphenyl	0.08
2,2',3,5,5',6-Hexachlorobiphenyl	0.08
2,2'-4,4'-5,5'-Hexachlorobiphenyl	0.08
2,2',3,3',4,4',5-Heptachlorobiphenyl	0.08
2,2',3,4,4',5,5'-Heptachlorobiphenyl	0.08
2,2',3,4,4',5',6-Heptachlorobiphenyl	0.08
2,2',3,4',5,5',6-Heptachlorobiphenyl	0.08
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	0.08

7.3.3.2.2 The solution must be prepared every six months or sooner if the solution has degraded or concentrated.

8.0 PROCEDURE

8.1 Gas chromatography set points:

The following set points are recommended:

Column Conditions:

DB-17MS/XLB

Carrier Gas:	Hydrogen at 12psi
Injector Temp:	220
Detector Temp:	320
Initial Temp:	110, hold for 0.5 minute
Temperature Prog.:	110 to 150 at 25 degrees/minute 150 to 250 at 9 degrees/minute 250 to 320 at 25 degrees/minute
Final Temp:	320 hold for 3.0 minutes.

DB-17/1701

Carrier Gas:	Hydrogen at 7psi
Injector Temp:	220
Detector Temp:	320
Initial Temp:	110, hold for 0.5 minutes Temperature Prog: 110 to 140 at 20 degrees/minute 140 to 280 at 12 degrees/minute
Final Temp:	280 hold for 6.33 minutes

RTX-CLPesticides/CLPesticides II 30m x 0.32mm

Carrier Gas:	Hydrogen at 7psi
Injector Temp:	220
Detector Temp:	320
Initial Temp:	140, hold for 0.5 minutes
Temperature Prog:	140 to 250 at 9 degrees/minute 250 to 300 at 15 degrees/minute
Final Temp:	300 hold for 4.44 minutes

RTX-CLPesticides/CLPesticides II 15m x 0.25mm

Carrier Gas:	Helium at 13 psi
Injector Temp:	220
Detector Temp:	320
Initial Temp:	110, hold for 0.5 minutes
Temperature Prog:	110 to 260 at 7.5 degrees/minute 260 to 290 at 11 degrees/minute
Final Temp:	290 hold for 2.0 minutes

DB-17/1701

Carrier Gas:	Helium at 11 psi
Injector Temp:	220
Detector Temp:	320
Initial Temp:	110, hold for 0.5 minutes
Temperature Prog:	110 to 140 at 20 degrees/minute 140 to 280 at 12 degrees/minute
Final Temp:	280 hold for 6.5 minutes

8.2 Calibration

8.2.1 Refer to Method 8000B for proper calibration techniques. Percent relative standard deviation must be ≤ 20 for all analytes over the five-point calibration range to assume linearity through the origin (and use the mean calibration factor for quantitation). In those instances where the RSD for one or more analytes exceeds 20%, the initial calibration may still be acceptable for mean calibration factor use if the following conditions are met: 1) The mean of the RSD values for all analytes in the calibration is ≤ 20%. The mean RSD is calculated by summing the RSD value for each analyte and dividing by the total number of analytes. If no analyte has an RSD above 20%, then the mean RSD calculation need not be performed. 2) The mean RSD criterion applies to all analytes in the standard, regardless of whether or not they are of interest for a specific project. In other words, if the target analyte is part of the calibration standard, its RSD value is included in the evaluation. 3) The data user must be provided with either a summary of the initial calibration data or a specific list of those compound for which the RSD exceeded 20% and the results of the mean RSD calculation.

8.2.1.1 Note: When using the average % RSD no individual compound may have a %RSD greater than 30% and any compound that has a %RSD greater than 20% must have this problem noted in the narrative associated with the samples.

8.2.2 The procedure of external calibration is used. Quantitation using the mean calibration factor is preferred, however, linear least squares and quadratic fit may be used. If a quadratic fit is to be used, six levels of standards must be analyzed for the initial calibration.

8.2.3 SWLO's policy is to use a five-point calibration for Aroclors 1016 and 1260 and a single point calibration for the other 5 Aroclors.

8.2.4 Because of the low concentration of PCB standards injected on a GC/ECD, column adsorption may be a problem when the GC has not been used for a day. Therefore, the GC column should be primed or deactivated by injecting a PCB standard mixture approximately 4 times more concentrated than the mid-concentration standard. Inject this standard mixture plus 10 to 15 solvent rinses prior to beginning initial or daily calibration, especially if the instrument has set for more than several hours.

Caution: Several analytes, may be observed in the injection just following this system priming. Always run an acceptable blank prior to running any standards or samples.

8.2.5 Results should be flagged with a "P" when the values of the two columns differ by more than 40RPD.

8.3 Gas chromatographic analysis:

8.3.1 Following acceptable initial calibration and calibration verification standards, samples may be analyzed. Analysis of a mid-concentration standard every 10 samples is recommended for dirty samples. Relatively clean samples may allow for an extended sequence (not to exceed a 12-hour period or 20 samples per Method 8000B) based on analyst judgment. Each sample must be bracketed with

an acceptable initial calibration or calibration verification standards interspersed between the sample analyses. When a calibration verification standard fails to meet the ± 15% difference criteria, all samples that were injected after the last standard that last met the criteria must be re-injected. Several exceptions to this rule follow: 1) If the ending calibration verification bracket fails with percent differences > 15% above the initial calibration response and no "hits" are present in the samples, then the samples may be reported; 2) If the average of the responses for all analytes is within 15%, then the calibration has been verified.

However, the average must include all analytes in the calibration, regardless of whether they are target analytes for a specific project, and the data user must be provided with the calibration verification data or a list of those analytes that exceeded the 15% limit. The effect of using the average of the response for all analytes for calibration verification would be similar to that for the initial calibration, namely that the quantitative results for those analytes where the difference is > 15% will include a greater uncertainty.

8.3.1.1 If the CCV fails required criteria, it may be re-injected (once) and if this CCV passes sample analyses may continue. If the CCV fails the 2nd time, then a new initial calibration must be analyzed.

Note: it may be necessary to perform corrective action at this point. Analysts should review reason for CCV failures.

8.3.2 Analysis of a mid-concentration standard every 12-hour shift (not to exceed 20 samples) is required.

8.3.3 Examples of GC/ECD chromatograms generated by instruments with capillary columns are presented in Attachments 2-9.

8.3.4 If the peak response is less than 2.5 times the baseline noise level, the validity of the quantitative result may be questionable. The analyst should consult with the source of the sample to determine whether further concentration of the sample is warranted by the context in which the result is to be used.

8.3.5 If the peak response exceeds the range of the highest standard, quantitatively dilute the extract and reanalyze. The calibration range is defined as the area of the level 5 peak for congeners and the sum of the 5 (level5) peak for Aroclor 1016 and 1260. For aroclors other than 1016/1260 the range is defined by the following

rule. If the peak height in the pattern of a target Aroclor other than 1016 or 1260 exceeds the peak height of the highest peak in the level 5 standard of the 1016/1260 initial calibration, the sample must be diluted to where the peak height of the target analyte pattern falls below the peak height of the highest peak in the level 5 standard.

8.3.6 The identification of target analytes is based on pattern recognition for aroclors and retention time windows for congeners.

Retention time (RT) windows may either be calculated (using the 72-hour study defined in SW846 method 8000B sections 7.6.1 through 7.6.4) or set as a laboratory default. For this method SWLO uses default RT window widths instead of calculating the windows for each instrument/column. The justification for using this approach on SW846 8000 series methods can be found in section 7.6 of SW846 Method 8000B. "The following subsections describe one approach that may be used to establish retention time windows for GC and HPLC methods.

Other approaches may be employed, provided that the analyst can demonstrate that they provide performance appropriate for the intended application."

Default RT window widths are carefully selected to minimize false negatives (windows too narrow) and false positives (windows too wide). The current default windows are ± 0.03 minutes for surrogate TCX and the congeners; ±0.05 minutes for surrogate DCB and the aroclors.

Due to recent advances in "high speed gas chromatography" (and to "demonstrate performance appropriate" for this method) SWLO also uses the following criteria to help define the best default RT window.

1. The window width for each analyte peak has been calculated (using the 72-hour study defined in SW846 Method 8000B sections 7.6.1 through 7.6.4) and are narrower than the default window. This can be done on one instrument and used for all instruments that have identical columns, carrier gas, and temperature programs.

2. The default window width should be wider than ± ½ the width of the peak at half-height (in the high standard).

3. The default window width should be less than ± 2 times the width of the peak at half-height (in the high standard) and less than ± 1% of the absolute retention time.

Table 9
Retention Time Windows (± minutes)

TCX	0.03
Aroclors	0.05
Congeners	0.03
DCB	0.05

8.3.6.1 Extreme care must be taken during the identification process when multiple aroclors are present in the sample extracts. Since many aroclor have similar peaks there will be shifts in peak heights due to contribution from one aroclor to another. Therefore, during the identification process when multiple aroclors appear to be present overlaying the aroclor standards chromatograms will help to assess the proper multiple aroclors present.

8.3.7 If compound identification or quantitation are precluded due to interference (e.g., broad, rounded peaks or ill-defined baselines are present), cleanup of the extract or replacement of the capillary column or detector may be warranted.

8.4 Quantitation of Multiple Component Analytes:

8.4.1 Residues that are mixtures of two or more components present problems in measurement. When they are found together, e.g., Aroclor 1254 and Aroclor 1260, the problem of quantitation becomes even more difficult. Suggestions are offered in the following sections for handing these mixtures.

8.4.1.1 Quantitation of mixtures of residues is difficult, but reasonable accuracy can be obtained. In many cases, the chromatogram of the residue may not exactly match that of the standard. A choice must be made as to which Aroclor or mixture of Aroclors will produce a chromatogram most similar to that of the residue.

8.4.1.2 Aroclor Quantitation--Quantitate the Aroclor residues by comparing the responses of 3 to 5 major peaks in each appropriate Aroclor standards with the peaks obtained from the Aroclor(s) in the sample extract. The amount of Aroclor is calculated using each of the major peaks, and the results of the 3 to 5 determinations are averaged. Major peaks are defined as those peaks in the Aroclor standards that are at least 25% of the height of the largest Aroclor peak and are not precluded by interference in samples containing that particular Aroclor. Later eluting Aroclor peaks are generally the most stable in the environment. Smaller peaks may be chosen for quantitation if major Aroclor and interference peaks co-elute in the samples.

8.4.1.3 When quantitating mixtures of Aroclors, choose peaks that do not coelute with other Aroclors present in the mixture. This minimizes error in quantitation.

8.4.1.4 Technical chlordane component ratios may vary from manufacturer to manufacturer and may degrade significantly in the environment. Highly degraded chlordane looks similar to degraded Aroclor 1254. Therefore, special care must be taken to determine if Aroclor 1254 or technical chlordane is present.

8.5 Aroclors or mixtures of Aroclors are reported as such. PCB congeners may be reported as specific PCB congeners or as estimated "Total PCBs".

8.5.1 When sample results are confirmed by the use of two dissimilar columns, the relative % difference (RPD) between the two concentrations should be calculated. If the RPD is greater than 40%, the peaks need to be checked to verify that there are no overlapping peaks and that the integration has been properly performed. If no anomalies can be detected, then the higher result should be reported.

8.6 See the standard operating procedure for the "Preventive Maintenance of Hewlett-Packard and Fisons Gas Chromatographs", SWL-OP-201, for specific GC maintenance procedures.

9.0 CALCULATIONS

9.1 Calibration Factor (CF) = $\frac{\text{Peak Area (or Height) of the Compound in the Standard}}{\text{conc. in ng/mL of compound}}$

9.2 Mean CF = $\frac{\text{Sum of CF for each level}}{\text{number of levels}}$

9.3 SD = Square root $\left[\frac{\text{Sum of (CF of each individual level - Mean CF)}^2}{\text{(number of levels - 1)}}\right]$

9.4 RSD = $\frac{\text{SD}}{\text{Mean CF}} \times 100$

9.5 See SW-846, Revision 2, January 1995, page 8000B - 20 through 22 for linear and higher order fit equations.

9.6 % Difference = $\frac{\text{Mean CF - CF from the calibration verification standard}}{\text{Mean CF}} \times 100$

9.7 % Drift (used for linear and higher order fits) = $\frac{\text{Calculated conc. - Nominal conc.}}{\text{Theoretical conc.}} \times 100$

9.8 Determine the concentration of individual compounds in the sample.

9.8.1 Sample Concentration Calculation:

9.8.1.1 Aqueous Samples

Concentration (µg/L)=[As] [V(t)][D] / [Mean CF] [V(s)]

where:
As = Area (or height) of the peak for the analyte in the sample.
V(t) = Total volume of concentrated extract (mL).
D = Dilution factor.
Mean CF = Mean calibration factor (1/ng/mL)
V(s) = Volume of aqueous sample extracted (mL).

9.8.1.2 Non-aqueous Samples

Concentration (µg/Kg)=[As] [V(t)][D] / [Mean CF] [W(s)]

where:
As = Area (or height) of the peak for the analyte in the sample.
V(t) = Total volume of concentrated extract (mL).
D = Dilution factor.
Mean CF = Mean calibration factor (1/ng/mL)
W(s) = Weight of sample extracted (g).

9.9 Report results in µg/L for water samples and µg/Kg for solid samples without correction for recovery data. All QC data obtained should be reported with the sample results.

9.10 Dry weight calculation (from data gathered during step 8.1.5.1.6):

$$\% \text{ Moisture} = \frac{\text{grams of sample - grams of dried sample}}{\text{grams of sample}} \times 100$$

10.0 QUALITY ASSURANCE/QUALITY CONTROL

10.1 Refer to Chapter One of SW-846 for specific quality control (QC) procedures. Quality control to validate sample extraction is covered in Method 3500 and in the extraction method utilized. If extract cleanup is to be performed, follow the QC in Method 3600 and in the specific cleanup method.

10.2 Calculate surrogate standard recovery on all samples, blanks, and spikes. Determine if the recovery is within limits established. If recovery is not within limits, the following are required:

10.2.1 Check to be sure there are no errors in calculations and surrogate solutions. Also, check instrument performance.

10.2.2 Recalculate the data and/or reanalyze the extract if any of the above checks reveal a problem.

10.2.3 If both method blank surrogate recoveries are outside of control limits, reanalyze the sample to rule out instrument problems. Re-extract and reanalyze the samples if none of the above are a problem.

10.3 If the spike recoveries are outside of laboratory control limits in both the LCS and LCSD, the LCS/LCSD and associated samples must be re-extracted and reanalyzed. If out-of-control analytes are out high and those analytes are not present in the samples, then no corrective action is required. Control limits will be those annually updated from in-house generated data. See "Blue Book" for SWLO's current control limits.

10.4 If spike recoveries in the MS/MSD are consistent and outside of control limits but the combined LCS/LCSD are within control limits, the poor MS/MSD recoveries may be attributed to matrix effect. If both LCS/LCSD and MS/MSD are outside of control limits the samples and associated QC must be re-extracted and reanalyzed. Control limits will be those annually updated from in-house generated data. See "Blue Book" for SWLO's current control limits.

10.5 Include a mid-concentration calibration standard (1016/1260 for Aroclors) at least every 20 or more samples (not to exceed a 12-hour period) in the analysis sequence as a calibration check. The response factors for the mid-concentration calibration should be within 15 percent of the average values for the multi-concentration calibration. When this continuing calibration is out of this acceptance window, the laboratory should stop analyses, clean the injector, replace the septum and recalibrate the system. Samples that are not preceded by acceptable standards must be re-injected to avoid errors in quantitation. Several exceptions to this rule follows: 1) If the ending calibration verification bracket fails with percent differences > 15% above the initial calibration response and no "hits" are present in the samples, then the samples may be reported; 2) If the average of the responses for all analytes is within 15%, then the calibration has been verified. However, the average must include all analytes in the calibration, regardless of whether they are target analytes for a specific project, and the data user must be provided with the calibration verification data or a list of those analytes that exceeded the 15% limit. The effect of using the average of the response for all analytes for calibration verification would be similar to that for the initial calibration, namely that the quantitative results for those analytes where the difference is > 15% will include a greater uncertainty.

10.6 If any of the target analytes in the calibration verification fall outside of the retention time window established during initial calibration, the system is considered out of control. All samples analyzed after the last compliant calibration verification must be re-analyzed after instrument maintenance and re-calibration is successfully performed.

10.7 Instrument blanks must not contain any confirmed target analyte greater than ½ of the reporting limit for the associated samples. Method blanks must not contain any confirmed target analyte greater than the reporting limit for the associated samples. If contamination is noted, stop all analyses, determine the source of the contamination, remove the source, and confirm the source is gone by reanalyzing an instrument blank and/or method blank as appropriate. QC and associated samples will be re-extracted and reanalyzed if the blank contamination is present > PQL in the samples.

11.0 WASTE DISPOSAL/POLLUTION PREVENTION

See Standard Operating Procedure "*Hazardous Waste Management Plan*", SWL-GA-114.

12.0 METHOD PERFORMANCE

12.1 The MDL concentrations are updated annually and are obtained using organic-free reagent water and sandy loam soil. The QA Department maintains MDL results in SWLO's "Red book". Details for determining MDLs are given in Chapter One of SW-846 and the SOP for the Definition and Determination of Detection Limits, SWL-GA-113. The MDL actually achievable in a given analysis is dependent on any matrix effects.

12.2 The accuracy and precision obtainable following this method will be determined by the sample matrix, sample preparation technique, optional cleanup techniques, and calibration procedures used.

12.3 The laboratory should maintain control charts of LCS, MS, and MSD recoveries and relative percent deviations between MS and MSD recovery for accuracy and precision data. Surrogate recovery is also plotted. The control charts are monitored monthly for LCS and quarterly for MS and are maintained on file in the laboratory. Control limits are updated on an annual basis (See SOP "Control Charts", SWL-GA-112 for more details). See "Blue Book" for SWLO's most current control limits.

12.4 Example chromatograms are shown in Attachments 2-5.

13.0 REFERENCES

U.S.EPA SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods: "Method 3500B. Organic Extraction and Sample Preparation" Revision 2, December 1996.

U.S.EPA SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods: "Method 3510C. Separatory Liquid-Liquid Extraction" Revision 3, December 1996.

U.S.EPA SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods: "Method 3520C. Continuous Liquid-Liquid Extraction" Revision 3, December 1996.

U.S.EPA SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods: "Method 3540C. Soxhlet Extraction" Revision 3, December 1996.

U.S.EPA SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods: "Method 3550B. Sonication Extraction" Revision 2, December 1996.

U.S.EPA SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods: "Method 3580A. Waste Dilution" Revision 1, July 1992.

U.S.EPA SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods: "Method 8000B. Determinative Chromatographic Separations" Revision 2, December 1996.

U.S.EPA SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods: "Method 8082. Polychlorinated Biphenyls (PCBs) by Gas Chromatography" Revision 0, December 1996.

Standard Operating Procedure, "Preventative Maintenance of Hewlett-Packard and Fisons Gas Chromatographs", SWL-OP-201.

Standard Operating Procedure, "Standards Receipt, Traceability, and Preparation", SWL-OP-202.

Standard Operating Procedure, "Laboratory Safety Plan", SWL-GA-111.

Standard Operating Procedure, "Control Charts", SWL-GA-112.

Standard Operating Procedure, "Definition and Determination of Detection Limits", SWL-GA-113.

Standard Operating Procedure, "Hazardous Waste Management Plan", SWL-GA-114.

Headquarters Air Force Center for Environmental Excellence Quality Assurance Project Plan, Version 2.0, January 1997.

U.S.EPA, Statement of Work OLM03.2, "Organic Analysis: Multi-media, Multi-concentration".

14.0 DEFINITIONS

PQL:.....Practical Quantitation Limit.

N/A:.....not applicable

MSDS: .....Material Safety Data Sheet: Information provided by commercial vendors for the chemical products prepared by their company. The information on the MSDS includes but is not limited to composition, physical properties, hazard identification, first aid measures, emergency clean up and/or response, exposure, and storage.

SDG: .....the Sample Delivery Group; a unit within a single case that is used to identify a group of samples for delivery. A SDG is a group of 20 or fewer field samples within a case, received over a period of up to 14 calendar days (7 calendar days for 14-day turns). Data from all samples in a SDG are due concurrently.

15.0 ATTACHMENTS

Attachment 1:.....Sample Extraction Log

Attachment 2:.....Chromatographic Report: Congeners

Attachment 3:.....Chromatographic Report: AR1221

Attachment 4:.....Chromatographic Report: AR1232

Attachment 5:.....Chromatographic Report: AR 1242

Attachment 6:.....Chromatographic Report: AR1248

Attachment 7:.....Chromatographic Report: AR1254

Attachment 8:.....BB&L Addendum

ATTACHMENT 1
Sample Extraction Log

	SV	PCB	OTHER
CONT EX. (3520B)			
SEP-F (3510B)		XXXXX	
SHAKER			
SONC. (3550)			
SOXHLET			

[ ] RUSH [ ] REEXTRACT [ ] TCLP [ ] N

SAMPLE EXTRACTION LO

SWLO
SOUTHWEST LABORATORY OF OKLAHOMA INC.

BATCH: 991110WB

EXTRACT DATE: 1999-11-10 08:27

000646
Page: 1 of 1

SAMPLE ID (EPISODE #)	CLIENT CASE	DATE RECEIVED / CLIENT SAMPLE ID	MATRIX/LEVEL	SAMPLE pH	% MOISTURE	DRY WEIGHT	AMOUNT EXTRACTED	EXTRACTED VOLUME	GPC VOLUME	GPC ELUTE VOL	FLORISIL VOL CONC	FLORISIL FIN VOL CONC	VOL SV (P)	FIN PROCESS VOLUME	SCREEN Y/N	MS SV (P)	SURR SV (P)	BASE pH CONFIRMATION	ACID pH CONFIRMATION
						g	g (g)	ml	ml	ml	ml	ml	ml	ml	Y/N	µl	µl		
BL1110WB			W/L				1000	200	N\A	N\A	N\A	N\A	10.0	10.0	N		1000		
BB1110WB			W/L				1000	200	N\A	N\A	N\A	N\A	10.0	10.0	N		1000		
LC1110WB			W/L				1000	200	N\A	N\A	N\A	N\A	10.0	10.0	N	1000	1000		
LD1110WB			W/L				1000	200	N\A	N\A	N\A	N\A	10.0	10.0	N	1000	1000		
41011.01 GC801	XXXXXXX XXXXXXX	XXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXX	W/L	6.44			1000	200	N\A	N\A	N\A	N\A	10.0	10.0	N		1000		
41011.02 GC801	XXXXXXX XXXXXXX	XXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXX	W/L	7.08			1000	200	N\A	N\A	N\A	N\A	10.0	10.0	N		1000		
41011.03 GC801	XXXXXXX XXXXXXX	XXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXX	W/L	7.09			1000	200	N\A	N\A	N\A	N\A	10.0	10.0	N		1000		
41011.04 GC801	XXXXXXX XXXXXXX	XXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXX	W/L	7.64			1000	200	N\A	N\A	N\A	N\A	10.0	10.0	N		1000		
41013.01 GC801	[redacted]	11/09/1999 09:15 U9-16-014	W/L	6.80			1000	200	N\A	N\A	N\A	N\A	10.0	10.0	N		1000		
41013.02MS GC801	[redacted]	11/09/1999 09:15 U9-16-014	W/L	6.80		✓	500	200	N\A	N\A	N\A	N\A	10.0	10.0	N	1000	1000		
41013.03MSD GC801	[redacted]	11/09/1999 09:15 U9-16-014	W/L	6.80		✓	500	200	N\A	N\A	N\A	N\A	10.0	10.0	N	1000	1000		

INITIALS

WEIGHING:	RC	EXTRACTION:	DDC	FLORISIL:	N/A
CLEANUP:	N/A	KD:	RC		
BLOWDOWN:	CLD	TV:	N/A		
SURROG. SPIKER:	DDC	VERIFIER:	JR		
MATRIX SPIKER:	DDC	VERIFIER:	JR		
SUBMITTED BY:	CLD	REVIEWED BY:			

11/11/99

ID NUMBERS

FLORISIL CARTRIDGE #:	N/A
GPC COLUMN #:	N/A
SURROGATES ID CONC #:	5-261-4
MATRIX SPIKE SOLN/CONC #(s):	5-188-4
SOP - METHOD # : SWL-OP-	414 Rev. 2.0

COMMENTS

✓ INSuff sample for full vol.

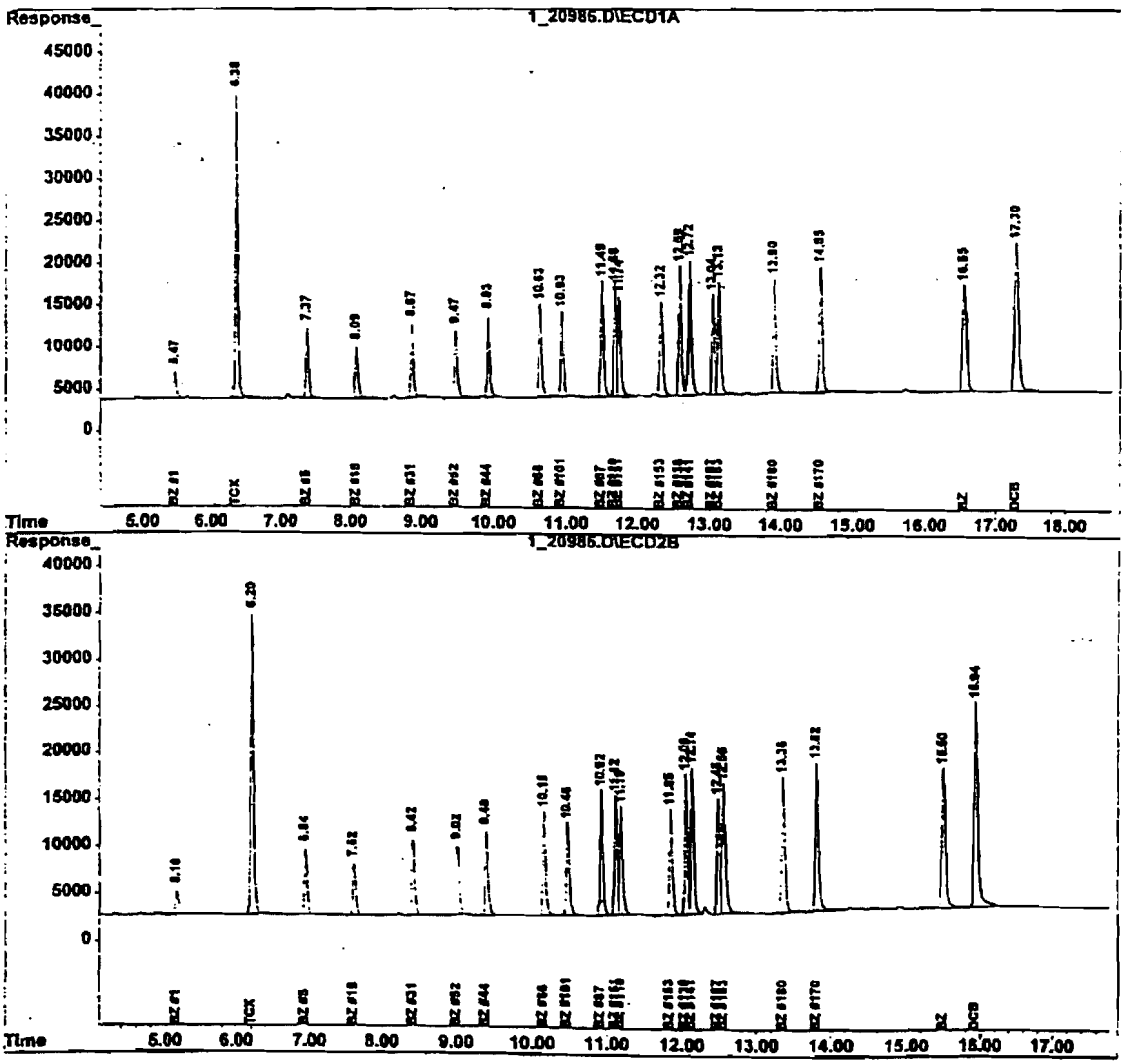
ATTACHMENT 2
Chromatographic Report: Congeners

Chromatographic Report

```
Signal #1 : F:\HPCHEM\HP\1\DATA\10_07_99\1_20986.D\ECD1A.CH Vial: 16
Signal #2 : F:\HPCHEM\HP\1\DATA\10_07_99\1_20986.D\ECD2B.CH
Acq On    :  7 Oct 1999  13:59                          Operator:
Sample    : BZL51A                                      Inst     : HP_01
Misc      : 5-231-4                                     Multiplr: 1.0000
IntFile Signal #1: events.e      IntFile Signal #2: events2.e
Quant Time: Oct  7 14:28 1999  Quant Results File: BZJ07.RES

Method        : F:\HPCHEM\HP\1\METHODS\BZJ07.M
Title-Path    : SW-846, METHOD 8082 - F:\HPCHEM\HP\1\DATA\10_07_99\
Last Update   : Fri Oct 08 09:02:03 1999
Response via  : Multiple Level Calibration

Volume Inj.       : 1uL
Signal #1 Phase   : DB-1701            Signal #2 Phase: DB-17
Signal #1 Info    : .32                Signal #2 Info : .32
Signal #1 Inst    : HP_01A             Signal #2 Inst : HP_01B
```



1_20986.D BZJ07.M Wed Oct 27 10:31:19 1999 Page 2

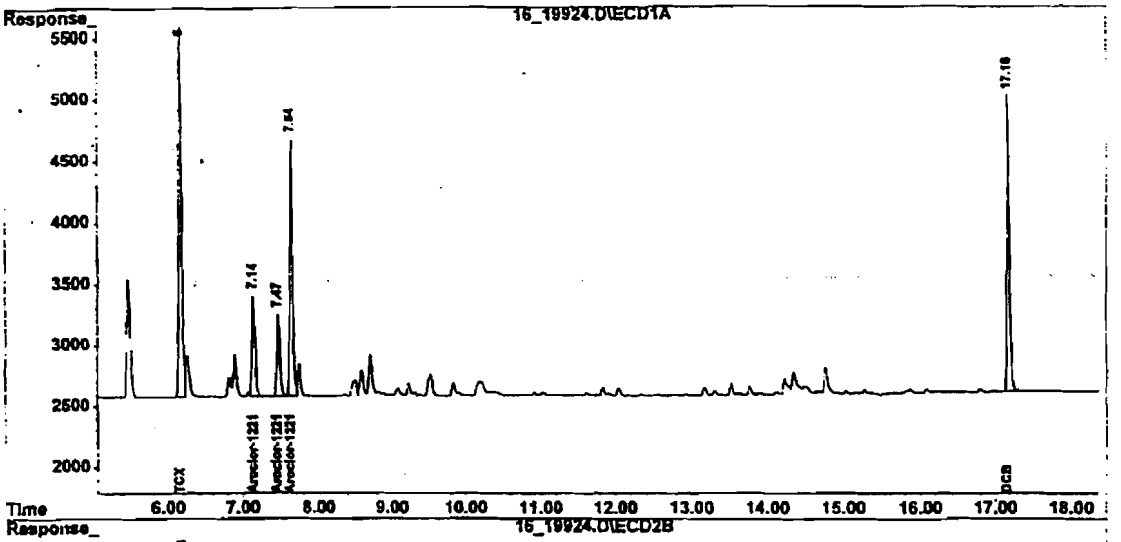
ATTACHMENT 3
Chromatographic Report: AR1221

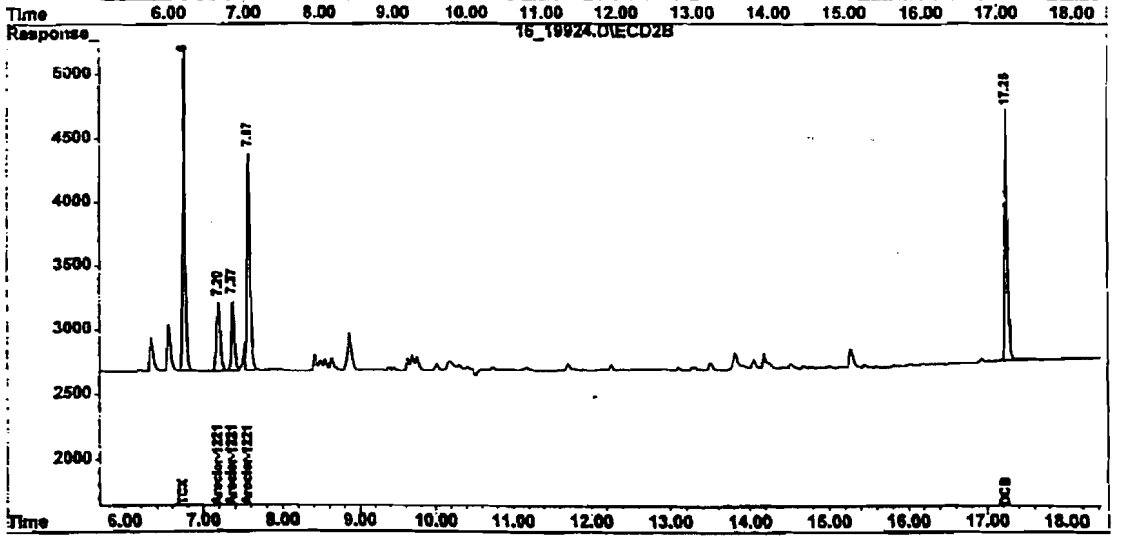
Chromatographic Report

```
Signal #1 : F:\HPCHEM\HP\16\DATA\10_26_99\16_19924.D\ECD1A.CH Vial: 7
Signal #2 : F:\HPCHEM\HP\16\DATA\10_26_99\16_19924.D\ECD2B.CH
Acq On    : 26 Oct 1999  16:26                        Operator: NITA
Sample    : AR1221L116O                               Inst    : HP_16
Misc      : 5-62-4                                    Multiplr: 1.0000
IntFile Signal #1: events.e     IntFile Signal #2: events2.e
Quant Time: Oct 27  7:46 1999  Quant Results File: SPPCBJ26.RES

Method        : F:\HPCHEM\HP\16\METHODS\SPPCBJ26.M
Title-Path    : PCB/TOXAPHENE - F:\HPCHEM\HP\16\DATA\10_21_99\
Last Update   : Thu Oct 28 14:57:34 1999
Response via  : Single Level Calibration

Volume Inj.      : 0.5uL
Signal #1 Phase  : DB-17MS            Signal #2 Phase: DB-XLB
Signal #1 Info   : .25                Signal #2 Info : .25
Signal #1 Inst   : HP_16A             Signal #2 Inst : HP_16B
```





16_19924.D SPPCBJ26.M Tue Nov 09 13:07:03 1999 Page 2

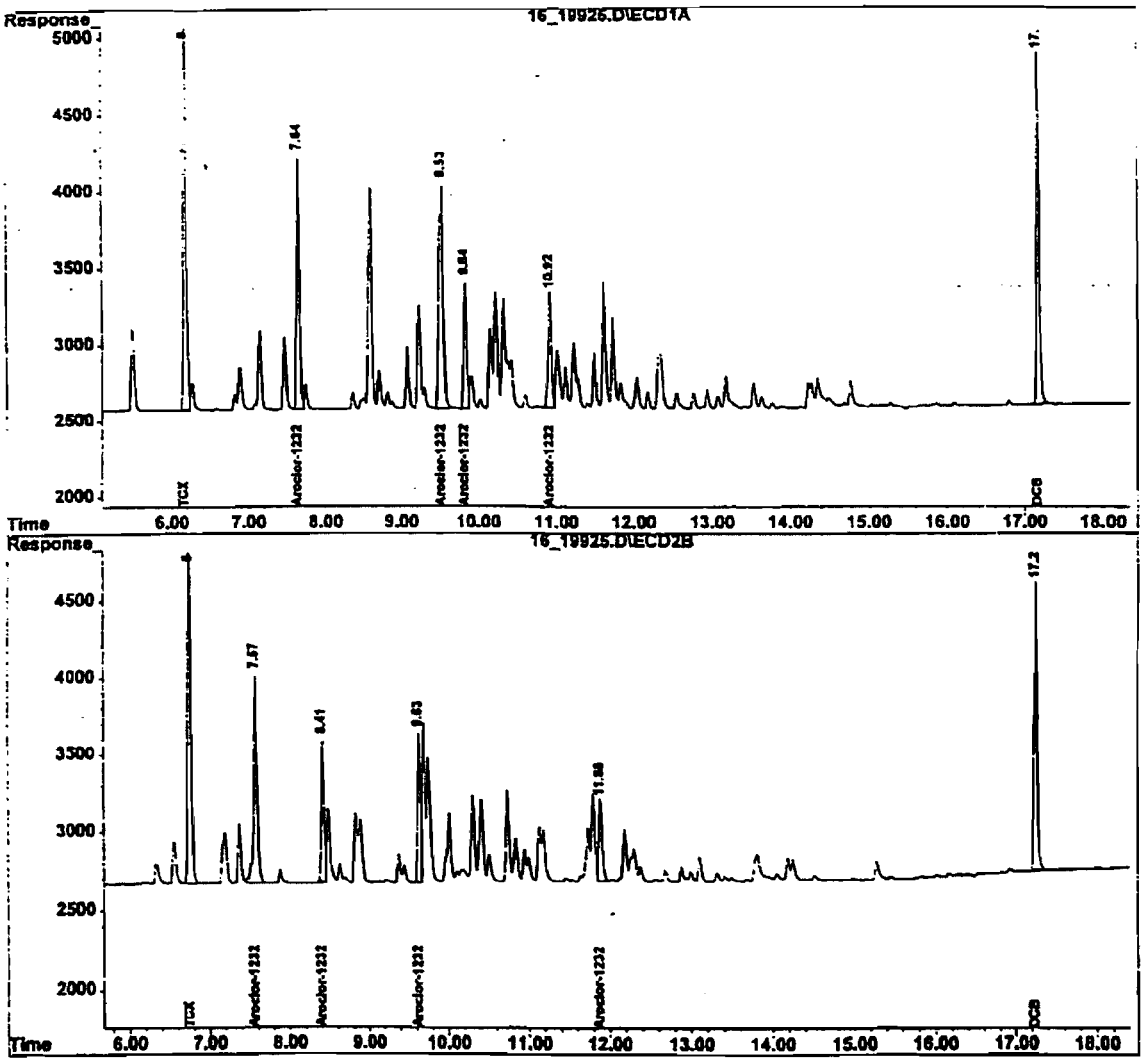
ATTACHMENT 4
Chromatographic Report: AR1232

Chromatographic Report

```
Signal #1 : F:\HPCHEM\HP\16\DATA\10_26_99\16_19925.D\ECD1A.CH Vial: 8
Signal #2 : F:\HPCHEM\HP\16\DATA\10_26_99\16_19925.D\ECD2B.CH
Acq On    : 26 Oct 1999  16:49                        Operator: NITA
Sample    : AR1232L1160                               Inst    : HP_16
Misc      : 5-67-4                                    Multiplr: 1.0000
IntFile Signal #1: events.e     IntFile Signal #2: events2.e
Quant Time: Oct 27  7:46 1999  Quant Results File: SPPCBJ26.RES

Method       : F:\HPCHEM\HP\16\METHODS\SPPCBJ26.M
Title-Path   : PCB/TOXAPHENE - F:\HPCHEM\HP\16\DATA\10_26_99\
Last Update  : Thu Oct 28 14:57:34 1999
Response via : Single Level Calibration

Volume Inj.      : 0.5uL
Signal #1 Phase  : DB-17MS          Signal #2 Phase: DB-XLB
Signal #1 Info   : .25              Signal #2 Info : .25
Signal #1 Inst   : HP_16A           Signal #2 Inst : HP_16B
```



16_19925.D SPPCBJ26.M Tue Nov 09 13:07:19 1999 Page 2

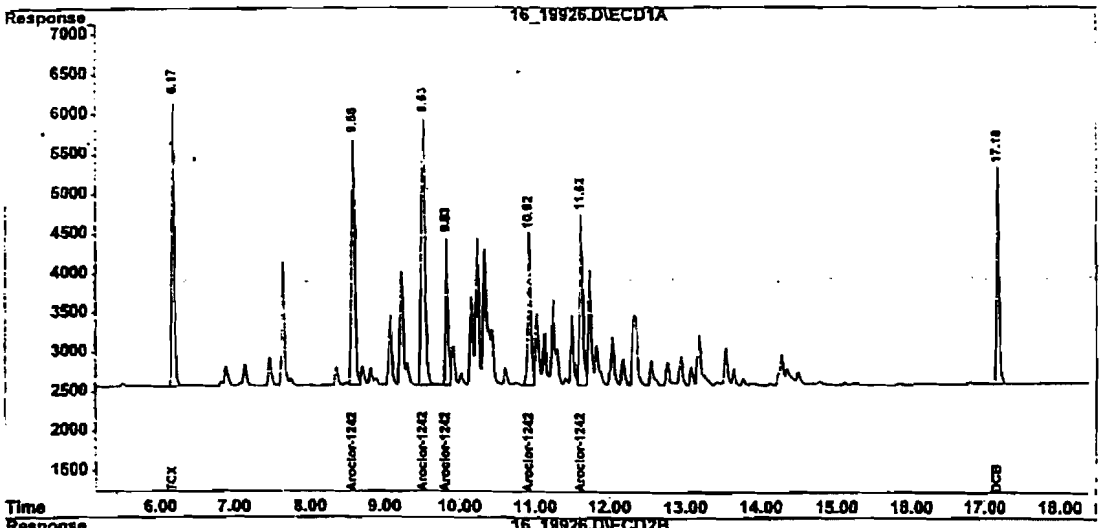
ATTACHMENT 5
Chromatographic Report: AR1242

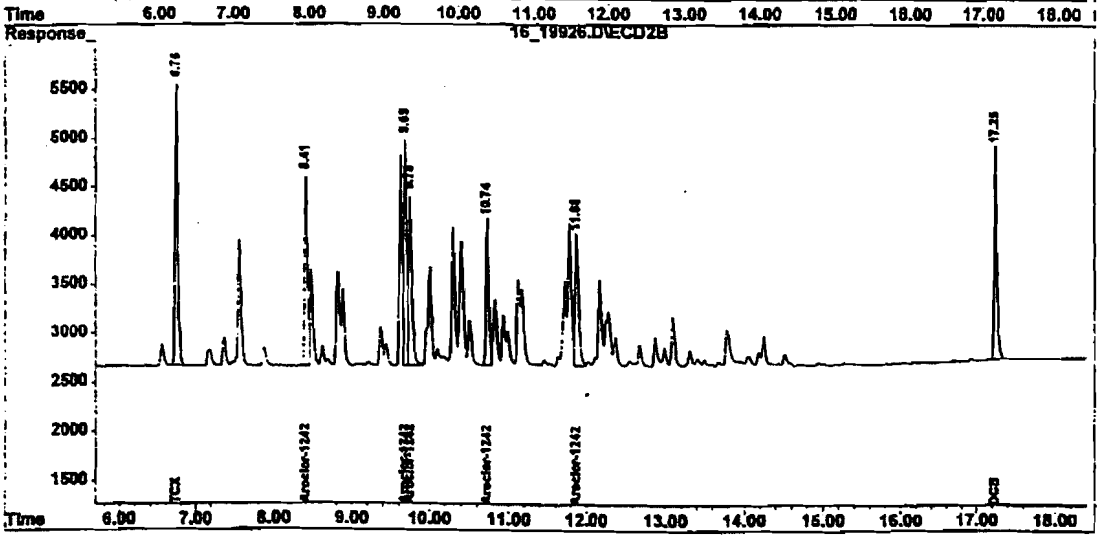
Chromatographic Report

```
Signal #1 : F:\HPCHEM\HP\16\DATA\10_26_99\16_19926.D\ECD1A.CH Vial: 9
Signal #2 : F:\HPCHEM\HP\16\DATA\10_26_99\16_19926.D\ECD2B.CH
Acq On    : 26 Oct 1999  17:12                        Operator: NITA
Sample    : AR1242L1160                               Inst    : HP_16
Misc      : 5-265-3                                   Multiplr: 1.0000
IntFile Signal #1: events.e     IntFile Signal #2: events2.e
Quant Time: Oct 27  7:47 1999  Quant Results File: SPPCBJ26.RES

Method       : F:\HPCHEM\HP\16\METHODS\SPPCBJ26.M
Title-Path   : PCB/TOXAPHENE - F:\HPCHEM\HP\16\DATA\10_26_99\
Last Update  : Thu Oct 28 14:57:34 1999
Response via : Single Level Calibration

Volume Inj.      : 0.5uL
Signal #1 Phase  : DB-17MS            Signal #2 Phase: DB-XLB
Signal #1 Info   : .25                Signal #2 Info : .25
Signal #1 Inst   : HP_16A             Signal #2 Inst : HP_16B
```





16_19926.D SPPCBJ26.M Tue Nov 09 13:07:34 1999 Page 2

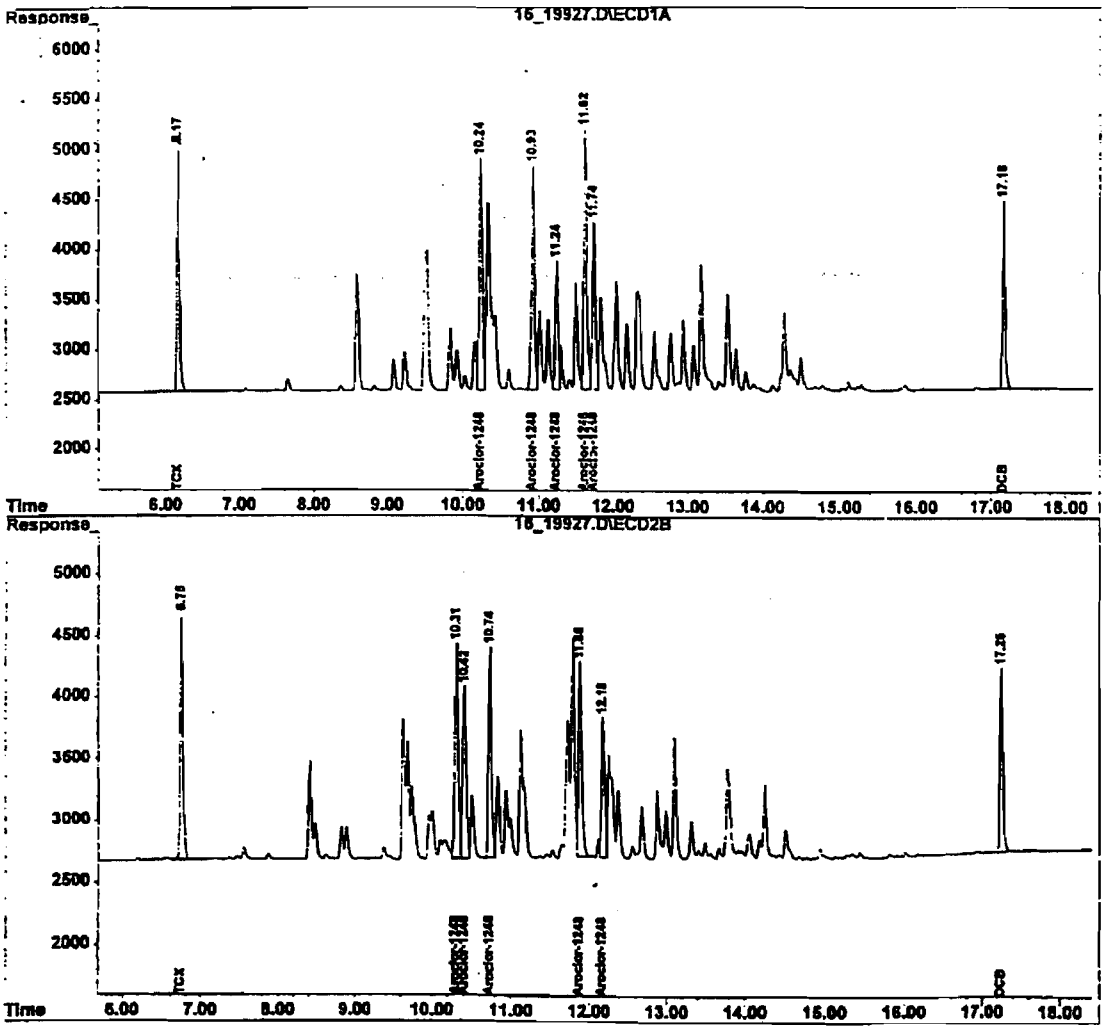
ATTACHMENT 6
Chromatographic Report: AR1248

Chromatographic Report

```
Signal #1 : F:\HPCHEM\HP\16\DATA\10_26_99\16_19927.D\ECD1A.CH Vial: 10
Signal #2 : F:\HPCHEM\HP\16\DATA\10_26_99\16_19927.D\ECD2B.CH
Acq On    : 26 Oct 1999  17:35                        Operator: NITA
Sample    : AR1248L1160                               Inst    : HP_16
Misc      : 5-72-4                                    Multiplr: 1.0000
IntFile Signal #1: events.e     IntFile Signal #2: events2.e
Quant Time: Oct 27  7:47 1999  Quant Results File: SPPCBJ26.RES

Method       : F:\HPCHEM\HP\16\METHODS\SPPCBJ26.M
Title-Path   : PCB/TOXAPHENE - F:\HPCHEM\HP\16\DATA\10_26_99\
Last Update  : Thu Oct 28 14:57:34 1999
Response via : Single Level Calibration

Volume Inj.      : 0.5uL
Signal #1 Phase  : DB-17MS          Signal #2 Phase: DB-XLB
Signal #1 Info   : .25              Signal #2 Info : .25
Signal #1 Inst   : HP_16A           Signal #2 Inst : HP_16B
```



16_19927.D SPPCBJ26.M Tue Nov 09 13:07:52 1999 Page 2

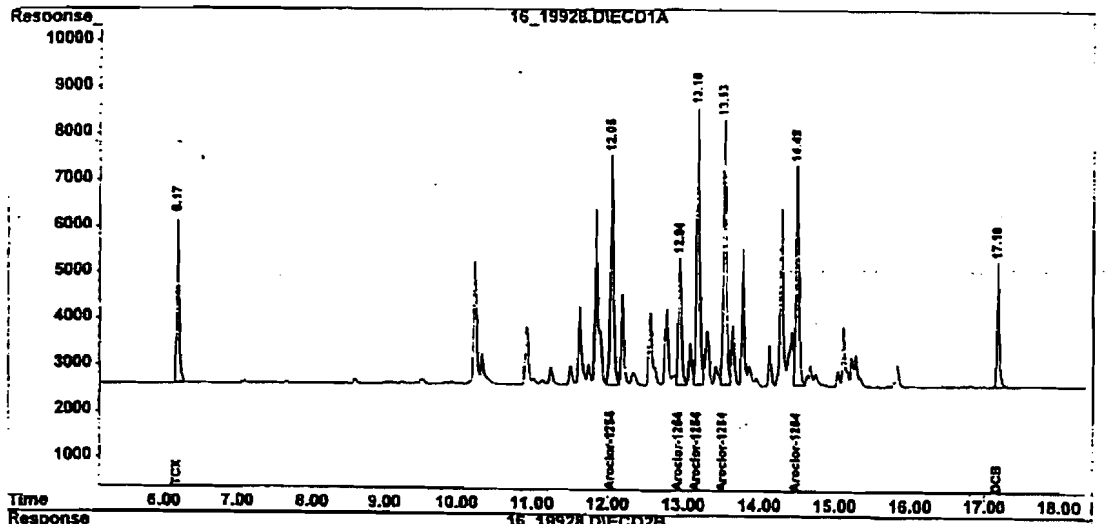
ATTACHMENT 7
Chromatographic Report: AR1254

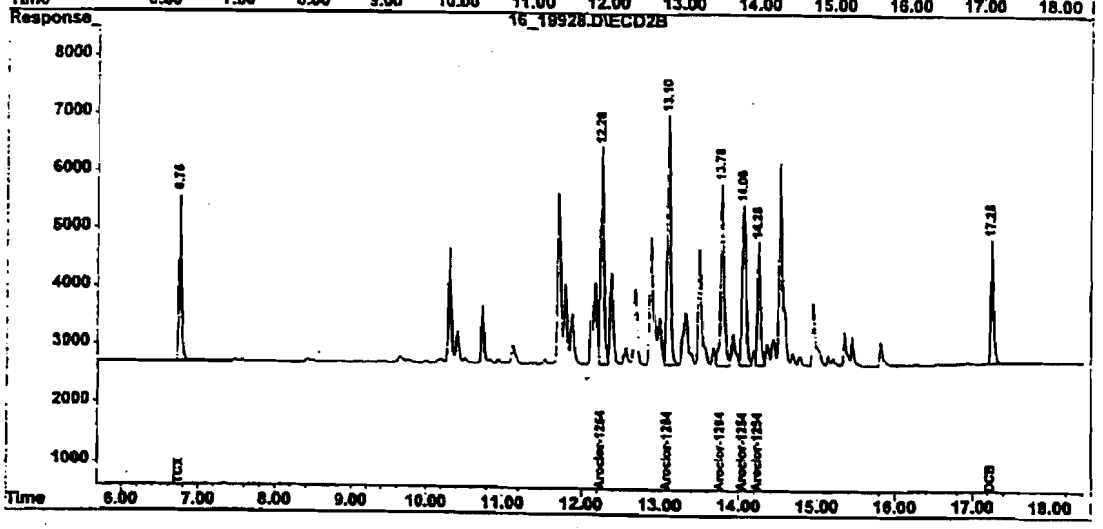
Chromatographic Report

```
Signal #1 : F:\HPCHEM\HP\16\DATA\10_26_99\16_19928.D\ECD1A.CH Vial: 11
Signal #2 : F:\HPCHEM\HP\16\DATA\10_26_99\16_19928.D\ECD2B.CH
Acq On    : 26 Oct 1999  17:58                        Operator: NITA
Sample    : AR1254L1160                               Inst    : HP_16
Misc      : 5-275-3                                   Multiplr: 1.0000
IntFile Signal #1: events.e     IntFile Signal #2: events2.e
Quant Time: Oct 27  7:48 1999  Quant Results File: SPPCBJ26.RES

Method       : F:\HPCHEM\HP\16\METHODS\SPPCBJ26.M
Title-Path   : PCB/TOXAPHENE - F:\HPCHEM\HP\16\DATA\10_26_99\
Last Update  : Thu Oct 28 14:57:34 1999
Response via : Single Level Calibration

Volume Inj.      : 0.5uL
Signal #1 Phase  : DB-17MS          Signal #2 Phase: DB-XLB
Signal #1 Info   : .25              Signal #2 Info : .25
Signal #1 Inst   : HP_16A           Signal #2 Inst : HP_16B
```





16_19928.D SPPCBJ26.M Tue Nov 09 13:08:07 1999 Page 2

ATTACHMENT 8
BB&L Addendum

BB&L Addendum

ANALYTICAL TECHNIQUES

PCB analyses will be performed according to the laboratory's Standard Operating Procedure (SOP) for SW-846 8082 analysis, modified to include the following:

- Five-point calibration will be performed for Aroclors 1016, 1242, 1254 and 1260. Single points will be analyzed for the remaining Aroclors;
- Samples will be extracted in hexane:acetone by soxhlet, followed by cleanup using sulfuric acid, silica gel and GPC (see SWL-OE-420;)
- All samples will be fully quantitated on two columns, one of which must be a DB-5 or equivalent. The second will be a Restek CLP Pesticide Column. The higher of the two quantitated results will be reported;
- Full integration results (rt-vs- response for all detected peaks) will be provided for all samples and standards;
- The matrix spike will include Aroclor 1254, additional Aroclors may also be added at the discretion of the laboratory;
- A reporting limit of 0.05 mg/kg will be used. Values between the reporting limit and the detection limit will be reported with a "J" qualifier.

Request for New, Revised, or Retired Documentation

GENERAL ADMINISTRATIVE

SOP SWL-GA-101, REV. # 2.0 FILE ID: GA101F1.doc

Document Title: Analysis of PCBs by GC, SW846-1460 8082

Document No.: SWL-0.P-415 *Existing* Rev. No. & Date 32 — 01123101

Submitted By *(if other than supervisor)*: (NB) Date Submitted: 9-14-01

Approved by: [signature] Date: 9-14-01
Program Manager/Section Supervisor

NEW Procedural Document *(Please attach hard-copy, and/or note below if file was e-mailed.)*

Author: _____

Justification for New Procedure:

REVISION *To Existing Procedural Documents, Including Forms & Logs*

Reason for Revision: ___ Annual Review (X Changes / ___ No Changes) X Other (error found, etc.) Navy #5 #6)

For Minor Revisions, provide the following References:

Page 10 Section: 8.2 ; Subpart: .1.1 Page 12 Section: 8.3 ; Subpart: .6.1
Page 11 Section: 8.3 ; Subpart: .1.1 Page 13 Section: 8.5 ; Subpart: .1

Attachment No. _____ — Title: _____
Attachment No. _____ — Title: _____

Required — The following must be completed if revisions are necessary.
Description:
Add attachment

RETIRED *(Circle One — PROCEDURE or DOCUMENT)*

Circle "Procedure" if we no longer do the Method/Procedure discussed in the SOP.
Circle "Document" if the Method/Procedure is now included in another SOP. (Reference Other SOP's below)

SOUTHWEST LABORATORY OF OKLAHOMA, INC.
1700 West Albany • Broken Arrow, OK 74012 • Office (918) 251-2858 • Fax (918) 251-2599

8.2.1.1 Note: When using the average % RSD no individual compound may have a %RSD greater than 30% and any compound that has a %RSD greater than 20% must have this problem noted in the narrative associated with the samples.

8.3.1.1 If the CCV fails required criteria, it may be re-injected (once) and if this CCV passes sample analyses may continue. If the CCV fails the 2nd time, then a new initial calibration must be analyzed. Note: it may be necessary to perform corrective action at this point. Analysts should review reason for CCV failures.

8.3.6.1 Extreme care must be taken during the identification process when multiple aroclors are present in the sample extracts. Since many aroclor have similar peaks there will be shifts in peak heights due to contribution from one aroclor to another. Therefore during the identification process when multiple aroclors appear to be present overlaying the aroclor standards chromatograms will help to assess the proper multiple aroclors present.

8.5.1 When sample results are confirmed by the use of two dissimilar columns the relative % difference (RPD) between the two concentrations should be calculated. If the RPD is greater than 40%, the peaks need to be checked to verify that there are no overlapping peaks and that the integration has been properly performed. If no anomalies can be detected then the higher result should be reported.

ATTACHMENT 3

SOUTHWEST LABS PROFICIENCY TEST REPORT

WADSWORTH CENTER
NEW YORK STATE DEPARTMENT OF HEALTH
ENVIRONMENTAL LABORATORY APPROVAL PROGRAM

Proficiency Test Report

Lab Id: 11672
EPA Lab Code: OK00006

SOUTHWEST LAB OF OKLAHOMA
1700 W ALBANY
BROKEN ARROW, OK-74012
(918) 251-2858
Director: MR. ROBERT W. HARRIS

Shipment Date : 22-Jul-2002
Closing Date : 05-Sep-2002
Score Date : 24-Sep-2002

This report may contain data that are not covered by the NVLAP accreditation.
** Indicates NVLAP accredited analyte. Lab Code 200387-0. ELAP is an A2LA accredited Proficiency Testing Provider. Certificate Number 1785.01

Shipment: 255 Non Potable Water Chemistry

Analyte Name	Units	Sample ID	Method	Result	Mean/ Target	Warning Limits	Acceptance Limits	Score
Sample: Solid and Hazardous Waste Polynuclear Aromatic Hydrocarbons								
Dibenzo(a,h)anthracene EPA Code: N/A	ug/kg	5524	SW-846 8270C	752	541		D.L. - 1180 *105 passed out of 105 reported results.*	Satisfactory
Fluoranthene EPA Code: N/A	ug/kg	5524	SW-846 8270C	645	502		73 - 931 *102 passed out of 106 reported results.*	Satisfactory
Fluorene EPA Code: N/A	ug/kg	5524	SW-846 8270C	911	793		73 - 1510 *104 passed out of 106 reported results.*	Satisfactory
Indeno(1,2,3-cd)pyrene EPA Code: N/A	ug/kg	5524	SW-846 8270C	3070	2910		231 - 5590 *104 passed out of 105 reported results.*	Satisfactory
Naphthalene EPA Code: N/A	ug/kg	5524	SW-846 8270C	578	425		D.L. - 863 *104 passed out of 106 reported results.*	Satisfactory
Phenanthrene EPA Code: N/A	ug/kg	5524	SW-846 8270C	4260	3400		280 - 6520 *106 passed out of 106 reported results.*	Satisfactory
Pyrene EPA Code: N/A	ug/kg	5524	SW-846 8270C	5080	3790		160 - 7420 *105 passed out of 107 reported results.*	Satisfactory
Sample: Solid and Hazardous Waste Polychlorinated Biphenyls								
PCB-1016 EPA Code: N/A	ug/kg	5525	SW-846 8082	< 33.1	< 2000		*115 passed out of 116 reported results.*	Satisfactory
PCB-1221 EPA Code: N/A	ug/kg	5525	SW-846 8082	< 33.1	< 2000		*115 passed out of 115 reported results.*	Satisfactory

WADSWORTH CENTER
NEW YORK STATE DEPARTMENT OF HEALTH
ENVIRONMENTAL LABORATORY APPROVAL PROGRAM

Proficiency Test Report

Lab Id: 11672
EPA Lab Code: OK00006

SOUTHWEST LAB OF OKLAHOMA
1700 W ALBANY
BROKEN ARROW, OK-74012
(918) 251-2858
Director: MR. ROBERT W. HARRIS

Shipment Date : 28-Jan-2002
Closing Date : 15-Mar-2002
Score Date : 02-Apr-2002

This report may contain data that are not covered by the NVLAP accreditation.
** Indicates NVLAP accredited analyte. Lab Code 200387-0. ELAP is an A2LA accredited Proficiency Testing Provider. Certificate Number 1785.01

Shipment: 250 Non Potable Water Chemistry

Analyte Name	Units	Sample ID	Method	Result	Mean/ Target	Acceptance Limits	Warning Limits	Score
Sample: Solid and Hazardous Waste Polychlorinated Biphenyls								
PCB-1232 EPA Code: N/A	ug/kg	5025	Invalid Method Code: 4098	< 3360	< 10000			Satisfactory *115 passed out of 119 reported results.*
PCB-1242 EPA Code: N/A	ug/kg	5025	Invalid Method Code: 4098	24800	23600	D.L. - 53900		Satisfactory *118 passed out of 119 reported results.*
PCB-1248 EPA Code: N/A	ug/kg	5025	Invalid Method Code: 4098	< 3360	< 10000			Satisfactory *113 passed out of 120 reported results.*
PCB-1254 EPA Code: N/A	ug/kg	5025	Invalid Method Code: 4098	< 3360	< 10000			Satisfactory *120 passed out of 121 reported results.*
PCB-1260 EPA Code: N/A	ug/kg	5025	Invalid Method Code: 4098	< 3360	< 10000			Satisfactory *119 passed out of 121 reported results.*
Sample: Solid and Hazardous Waste Chlorinated Hydrocarbon Pesticides								
4,4-DDD EPA Code: N/A	ug/kg	5027	Invalid Method Code: 4098	28.8	26.7	D.L. - 55.9		Satisfactory *84 passed out of 87 reported results.*
4,4 -DDE EPA Code: N/A	ug/kg	5027	Invalid Method Code: 4098	63	< 30			Unsatisfactory <== *83 passed out of 87 reported results.*
4,4 -DDT EPA Code: N/A	ug/kg	5027	Invalid Method Code: 4098	18.8	19.7	D.L. - 42.6		Satisfactory *83 passed out of 87 reported results.*
alpha-BHC EPA Code: N/A	ug/kg	5027	Invalid Method Code: 4098	43	37.4	5.3 - 69.5		Satisfactory *84 passed out of 87 reported results.*