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NAVY ENVIRONMENTAL LEADERSHIP PROGRAM TECHNOLOGY EVALUATION REPORT  
FOR SOLID WASTE MANAGEMENT UNIT 15 NS MAYPORT FL  
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ABB ENVIRONMENTAL SERVICES

**NAVY ENVIRONMENTAL LEADERSHIP PROGRAM  
TECHNOLOGY EVALUATION REPORT FOR  
SOLID WASTE MANAGEMENT UNIT 15**

**U.S. NAVAL STATION  
MAYPORT, FLORIDA**

**Unit Identification Code: N60201**

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**Prepared by:**

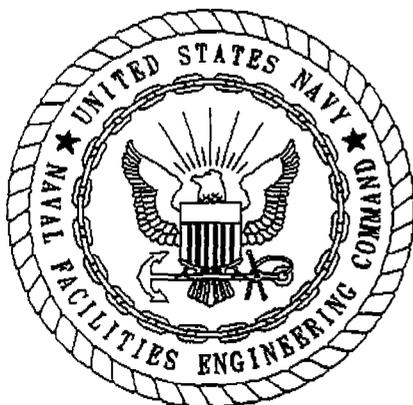
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**January 1998**



CERTIFICATION OF TECHNICAL  
DATA CONFORMITY (MAY 1987)

The Contractor, ABB Environmental Services, Inc., hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-89-D-0317/028 are complete and accurate and comply with all requirements of this contract.

DATE: January 13, 1998

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## FOREWORD

In order to meet its mission objectives, the U.S. Navy performs a variety of operations, some requiring the use, handling, storage, or disposal of hazardous materials. Through accidental spills and leaks and conventional methods of past disposal, hazardous materials may have entered the environment in ways unacceptable by today's standards. With growing knowledge of the long-term effects of hazardous materials on the environment, the Department of Defense initiated various programs to investigate and remediate conditions related to suspected past releases of hazardous materials at their facilities.

One of these programs is the Installation Restoration (IR) program. This program complies with the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act. The acts, passed by Congress in 1980 and 1986, respectively, established the means to assess and clean up hazardous waste sites for both private-sector and Federal facilities. These acts are the basis for what is commonly known as the Superfund Program.

Originally, the Navy's part of this program was called the Navy Assessment and Control of Installation Pollutants (NACIP) program. Early reports reflect the NACIP process and terminology. The Navy eventually adapted the program structure and terminology of the standard IR program.

The IR program is conducted in several stages.

- The Preliminary Assessment (PA) identifies potential sites through record searches and interviews.
- A Site Inspection (SI) then confirms which areas contain contamination, constituting actual "sites." (Together, the PA and SI steps were called the Initial Assessment Study under the Navy's old NACIP program.)
- Next, the Remedial Investigation and Feasibility Study (RI/FS) together determine the type and extent of contamination, establish criteria for cleanup, and identify and evaluate any necessary

remedial action alternatives and their costs. As part of the RI/FS, a Risk Assessment identifies potential effects on human health or the environment in order to help evaluate remedial action alternatives.

- The selected alternative is planned and conducted in the Remedial Design and Remedial Action Stages. Monitoring then ensures the effectiveness of the effort.

A second program to address present hazardous material management is the Resource Conservation and Recovery Act (RCRA) Corrective Action program. This program is designed to identify and cleanup releases of hazardous substances at RCRA-permitted facilities. RCRA is the law that ensures that solid and hazardous wastes are managed in an environmentally sound manner. The law applies primarily to facilities that generate or handle hazardous waste.

This program is conducted in three stages.

- The RCRA Facility Assessment identifies solid waste management units, evaluates the potential for releases of contaminants, and determines the need for future investigations.
- The RCRA Facility Investigation then determines the nature, extent, and fate of contaminant releases.
- The Corrective Measures Study identifies and recommends measures to correct the release.

The hazardous waste investigations at Naval Station Mayport are presently being conducted under the RCRA Corrective Action program. Earlier preliminary investigations had been conducted at Naval Station Mayport under the Navy's old NACIP program and IR program following Superfund guidelines. In 1988, in coordination with the U.S. Environmental Protection Agency (USEPA) and the Florida Department of Environmental Protection (FDEP), the hazardous waste investigations were formalized under the RCRA program.

Naval Station Mayport is conducting the cleanup at their facility by working through the Southern Division, Naval Facilities Engineering Command. The USEPA and the FDEP oversee the Navy environmental program. All aspects of the program are conducted in compliance with State and Federal regulations, as ensured by the participation of these regulatory agencies.

Questions regarding the RCRA Program at Naval Station Mayport should be addressed to Mr. David Driggers, Code 1852, at (803) 743-0501.

## EXECUTIVE SUMMARY

A technology demonstration, *in situ* bioaugmentation of soil containing pesticides, was conducted at Solid Waste Management Unit (SWMU) 15 at Naval Station (NAVSTA) Mayport, Florida, under the Navy Environmental Leadership Program (NELP). NELP was created to promote the use of new and innovative technologies in the areas of compliance, conservation, cleanup, and pollution prevention within the Navy. NAVSTA Mayport was selected to participate in NELP because activities at this station are representative of similar activities at other naval stations.

ABB Environmental Services, Inc. (ABB-ES), was contracted by the Department of the Navy, Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) to provide technical oversight for the technology demonstration by others at SWMU 15. This technology evaluation report was prepared to describe and evaluate the effectiveness of activities carried out during the technology demonstration.

Through NELP, the Navy proposed to demonstrate bioaugmentation of pesticide-impacted soil at SWMU 15. FIFCO International, Inc. (FIFCO) was selected as the contractor for the Navy and implemented an *in situ* bioaugmentation process for degradation of 4,4'-dichlorodiphenyltrichloroethane (DDT); 4,4'-dichlorodiphenyldichloroethene (DDE); and chlordane detected in soil samples collected from the site.

ABB-ES provided technical oversight of the NELP technology demonstration contractor, FIFCO. ABB-ES was onsite during the technology demonstration to observe contractor activities, including

- site preparation,
- construction,
- operation and maintenance activities, and
- soil sampling.

Analytical results from the ABB-ES postdemonstration sampling program (performance samples) suggest the presence of 4,4'-DDE and chlordane in soil in excess of target cleanup goals at two locations. ABB-ES's analytical results also suggest that there was a decrease in the concentrations of 4,4'-DDT and chlordane at most of the sampling locations within the treated area. These results suggest that the bioaugmentation demonstration may have worked to some degree. However, the results of technology demonstration samples suggest that the pesticides at the site have a considerable variation over a short distance. The variation creates an uncertainty in determining the degree to which the technology demonstration was successful in reducing the concentration of pesticides.

FIFCO's analytical results also suggest that biodegradation was occurring. The degree to which their technology demonstration was successful in reducing the concentrations of the pesticides was obscured by the variations in concentrations of 4,4'-DDT and 4,4'-DDE over short distances.

Comparison of analytical results to FDEP soil cleanup goals suggest the following:

- Beta-benzene hexachloride was detected in a performance sample at concentrations exceeding the Florida Department of Environmental Protection (FDEP) leachability goal.
- Heptachlor and heptachlor epoxide were not detected in performance samples at concentrations exceeding the FDEP soil cleanup goals.
- 4,4'-DDT; 4,4'-DDE; and 4,4'-dichlorodiphenyldichloroethane (DDD) were not detected in performance samples at concentrations exceeding the FDEP soil cleanup goals. A baseline sample collected in 1994 contained 4,4'-DDT at a concentration that exceeded the FDEP industrial soil cleanup goal. 4,4'-DDT was not detected in a baseline sample collected in December 1995 from this location.
- Chlordane was detected in a performance sample at a concentration that exceeds the FDEP industrial soil cleanup goal.
- A polychlorinated biphenyl (Aroclor-1260) was detected in performance samples at concentrations that exceed FDEP industrial and residential soil cleanup goals.

The variability of pesticides in the soil at SWMU 15 suggest that the area was not the most suitable site for evaluating this particular technology demonstration.

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## GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
BHC	benzene hexachloride
bls	below land surface
CMS	Corrective Measures Study
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
FDEP	Florida Department of Environmental Protection
FIFCO	FIFCO International, Inc.
$\mu\text{g}/\text{kg}$	micrograms per kilogram
NAVSTA	Naval Station
NEESA	Naval Energy and Environmental Support Activity
NELP	Navy Environmental Leadership Program
PA	Preliminary Assessment
PCB	polychlorinated biphenyl
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RPD	relative percent difference
SWMU	Solid Waste Management Unit
USEPA	U.S. Environmental Protection Agency

## 1.0 INTRODUCTION

A technology demonstration, *in situ* bioaugmentation of soil containing pesticide, was conducted at Solid Waste Management Unit (SWMU) 15 at Naval Station (NAVSTA) Mayport, Florida, (Figures 1-1 and 1-2) under the Navy Environmental Leadership Program (NELP). NELP was created to promote the use of new and innovative technologies in the areas of compliance, conservation, cleanup, and pollution prevention within the Navy. NAVSTA Mayport was selected to participate in NELP because activities (aircraft squadrons and maintenance and surface support for ships) at this station are representative of similar activities at other naval stations.

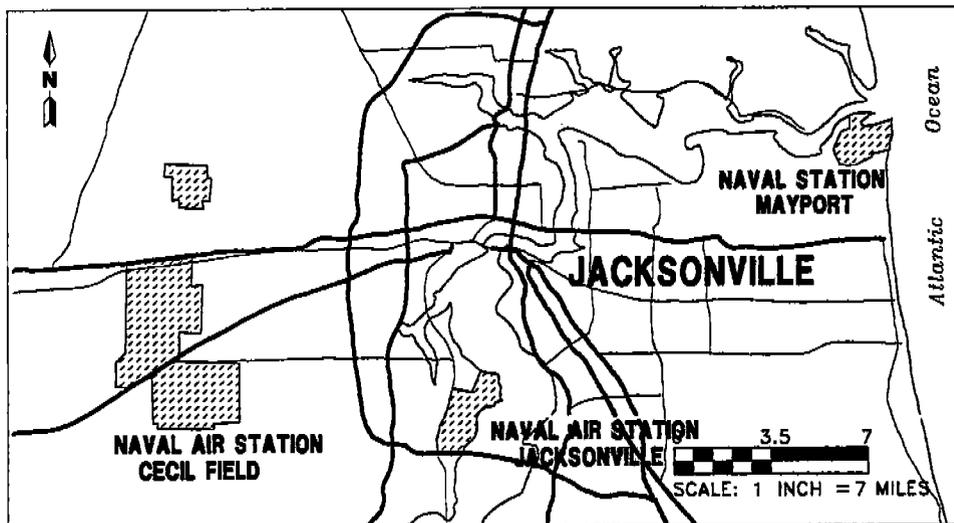
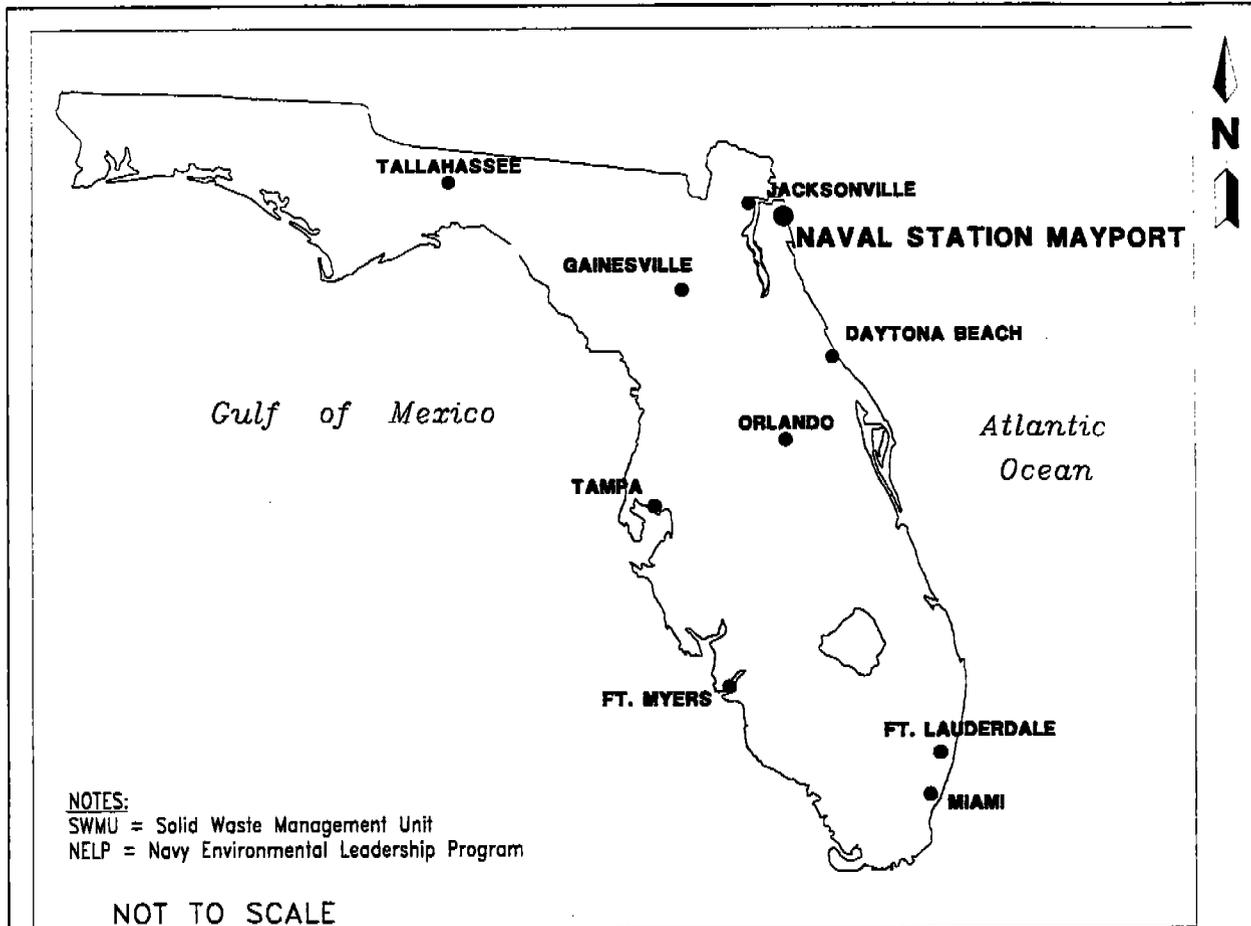
ABB Environmental Services, Inc. (ABB-ES), was contracted by the Department of the Navy, Southern Division, Naval Facilities Engineering Command to provide technical oversight for the technology demonstration by others at SWMU 15. This technology evaluation report was prepared to describe and evaluate the effectiveness of activities carried out during the technology demonstration.

1.1 SITE DESCRIPTION AND BACKGROUND, SWMU 15. SWMU 15, the Old Pesticide Handling Area is located adjacent to Building 48-A (Figure 1-2) at NAVSTA Mayport. During the 1960s, pesticides and pesticide application equipment were stored in Building 48, formerly located adjacent to and east of Building 48-A. Mixing of pesticides and washing of pesticide application equipment may have occurred near the building. As a result, runoff from the washing and rinsing activities have infiltrated the ground surface.

In 1989, a Resource Conservation and Recovery Act (RCRA) Facility Assessment (A.T. Kearney, Inc., 1989) identified the Old Pesticide Handling Area as SWMU 15 and recommended the SWMU for an RCRA Facility Investigation (RFI). An RFI was completed for SWMU 15 in 1994 (ABB-ES, 1995a). Analysis of soil samples collected during the RFI for SWMU 15 suggested that soil from 0 to 1 foot below land surface (bls) contained pesticides, specifically 4,4'-dichlorodiphenyl-trichloroethane (DDT) and chlordane. Furthermore, human health and ecological risk assessments performed in conjunction with the RFI determined that these compounds may present adverse risk for the following exposures:

- there is a potential risk to human receptors from dermal exposure to 4,4'-DDT and chlordane in surface soil,
- there is a potential risk to a maintenance worker from exposure to 4,4'-DDT in subsurface soil, and
- there is a potential risk to ecological receptors from exposure to 4,4'-DDT in surface soil.

Based on the analytical results of the soil samples and potential human health and ecological risk, SWMU 15 was recommended for a corrective measures study (CMS) (ABB-ES, 1995b). The CMS for SWMU 15 identified one Corrective Action Objective for SWMU 15 soil: "Eliminate the potential for human and ecological receptors to contact pesticide-impacted soil at SWMU 15." The NELP technology demonstration undertaken at SWMU 15 was considered as a possible alternative cleanup option for the pesticide-impacted soil.



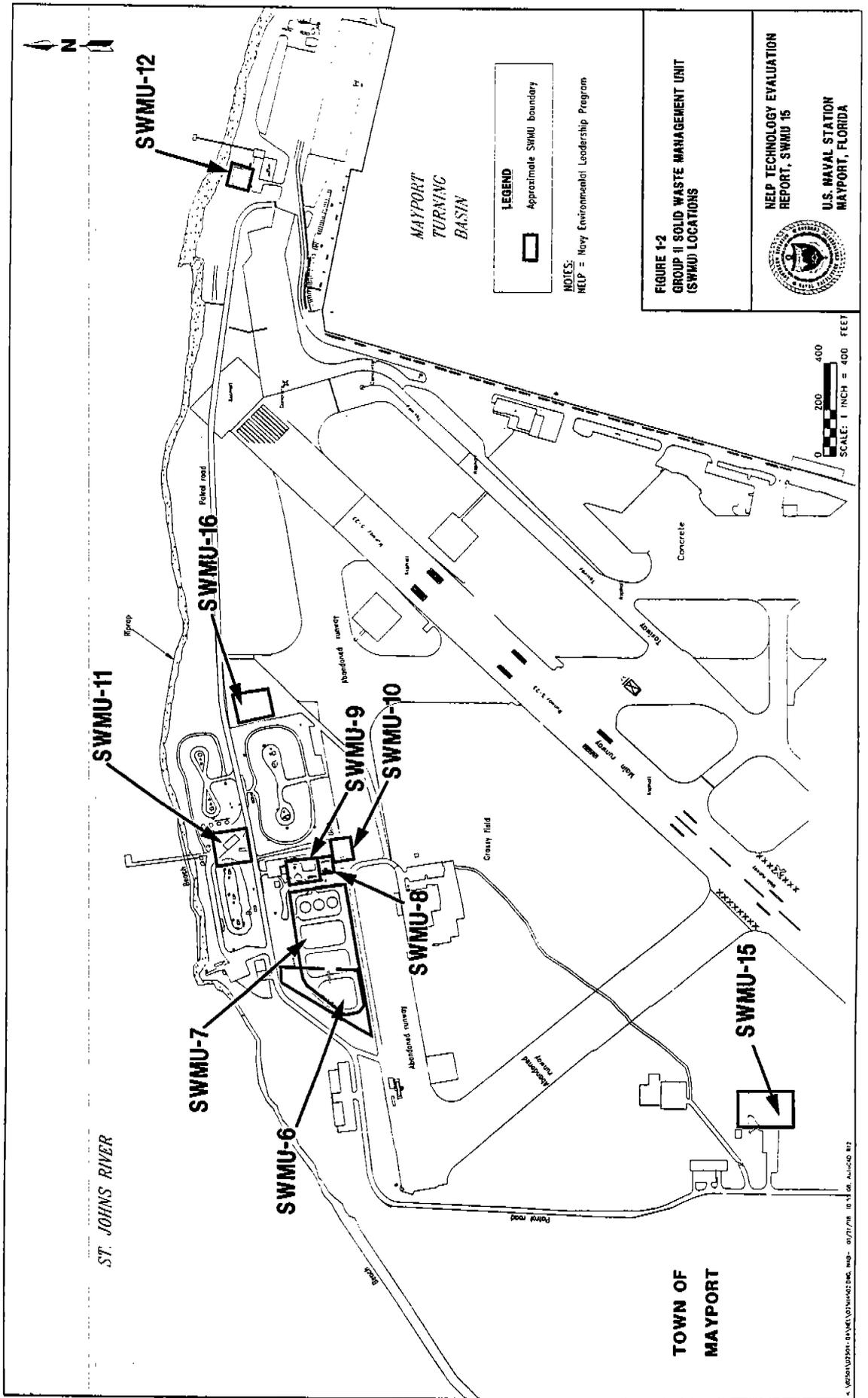
**FIGURE 1-1  
 FACILITY LOCATION MAP**



**NELP TECHNOLOGY  
 EVALUATION REPORT  
 SWMU 15**

**U.S. NAVAL STATION  
 MAYPORT, FLORIDA**

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1.2 TREATMENT LEVELS FOR SOIL CONTAINING PESTICIDE AT SWMU 15. Target treatment levels for pesticides and polychlorinated biphenyls (PCBs) detected at SWMU 15 are provided in Table 1-1. PCBs were not evaluated in the CMS (ABB-ES, 1995b), but were evaluated during the technology demonstration because a congener (Aroclor-1260) was detected in soil samples collected for the NELP Technology Demonstration (please refer to Chapter 3.0). PCBs were not detected in soil samples collected at SWMU 15 for the RFI (ABB-ES, 1995a). Target treatment levels were established prior to implementation of the technology demonstration. Treatment levels for cleanup of soil containing the pesticides 4,4'-DDT and/or chlordane were based on the remedial goal options selected (ABB-ES, 1995a) to be protective of ecological and human receptors. The treatment level (1,000 micrograms per kilogram [ $\mu\text{g}/\text{kg}$ ]) for 4,4'-DDT is based on the ingestion of 4,4'-DDT by an avian species such as a robin (ABB-ES, 1995a). The treatment level for chlordane (2,100  $\mu\text{g}/\text{kg}$ ) is the Florida Department of Environmental Protection (FDEP) soil cleanup goal based on leachability. The leachability soil cleanup goal was selected because of the detection of the pesticides alpha- and beta-benzene hexachloride (BHC) (also known as hexachlorocyclohexane) in groundwater samples. Alpha- and beta- BHC were detected in field screening soil samples, but not in validated confirmation soil samples. 4,4'-DDT and chlordane were not detected in the groundwater samples collected from SWMU 15 during the RFI (ABB-ES, 1995a).

1.3 VOLUME OF SOIL CONTAINING PESTICIDE AT SWMU 15. The volume of pesticide-impacted soil was estimated during the CMS (ABB-ES, 1995b). Appendix A of this report provides detailed information on these calculations. The volume of pesticide-impacted soil at SWMU 15 was calculated using the following assumptions.

- The lateral extent of pesticide-impacted soil (i.e., surface soil) was estimated based on concentrations of 4,4'-DDT and chlordane in surface soil samples.
- The vertical extent of chlordane-impacted soil was assumed to be 1 foot bls, based on concentrations of chlordane found in subsurface soil samples (greater than 1 foot bls).
- The vertical extent of 4,4'-DDT-impacted soil was assumed to be 1 foot bls, based on concentrations of 4,4'-DDT in subsurface soil samples, except in areas where detection in surface soil exceeded the treatment levels shown in Table 1-1. In these areas, the concentrations of 4,4'-DDT in subsurface soil samples were estimated with a fate and transport model. The model predicted that, in some areas, 4,4'-DDT may have migrated to 2 or 3 feet bls (ABB-ES, 1995b).

Based on these assumptions, the total volume of pesticide-impacted soil at SWMU 15 is estimated to be approximately 533 cubic yards.

1.4 ENVIRONMENTAL FATE OF 4,4'-DDT AND CHLORDANE IN SOIL. Below is a brief discussion of the fate and transport of 4,4'-DDT and chlordane in soil.

4,4'-DDT. Four mechanisms, including volatilization, removal by harvest of organic matter, water and sediment runoff, and chemical transformation have been

**Table 1-1**  
**Possible Target Treatment Levels and Cleanup Goals for Pesticides and PCBs**  
**Detected at Solid Waste Management Unit 15**

Navy Environmental Leadership Program  
 Technology Evaluation Report for  
 Solid Waste Management Unit 15  
 U.S. Naval Station  
 Mayport, Florida

Chemical	Human Health Treatment Level (Industrial) <sup>1</sup>	Human Health Treatment Level (Residential) <sup>1</sup>	Treatment Level (Leachability) <sup>1</sup>	Ecological Treatment Level <sup>2</sup>
alpha-BHC	600	200	2	--
beta-BHC	2,300	600	5	--
delta-BHC	470,000	23,000	NA	--
gamma-BHC (Lindane)	3,000	800	NA	--
Chlordane	3,000	800	NA	--
4,4'-DDE	11,000	3,000	NA	--
4,4'-DDD	17,000	4,500	NA	--
4,4'-DDT	12,000	3,100	NA	1,000
Heptachlor	500	200	NA	--
Heptachlor epoxide	300	100	NA	--
PCBs	3,500	900	NA	--

<sup>1</sup> Soil Cleanup Goals (micrograms per kilogram) for Florida, September 29, 1995.

<sup>2</sup> Concentrations (micrograms per kilogram) based on ingestion of reference toxicity value for ecological receptors (ABB-ES, 1995a).

Notes: PCBs = polychlorinated biphenyls.

BHC = benzene hexachloride (also known as hexachlorocyclohexane).

-- = analyte was not determined to be an ecological chemical of potential concern in the ecological risk assessment for SWMU 15 (ABB-ES, 1995a).

NA = not detected in groundwater samples at concentrations exceeding FDEP groundwater guidance concentrations (ABB-ES, 1995a).

DDE = dichlorodiphenyldichloroethane.

DDD = dichlorodiphenyldichloroethane

DDT = dichlorodiphenyltrichloroethane.

suggested to account for most losses of 4,4'-DDT from soil. Volatilization occurs by photooxidation of 4,4'-DDT at the soil surface. Volatilization is significantly enhanced by temperature, sunlight, and flooding of soil (Clement International Corp, 1993). One hundred days is the estimated half-life for 4,4'-DDT exposed at the land surface (Sleicher and Hopcraft, 1984). The Handbook of Environmental Degradation Rates (Howard, et al., 1991) indicated biodegradation rates in aerobic soils under field conditions (soil with moisture content between the wilting point and saturation) range from 2 to 15.6 years.

Plants may absorb 4,4'-DDT, which is then removed from the medium by harvesting or ingestion by grazing animals (Clement International Corp, 1993).

4,4'-DDT is strongly absorbed to soil particles and is only slightly soluble in water and has a low potential to be leached. Therefore, transport of the soil by erosion is a major transport mechanism, and also a mechanism to transfer the chemical to a new environment (Clement International Corp, 1993).

Biodegradation of 4,4'-DDT occurs under aerobic and anaerobic conditions. Aerobic transformation (dehydrochlorination) occurs slowly, and anaerobic transformation (reductive dechlorination) occurs rapidly (Clement International Corp, 1993). Estimates for the half-life of 4,4'-DDT in soil by natural biodegradation range from 2 to 15 years (Lichtenstein and Schulz, 1959; Stewart and Chisholm, 1971).

Chlordane. Chlordane appears to persist for potentially long periods of time (greater than 20 years) in soils. Chlordane appears to be more persistent in soil as the amount of organic material and silt and clay increase relative to the sand fraction. Chlordane does not leach and is likely to remain in the upper 50 inches of a soil profile. Transport of the soil by erosion is a major transport mechanism and also a mechanism to transfer the chemical to a new environment. Volatilization from soil is a major loss mechanism, the rate dependant on moisture and organic material content, temperature, and humidity (Syracuse Research Corporation, 1992). Only a few microorganisms have been isolated and identified as capable of degrading chlordane (Iyengar and Rao, 1993; Beeman and Matsumura, 1981; and Kenedy, et al., 1990). Mineralization has also been documented to occur under low nitrogen concentrations (Aust, 1990). The Handbook of Environmental Degradation Rates (Howard, et al., 1991) indicated biodegradation rates in unacclimated river die-away tests, and soil samples range from 283 days to 3.8 years.

**1.5 TECHNOLOGY EVALUATION REPORT CONTENTS.** This Technology Evaluation Report includes the following:

- a description of the technology demonstrated;
- a summary of monitoring and sampling activities performed by FIFCO International, Inc. (FIFCO) during the demonstration;
- a summary of technical oversight activities performed by ABB-ES during the demonstration, including photographs, observations, and analytical results;

- an evaluation of the technology demonstration by comparison of analytical results to cleanup goals;
- an assessment of the uncertainty associated with assessing the technology demonstration's ability to meet the target cleanup goals;
- and finally, conclusions based on findings from the technology demonstration.

## 2.0 SUMMARY OF TECHNOLOGY DEMONSTRATION AT SWMU 15

Through NELP, the Navy proposed to demonstrate bioaugmentation of pesticide-impacted soils at SWMU 15. FIFCO was selected as the contractor for the Navy and implemented an *in situ* bioaugmentation process for degradation of 4,4'-DDT, 4,4'-dichlorodiphenyldichloroethene (DDE), and chlordane detected in soil samples collected from SWMU 15.

This chapter includes an overview of the technology demonstration and a description of sampling activities conducted by both FIFCO and ABB-ES during the technology demonstration.

2.1 FIFCO's TECHNOLOGY DEMONSTRATION ACTIVITIES. FIFCO applied a proprietary microorganism mixture (Bac-Terra™ BR650), in liquid form, to soil at SWMU 15 (Photographs 1 and 2, Appendix B). The mixture contained microorganisms capable of degrading a variety of organic chemicals (FIFCO, 1995). FIFCO also indicated in their workplan (FIFCO, 1995), that the addition of nutrients may be required to supplement the biodegradation. However, FIFCO determined during the demonstration that nutrients contained in the Bac-Terra™ were sufficient to provide the nutrients necessary for biodegradation of the target compounds (FIFCO, 1997).

The Bac-Terra™ was applied by FIFCO using two off-the-shelf, garden- or home-type application systems. The systems were a drip system and an impact sprinkler system. The surface drip system was made from Roberts RO-DRIP™ components and the impact sprinkler system was made from Rain Bird™ components and polyvinyl chloride (PVC) piping. Please refer to Chapter 2.0 of FIFCO's report entitled "Demonstration of New and Emerging Environmental Technologies," Naval Station Mayport, Florida, 1996, for details of the treatment system.

The drip irrigation system was used to supply the initial treatment. However, this system was determined by FIFCO to provide more of the Bac-Terra™ solution than was desired. FIFCO indicated that the impact sprinkler system appeared to allow for more control of a measured volume of the Bac-Terra™ solution and to maintain and control soil moisture at desired levels (FIFCO, 1997).

The treatment phase of the technology demonstration was conducted from January 5, 1996, to February 26, 1996, the time from FIFCO's start up and first application to the final application of the Bac-Terra™ solution. The length of the demonstration was determined by FIFCO to be the approximate time required for degradation of 4,4'-DDT and chlordane to concentrations below treatment levels (FIFCO, 1997). It should be noted that, with few exceptions, most locations within the treatment area were initially at or below target treatment levels for the target compounds--4,4'-DDT and chlordane.

During the technology demonstration, FIFCO collected soil samples to monitor and assess the performance of the microorganisms (FIFCO, 1995; 1997). FIFCO's sampling events occurred on December 26, 1995; January 3, 1996; January 9, 1996; January 13, 1996; January 22, 1996; February 8, 1996; February 22, 1996; and March 5, 1996. Analytical results for these sampling events are presented in FIFCO's final report (FIFCO, 1997).

**2.2 TECHNOLOGY DEMONSTRATION OVERSIGHT.** ABB-ES provided technical oversight of the NELP technology demonstration contractor, FIFCO. ABB-ES was onsite during the technology demonstration to observe contractor activities, including

- site preparation,
- construction,
- operation and maintenance activities, and
- soil sampling.

Site Preparation. Site preparation at SWMU 15 commenced on December 19, 1996, and included the installation of boundary fencing, mowing, and land clearing (Photographs 3 through 9 Appendix B). FIFCO personnel installed an orange colored security fence around the area to be treated. The entire treatment system was set up within this fenced area. FIFCO personnel used conventional lawn mowers to cut grass within the treatment area to a desired length. FIFCO also required clearing to ground level palm trees located at the north side of the treatment area. This was done to allow the treatment system piping to be laid out and easily set up. This clearing was conducted by Navy personnel. After the site preparation activities were completed, FIFCO personnel conducted their first sampling event on December 26, 1995 (Photographs 10 through 15, Appendix B).

Construction. Construction of the two treatment delivery systems at SWMU 15 commenced on December 26, 1996. Construction activities included the assembly and layout of piping for the drip and impact distribution systems (Photographs 16 through 21, Appendix B). The drip system was laid out at 2-foot intervals and oriented east to west within the treatment area. The impact sprinkler system consisted of six PVC pipelines (glue jointed), each containing four sprinkler-head risers. The pipes were laid out at 5-foot intervals and oriented north to south within the treatment area. Sprinkler-head risers at the edge of the treatment area were set facing in, and risers within the interior were set for full circular dispersion. This configuration allowed overlap of areas covered by an individual sprinkler and complete coverage of the treatment area. Please refer to Chapter 2.0 of FIFCO's report entitled "Demonstration of New and Emerging Environmental Technologies," Naval Station Mayport, Florida, 1997, for additional details of the treatment system.

Operation and Maintenance Activities. Operation and Maintenance of the two treatment delivery systems commenced on January 5, 1996. These activities included the daily operation and maintenance of the drip-and-impact irrigation systems, the microbial solution storage tanks, and the pump-and-filter system. The microorganisms (Bac-Terra™ BR650) were mixed with water in three aboveground storage tanks. An initial flushing of the site with water was conducted on January 4, 1996. The application systems were operated on an as-needed basis from January 5, 1996, until completion of the demonstration on February 26, 1996. The operation and application schedule for the two treatment systems is provided in Section 2.2, Table 2.2.1 of FIFCO's report entitled "Demonstration of New and Emerging Environmental Technologies," Naval Station Mayport, Florida, 1997. Maintenance of the system included general daily maintenance of the piping layout and the storage tank pump-and-filter system to ensure the system was in proper working order.

Soil Sampling. Independent of the sampling events conducted by FIFCO, ABB-ES collected soil samples before and after the NELP technology demonstration. The ABB-ES baseline (pretreatment) sampling event took place on December 18, 1996, and the performance (posttreatment) sampling event on March 5, 1996. FIFCO split samples with ABB-ES on March 5, 1996. Seven surface soil samples and one subsurface soil sample were collected prior to the treatment of the soil to assess and establish a baseline for evaluation and augment existing analytical data. Sixteen surface soil and five subsurface samples were collected upon completion of the technology demonstration to assess the technology's performance. Multiple samples from the same location were collected within 12 inches of the stake marking the sample location.

Analytical results from both the ABB-ES and FIFCO sampling events were evaluated to assess whether or not the technology demonstration achieved the target treatment levels (Table 1-1). This evaluation consisted of comparing the baseline sample analytical results to the performance sample results and reviewing the analytical results from the multiple sample events by FIFCO.

2.2.1 Baseline Sampling Baseline conditions were determined in order to evaluate the effectiveness of the NELP technology demonstration. Baseline conditions were based on previous analytical results and additional soil samples that were collected on December 18, 1995, prior to implementation of the technology demonstration.

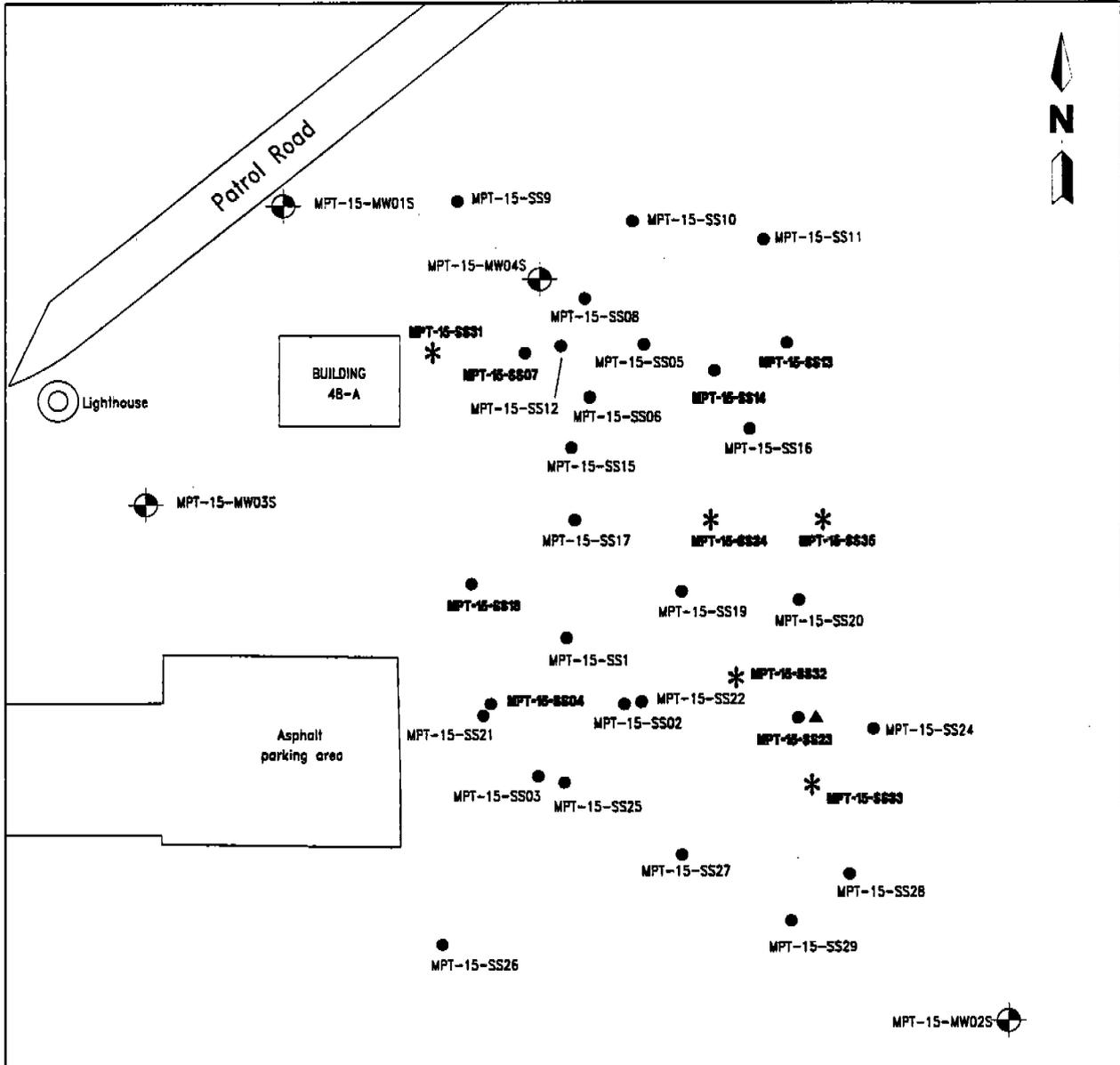
Surface Soils. The Group II RFI identified the lateral and vertical extent of pesticide-impacted soils at SWMU 15. However, limited areas required additional surface soil sampling to assess potential "hot spots" as stated in the Group II RFI report (ABB-ES, 1995a). Surface soil samples were collected from the land surface to a depth of 1 foot.

Based on the locations of samples collected during the Group II RFI, three areas required additional characterization to assess the presence or absence of pesticides in surface soil. Three surface soil samples, MPT-15-SS31, MPT-15-SS32, and MPT-15-SS33, were collected on December 18, 1995, to assess the presence of 4,4'-DDT in surface soil (Figure 2-1). Two surface soil samples, MPT-15-SS34 and MPT-15-SS35, were collected on December 18, 1995, to assess the presence of chlordane (Figure 2-1).

Two additional surface soil samples were collected at locations known to contain 4,4'-DDT and chlordane. The samples were collected to determine a current baseline with which to assess both the pre- and postdemonstration samples and evaluate the effectiveness of the technology. One surface soil sample was collected at MPT-15-SS23 to determine the current baseline concentration for 4,4'-DDT, and a sample was collected at MPT-15-SS16 to determine the current baseline concentration for chlordane (Figure 2-1).

Subsurface Soils. One subsurface soil sample (15B02302) was collected at sampling location MPT-15-SS23 (Figure 2-1). The detection of 4,4'-DDT at a concentration of 790 parts per million in the surface soil sample from this location in 1994 suggested that 4,4'-DDT may have migrated vertically. The subsurface soil sample was collected from 1 to 2 feet bls.

2.2.2 Performance Sampling Sixteen surface soil and five subsurface soil samples were collected on March 5, 1996, after receiving notification from FIFCO



LEGEND	
MPT-15-MW015 	Monitoring well location
MPT-15-SS23 	Existing surface soil sample
MPT-15-SS23 	NELP surface soil sampling location
MPT-15-SS23 	NELP subsurface soil sampling location

**NOTES:**  
 NELP = Navy Environmental Leadership Program  
 SWMU = Solid Waste Management Unit

0 30 60  
  
 SCALE: 1 INCH = 60 FEET

**FIGURE 2-1**  
**SOIL SAMPLING LOCATIONS AT SWMU 15**

**NELP TECHNOLOGY  
 EVALUATION REPORT  
 SWMU 15**

**U.S. NAVAL STATION  
 MAYPORT, FLORIDA**

K:\02504\02504-04\NEL\02504503.DWG, NAB- 01/21/98 11:35:15, AutoCAD R12

of the completion of the technology demonstration (Figure 2-1). The performance samples were collected to evaluate whether or not the technology achieved the target treatment levels.

Performance sample locations were identified to bias sample collection toward known pesticide-impacted soil areas, to randomly select soil samples surrounding these pesticide-impacted soil areas, and to assess the effects of the technology demonstration on low levels (less than 1  $\mu\text{g}/\text{kg}$ ) of pesticides in the surface and subsurface soil.

During the postdemonstration sampling event, March 5, 1996, eight biased performance samples were collected at locations where 4,4'-DDT and chlordane were detected above treatment levels prior to implementation of the technology demonstration. These samples included surface and subsurface soil samples at two existing locations, MPT-15-SS05 and MPT-15-SS07, and two baseline locations, MPT-15-SS16 and MPT-15-SS23 (Figure 2-1). Surface and subsurface soil samples were collected from intervals of 0 to 1 foot bls and 1 to 2 feet bls, respectively.

Additional performance samples were collected at random locations around each of the areas where 4,4'-DDT and chlordane previously exceeded target treatment levels. Random performance samples were collected at locations MPT-15-SS13, MPT-15-SS14, MPT-15-SS18, and MPT-15-SS31 through MPT-15-SS38 (Figure 2-1). Surface soil samples were collected 0 to 1 foot bls at these locations.

Two soil samples were collected from 0 to 1 foot and 1 to 2 feet bls at location MPT-15-SS04, where FIFCO also collected samples. These samples served two purposes: (1) to evaluate the effects of the technology demonstration on low levels of pesticides in surface and subsurface soil and (2) assess the comparability of analytical results between samples collected by ABB-ES and FIFCO. However, the comparison of analytical results was not accomplished because FIFCO did not provide the results from their final sampling event on March 5, 1996, in their final report (FIFCO, 1997).

**2.2.3 Sampling Procedures** The methodology for surface and subsurface soil sample collection was consistent with standard operating procedures described in the NAVSTA Mayport RFI Workplan (ABB-ES, 1991), the NAVSTA Mayport General Information Report (ABB-ES, 1995c), and U.S. Environmental Protection Agency (USEPA) Region IV standard operating procedures (USEPA, 1991). Soil samples were collected from land surface to a depth of 1 foot bls (surface soil) and 1 to 2 feet bls (subsurface soil). The soil samples were collected using a decontaminated stainless-steel hand auger. Soil in the stainless-steel hand auger was transferred to a glass (Pyrex) bowl using a stainless-steel spoon. Aliquots of the sample for analysis of pesticides were homogenized and transferred to an appropriate sample container. The soil samples were placed in a cooler with ice and shipped by express-overnight delivery to a Naval Energy and Environment Support Activity (NEESA)-approved laboratory under chain-of-custody protocol.

**2.2.4 Analytical Procedures** The surface and subsurface soil samples were analyzed using SW-846 Method 8080 for chlorinated pesticides by the methodology contained in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, USEPA SW846 (USEPA, 1985). The analytical data package produced by the laboratory was NEESA Level C. NEESA Level C was used to provide analytical data that could be validated substituting the SW-846 method criteria for USEPA's Contract Laboratory program method criteria using National Functional Guidelines

for Organic Data Review (USEPA, 1990). The data have been validated so that appropriate decisions were made as to whether or not soil at the site should be further evaluated by the CMS under NAVSTA Mayport's RCRA Corrective Action Program. Summaries of the analytical data are provided in Appendix C, and data validation reports are provided in Appendix D. Appendix E contains a copy of the field logbook.

2.2.5 Temperature and Rainfall Data Maximum and minimum air temperature measurements and rainfall amounts were obtained for the period of January 5, 1996, to February 26, 1996, from the NAVSTA Mayport Meteorology Department. Periodic measurements were also made of the temperature of the soil at the treatment site. These data are presented in Section 3.2 along with the analytical results of the performance sampling.

### 3.0 RESULTS AND EVALUATION OF TECHNOLOGY DEMONSTRATION SAMPLING EVENTS

This chapter presents analytical results from the baseline and performance sampling events and an evaluation of the results relative to the target cleanup goals.

3.1 ANALYTICAL RESULTS. Below is a general overview of analytical results for surface and subsurface soil samples collected during sampling events in 1993, 1994, 1995, and 1996.

Surface soils. Pesticides detected in surface soil samples collected at SWMU 15 consist of alpha-BHC (also known as hexachlorocyclohexane); beta-BHC; gamma-BHC (lindane); heptachlor; heptachlor epoxide; 4,4'-DDE; 4,4'-dichlorodiphenyl-dichloroethane (DDD); 4,4'-DDT; and chlordane (Table 3-1). One PCB congener (Aroclor-1260) has been detected in the surface soil samples collected at SWMU 15.

Alpha-, beta-, and gamma-BHC were detected at one location, MPT-15-SS16, in surface soil samples collected in 1995 and 1996. The sample collected in 1995 contained each of the three isomers, and the sample collected in 1996 contained only alpha- and beta-BHC at lower concentrations. Alpha-, beta-, and gamma-BHC were not detected at concentrations greater than the FDEP industrial and residential soil cleanup goals (Table 1-1). The leachability to groundwater criteria (guidance concentration for sites where a chemical is detected in soil and groundwater samples, and exceeds groundwater guidance concentrations) was exceeded for alpha-BHC and beta-BHC at sampling location MPT-15-SS16.

Isomers of alpha-, beta-, and gamma-BHC are products of the photochlorination of benzene (Clement International corporation, 1992). The technical grade consisted primarily of gamma-BHC.

Heptachlor and heptachlor epoxide (a biological degradation product of heptachlor [Montgomery, 1991]) were detected at three sampling locations, MPT-15-SS05, MPT-15-SS07, and MPT-15-SS16, in surface soil samples collected in 1993, 1995, and 1996. Heptachlor and heptachlor epoxide were detected in 1993 at sampling location MPT-15-SS05. The sample collected in 1996 from this location contained only heptachlor epoxide at a lower concentration.

Heptachlor epoxide was detected in 1996 in a surface soil sample collected from sampling location MPT-15-SS07. The concentration detected exceeded the residential FDEP soil cleanup goal. Heptachlor epoxide was not detected in the sample collected from this location in 1993.

Heptachlor and heptachlor epoxide were detected in the sample collected at MPT-15-SS16 in 1995, and the sample collected in 1996 contained only heptachlor epoxide at a lower concentration. Heptachlor and heptachlor epoxide were not detected in the surface soil samples collected in 1994 from sampling location MPT-15-SS16.

4,4'-DDT was detected in 47 of 53 surface soil samples at concentrations ranging from 1.4 to 790,000  $\mu\text{g}/\text{kg}$  (average value of 16,890  $\mu\text{g}/\text{kg}$ ). 4,4'-DDE (an aerobic degradation product of 4,4'-DDT) was detected in 51 of 53 surface soil samples at concentrations ranging from 0.67 to 2,800  $\mu\text{g}/\text{kg}$  (average value of 176  $\mu\text{g}/\text{kg}$ ).

**Table 3-1  
Pesticides and PCBs Detected in Surface Soil Samples at Solid Waste Management Unit 15**

Navy Environmental Leadership Program  
Technology Evaluation Report for  
Solid Waste Management Unit 15  
U.S. Naval Station  
Mayport, Florida

Analytical Batch Number:	23953	23953	23953	23953	23953	23953	23953	23953	23953	23953	23953	23953	23953	23953	23953	23953	23953
Sample Location:	MPT-15-SS01	MPT-15-SS02	MPT-15-SS03	MPT-15-SS04	MPT-15-SS05	MPT-15-SS05	MPT-15-SS05	MPT-15-SS05	MPT-15-SS06	MPT-15-SS06	MPT-15-SS06						
Sample Number:	15SS11	15SS21	15SS31	15SS41	15SS0501												
Date Sampled:	02-FEB-93	05-MAR-96	05-MAR-96	05-MAR-96	05-MAR-96	02-FEB-93	02-FEB-93	02-FEB-93									
Sample Depth (ft bis):	0 to 1																
<b>Pesticides/PCBs (µg/kg)</b>																	
Aroclor-1260	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
alpha-BHC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
beta-BHC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
gamma-BHC (Lindane)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDE	24	28	160	49	18	18	18	18	18	18	16 J						
4,4'-DDD	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDT	9.2	22	34	18	5.7	18	18	18	18	18	9 J	9 J	9 J	9 J	9 J	9 J	9 J
Heptachlor	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Heptachlor epoxide	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

See notes at end of table.

**Table 3-1 (Continued)**  
**Pesticides and PCBs Detected in Surface Soil Samples at Solid Waste Management Unit 15**

Navy Environmental Leadership Program  
 Technology Evaluation Report for  
 Solid Waste Management Unit 15  
 U.S. Naval Station  
 Mayport, Florida

Analytical Batch Number:	23953	RB147	23953	23953	M7902	M7902	M7902	M7902	M7902	M7902	M7902	M7867	M7867
Sample Location:	MPT-15-SS07	MPT-15-SS07	MPT-15-SS08	MPT-15-SS08	MPT-15-SS08	MPT-15-SS09	MPT-15-SS09	MPT-15-SS09	MPT-15-SS09	MPT-15-SS10	MPT-15-SS11	MPT-15-SS10	MPT-15-SS11
Sample Number:	15SS71	15S00701	15SS81	15SS81DUP	15SS00901	15SS00901	15SS00901	15SS00901	15SS00901DUP	15SS01001	15SS01101	15SS01001	15SS01101
Date Sampled:	02-FEB-93	05-MAR-96	02-FEB-93	02-FEB-93	20-SEP-94	20-SEP-94	20-SEP-94	20-SEP-94	20-SEP-94	13-SEP-94	13-SEP-94	13-SEP-94	13-SEP-94
Sample Depth (ft bis):	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1								
<b>Pesticides/PCBs (µg/kg)</b>													
Aroclor-1260	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	--	--	--	--	--	--	--	--	--	--	--	--	--
beta-BHC	--	--	--	--	--	--	--	--	--	--	--	--	--
gamma-BHC (Lindane)	--	--	--	--	--	--	--	--	--	--	--	--	--
Chlordane	--	150,000	1,000	710	83 J	83 J	83 J	83 J	60 J	54	60 J	54	3.1
4,4'-DDE	2,800	--	260 J	230 J	--	--	--	--	--	--	--	--	--
4,4'-DDD	--	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDT	1,500	--	110 J	140 J	7.1 J	7.1 J	7.1 J	7.1 J	7.4 J	18	7.4 J	18	1.8
Heptachlor	--	--	--	--	--	--	--	--	--	--	--	--	--
Heptachlor epoxide	--	180 J	--	--	--	--	--	--	--	--	--	--	--

See notes at end of table.

**Table 3-1 (Continued)  
Pesticides and PCBs Detected in Surface Soil Samples at Solid Waste Management Unit 15**

Navy Environmental Leadership Program  
Technology Evaluation Report for  
Solid Waste Management Unit 15  
U.S. Naval Station  
Mayport, Florida

Analytical Batch Number:	M7867	M7867	RB147	M7867	RB147	M7867	RB147	M7867	RB147	M7867	M7867	RA781
Sample Location:	MPT-15-SS12	MPT-15-SS13	MPT-15-SS13	MPT-15-SS14	MPT-15-SS14	MPT-15-SS14	MPT-15-SS14	MPT-15-SS15	MPT-15-SS16	MPT-15-SS16	MPT-15-SS16	MPT-15-SS16
Sample Number:	15SS01201	15SS01301	15SS01301	15SS01401	15SS01401	15SS01401	15SS01401	15SS01501	15SS01601	15SS01601	15SS01601	15SS01601
Date Sampled:	13-SEP-94	13-SEP-94	05-MAR-96	13-SEP-94	05-MAR-96	13-SEP-94	05-MAR-94	13-SEP-94	13-SEP-94	13-SEP-94	13-SEP-94	18-DEC-95
Sample Depth (ft bis):	0 to 1											
<b>Pesticides/PCBs (µg/kg)</b>												
Aroclor-1260	NA	NA	--	NA	--	NA	--	NA	NA	NA	NA	--
alpha-BHC	--	--	--	--	--	--	--	--	--	--	--	3.1
beta-BHC	--	--	--	--	--	--	--	--	--	--	--	1,270
gamma-BHC (Lindane)	--	--	--	--	--	--	--	--	--	--	--	2.3
Chlordane	380	20	--	75	--	75	--	31	9,000	9,000	9,000	13,700
4,4'-DDE	220	3.4	3.6	9.3	6.3 J	9.3	6.3 J	1.1	560	560	560	1,850
4,4'-DDD	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDT	56 J	4.4 J	2.1	34	8.1	34	8.1	2.5	340	340	340	1,390
Heptachlor	--	--	--	--	--	--	--	--	--	--	--	4.6 J
Heptachlor epoxide	--	--	--	--	--	--	--	--	--	--	--	32
See notes at end of table.												

**Table 3-1 (Continued)  
Pesticides and PCBs Detected in Surface Soil Samples at Solid Waste Management Unit 15**

Navy Environmental Leadership Program  
Technology Evaluation Report for  
Solid Waste Management Unit 15  
U.S. Naval Station  
Mayport, Florida

Analytical Batch Number:	RB147	M7867	M7867	RB147	M7867	M7867	M7867	M7902	M7902
Sample Location:	MPT-15-SS16	MPT-15-SS17	MPT-15-SS18	MPT-15-SS18	MPT-15-SS18	MPT-15-SS19	MPT-15-SS19	MPT-15-SS19	MPT-15-SS19
Sample Number:	15SS01601	15SS01701	15SS01801	15SS01801	15SS01901	15SS01901	15SS01901	15SS01901	15SS01901
Date Sampled:	05-MAR-96	13-SEP-94	13-SEP-94	05-MAR-96	13-SEP-94	13-SEP-94	13-SEP-94	20-SEP-94	20-SEP-94
Sample Depth (ft bis):	0 to 1								
Pesticides/PCBs ( $\mu$ g/kg)									
Aroclor-1260	--	NA	NA	--	NA	NA	NA	NA	NA
alpha-BHC	0.81	--	--	--	--	--	--	--	--
beta-BHC	'11	--	--	--	--	--	--	--	--
gamma-BHC (Lindane)	--	--	--	--	--	--	--	--	--
Chlordane	'260	--	--	--	--	--	19	--	--
4,4'-DDE	'110	93	180	1,500	4.8 J	4.4	4.4	2.1 J	1.7 J
4,4'-DDD	--	--	--	--	--	--	--	--	--
4,4'-DDT	30	89	54	100	48	12	12	1.5 J	1.7 J
Heptachlor	--	--	--	--	--	--	--	--	--
Heptachlor epoxide	'1.7 J	--	--	--	--	--	--	--	--

See notes at end of table.

**Table 3-1 (Continued)**  
**Pesticides and PCBs Detected in Surface Soil Samples at Solid Waste Management Unit 15**

Navy Environmental Leadership Program  
 Technology Evaluation Report for  
 Solid Waste Management Unit 15  
 U.S. Naval Station  
 Mayport, Florida

Analytical Batch Number:	M7867	M7867	M7867	M7867	M7867	RA781	RB147	RB742	M7867
Sample Location:	MPT-15-SS20	MPT-15-SS21	MPT-15-SS22	MPT-15-SS23	MPT-15-SS23	MPT-15-SS23	MPT-15-SS23	MPT-15-SS24	MPT-15-SS25
Sample Number:	15SS02001	15SS02101	15SS02201	15SS02301	15SS02301	15SS02301	15SS02301	15SS02401	15SS02501
Date Sampled:	13-SEP-94	13-SEP-94	13-SEP-94	13-SEP-94	18-DEC-95	05-MAR-96	13-SEP-94	13-SEP-94	13-SEP-94
Sample Depth (ft bls):	0 to 1								
<b>Pesticides/PCBs (µg/kg)</b>									
Aroclor-1260	NA	NA	NA	NA	NA	--	--	NA	NA
alpha-BHC	--	--	--	--	--	--	--	--	--
beta-BHC	--	--	--	--	--	--	--	--	--
gamma-BHC (Lindane)	--	--	--	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--	--	--	--
4,4'-DDE	4.8	270	14	--	2.4 J	3.4	1.4	1.4	49
4,4'-DDD	--	--	--	--	--	--	--	--	--
4,4'-DDT	3.1	60	6.5	790,000	1.9	1.4	1.6	1.6	17
Heptachlor	--	--	--	--	--	--	--	--	--
Heptachlor epoxide	--	--	--	--	--	--	--	--	--
See notes at end of table.									

**Table 3-1 (Continued)**  
**Pesticides and PCBs Detected in Surface Soil Samples at Solid Waste Management Unit 15**

Navy Environmental Leadership Program  
 Technology Evaluation Report for  
 Solid Waste Management Unit 15  
 U.S. Naval Station  
 Mayport, Florida

Analytical Batch Number:	M7867	R8785	R8785	R8742	R8742	R8742	R8742	RA781	RB147
Sample Location:	MPT-15-SS26	MPT-15-SS27	MPT-15-SS27	MPT-15-SS28	MPT-15-SS29	MPT-15-SS30	MPT-15-SS31	MPT-15-SS31	MPT-15-SS31
Sample Number:	15SS02601	15SS02701	15SS02701DUP	15SS02801	15SS02901	15SS03001	15S03101	15S03101	15S03101
Date Sampled:	13-SEP-94	22-SEP-94	22-SEP-94	13-SEP-94	13-SEP-94	13-SEP-94	18-DEC-95	18-DEC-95	05-MAR-96
Sample Depth (ft bin):	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1	0 to 1
<b>Pesticides/PCBs (<math>\mu\text{g}/\text{kg}</math>)</b>									
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	--
alpha-BHC	--	--	--	--	--	--	--	--	--
beta-BHC	--	--	--	--	--	--	--	--	--
gamma-BHC (Lindane)	--	--	--	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--	--	--	--
4,4'-DDE	7.9	1.2	0.67	2.8	6.5	3.8	360	360	320
4,4'-DDD	--	--	--	--	--	--	--	--	--
4,4'-DDT	7.4	--	--	--	2.1	2.2	160	160	130
Heptachlor	--	--	--	--	--	--	--	--	--
Heptachlor epoxide	--	--	--	--	--	--	--	--	--

See notes at end of table.

**Table 3-1 (Continued)**  
**Pesticides and PCBs Detected in Surface Soil Samples at Solid Waste Management Unit 15**

Navy Environmental Leadership Program  
 Technology Evaluation Report for  
 Solid Waste Management Unit 15  
 U.S. Naval Station  
 Mayport, Florida

	RA781	RA781	RA781	RB147								
Analytical Batch Number:	RA781	RA781	RA781	RB147								
Sample Location:	MPT-15-SS32											
Sample Number:	15S03201	15S03201DUP	15S03201	15S03201	15S03301	15S03301	15S03401	15S03401	15S03401	15S03401	15S03501	15S03501
Date Sampled:	18-DEC-95	18-DEC-95	18-DEC-95	05-MAR-96	18-DEC-95	18-DEC-95	18-DEC-95	05-MAR-96	18-DEC-95	05-MAR-96	18-DEC-95	18-DEC-95
Sample Depth (ft bis):	0 to 1											
<b>Pesticides/PCBs (µg/kg)</b>												
Aroclor-1260	--	--	--	--	--	--	--	--	--	--	--	3,000 J
alpha-BHC	--	--	--	--	--	--	--	--	--	--	--	--
beta-BHC	--	--	--	--	--	--	--	--	--	--	--	--
gamma-BHC (Lindane)	--	--	--	--	--	--	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--	--	--	--	--	--	--
4,4'-DDE	14 J	62	66	66	2.2	1.7	43 J	310	43 J	310	39 J	39 J
4,4'-DDD	--	--	1.5	--	--	--	--	--	--	--	--	--
4,4'-DDT	7 J	20	21	21	1.4 J	--	11 J	78	11 J	78	130	130
Heptachlor	--	--	--	--	--	--	--	--	--	--	--	--
Heptachlor epoxide	--	--	--	--	--	--	--	--	--	--	--	--
See notes at end of table.												

**Table 3-1 (Continued)**  
**Pesticides and PCBs Detected in Surface Soil Samples at**  
**Solid Waste Management Unit 15**

Navy Environmental Leadership Program  
 Technology Evaluation Report for  
 Solid Waste Management Unit 15  
 U.S. Naval Station  
 Mayport, Florida

Analytical Batch Number:	RB147	RB147	RB147	RB147
Sample Location:	MPT-15-SS35	MPT-15-SS37	MPT-15-SS38	MPT-15-SS38
Sample Number:	15S03501	15S03701	15S03801	15S03801DUP
Date Sampled:	05-MAR-96	05-MAR-96	05-MAR-96	05-MAR-96
Sample Depth (ft bls):	0 to 1	0 to 1	0 to 1	0 to 1
<b>Pesticides/PCBs (<math>\mu\text{g}/\text{kg}</math>)</b>				
Aroclor-1260	580	--	--	--
alpha-BHC	--	--	--	--
beta-BHC	--	--	--	--
gamma-BHC (Lindane)	--	--	--	--
Chlordane	--	--	--	--
4,4'-DDE	8.9	<sup>1</sup> 250	0.83	--
4,4'-DDD	--	3.1	--	--
4,4'-DDT	--	<sup>1</sup> 84	--	--
Heptachlor	--	--	--	--
Heptachlor epoxide	--	--	--	--

<sup>1</sup> Value reported from diluted reanalysis.

Notes: PCB = polychlorinated biphenyl.  
 ft bls = feet below land surface.  
 $\mu\text{g}/\text{kg}$  = micrograms per kilogram.  
 BHC = benzene hexachloride (also known as hexachlorocyclohexane).  
 -- = analyte, if present, was less than the detection limit.  
 J = estimated value.  
 DDE = dichlorodiphenyldichloroethene.  
 DDD = dichlorodiphenyldichloroethane.  
 DDT = dichlorodiphenyltrichloroethane.  
 DUP = duplicate.

4,4'-DDD (an anaerobic degradation product of 4,4'-DDT) was detected in 2 of 53 surface soil samples, MPT-15-SS32 and MPT-15-SS37, at concentrations of 1.5 and 3.1  $\mu\text{g}/\text{kg}$ , respectively.

One surface soil sample (MPT-15-SS23) contained 4,4'-DDT at a concentration that exceeded the FDEP industrial soil cleanup goal. 4,4'-DDT was detected at two sampling locations, MPT-15-SS07 and MPT-15-SS23, at concentrations that exceeded the ecological based treatment level. None of the surface soil samples contained 4,4'-DDE or 4,4'-DDD at concentrations that exceed the FDEP industrial or residential soil cleanup goals, or the ecological based treatment level.

Chlordane was detected in 13 of 53 surface soil samples at concentrations ranging from 19 to 790,000  $\mu\text{g}/\text{kg}$  (average value of 68,774  $\mu\text{g}/\text{kg}$ ). Chlordane was detected in surface soil samples from five sampling locations (MPT-15-SS05, MPT-15-SS06, MPT-15-SS07, MPT-15-SS08, and MPT-15-SS16) at concentrations that exceed the FDEP residential soil cleanup goal and in samples from three sampling locations (MPT-15-SS05, MPT-15-SS07, and MPT-15-SS16) at concentrations that exceed the industrial soil cleanup goal.

The PCB, Aroclor-1260, was detected at one sampling location, MPT-15-SS35, in surface soil samples collected in 1995 and 1996 at concentrations of 3,000 and 580  $\mu\text{g}/\text{kg}$ , respectively. Analysis for PCBs were not requested for samples collected in 1994 (27 samples). The sample from location MPT-15-SS35 exceeded the FDEP residential soil cleanup goal.

Environmental and duplicate sample pairs consist of one for 1993, four for 1994, one for 1995, and one for 1996 (Table 3-2). The relative percent difference (RPD) between the environmental and duplicate can be used to judge the precision of the analytical results for the sample pairs. An RPD of  $\pm 50$  percent for a sample and duplicate is generally considered acceptable precision for 4,4'-DDT (USEPA, 1990). Two of the sample pairs, MPT-15-SS19 (collected on September 13, 1994) and MPT-15-SS32 had an RPD greater than 50 percent. The RPD values for 4,4'-DDE; 4,4'-DDT; and chlordane were generally less than 50 percent. This would suggest the following:

- the chemicals were a homogenous mixture at the sampling location, or
- the chemicals were not a homogenous mixture at the sampling location, but were sufficiently blended into the sample matrix during sample preparation.

Surface soil duplicate sample pairs were collected at sampling location MPT-15-SS19 7 days apart (Table 3-2). The average values of 4,4'-DDE for each of the sample pairs are 4.6 (September 13, 1994), 1.9 (September 20, 1994), and 1.9  $\mu\text{g}/\text{kg}$ , respectively. The average values of 4,4'-DDT for each of the sample pairs are 30 (September 13, 1994), 1.6 (September 20, 1994), and 1.9  $\mu\text{g}/\text{kg}$ , respectively. The RPD of the average values for 4,4'-DDE and 4,4'-DDT are 83 and 180 percent, respectively. This suggests that there may be variability in the concentration of the chemicals within the sample (i.e., not a homogenous mixture) and/or the concentration varies over short distances. Multiple samples from the same location were collected within 12 inches of the stake marking the sampling location.

**Table 3-2  
Relative Percent Difference for Environmental and Duplicate Surface Soil Samples**

Navy Environmental Leadership Program  
Technology Evaluation Report for  
Solid Waste Management Unit 15  
U.S. Naval Station  
Mayport, Florida

Sample Location	Sample Date	Sample Number	Sample Number	Analyte	Concentration (µg/kg)		Relative Percent Difference <sup>1</sup>
					First Sample	Second Sample	
MPT-15-SS08	02-FEB-93	15SS81	15SS81Dup	4,4'-DDE	280	230	12
				4,4'-DDT	110	140	-24
				Chlordane	1,000	710	34
MPT-15-SS09	20-SEPT-94	15SS00901	15SS00901Dup	4,4'-DDE	63	60	5
				4,4'-DDT	7.1	7.4	-4
MPT-15-SS19	13-SEPT-94	15SS01901	15SS01901Dup	4,4'-DDE	4.8	4.4	9
				4,4'-DDT	48	12	120
MPT-15-SS19	20-SEPT-94	15SS01901	15SS01901Dup	4,4'-DDE	2.1	1.7	21
				4,4'-DDT	1.5	1.7	-13
MPT-15-SS27	22-SEPT-94	15SS02701	15SS02701Dup	4,4'-DDE	1.2	0.67	57
MPT-15-SS32	18-DEC-95	15SS03201	15SS03201Dup	4,4'-DDE	14	62	-126
				4,4'-DDT	7	20	-96
MPT-15-SS38	5-MAR-96	15S03801	15S03801Dup	4,4'-DDE	0.83	ND	NC

<sup>1</sup> Relative percent difference = ((first sample - second sample) / ½(first sample + second sample)) x 100.

Notes: µg/kg = micrograms per kilogram.

Dup = duplicate.

DDD = dichlorodiphenyldichloroethane.

DDT = dichlorodiphenyltrichloroethane.

DDE = dichlorodiphenyldichloroethene.

ND = analyte, if present, was less than the detection limit.

NC = not calculated.

Subsurface Soils. Pesticides detected in subsurface soil samples collected at SWMU 15 consist of alpha-BHC; beta-BHC; delta-BHC; gamma-BHC; heptachlor epoxide; 4,4'-DDE; 4,4'-DDT; and chlordane (Table 3-3). PCBs were not detected in the surface soil samples collected at SWMU 15. The soil sample from location MPT-15-SS16 contained beta-BHC at a concentration that exceeded the leachability goal and chlordane at a concentration that exceeded the FDEP residential soil cleanup goal.

A subsurface soil environmental and duplicate sample pair were collected in March 1996 at sampling location MPT-15-SS23. The target analytes, if present, were less than the detection limit in this sample pair.

3.2 EVALUATION OF BASELINE AND PERFORMANCE SAMPLING EVENTS. Below is an evaluation of analytical results from baseline and performance sampling events for surface and subsurface soil samples.

3.2.1 Surface Soil Samples Below is an evaluation of analytical results for the baseline and performance sampling events.

Baseline Sampling Event. Surface soil samples were collected in December 1995 at sampling locations MPT-15-SS23 and MPT-23-SS16 to determine the current baseline concentrations for 4,4'-DDT and chlordane (Table 3-4 and Figure 3-1). Samples collected previously from these two locations contained 4,4'-DDT and chlordane at concentrations of 790,000 and 9,000  $\mu\text{g}/\text{kg}$ , respectively. The December 1995 samples were collected within approximately 12 inches of the original sample location. 4,4'-DDT and chlordane were detected in the December 1995 samples from locations MPT-15-SS23 and MPT-15-SS16 at lower concentrations (1.9 and 3,700  $\mu\text{g}/\text{kg}$ , respectively). MPT-15-SS23 was located outside of the treatment area immediately adjacent to the fence line.

4,4'-DDE was detected in the December 1995 sample from location MPT-15-SS23 and was not detected in the previous sample. Chlordane has not been detected in samples collected from location MPT-15-SS23. 4,4'-DDT and 4,4'-DDE were detected in the samples collected in September 1994 from location MPT-15-SS16 and in December 1995. The samples collected in December 1995 contained 4,4'-DDT and 4,4'-DDE at slightly higher concentrations.

These analytical results suggest that either biological degradation (aerobic) is naturally occurring at the site, or the chemicals are not present in the soil as a homogenous mixture over short distances. Aerobic biodegradation occurring prior to the technology demonstration is supported by the detection of degradation products 4,4'-DDE and heptachlor epoxide.

Estimates for the half-life of 4,4'-DDE in soil by natural biodegradation range from 2 to 15.6 years (Lichtenstein and Schulz, 1959; Stewart and Chisholm, 1971). The half-life for heptachlor epoxide in aerobic soil is estimated at 33 to 552 days (Bowman, M.C. et al., 1965).

Performance Sampling Event. Surface soil samples collected during the performance sampling event in March 1996 are compared to samples collected in 1993, 1994, and 1995 in Table 3-4. Concentrations of alpha-, beta-, and gamma-BHC (lindane) were detected in surface soil samples collected from one of the

**Table 3-3  
Pesticides Detected in Subsurface Soil Samples at Solid Waste Management Unit 15**

Navy Environmental Leadership Program  
Technology Evaluation Report for  
Solid Waste Management Unit 15  
U.S. Naval Station  
Mayport, Florida

Analytical Batch Number:	23953	RB147	23953	RB147	RB147	RB147	RB147
Sample Location:	MPT-15-SS04	MPT-15-SS04	MPT-15-SS05	MPT-15-SS05	MPT-15-SS05	MPT-15-SS07	MPT-15-SS16
Sample Number:	15SS42	15B00402	15SS52	15B00502	15B00702	15B01802	15B01802
Date Sampled:	02-FEB-93	05-MAR-96	02-FEB-93	05-MAR-96	05-MAR-96	05-MAR-96	05-MAR-96
Sample Depth (ft bis):	1 to 2	1 to 2	1 to 2	1 to 2	1 to 2	1 to 2	1 to 2
<b>Pesticides (<math>\mu\text{g}/\text{kg}</math>)</b>							
alpha-BHC	--	--	--	--	--	--	1.5
beta-BHC	--	--	--	--	--	--	1 <sup>1</sup> 40
delta-BHC	--	--	--	--	1.5 J	--	--
gamma-BHC (Lindane)	--	--	--	--	--	1.3 J	--
Chlordane	--	--	180	1 <sup>4</sup> 20	--	1 <sup>1</sup> ,000	--
4,4'-DDE	2.1	1.2	1.9 J	1 <sup>4</sup> .7 J	--	1 <sup>1</sup> 220	--
4,4'-DDT	2.4	--	--	--	--	1 <sup>1</sup> 130	--
Heptachlor epoxide	--	--	--	1.6 J	4.8 J	3.8 J	--

<sup>1</sup> Value reported from diluted reanalysis.

Notes: ft bis = feet below land surface.

$\mu\text{g}/\text{kg}$  = micrograms per kilogram.

BHC = benzene hexachloride (also known as hexachlorocyclohexane).

-- = analyte, if present, was less than the detection limit.

J = estimated value.

DDE = dichlorodiphenyldichloroethene.

DDT = dichlorodiphenyltrichloroethane.

**Table 3-4  
Baseline and Performance Comparison for Surface Soil at Solid Waste Management Unit 15**

Navy Environmental Leadership Program  
Technology Evaluation Report for  
Solid Waste Management Unit 15  
U.S. Naval Station  
Mayport, Florida

Sample Location:	MPT-15-SS04		MPT-15-SS05		MPT-15-SS07		MPT-15-SS13		MPT-15-SS14	
	15SS41 2/93	15S00401 3/96	15SS51 2/93	15S00501 3/96	15SS71 2/93	15S00701 3/96	15SS01301 9/94	15S01301 3/96	15SS01401 9/94	15S01401 3/96
Sample Number:	0 to 1		0 to 1		0 to 1		0 to 1		0 to 1	
Date Sampled:	0 to 1		0 to 1		0 to 1		0 to 1		0 to 1	
Sample Depth: (ft bis)	0 to 1		0 to 1		0 to 1		0 to 1		0 to 1	
<b>Pesticides/PCBs (µg/kg)</b>										
Aroclor-1280	--	--	--	--	--	--	NA	--	NA	--
alpha-BHC	--	--	--	--	--	--	--	--	--	--
beta-BHC	--	--	--	--	--	--	--	--	--	--
gamma-BHC	--	--	--	--	--	--	--	--	--	--
Chlordane	--	5,600	1,800	150,000	--	150,000	--	--	75	--
4,4'-DDE	49	18	100	16	2,800	--	3.4	4.6	9.3	6.3
4,4'-DDD	--	--	--	--	--	--	--	--	--	--
4,4'-DDT	18	5.7	100	9	1,500	--	4.4	2.1	34	8.1
Heptachlor	--	--	16	--	--	--	--	--	--	--
Heptachlor epoxide	--	--	85	4.3	--	--	--	--	--	--
See notes at end of table.										

**Table 3-4 (Continued)**  
**Baseline and Performance Comparison for Surface Soil at Solid Waste Management Unit 15**

Navy Environmental Leadership Program  
 Technology Evaluation Report for  
 Solid Waste Management Unit 15  
 U.S. Naval Station  
 Mayport, Florida

Sample Location:	MPT-15-SS16				MPT-15-SS18		MPT-15-SS23			MPT-15-SS31	
	15SS01601 9/94	15SS01601 12/95	15SS01601 3/96	15SS01601 3/96	15SS01801 9/94	15SS01801 3/96	15SS02301 9/94	15SS02301 12/95	15SS02301 3/96	15SS03101 12/95	15SS03101 3/96
Sample Number:	0 to 1										
Date Sampled:	0 to 1										
Sample Depth: (ft bis)	0 to 1										
<b>Pesticides/PCBs (µg/kg)</b>											
Aroclor-1260	NA	--	--	--	NA	--	NA	--	--	--	--
alpha-BHC	--	3.1	0.81	--	--	--	--	--	--	--	--
beta-BHC	--	270	8.8	--	--	--	--	--	--	--	--
gamma-BHC	--	2.3	--	--	--	--	--	--	--	--	--
Chlordane	9,000	3,700	260	--	--	--	--	--	--	--	--
4,4'-DDE	560	850	110	180	1,500	--	2.4	3.4	360	320	
4,4'-DDD	--	--	--	--	--	--	--	--	--	--	
4,4'-DDT	340	380	30	54	100	790,000	1.9	1.4	160	130	
Heptachlor	--	4.6	--	--	--	--	--	--	--	--	
Heptachlor epoxide	--	32	1.6	--	--	--	--	--	--	--	

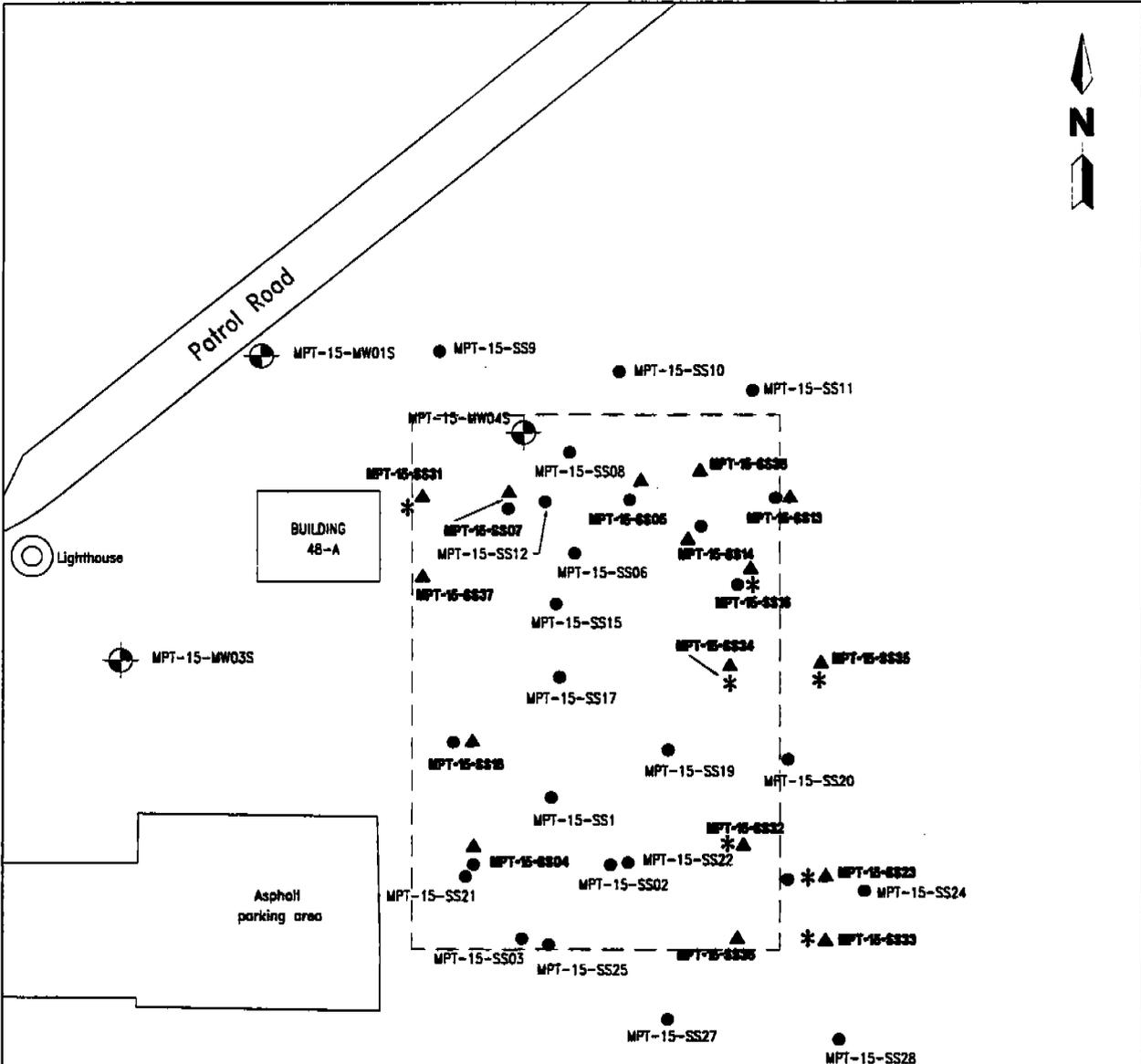
See notes at end of table.

**Table 3-4 Continued)**  
**Baseline and Performance Comparison for Surface Soil at Solid Waste Management Unit 15**

Navy Environmental Leadership Program  
 Technology Evaluation Report for  
 Solid Waste Management Unit 15  
 U.S. Naval Station  
 Mayport, Florida

Sample Location:	MPT-15-SS32		MPT-15-SS33		MPT-15-SS34		MPT-15-SS35		
	15S03201 12/95	15S03201Dup 12/95	15S03201 3/96	15S03301 12/95	15S03301 3/96	15S03401 12/95	15S03401 3/96	15S03501 12/95	15S03501 3/96
Sample Depth (ft bis):	0 to 1		0 to 1		0 to 1		0 to 1		0 to 1
<b>Pesticides/PCBs (µg/kg)</b>									
Aroclor-1260	--	--	--	--	--	--	--	3,000	580
alpha-BHC	--	--	--	--	--	--	--	--	--
beta-BHC	--	--	--	--	--	--	--	--	--
gamma-BHC	--	--	--	--	--	--	--	--	--
Chlordane	--	--	--	--	--	--	--	--	--
4,4'-DDE	14 J	62	66	2.2	1.7	43	310	39	8.9
4,4'-DDD	--	--	1.5	--	--	--	--	--	--
4,4'-DDT	7 J	20	21	1.4	--	11	78	130	--
Heptachlor	--	--	--	--	--	--	--	--	--
Heptachlor epoxide	--	--	--	--	--	--	--	--	--

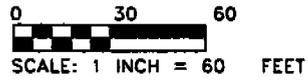
Notes: ft bis = feet below land surface.  
 PCB = polychlorinated biphenyl.  
 µg/kg = micrograms per kilogram.  
 BHC = benzene hexachloride (also known as hexachlorocyclohexane).  
 - = concentration of analyte, if present, was less than the detection limit.  
 DDE = dichlorodiphenyldichloroethane  
 DDD = dichlorodiphenyldichloroethane  
 DDT = dichlorodiphenyltrichloroethane  
 NA = not analyzed.  
 Dup = duplicate sample.



**LEGEND**

- MPT-15-MW015 Monitoring well location
- MPT-15-SS23 Existing surface soil sample locations
- MPT-15-SS22 NELP baseline sampling location
- MPT-15-SS23 NELP performance evaluation sampling location
- Technology demonstration grid boundary

**NOTES:**  
 NELP = Navy Environmental Leadership Program  
 SWMU = Solid Waste Management Unit



**FIGURE 3-1  
 BASELINE AND PERFORMANCE  
 EVALUATION SAMPLING LOCATIONS**



**NELP TECHNOLOGY  
 EVALUATION REPORT  
 SWMU 15**

**U.S. NAVAL STATION  
 MAYPORT, FLORIDA**

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baseline and performance sampling locations. The sample collected from this location in 1994 did not contain these three pesticides, if present, at concentrations that exceeded the detection limit. The sample collected in 1995 contained each of the three chemicals, and lower concentrations were detected in the sample collected in 1996. Beta-BHC was detected in the samples collected in 1995 and 1996 at concentrations exceeding its leachability target treatment level (Table 1-1).

The analytical results for alpha-, beta-, and gamma-BHC (lindane) at sampling location MPT-15-SS16 appear to not conclusively support that biodegradation occurred. The pattern of detection presents an uncertainty as to whether the variation in the chemical concentrations are from biodegradation or the chemicals variation in surface soils. The limited number of detections and apparent variations in concentrations over a short distance for alpha-, beta-, and gamma-BHC (lindane) creates uncertainty in corroborating the effectiveness of the technology demonstration for these chemicals.

Concentrations of heptachlor and heptachlor epoxide were detected in surface soil samples collected from two locations, MPT-15-SS05 and MPT-15-SS16 (Table 3-4). The concentrations detected did not exceed the target treatment levels (Table 1-1).

The detection of heptachlor epoxide in samples collected in 1993 supports that biodegradation of heptachlor is occurring naturally at the site. The samples collected from sampling location MPT-15-SS05 suggest a decrease in concentrations for the 1993 and 1996 sampling events. However, the samples collected from location MPT-15-SS16 in 1994 did not contain the chemicals, if present, at concentrations greater than the detection limit. Both chemicals were detected in the sample collected in 1995 and only a lower concentration of heptachlor epoxide was detected in the sample collected in 1996.

The presence of both heptachlor and its degradation product heptachlor epoxide suggest that biodegradation is occurring. However, the pattern of detection at sampling location MPT-15-SS16 suggest that there are lateral variations in chemical concentrations in surface soil. The variations in concentration over a short distance appear to be greater than or at least similar to the reduction from biodegradation. The limited number of detections and apparent variations in concentrations over a short distance for heptachlor and heptachlor epoxide creates uncertainty in corroborating the effectiveness of the technology demonstration for these chemicals.

The concentrations of both 4,4'-DDT and 4,4'-DDE in the performance samples from eight locations, MPT-15-SS04, MPT-15-SS05, MPT-15-SS07, MPT-15-SS14, MPT-15-SS16, MPT-15-SS31, MPT-15-SS33, and MPT-15-SS35, was less than the concentrations detected in the baseline samples. Sample locations MPT-15-SS33 and MPT-15-SS35 were located outside (east) of the technology demonstration treatment area.

Comparison of baseline and performance analytical results at MPT-15-SS13 and MPT-15-SS23 suggest that the concentrations of 4,4'-DDT decreased and the concentrations of 4,4'-DDE increased. The increase in the concentrations of 4,4'-DDE could be from the degradation of 4,4'-DDT, or the variation in concentration over a short distance. These two sampling locations were located outside (east) of the technology demonstration treatment area. The concentrations of 4,4'-DDT and

4,4'-DDE were relatively similar at these two sampling locations and at MPT-15-SS33.

The concentrations of both 4,4'-DDT and 4,4'-DDE in the performance samples from two locations, MPT-15-SS18, and MPT-15-SS35, were greater than the concentrations detected in the baseline samples. MPT-15-SS18 was located along the western central part of the site, and MPT-15-SS35 was located outside of the treatment area, east of the middle of the site.

4,4'-DDT; 4,4'-DDE; and 4,4'-DDD were detected at one performance sampling location, MPT-15-SS32, located in the southeastern part of the site. The concentrations of 4,4'-DDT and 4,4'-DDE were relatively similar for the performance sample (March 1996 sample number 15S03201) and baseline sample duplicate (December 1995 sample number 15S03201Dup) (Table 3-4). However, the performance sample contained higher concentration of 4,4'-DDT, and 4,4'-DDE compared to the environmental sample (December 1995 sample number 15S03201). The presence of 4,4'-DDD at this location suggests that some anaerobic degradation of 4,4'-DDT occurred.

Overall, the analytical results for 4,4'-DDT and 4,4'-DDE suggest that aerobic biodegradation occurred. However, some of the analytical results (MPT-15-SS16, MPT-15-SS18, MPT-15-SS23, MPT-15-SS32, and MPT-15-SS34) also suggest an uncertainty in determining whether or not the values for the performance samples (March 1996) are representative of a decrease in concentration detected in its associated baseline sample.

None of the baseline or performance samples contained 4,4'-DDE or 4,4'-DDD at concentrations that exceed their respective FDEP soil cleanup goals (Table 1-1). Only the baseline sample collected in September 1994 contained 4,4'-DDT at a concentration that exceeded the FDEP industrial soil cleanup goal.

Chlordane was detected in samples collected from four of the baseline and performance samples. The analytical results for three of the locations (MPT-15-SS05, MPT-15-SS14, and MPT-15-SS16) suggest that the concentrations of chlordane decreased. However, the highest detected concentration of chlordane was the performance sample from sampling location MPT-15-SS07. Chlordane, if present, was not detected at concentration exceeding the detection limit in the baseline sample from this location. The limited number of detection and the analytical results for sampling location MPT-15-SS07 present an uncertainty in determining whether or not the values for the performance samples (March 1996) are representative of a decrease in concentration detected in its associated baseline sample.

The concentration of chlordane detected in the performance sample from location MPT-15-SS07 exceeds the FDEP industrial soil cleanup goal.

The PCB, Aroclor-1260, was detected a single sampling location MPT-15-SS35. The sampling location, as previously stated, was located outside of the treatment area, east of the middle of the site. The limited number of detections, and the likely variations in concentrations over a short distance for the PCB creates uncertainty in corroborating the effectiveness of the technology demonstration for this chemical.

Aroclor-1260 was detected in the baseline sample from location MPT-15-SS35 at a concentration that exceeds the FDEP residential soil cleanup goal (Table 1-1).

3.2.2 Subsurface Soil Samples Below is an evaluation of analytical results for the baseline and performance sampling events.

Baseline Sampling Event. Subsurface soil samples were collected in December 1995 at sampling locations MPT-15-SS23 and MPT-23-SS16 to determine the current baseline concentrations for 4,4'-DDT and chlordane (Table 3-5 and Figure 3-1). Surface soil samples collected previously from these two locations contained 4,4'-DDT and chlordane at concentrations of 790,000 and 9,000  $\mu\text{g}/\text{kg}$ , respectively. The December 1995 samples were collected within approximately 12 inches of the original sample location.

Pesticides were not detected in the subsurface soil sample collected from location MPT-15-SS23. Alpha-; beta-; and gamma-BHC (lindane); heptachlor epoxide; 4,4'-DDT; 4,4'-DDE; and chlordane were detected in the subsurface soil sample collected from sampling location MPT-15-SS16.

Performance Sampling Event. The presence of 4,4'-DDE and heptachlor epoxide in subsurface soil samples suggest that some biodegradation has occurred. Analytical results for sampling location MPT-15-SS04 suggest that concentrations of 4,4'-DDT and 4,4'-DDE decreased, and the results for sampling location MPT-15-SS05 suggest a decrease in the concentration of 4,4'-DDE. However, the results for this sampling location also suggest an increase in the concentration of 4,4'-DDT. Delta-BHC was detected in the performance subsurface soil sample collected from location MPT-15-SS07, but not in the baseline sample.

The limited number of detections and the likely variations in concentrations over a short distance for the chemicals detected in the subsurface soil samples creates uncertainty in corroborating the effectiveness of the technology demonstration.

3.3 RAINFALL AND TEMPERATURE DATA. Maximum and minimum air temperature measurements were obtained along with daily rainfall amounts from the NAVSTA Mayport Meteorology Department (Table 3-6). Soil temperature measurements made periodically by ABB-ES are also presented in Table 3-6. Air temperature measurements suggest that, with exception of a few cool periods, the temperature was higher than 60 degrees Fahrenheit. The warmest period was at the end of February, with highs in the 70s and 80s. Minimal rainfall events occurred during the technology demonstration.

Biological degradation has been observed at soil temperatures ranging from 32 (0 degrees Centigrade) to 77 degrees Fahrenheit (25 degrees Centigrade). With every 18 degree Fahrenheit increase (10 degrees Centigrade), microbial activity doubles (Sayles, et al., 1992).

**Table 3-5  
Baseline and Performance Comparison for Subsurface Soil at  
Solid Waste Management Unit 15**

Navy Environmental Leadership Program  
Technology Evaluation Report for  
Solid Waste Management Unit 15  
U.S. Naval Station  
Mayport, Florida

Sample Location:	MPT-15-SS04		MPT-15-SS05		MPT-15-SS07		MPT-15-SS16		MPT-15-SS23		
	15SS42 2/93	15B00402 3/96	15SS52 2/93	15B00502 3/96	15B00702 2/93	15B01602 3/96	NS 3/96	15B01602 3/96	15S02302 12/95	15B02302 3/96	15B02302Dup 3/96
Sample Number:	1 to 2		1 to 2		1 to 2		1 to 2		1 to 2		
Date Sampled:	1 to 2		1 to 2		1 to 2		1 to 2		1 to 2		
Sample Depth: (ft bis)	1 to 2		1 to 2		1 to 2		1 to 2		1 to 2		
<b>Pesticides (µg/kg)</b>											
alpha-BHC	--	--	--	--	--	--	NS	1.5	--	--	--
beta-BHC	--	--	--	--	--	--	NS	140	--	--	--
delta-BHC	--	--	--	--	--	1.5	NS	--	--	--	--
gamma-BHC	--	--	--	--	--	--	NS	1.3	--	--	--
Chlordane	--	--	180	420	--	--	NS	1,000	--	--	--
4,4-DDE	2.1	1.2	1.9	1.6	--	--	NS	220	--	--	--
4,4-DDT	2.4	--	--	4.7	--	--	NS	130	--	--	--
Heptachlor epoxide	--	--	--	--	--	4.8	NS	3.8	--	--	--

Notes: Dup = duplicate sample.  
ft bis = feet below land surface  
µg/kg = micrograms per kilogram.  
BHC = benzene hexachloride (also known as hexachlorocyclohexane).  
- = concentration of analyte, if present, was less than the detection limit.  
NS = not sampled.  
DDE = dichlorodiphenyldichloroethene  
DDT = dichlorodiphenyltrichloroethane

**Table 3-6  
Summary of Temperature and Rainfall Data**

Navy Environmental Leadership Program  
Technology Evaluation Report for  
Solid Waste Management Unit 15  
U.S. Naval Station  
Mayport, Florida

Date	Air Temperature (Fahrenheit)		Soil Temperature (Fahrenheit)		Precipitation (Inches)
	Minimum	Maximum	Morning	Afternoon	
5-Jan-96	39	58	-	-	0
6-Jan-96	42	70	-	-	Trace
7-Jan-96	33	63	-	-	0.01
8-Jan-96	28	42	-	-	0
9-Jan-96	27	54	41	53	0
10-Jan-96	42	64	42	57	0
11-Jan-96	38	67	-	58	0
12-Jan-96	45	60	-	57	Trace
13-Jan-96	39	57	-	-	0
14-Jan-96	42	71	-	-	0
15-Jan-96	45	69	-	68	0
16-Jan-96	48	67	-	-	0
17-Jan-96	53	61	-	-	0.03
18-Jan-96	61	74	-	-	0.15
19-Jan-96	36	68	-	61	0.06
20-Jan-96	30	53	-	-	0
21-Jan-96	48	56	-	-	0
22-Jan-96	46	54	-	-	0
23-Jan-96	49	63	62	-	0
24-Jan-96	57	75	60	-	0.06
25-Jan-96	39	57	50	-	0
26-Jan-96	56	72	60	-	0
27-Jan-96	44	73	-	-	0.03
28-Jan-96	42	56	-	-	0
29-Jan-96	49	67	-	-	0
30-Jan-96	49	74	-	63	0
31-Jan-96	56	74	59	69	Trace

See notes at end of table.

**Table 3-6 (Continued)**  
**Summary of Temperature and Rainfall Data**

Navy Environmental Leadership Program  
 Technology Evaluation Report for  
 Solid Waste Management Unit 15  
 U.S. Naval Station  
 Mayport, Florida

Date	Air Temperature (Fahrenheit)		Soil Temperature (Fahrenheit)		Precipitation (Inches)
	Minimum	Maximum	Minimum	Maximum	
1-Feb-96	52	62	-	63	0
2-Feb-96	54	73	64	64	0.09
3-Feb-96	40	63	-	-	0.03
4-Feb-96	28	40	-	-	0
5-Feb-96	21	38	47	53	0
6-Feb-96	32	47	-	-	0
7-Feb-96	33	56	-	-	0
8-Feb-96	39	73	53	61	0
9-Feb-96	48	76	-	-	0
10-Feb-96	53	75	-	-	0
11-Feb-96	58	75	-	-	0
12-Feb-96	42	59	-	-	0
13-Feb-96	34	58	-	-	0
14-Feb-96	38	71	-	-	0
15-Feb-96	55	75	-	-	0.06
16-Feb-96	36	64	-	-	0.12
17-Feb-96	32	52	-	-	0
18-Feb-96	40	62	-	-	0
19-Feb-96	40	68	-	-	0
20-Feb-96	54	79	-	-	Trace
21-Feb-96	53	70	-	-	0
22-Feb-96	51	76	-	-	0
23-Feb-96	60	81	-	-	0
24-Feb-96	60	81	-	-	0
25-Feb-96	58	73	-	-	0
26-Feb-96	62	81	-	-	0

Notes: NELP = Navy Environmental Leadership Program  
 - = Soil temperature not measured.

#### 4.0 EVALUATION OF FIFCO TECHNOLOGY DEMONSTRATION RESULTS

Sampling locations and analytical results from FIFCO's sampling events are described in their report entitled "Demonstration of New and Emerging Environmental Technologies," Naval Station Mayport, Florida, 1997. FIFCO's analytical results for 4,4'-DDT; 4,4'-DDE; and 4,4'-DDD were tabulated and characterized as decreasing, increasing, random, and insufficient number of samples (Tables 4-1 through 4-3, respectively).

The row for a sample was marked as "Decrease" when two or more samples had decreasing concentrations. The row for a sample was marked as "Increase" when two or more samples had increasing concentrations. The row for a sample was marked as "Random" when three or more samples had concentrations that increased from the previous analytical result. The row for a sample was marked as "Insufficient Number of Samples" when only one sample was analyzed or all of the analytical results were nondetects; therefore, a decrease, increase, or random pattern could not be determined.

Based on the above criteria, the results for 4,4'-DDT are as follows:

- 8 samples were marked as decreasing concentrations,
- 4 samples were marked as increasing concentrations,
- 11 samples were marked as random concentrations, and
- 10 samples were marked as insufficient number of samples (Table 4-1).

The results for 4,4'-DDE are as follows:

- 4 samples were marked as decreasing concentrations,
- 6 samples were marked as increasing concentrations,
- 15 samples were marked as random concentrations, and
- 8 samples were marked as insufficient number of samples (Table 4-2).

The results for 4,4'-DDD are as follows:

- 2 samples were marked as decreasing concentrations,
- 11 samples were marked as increasing concentrations,
- 0 samples were marked as random concentrations, and
- 20 samples were marked as insufficient number of samples (Table 4-3).

The number of random and increasing concentrations compared to the decreasing concentrations for 4,4'-DDT, and 4,4'-DDE suggest that the reduction in concentration from biodegradation may be obscured by the variations in concentrations at a sampling location, or possibly poor sampling techniques (incomplete homogenization of the sample). The detection of 4,4'-DDE suggests that aerobic biodegradation of 4,4'-DDT occurred.

An uncertainty for this conclusion is that the inherent precision of the analytical method (USEPA Method 8080) may not be able to determine the concentrations. The percent recovery acceptance criteria for a matrix spike and matrix spike duplicate pair for 4,4'-DDT is 23 to 134 percent and the RPD is  $\pm 50$  percent (USEPA, 1991). Analytical results that are biased high or low could result in the variations observed for the concentrations detected.

None of the FIFCO samples appear to contain 4,4'-DDT; 4,4'-DDE; or 4,4'-DDD at concentrations that exceed the FDEP residential or industrial soil cleanup goals (Table 1-1).

**Table 4-1**  
**FIFCO's Soil Sample Analytical Results for 4,4'-DDT**

Navy Environmental Leadership Program  
 Technology Evaluation Report for  
 Solid Waste Management Unit 15  
 U.S. Naval Station  
 Mayport, Florida

Sample Location	Sample Depth (ft bis)	Soil Sample Collection Dates										Decrease	Increase	Random	Insufficient Number of Samples	
		1/26/95 (µg/kg)	1/3/96 (µg/kg)	1/9/96 (µg/kg)	1/13/96 (µg/kg)	1/22/96 (µg/kg)	2/8/96 (µg/kg)	2/22/96 (µg/kg)	3/5/96' (µg/kg)							
SS01F	0 to 1	NS	59.4	192.4	165	33	NS	NS	NS	NR				X		
SS02F	0 to 1	NS	--	-- <sup>2</sup>	--	12.94	NS	NS	NS	NR				X		
SS03F	0 to 1	NS	4.29	15.61	7.59	9.54	NS	NS	NS	NR				X		
SS04F	0 to 1	NS	66	283.8	158.4	95.7	NS	NS	NS	NR				X		
SS05F	0 to 1	NS	--	--	2.97	--	NS	NS	NS	NR				X		
15-SS05	0 to 1	NS	NS	NS	NS	NS	--	NS	NS	NR					X	
SS06F	0 to 1	NS	277.2	151.8	165	196	NS	NS	NS	NR				X		
SS13F <sup>3</sup>	0 to 1	NS	409.2	92.4	125.4	165	NS	NS	NS	NR				X		
SS07F	0 to 1	NS	32.34	43.56	39.6	29.37	NS	NS	NS	NR				X		
15-SS07	0 to 1	NS	NS	NS	NS	NS	136.6	NS	NS	NR					X	
SS08F	0 to 1	NS	2.31	--	3.96	--	NS	NS	NS	NR				X		
SS09F	0 to 1	NS	231	36.3	38.94	184.4	NS	NS	NS	NR				X		
SS10F	0 to 1	NS	118.8	125.4	138.6	33	NS	NS	NS	NR				X		
SS11F	0 to 1	NS	--	11.88	3.63	20.79	NS	NS	NS	NR				X		
SS12F	0 to 1	NS	4.62	7.26	--	--	NS	NS	NS	NR				X		
15-SS16	0 to 1	326.7	NS	NS	NS	NS	132	29	NS	NR					X	
SS16F	0 to 1	NS	NS	NS	547.8	NS	NS	NS	NS	NR					X	
SS16D	1 to 2	NS	--	NS	NS	11.55	NS	NS	NS	NR					X	
15-SS23S	0 to 1	4.29	NS	NS	NS	NS	--	--	NS	NR					X	
15-SS23D	1 to 2	--	NS	NS	NS	NS	NS	NS	NS	NR					X	
15-SS31	0 to 1	198	NS	NS	NS	NS	NS	NS	NS	NR					X	

See notes at end of table.

**Table 4-1 (Continued)**  
**FIFCO's Soil Sample Analytical Results for 4,4'-DDT**

Navy Environmental Leadership Program  
Technology Evaluation Report for  
Solid Waste Management Unit 15  
U.S. Naval Station  
Mayport, Florida

Sample Location	Sample Depth (ft bis)	Soil Sample Collection Dates										Decrease	Increase	Random	Insufficient Number of Samples	
		1/26/95 (µg/kg)	1/3/96 (µg/kg)	1/9/96 (µg/kg)	1/13/96 (µg/kg)	1/22/96 (µg/kg)	2/8/96 (µg/kg)	2/22/96 (µg/kg)	3/5/96 (µg/kg)							
15-SS32	0 to 1	23.43	NS	NS	NS	NS	NS	15.18	4	NR	X					
15-SS33	0 to 1	2.31	NS	NS	NS	NS	NS	NS	NS	NS					X	
15-SS34	0 to 1	234.3	NS	NS	NS	NS	NS	72.6	25	NR	X					
15-SS35	0 to 1	--	NS	NS	NS	NS	NS	NS	NS	NS					X	
SS35F	0 to 1	NS	NS	NS	--	NS	NS	NS	NS	NS					X	
SS35D	1 to 2	NS	--	NS	NS	NS	--	NS	NS	NS					X	
15-SS36	0 to 1	NS	NS	NS	NS	NS	NS	257.4	85	NR	X					
15-SS37	0 to 1	NS	NS	NS	NS	NS	NS	26.4	10	NR	X					
15-SS38	0 to 1	NS	NS	NS	NS	NS	NS	--	--	NR					X	
SS41	0 to 1	NS	NS	NS	NS	NS	NS	--	--	NR					X	
SS45	0 to 1	NS	NS	NS	NS	NS	NS	4.29	5	NR			X			
SS50	0 to 1	NS	NS	NS	NS	NS	NS	10.89	--	NR	X					

<sup>1</sup> Split Samples with ABB-ES, but were not presented in FIFCO's final report (FIFCO, 1997).  
<sup>2</sup> No record of data or analysis, only shown in summary tables.  
<sup>3</sup> SS13F (Dup of SS06F).

Notes: FIFCO = FIFCO International, Inc.  
 DDT = dichlorodiphenyltrichloroethane.  
 ft bis = depth in feet beneath the land surface.  
 µg/kg = micrograms per kilogram.  
 NS = not sampled.  
 NR = not reported by FIFCO (FIFCO, 1997).  
 -- = not present above detection limit (FIFCO, 1997).

**Table 4-2**  
**FIFCO's Soil Sample Analytical Results for 4,4'-DDE**

Navy Environmental Leadership Program  
 Technology Evaluation Report for  
 Solid Waste Management Unit 15  
 U.S. Naval Station  
 Mayport, Florida

Sample Location	Sample Depth (ft bis)	Soil Sample Collection Dates										Decrease	Increase	Random	Insufficient number of Samples		
		12/26/95 (µg/kg)	1/3/96 (µg/kg)	1/9/96 (µg/kg)	1/13/96 (µg/kg)	1/22/96 (µg/kg)	2/8/96 (µg/kg)	2/22/96 (µg/kg)	3/5/96 <sup>1</sup> (µg/kg)								
SS01F	0 to 1	NS	316.8	521.40	435.6	679.8	NS	NS	NR								
SS02F	0 to 1	NS	2.64	4.95	3.63	7.59	NS	NS	NR								
SS03F	0 to 1	NS	9.57	10.23	11.88	9.57	NS	NS	NR								
SS04F	0 to 1	NS	66	363	310.2	95.7	NS	NS	NR								
SS05F	0 to 1	NS	-	1.65	1.98	-	NS	NS	NR								
15-SS05	0 to 1	NS	NS	NS	NS	NS	-	-	NR								X
SS06F	0 to 1	NS	541.2	323.4	442.2	673.2	NS	NS	NR								
SS13F <sup>3</sup>	0 to 1	NS	607.2	151.8	528	303.6	NS	NS	NR								
SS07F	0 to 1	NS	178.2	204.6	145.2	165	NS	NS	NR								
15-SS07	0 to 1	NS	NS	NS	NS	NS	105.6	112	NR								
SS08F	0 to 1	NS	3.3	2.31	3.63	5.28	NS	NS	NR								
SS09F	0 to 1	NS	323.4	95.7	89.1	257.4	NS	NS	NR								
SS10F	0 to 1	NS	561	303.6	600.6	574.2	NS	NS	NR								
SS11F	0 to 1	NS	38.28	50.49	37.62	56.1	NS	NS	NR								
SS12F	0 to 1	NS	11.88	-	10.23	18.81	NS	NS	NR								
15-SS16	0 to 1	1,765.5	NS	NS	NS	NS	739.2	570	NR								
SS16F	0 to 1	NS	NS	NS	1,914	NS	NS	NS	NR								X
SS16D	1 to 2	NS	3.3	NS	NS	66	NS	NS	NR								
15-SS23S	0 to 1	3.3	NS	NS	NS	NS	4.95	5	NR								
15-SS23D	1 to 2	-	NS	NS	NS	NS	NS	NS	NR								
15-SS31	0 to 1	419	NS	NS	NS	NS	NS	NS	NR								X
15-SS32	0 to 1	82.5	NS	NS	NS	NS	62.7	56	NR								
15-SS33	0 to 1	5.61	NS	NS	NS	NS	NS	NS	NR								X

See notes at end of table.

**Table 4-2 (Continued)**  
**FIFCO's Soil Sample Analytical Results for 4,4'-DDE**

Navy Environmental Leadership Program  
 Technology Evaluation Report for  
 Solid Waste Management Unit 15  
 U.S. Naval Station  
 Mayport, Florida

Sample Location	Sample Depth (ft bis)	Soil Sample Collection Dates										Decrease	Increase	Random	Insufficient number of Samples	
		12/26/95 (µg/kg)	1/3/96 (µg/kg)	1/9/96 (µg/kg)	1/13/96 (µg/kg)	1/22/96 (µg/kg)	2/8/96 (µg/kg)	2/22/96 (µg/kg)	3/5/96 <sup>1</sup> (µg/kg)							
15-SS34	0 to 1	1,815	NS	NS	NS	NS	NS	475.2	541	NR				X		
15-SS36	0 to 1	--	NS	NS	NS	NS	NS	NS	NS	NR					X	
SS35F	0 to 1	NS	NS	NS	--	NS	NS	NS	NS	NR					X	
SS35D	1 to 2	NS	--	NS	NS	1.65	NS	NS	NS	NR			X			
15-SS36	0 to 1	NS	NS	NS	NS	NS	600	449	NR				X			
15-SS37	0 to 1	NS	NS	NS	NS	NS	32.01	39	NR					X		
15-SS38	0 to 1	NS	NS	NS	NS	NS	--	--	NR						X	
SS41	0 to 1	NS	NS	NS	NS	NS	7.26	11	NR				X			
SS45	0 to 1	NS	NS	NS	NS	NS	24.75	42	NR					X		
SS50	0 to 1	NS	NS	NS	NS	NS	59.4	--	NR			X				

<sup>1</sup> Split samples with ABB-ES, but was not presented in FIFCO's final report (FIFCO, 1997).

<sup>2</sup> No record of data or analysis, only shown in summary tables.

<sup>3</sup> SS13F (Dup of SS06F).

Notes: FIFCO = FIFCO International, Inc.

DDE = dichlorodiphenyldichloroethene.

ft bis = depth in feet beneath the land surface.

µg/kg = micrograms per kilogram

NS = not sampled.

NR = not reported by FIFCO (FIFCO, 1997).

-- = not present above detection limit (FIFCO, 1997).

**Table 4-3  
FIFCO's Soil Sample Analytical Results for 4,4'-DDD**

Navy Environmental Leadership Program  
Technology Evaluation Report for  
Solid Waste Management Unit 15  
U.S. Naval Station  
Mayport, Florida

Sample Location	Sample Depth (ft bis)	Soil Sample Collection Dates										Decrease	Increase	Random	Insufficient Number of Samples	
		12/26/95 (µg/kg)	1/3/96 (µg/kg)	1/9/96 (µg/kg)	1/13/96 (µg/kg)	1/22/96 (µg/kg)	2/8/96 (µg/kg)	2/22/96 (µg/kg)	3/5/96' (µg/kg)							
SS01F	0 to 1	NS	NR	NR	--	--	NS	NS	NS	NS	NS	NR				X
SS02F	0 to 1	NS	NR	NR	--	--	NS	NS	NS	NS	NS	NR				X
SS03F	0 to 1	NS	NR	NR	--	--	NS	NS	NS	NS	NS	NR				X
SS04F	0 to 1	NS	NR	--	--	--	NS	NS	NS	NS	NS	NR				X
SS05F	0 to 1	NS	NR	--	--	--	NS	NS	NS	NS	NS	NR				X
15-SS05	0 to 1	NS	NS	NS	NS	NS	NS	--	--	NS	--	NR				X
SS06F	0 to 1	NS	NR	--	--	--	NS	237.6	NS	NS	NS	NR		X		
SS13F <sup>2</sup>	0 to 1	NS	NR	--	--	--	NS	92.4	NS	NS	NS	NR		X		
SS07F	0 to 1	NS	NR	--	--	--	NS	23.76	NS	NS	NS	NR		X		
15-SS07	0 to 1	NS	NS	NS	NS	NS	NS	NS	--	--	--	NR				X
SS08F	0 to 1	NS	NR	--	--	--	NS	--	NS	NS	NS	NR				X
SS09F	0 to 1	NS	NR	--	--	--	NS	85.8	NS	NS	NS	NR		X		
SS10F	0 to 1	NS	NR	--	--	--	NS	52.8	NS	NS	NS	NR		X		
SS11F	0 to 1	NS	NR	--	--	--	NS	4.95	NS	NS	NS	NR		X		
SS12F	0 to 1	NS	NR	--	--	--	NS	7.59	NS	NS	NS	NR		X		
15-SS16	0 to 1	--	NS	NS	NS	NS	NS	NS	92.4	NS	114	NR		X		
SS16F	0 to 1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NR				X
SS16D	1 to 2	NS	NR	NS	NS	NS	NS	10.89	NS	NS	NS	NR				X
15-SS23S	0 to 1	--	NS	NS	NS	NS	NS	NS	--	--	--	NR				X
15-SS23D	1 to 2	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NR				X
15-SS31	0 to 1	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NR				X
15-SS32	0 to 1	--	NS	NS	NS	NS	NS	NS	11.2	NS	14	NR		X		

See notes at end of table.

**Table 4-3 (Continued)**  
**FIFCO's Soil Sample Analytical Results for 4,4'-DDD**

Navy Environmental Leadership Program  
 Technology Evaluation Report for  
 Solid Waste Management Unit 15  
 U.S. Naval Station  
 Mayport, Florida

Sample Location	Sample Depth (ft bis)	Soil Sample Collection Dates										Decrease	Increase	Random	Insufficient Number of Samples	
		12/26/95 (µg/kg)	1/3/96 (µg/kg)	1/9/96 (µg/kg)	1/13/96 (µg/kg)	1/22/96 (µg/kg)	2/8/96 (µg/kg)	2/22/96 (µg/kg)	3/5/96 <sup>1</sup> (µg/kg)							
15-SS33	0 to 1	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NR				X
15-SS34	0 to 1	--	NS	NS	NS	NS	39.6	40	NS	NS	NR		X			
15-SS35	0 to 1	--	NS	NS	NS	NS	NS	NS	NS	NS	NR				X	
SS35F	0 to 1	NS	NS	NS	--	NS	NS	NS	NS	NS	NR				X	
SS35D	1 to 2	NS	NR	NS	NS	--	NS	NS	NS	NS	NR				X	
15-SS36	0 to 1	NS	NS	NS	NS	NS	--	--	NS	NS	NR				X	
15-SS37	0 to 1	NS	NS	NS	NS	NS	NS	12	NS	NS	NR		X			
15-SS38	0 to 1	NS	NS	NS	NS	NS	--	--	NS	NS	NR				X	
SS41	0 to 1	NS	NS	NS	NS	NS	--	--	NS	NS	NR				X	
SS45	0 to 1	NS	NS	NS	NS	NS	8.9	8	NS	NS	NR		X			
SS50	0 to 1	NS	NS	NS	NS	NS	11.2	--	NS	NS	NR		X			

<sup>1</sup> Split samples with ABB-ES, but were not presented in FIFCO's final report (FIFCO, 1997).

<sup>2</sup> SS13F (Dup of SS08F).

Notes: FIFCO = FIFCO International, Inc.

DDD = dichlorodiphenyldichloroethane.

ft bis = depth in feet beneath the land surface.

µg/kg = micrograms per kilogram

NS = not sampled.

NR = not reported by FIFCO (FIFCO, 1997).

-- = not present above detection limit (FIFCO, 1997).

Concentrations of 4,4'-DDD were detected primarily in soil samples collected on January 22, 1996. This would suggest that anaerobic degradation of 4,4'-DDT occurred.

FIFCO's analytical results for chlordane and PCBs were also tabulated (Tables 4-4 and 4-5). None of the FIFCO soil samples were indicated to contain chlordane (Table 4-4), if present, at concentrations above the detection limit. Three of the FIFCO samples (15-SS35, SS35F, and SS35D) contained PCBs. Two of the locations, 15-SS35 and SS35F, were not resampled. Sample location SS35D was sampled twice. PCBs were detected in the sample from this location on January 3, 1996, and were not detected, if present, in the sample collected on January 22, 1996. Because PCBs were detected in very few samples and only one was resampled, the data are insufficient to assess whether or not biological degradation occurred.

One sample, SS35D, contained PCBs at a concentration that exceeded the FDEP residential soil cleanup goal, and one sample, 15-SS35, contained PCBs at a concentration that exceeded the industrial soil cleanup goal (Table 1-1).

**Table 4-4**  
**FIFCO's Soil Sample Analytical Results for Chlordane**

Navy Environmental Leadership Program  
Technology Evaluation Report for  
Solid Waste Management Unit 15  
U.S. Naval Station  
Mayport, Florida

Sample Location	Sample Depth (ft bls)	Soil Sample Collection Dates							
		12/26/95 ( $\mu\text{g}/\text{kg}$ )	1/3/96 ( $\mu\text{g}/\text{kg}$ )	1/9/96 ( $\mu\text{g}/\text{kg}$ )	1/13/96 ( $\mu\text{g}/\text{kg}$ )	1/22/96 ( $\mu\text{g}/\text{kg}$ )	2/8/96 ( $\mu\text{g}/\text{kg}$ )	2/22/96 ( $\mu\text{g}/\text{kg}$ )	3/5/96 <sup>1</sup> ( $\mu\text{g}/\text{kg}$ )
SS01F	0 to 1	NS	NR	NR	--	--	NS	NS	NR
SS02F	0 to 1	NS	NR	NR	--	--	NS	NS	NR
SS03F	0 to 1	NS	NR	NR	--	--	NS	NS	NR
SS04F	0 to 1	NS	NR	--	--	--	NS	NS	NR
SS05F	0 to 1	NS	NR	--	--	--	NS	NS	NR
15-SS05	0 to 1	NS	NR	NS	NS	NS	--	--	NR
SS06F	0 to 1	NS	NR	--	--	--	NS	NS	NR
SS13F <sup>2</sup>	0 to 1	NS	NR	--	--	--	NS	NS	NR
SS07F	0 to 1	NS	NR	--	--	--	NS	NS	NR
15-SS07	0 to 1	NS	NR	NS	NS	NS	--	--	NR
SS08F	0 to 1	NS	NR	--	--	--	NS	NS	NR
SS09F	0 to 1	NS	NR	--	--	--	NS	NS	NR
SS10F	0 to 1	NS	NR	--	--	--	NS	NS	NR
SS11F	0 to 1	NS	NR	--	--	--	NS	NS	NR
SS12F	0 to 1	NS	NR	--	--	--	NS	NS	NR
15-SS16	0 to 1	--	NR	NS	NS	NS	--	--	NR
SS16F	0 to 1	NS	NR	NS	--	NS	NS	NS	NR
SS16D	1 to 2	NS	NR	NS	NS	--	NS	NS	NR
15-SS23S	0 to 1	--	NR	NS	NS	NS	--	--	NR
15-SS23D	1 to 2	--	NR	NS	NS	NS	NS	NS	NR
15-SS31	0 to 1	--	NR	NS	NS	NS	NS	NS	NR
15-SS32	0 to 1	--	NR	NS	NS	NS	--	--	NR
15-SS33	0 to 1	--	NR	NS	NS	NS	NS	NS	NR
15-SS34	0 to 1	--	NR	NS	NS	NS	--	--	NR
15-SS35	0 to 1	--	NR	NS	NS	NS	NS	NS	NR
SS35F	0 to 1	NS	NR	NS	--	NS	NS	NS	NR
SS35D	1 to 2	NS	NR	NS	NS	--	NS	NS	NR
15-SS36	0 to 1	NS	NR	NS	NS	NS	--	--	NR
15-SS37	0 to 1	NS	NR	NS	NS	NS	--	--	NR
15-SS38	0 to 1	NS	NR	NS	NS	NS	--	--	NR
SS41	0 to 1	NS	NR	NS	NS	NS	--	--	NR
SS45	0 to 1	NS	NR	NS	NS	NS	--	--	NR
SS50	0 to 1	NS	NR	NS	NS	NS	--	--	NR

<sup>1</sup> Split samples with ABB-ES, but were not presented in FIFCO's final report (FIFCO, 1997).

<sup>2</sup> SS13F (Dup of SS06F).

Notes: FIFCO = FIFCO International, Inc.  
ft bls = depth in feet beneath the land surface.  
 $\mu\text{g}/\text{kg}$  = micrograms per kilogram.

NS = not sampled.  
NR = not reported by FIFCO (FIFCO, 1997).  
-- = not present above detection limit (FIFCO, 1997).

**Table 4-5**  
**FIFCO's Soil Sample Analytical Results for Polychlorinated Biphenyls**

Navy Environmental Leadership Program  
Technology Evaluation Report for  
Solid Waste Management Unit 15  
U.S. Naval Station  
Mayport, Florida

Sample Location	Sample Depth (ft bls)	Soil Sample Collection Dates							
		12/26/95 (µg/kg)	1/3/96 (µg/kg)	1/9/96 (µg/kg)	1/13/96 (µg/kg)	1/22/96 (µg/kg)	2/8/96 (µg/kg)	2/22/96 (µg/kg)	3/5/96 <sup>1</sup> (µg/kg)
SS01F	0 to 1	NS	-	NR	-	-	NS	NS	NR
SS02F	0 to 1	NS	-	NR	-	-	NS	NS	NR
SS03F	0 to 1	NS	-	NR	-	-	NS	NS	NR
SS04F	0 to 1	NS	-	-	-	-	NS	NS	NR
SS05F	0 to 1	NS	-	-	-	-	NS	NS	NR
15-SS05	0 to 1	NS	NS	NS	NS	NS	-	-	NR
SS06F	0 to 1	NS	-	-	-	-	NS	NS	NR
SS13F <sup>2</sup>	0 to 1	NS	-	-	-	-	NS	NS	NR
SS07F	0 to 1	NS	-	-	-	-	NS	NS	NR
15-SS07	0 to 1	NS	NS	NS	NS	NS	-	-	NR
SS08F	0 to 1	NS	-	-	-	-	NS	NS	NR
SS09F	0 to 1	NS	-	-	-	-	NS	NS	NR
SS10F	0 to 1	NS	-	-	-	-	NS	NS	NR
SS11F	0 to 1	NS	-	-	-	-	NS	NS	NR
SS12F	0 to 1	NS	-	-	-	-	NS	NS	NR
15-SS16	0 to 1	-	NS	NS	NS	NS	-	-	NR
SS16F	0 to 1	NS	NS	NS	-	NS	NS	NS	NR
SS16D	1 to 2	NS	-	NS	NS	-	NS	NS	NR
15-SS23S	0 to 1	-	NS	NS	NS	NS	-	-	NR
15-SS23D	1 to 2	-	NS	NS	NS	NS	NS	NS	NR
15-SS31	0 to 1	-	NS	NS	NS	NS	NS	NS	NR
15-SS32	0 to 1	-	NS	NS	NS	NS	-	-	NR
15-SS33	0 to 1	-	NS	NS	NS	NS	NS	NS	NR
15-SS34	0 to 1	-	NS	NS	NS	NS	-	-	NR
15-SS35	0 to 1	4,747	NS	NS	NS	NS	NS	NS	NR
SS35F	0 to 1	NS	NS	NS	3,198	NS	NS	NS	NR
SS35D	1 to 2	NS	239	NS	NS	-	NS	NS	NR
15-SS36	0 to 1	NS	NS	NS	NS	NS	-	-	NR
15-SS37	0 to 1	NS	NS	NS	NS	NS	-	-	NR
15-SS38	0 to 1	NS	NS	NS	NS	NS	-	-	NR
SS41	0 to 1	NS	NS	NS	NS	NS	-	-	NR
SS45	0 to 1	NS	NS	NS	NS	NS	99	-	NR
SS50	0 to 1	NS	NS	NS	NS	NS	-	-	NR

<sup>1</sup> Split samples with ABB-ES, but were not presented in FIFCO's final report (FIFCO, 1997).

<sup>2</sup> SS13F (Dup of SS06F).

Notes: FIFCO = FIFCO International, Inc.  
PCBs = polychlorinated biphenyls.  
ft bls = depth in feet beneath the land surface.  
µg/kg = micrograms per kilogram.

NS = not sampled.  
-- = not present above detection limit (FIFCO, 1997).  
NR = not reported by FIFCO (FIFCO, 1997).

## 5.0 CONCLUSIONS

Analytical data collected before the technology evaluation occurred suggest that biological degradation of heptachlor and 4,4'-DDT was occurring naturally at the site. This is based on the detection of heptachlor epoxide and 4,4'-DDE.

Assessment of environmental and duplicate sample pairs suggest that the pesticides were either a homogenous mixture at soil sampling locations or were not a homogenous mixture but were sufficiently blended into the sample matrix during sample preparation.

Two sampling locations (MPT-SS16 and MPT-SS23) were collected to assess baseline concentrations for chlordane and 4,4'-DDT. Analytical results from baseline samples collected within 12 inches of the original sampling locations suggest that the pesticides were likely to have a considerable variation over a short distance. This would suggest that the environmental and duplicate sample results represent the homogenization of the pesticides in the samples (i.e., the pesticides are not likely homogenous within the sample matrix). This would be consistent with the random application at the site during the emptying and rinsing of pesticide application equipment, and the natural biodegradation that has occurred since the site was used.

Comparison of the baseline and performance samples suggest that the variations in concentrations over short distances created an uncertainty in determining the degree to which the technology demonstration was successful in reducing the concentrations of the pesticides. The evaluation was also impaired by the low number of detections for alpha-; beta-; delta-; and gamma-BHC (lindane); heptachlor; heptachlor epoxide; 4,4'-DDD; chlordane; and Aroclor-1260.

FIFCO's analytical results also suggest that biodegradation was occurring. However, the random concentrations (increasing and decreasing values) for 4,4'-DDT and 4,4'-DDE at sampling locations also support that the variation in concentrations obscured the determination of the degree to which the technology demonstration was successful in reducing the concentrations of the pesticides.

Comparison of analytical results to FDEP soil cleanup goals suggest the following:

- Beta-BHC was detected in a performance sample at concentrations exceeding the FDEP leachability goal.
- Heptachlor and heptachlor epoxide were not detected in performance samples at concentrations exceeding the FDEP soil cleanup goals.
- 4,4'-DDT; 4,4'-DDE; and 4,4'-DDD were not detected in performance samples at concentrations exceeding the FDEP soil cleanup goals. A baseline sample collected in 1994 contained 4,4'-DDT at a concentration that exceeded the FDEP industrial soil cleanup goal. 4,4'-DDT was not detected in a baseline sample collected in December 1995 from this location.
- Chlordane was detected in a performance sample at a concentration that exceeds the FDEP industrial soil cleanup goal.

- A PCB (Aroclor-1260) was detected in performance samples at concentrations that exceed FDEP industrial and residential soil cleanup goals.

No soil samples have been collected at the site since March 5, 1996.

The variability of pesticides in the soil at SWMU 15 suggests that the area was not the most suitable site for evaluating this particular technology.

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**APPENDIX A**

**VOLUME OF PESTICIDE-IMPACTED SOIL AT SWMU 15**

## VOLUME OF CONTAMINATED SOIL - SWMU 15 - ESTIMATE RATIONALE

The volume of pesticide-contaminated soil was calculated by including areas where analytical data indicated detections of 4,4'-DDT and chlordane in surface soil above MPSs.

Volume of Soil Containing 4,4'-DDT 4,4'-DDT was detected in surface soil at a concentration of 790 ppm in the southeastern portion of the SWMU (MPT-15-SS23), and at a concentration of 1.5 ppm in the northwestern portion of the SWMU (MPT-15-SS07). Only one surface soil sample was collected adjacent to MPT-15-SS23, and only one surface soil sample was collected adjacent to MPT-15-SS07. As a result, there are areas surrounding these samples where the concentrations of 4,4'-DDT in soil are unknown. Therefore, the areal extent of concentrations of 4,4'-DDT in excess of 1 ppm was estimated based on detections and non-detections of the chemical in outlying surface soil samples. The attached figure shows these estimated areas.

Additionally, no subsurface soil samples were collected at MPT-15-SS23. The detection of 790 ppm of 4,4'-DDT in the surface soil sample collected at this location suggests that 4,4'-DDT would most likely be found at some lower concentration in subsurface soil. As a result, a fate and transport model described by Jury, et. al. (1990), was performed to estimate the concentration of 4,4'-DDT in subsurface soil. The model assumed that the initial pesticide spill (containing 4,4'-DDT) penetrated the soil to 2 feet bls. The model results indicated that 4,4'-DDT would not have migrated in subsurface soil below 3 feet. Model assumptions, data, and results are attached.

Based on the modelling results, a 15 by 20 by 3 foot area surrounding surface soil sample MPT-15-SS23 was assumed to have 4,4'-DDT exceeding the MPS, and a 30 by 40 by 2 foot area surrounding the area described above is assumed to have concentrations of 4,4'-DDT in excess of the MPS (see attached figure).

The total volume of soil contaminated with 4,4'-DDT for the purposes of the CMS is approximately 321 yd<sup>3</sup>. The attached calculation sheets show in more detail how the volume of soil contaminated with 4,4'-DDT was estimated.

Volume of Soil Containing Chlordane Chlordane was detected in two surface soil samples at SWMU 15 at concentrations of 9 and 5.6 ppm (in surface soil samples MPT-15-SS16 and MPT-15-SS05, respectively). These samples were located in the northeast area of the SWMU. Additional surface soil samples were not collected in the immediate vicinity of these locations. As a result, the areal extent of surface soil containing chlordane in excess of the MPS was estimated based on detections and nondetections of chlordane in outlying surface soil samples. The attached figure shows the areal extent of chlordane contamination.

One subsurface soil sample was collected from location MPT-15-SS05, and chlordane was detected at a concentration of 0.18 ppm. This concentration is well below the MPS

for chlordane. Since no subsurface soil sample was collected from MPT-15-SS16, the concentration of chlordane in subsurface soil was estimated. This was accomplished by backcalculating the conditions at MPT-15-SS05; which indicate that a 97% reduction in chlordane concentration could be expected in subsurface soil at MPT-15-SS16. As a result, the chlordane concentration in subsurface soil at MPT-15-SS16 would be approximately 0.28 ppm, which is below the MPS. An attached sheet shows this calculation.

As a result, the total volume of soil contaminated with chlordane for the purposes of the CMS is approximately 211 yd<sup>3</sup>. The attached calculation sheets show in more detail how the volume of soil contaminated with chlordane was calculated.

Total Volume of Soil Containing 4,4'-DDT and Chlordane The total volume of soil at SWMU 15 containing either 4,4'-DDT or chlordane in excess of media protection standards is: 533 yd<sup>3</sup> or 14,400 ft<sup>3</sup>.

Assumptions

- 1) Evaluating three different areas: the two areas containing 4,4'-DDT in concentrations exceeding 1 ppm and the one area containing chlordane in concentration exceeding 2.75 ppm.
- 2) For area surrounding 790 ppm 4,4'-DDT detection used a leaching model to predict depth of contamination. Model generated a depth of 1/2 and 3 ft. Assumed 3/4 ft for small area and 2 ft for a larger area as shown on the figure.
- 3) All other areas contamination was assumed to not exceed 1 ft b/s.
- 4) Planimeter used to calculate volumes.

Area 1: large area surrounding 790 ppm DDT 1 ft  
 Area 2: small area surrounding 790 ppm DDT 1 ft  
 Area 3: Area surrounding 1.5 ppm DDT 1 ft  
 Area 4: Area surrounding 9 ppm chlordane 1 ft  
 Area 5: 30' by 40' medium area surrounding 790 ppm DDT 1 ft  
 Volume units = 0.01

**Area 1** Scale 1" = 60'

Try #	Start	Finish	Difference	Average	Area (in <sup>2</sup> )	Area (ft <sup>2</sup> )
①	5257	5396	139			
②	5502	5641	139	139.7	1.397	5,029
③	5554	5695	141			
					1.397 in <sup>2</sup>	$\frac{3600 \text{ ft}^2}{1 \text{ in}^2} = 5,029 \text{ ft}^2$

**Area 2** Scale 1" = 60'

Try #	Start	Finish	Difference	Average	Area (in <sup>2</sup> )	Area (ft <sup>2</sup> )
①	0694	0699	5			
②	0736	0741	5	5.67	0.0567	204
③	1278	1285	7			
					0.0567 in <sup>2</sup>	$\frac{3600 \text{ ft}^2}{1 \text{ in}^2} = 204 \text{ ft}^2$

PROJECT  
 NARAL Station Wayport  
 SMMU 15 volumes of Contaminated Media

COMP. BY  
 JH  
 CHK. BY  
 LDP

JOB NO.  
 08533.29  
 DATE  
 6.5.95

Area 3 Scale 1" = 60'

Try #	Start	Finish	Difference	Avg.	Area (in <sup>2</sup> )	Area (ft <sup>2</sup> )
①	7283	7347	64			
②	8167	8229	62	62.3	0.623	2,343
③	6274	6335	61			

$$0.623 \text{ in}^2 \cdot \frac{3600 \text{ ft}^2}{1 \text{ in}^2} = 2,243 \text{ ft}^2$$

Area 4 Scale 1" = 60'

Try #	Start	Finish	Difference	Avg.	Area (in <sup>2</sup> )	Area (ft <sup>2</sup> )
①	5465	5625	160			
②	4759	4917	158	158.7	1.587	5,711
③	5509	5667	158			

$$1.587 \text{ in}^2 \cdot \frac{3600 \text{ ft}^2}{1 \text{ in}^2} = 5713 \text{ ft}^2$$

Area 5 30' x 40' = 1200 ft<sup>2</sup>

So compute Total Volume of soil affected by 790ppm DPT detection

The difference btwn Area 1 & Area 5 is contaminated up to 1 ft bls so:

$$5,029 \text{ ft}^2 - 1200 \text{ ft}^2 = 3,829 \text{ ft}^2 \quad \boxed{3,829 \text{ ft}^2} \quad \boxed{3,829 \text{ ft}^2 \cdot 1 \text{ ft} = 3,829 \text{ ft}^3}$$

Difference btwn Area 5 & Area 2 is contaminated up to 2ft bls  
 $1,200 \text{ ft}^2 - 204 \text{ ft}^2 = 996 \text{ ft}^2 \quad 996 \text{ ft}^2 \cdot 2 \text{ ft} = \boxed{1,992 \text{ ft}^3}$

Area 2 is contaminated up to 3ft

$$\text{So: } 204 \text{ ft}^2 \cdot 3 \text{ ft} = \boxed{612 \text{ ft}^3}$$

$$\text{Total Volume} = \boxed{6,433 \text{ ft}^3}$$

PROJECT  
 Naval Station Mayport  
 SWMU 15 Volume of Contaminated Media

COMP. BY  
 JH  
 CHK. BY  
 LDP

JOB NO.  
 08533.21  
 DATE  
 6.5.95

Total volume of soil affected by 1.5 ppm DDT hit is 1 ft bls and Area 3

So:  $2,243 \text{ ft}^2 \cdot 1 \text{ ft} = \boxed{2,243 \text{ ft}^3}$

Total volume of soil affected by 9 ppm Chlordane detection is 1 ft bls of Area 4

So:  $5,713 \text{ ft}^2 \cdot 2 \text{ ft} = \boxed{5,713 \text{ ft}^3}$

Sum of all volumes is:

$6,433 \text{ ft}^3 + 2,243 \text{ ft}^3 + 5,713 \text{ ft}^3 = 14,389 \text{ ft}^3$   
 $\sim \boxed{14,400 \text{ ft}^3}$

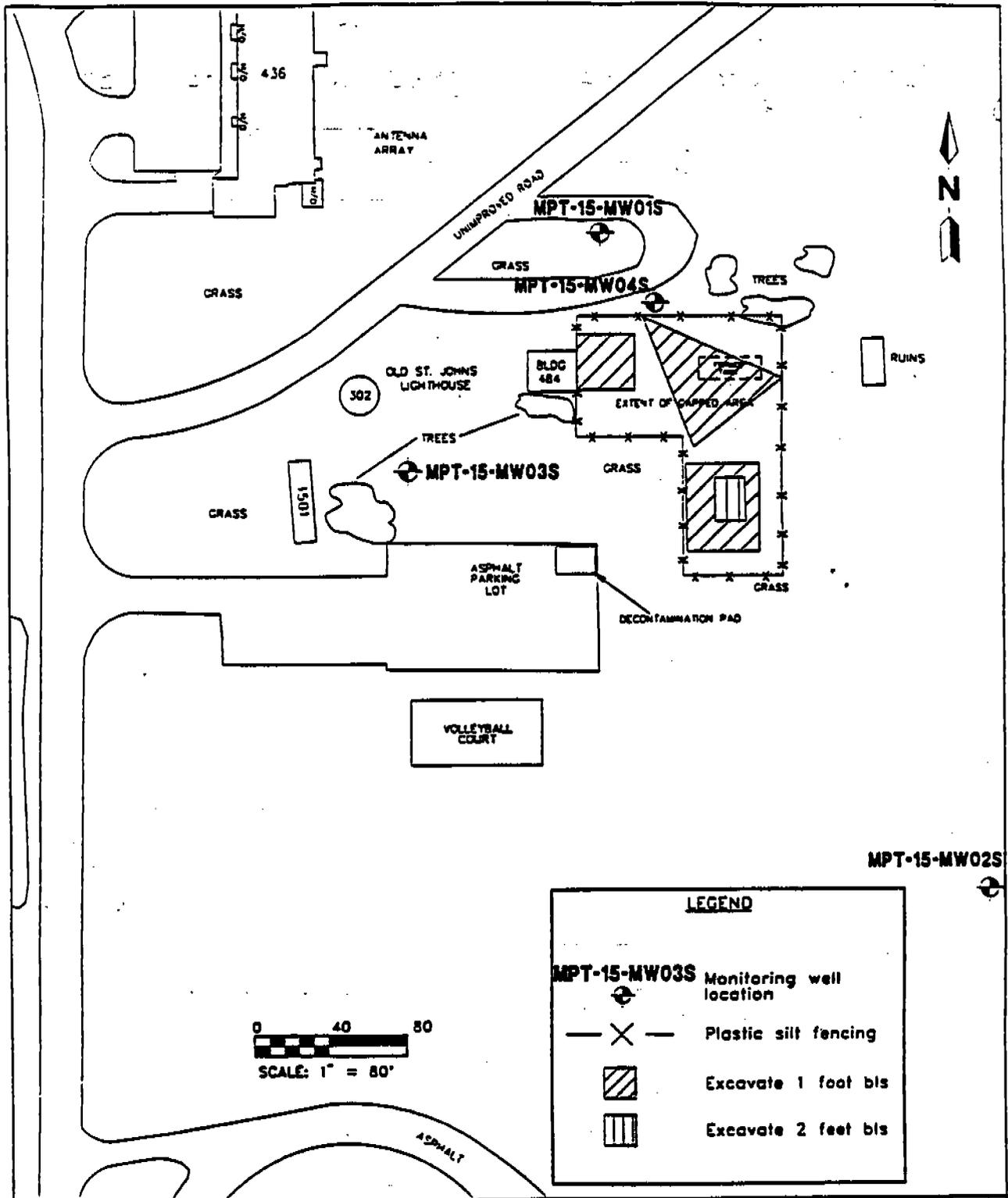
In cubic yards:

$\frac{14,389 \text{ ft}^3}{27 \text{ cf}} = \boxed{533 \text{ yd}^3}$

In tons assuming 1.4 g/cm<sup>3</sup> density

$14,400 \text{ ft}^3 \cdot \frac{1.4 \text{ g}}{\text{cm}^3} \cdot \left(\frac{2.54 \text{ cm}}{1 \text{ in}}\right)^3 \cdot \left(\frac{12 \text{ in}}{1 \text{ ft}}\right)^3 \cdot \left(\frac{2.2 \text{ lbs}}{1 \text{ kg}}\right) \cdot \left(\frac{1 \text{ kg}}{1000 \text{ g}}\right) = 1,255,103$   
 $\sim 1,260,000$

$\frac{1,260,000 \text{ lbs}}{2,000 \text{ lbs}} = \boxed{630 \text{ tons of soil to be removed}}$



**FIGURE 6-9**  
**SITE LAYOUT**  
**ALTERNATIVE 15-1: OFFSITE**  
**TRANSPORT AND INCINERATION**



**CORRECTIVE MEASURES STUDY**  
**REPORT, GROUP II SWMUs**

**U.S. NAVAL STATION**  
**MAYPORT, FLORIDA**

## Modeling DDT Concentrations in Soil

The highest concentration of DDT detected at SWMU 15 was detected in the surface soil sample from MPT-15-SS23. Because no subsurface soil sample was collected at this location. The depth of DDT contamination in the soil is not known. A fate and transport model described by Jury et. al. (1990) was used to estimate the depth of the DDT contamination.

### Model Inputs

The following inputs were used for this model:

Soil bulk density - 1.4 g/cm<sup>3</sup> - calculated by averaging bulk density measurements for soil across the facility (ABB-ES, 1995).

Soil volumetric water content - two values were used 0.20 and 0.07 - calculated using the soil bulk density and the percent moisture. Values of 5 and 15 percent moisture were used to calculate the volumetric water content in order to represent the wide range measured in soil across the facility (ABB-ES, 1995). See attached worksheets for calculations.

Soil volumetric air content - two values were used 0.15 and 0.28 - calculated using the soil volumetric water content and the porosity. See attached worksheets for calculations.

Soil porosity - 0.35 (ABB-ES, 1995)

Fraction of organic carbon - 0.003 - calculated by averaging TOC concentrations measured in soil (approximately 2,800 mg/kg) and converting to a dimensionless number. See attached worksheets for calculations.

Air boundary layer thickness - 0.5 cm (Jury et. al., 1990)

Infiltration rate - 0.1 cm/day.- calculated from the annual rainfall assuming 25 percent of rainfall infiltrates (ABB-ES, 1995). See attached worksheets for calculations.

Initial concentration - 2,100 ppm - back calculated from the concentration measured in the surface soil sample from MPT-15-SS23. See attached worksheets for calculations.

Henry's Law constant - 0.000513

Organic carbon partitioning coefficient ( $K_{oc}$ ) - 230,000 cm<sup>3</sup>/g

Half life - 5,500 days

Top of contaminated zone - 0.001 cm below ground surface

Thickness of contaminated zone - 60 cm - Assuming that DDT and it's carrier contaminated the top two feet of soil when it was initially spilled.

### Model Results

The model was run twice using the different values for volumetric water and air content (see attached printouts). The Jury model only accounts for the fate and transport of DDT alone, it does not account for the facilitated transport of DDT by the carrier during the initial release. To provide for facilitated transport, it was assumed that the initial release of DDT and it's carrier reached a depth of 2 feet (approximately 60 cm). In run, the contamination initially present in the top 60 cm of soil as a result of the release did not reach a depth of 90 cm (approximately 3 feet) after 21 years. It is possible that the DDT was carried deeper than 2 feet below ground surface during the initial release. However, even if the initial release carried DDT deeper than 2 feet, the results of the model indicate that further downward migration after the release is not expected.

The maximum concentration of DDT reported by the model after 21 years was 795 mg/kg. This is consistent with the 790 mg/kg of DDT detected in the sample from MPT-15-SS23. A close correlation between these values is expected because the 790 mg/kg was used to calculate the initial concentration of 2,100 mg/kg used in the model. The initial concentration was calculated using a first order reaction (half-life). Because of DDT's chemical properties, minimal transport is expected and the primary fate for this compound in the model is degradation (half-life decay).

RUN #1  
 PROJECT TITLE = Mayport SWMU 15 DDT  
 JOB # = 8533-29  
 DATE = 6/6/95  
 NAME = Mark Woodruff

SOIL PROPERTIES

SOIL BULK DENSITY (G/CM3) = 1.4  
 SOIL VOLUMETRIC WATER CONTENT (DIM) = .2  
 SOIL VOLUMETRIC AIR CONTENT (DIM) = .15  
 TOTAL SOIL POROSITY (DIM) = .35  
 FRACTION OF ORGANIC CARBON (DIM) = .003

TRANSPORT PROPERTIES

AIR BOUNDARY LAYER THICKNESS (CM) = .5  
 INFILTRATION RATE (CM/DAY) = .1

CHEMICAL DATA

CHEMICAL NAME = DDT  
 INITIAL CONCENTRATION (PPM) = 2100  
 HENRY'S LAW CONSTANT (DIM) = .000513  
 ORGANIC CARBON PART COEF (CM3/G) = 230000  
 HALF LIFE (DAYS) = 5500  
 DEPTH TO TOP OF CONTAMINANTS (CM) = .001  
 THICKNESS OF CONTAMINANT ZONE (CM) = 60

CONCENTRATION (PPM) AS A FUNCTION OF TIME AND DEPTH

DEPTH (CM)	TIME (DAYS)				
	1.0	1101.0	2201.0	3301.0	4401.0
0.000	1073.008	29.499	14.292	8.314	5.233
30.000	2099.735	1827.926	1591.302	1385.309	1205.981
60.000	1141.478	1160.094	1091.631	1001.927	907.993
90.000	0.000	0.000	0.000	0.000	0.000

CONCENTRATION (PPM) AS A FUNCTION OF TIME AND DEPTH

DEPTH (CM)	TIME (DAYS)				
	5501.0	6601.0	7701.0	0.0	0.0
0.000	3.444	2.332	1.611	0.000	0.000
30.000	1049.868	913.963	795.651	0.000	0.000
60.000	816.346	729.903	649.947	0.000	0.000
90.000	0.000	0.000	0.000	0.000	0.000

FLUX (MICROGRAMS/CM\*CM/DAY) AND LOSS (PERCENT)  
AS A FUNCTION OF TIME

TIME (DAY.?)	FLUX	LOSS
1.0	-3.517	0.0046
1101.0	-0.099	0.2324
2201.0	-0.050	0.2933
3301.0	-0.030	0.3268
4401.0	-0.019	0.3477
5501.0	-0.013	0.3616
6601.0	-0.009	0.3712
7701.0	-0.007	0.3780

CAUTION: THE USE OF TOO LARGE TIME STEPS MAY CAUSE THE ESTIMATED CUMULATIVE VOLATILIZATION LOSSES TO BE ERRONEOUS. USE THE ESTIMATED TOTAL LOSSES AT INFINITE TIME AS FOLLOWS.

THE TOTAL FRACTION VOLATILIZED IS APPROXIMATELY 0.0105 ASSUMING ZERO WATER EVAPORATION AND LARGE KH (SEE JURY APP. B)

RUN #2  
 PROJECT TITLE = Mayport SWMU 15 DDT  
 JOB # = 8533-29  
 DATE = 6/6/95  
 NAME = Mark Woodruff

SOIL PROPERTIES

SOIL BULK DENSITY (G/CM3) = 1.4  
 SOIL VOLUMETRIC WATER CONTENT (DIM) = .07  
 SOIL VOLUMETRIC AIR CONTENT (DIM) = .28  
 TOTAL SOIL POROSITY (DIM) = .35  
 FRACTION OF ORGANIC CARBON (DIM) = .003

TRANSPORT PROPERTIES

AIR BOUNDARY LAYER THICKNESS (CM) = .5  
 INFILTRATION RATE (CM/DAY) = .1

CHEMICAL DATA

CHEMICAL NAME = DDT  
 INITIAL CONCENTRATION (PPM) = 2100  
 HENRY'S LAW CONSTANT (DIM) = .000513  
 ORGANIC CARBON PART COEF (CM3/G) = 230000  
 HALF LIFE (DAYS) = 5500  
 DEPTH TO TOP OF CONTAMINANTS (CM) = .001  
 THICKNESS OF CONTAMINANT ZONE (CM) = 60

CONCENTRATION (PPM) AS A FUNCTION OF TIME AND DEPTH

DEPTH (CM)	TIME (DAYS)				
	1.0	1101.0	2201.0	3301.0	4401.0
0.000	1518.484	90.700	51.286	34.012	24.131
30.000	2099.735	1827.926	1591.302	1385.309	1205.981
60.000	1089.652	1022.400	928.062	833.106	743.560
90.000	0.000	0.000	0.000	0.000	0.000

CONCENTRATION (PPM) AS A FUNCTION OF TIME AND DEPTH

DEPTH (CM)	TIME (DAYS)				
	5501.0	6601.0	7701.0	0.0	0.0
0.000	17.781	13.427	10.314	0.000	0.000
30.000	1049.868	913.963	795.651	0.000	0.000
60.000	661.196	586.422	519.077	0.000	0.000
90.000	0.000	0.000	0.000	0.000	0.000

FLUX (MICROGRAMS/CM\*CM/DAY) AND LOSS (PERCENT)  
AS A FUNCTION OF TIME

TIME (DAYS)	FLUX	LOSS
1.0	-4.977	0.0054
1101.0	-0.299	0.5722
2201.0	-0.170	0.7672
3301.0	-0.113	0.8882
4401.0	-0.081	0.9719
5501.0	-0.060	1.0328
6601.0	-0.045	1.0785
7701.0	-0.035	1.1135

CAUTION: THE USE OF TOO LARGE TIME STEPS MAY CAUSE THE ESTIMATED CUMULATIVE VOLATILIZATION LOSSES TO BE ERRONEOUS. USE THE ESTIMATED TOTAL LOSSES AT INFINITE TIME AS FOLLOWS.

THE TOTAL FRACTION VOLATILIZED IS APPROXIMATELY 0.0244 ASSUMING ZERO WATER EVAPORATION AND LARGE KH (SEE JURY APP. B)

PROJECT  
 May 2004  
 Group II SAMPLING: Volatiles of Chlorinated Media

COMP. BY  
 JH  
 CHK. BY  
 LDP

JOB NO.  
 08533.29  
 DATE  
 6.7.95

Calculation for chloroform contamination in Subsurface Soil

Sample location	Media	Concentration
MPT-15-SSx 1	Surface Soil	9.0 ppm
	Subsurface Soil	?
MPT-15-SSx 2	Surface Soil	5.6 ppm
	Subsurface Soil	0.18 ppm

Surface Soil 5.6 ppm yields subsurface soil = 0.18 ppm

Set up calculation to estimate subsurface soil concentration at sample location MPT-15-SS

Assume straight line effects

$$\frac{0.18 \text{ ppm}}{5.6 \text{ ppm}} = \frac{x \text{ ppm}}{9.0 \text{ ppm}}$$

$$(9.0 \text{ ppm})(0.18 \text{ ppm}) = (5.6 \text{ ppm})(x \text{ ppm})$$

$$\frac{1.62}{5.6} = x$$

$$x = 0.289 \sim 0.29 \text{ ppm}$$

0.29 ppm is below MFL for chloroform in subsurface soil.

**APPENDIX B**  
**PHOTOGRAPHS**



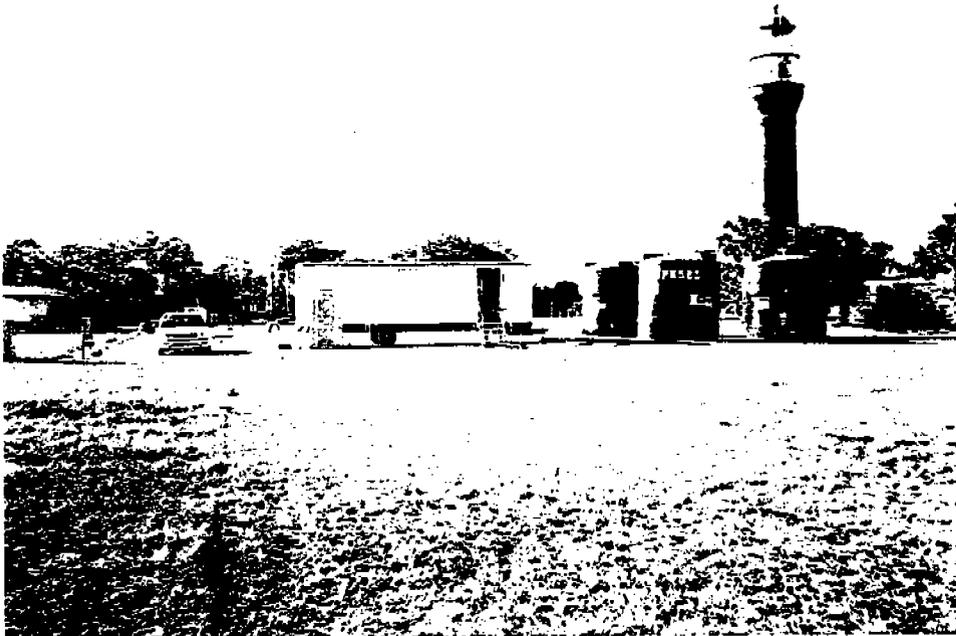
Photograph 1: SWMU 15, Old Pesticide Handling Area, prior to technology demonstration. View looking north.



Photograph 2: SWMU 15, Old Pesticide Handling Area, prior to technology demonstration. View looking west. FIFCO's trailer and treatment solution tanks are in background.



Photograph 3: Mowing of grass to prepare the site prior to construction of bioaugmentation system. View looking east shows FIFCO personnel operating equipment.



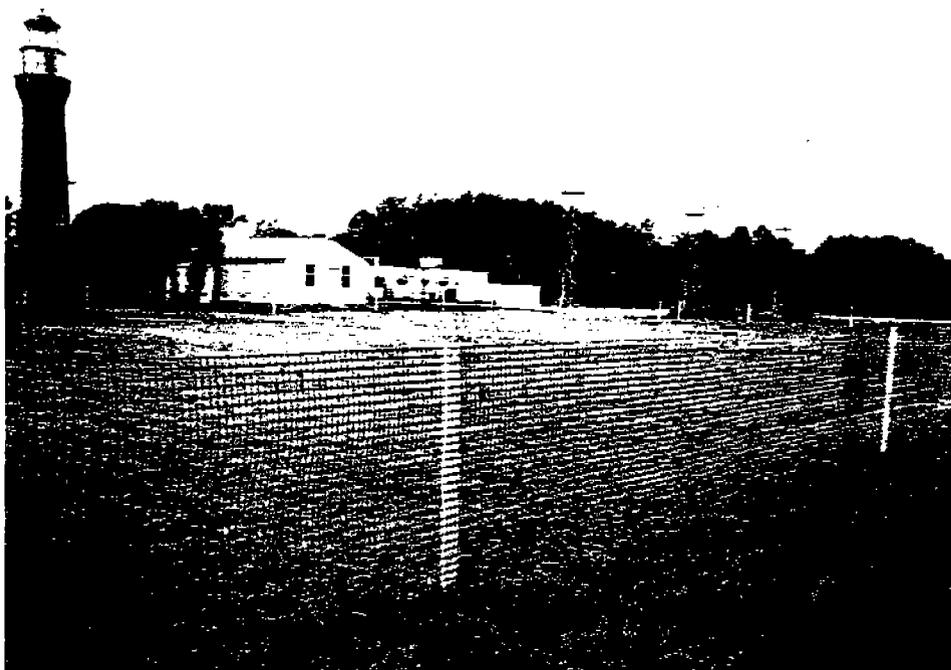
Photograph 4: FIFCO trailer and microbial solution tank setup prior to construction at the site. View looking west.



Photograph 5: Treatment area after completion of mowing. View looking northeast shows equipment and treatment area boundary fence in the early stages of construction.



Photograph 6: Navy personnel clearing site to level ground prior to system construction. View looking east shows Navy personnel cutting down palm trees at the north end of the treatment area.



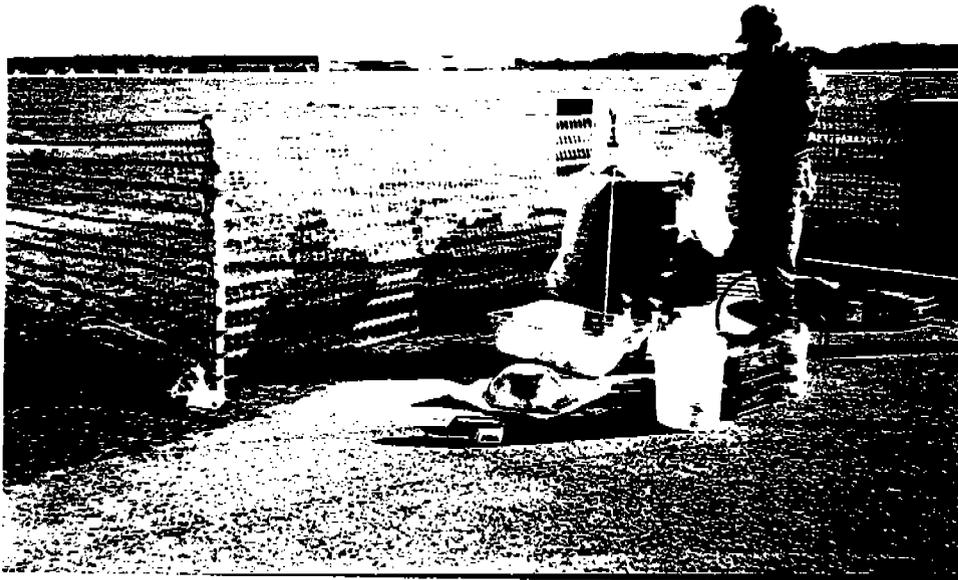
Photograph 7: Treatment area boundaries finalized. View looking northwest shows cleared treatment area with boundary fence completed.



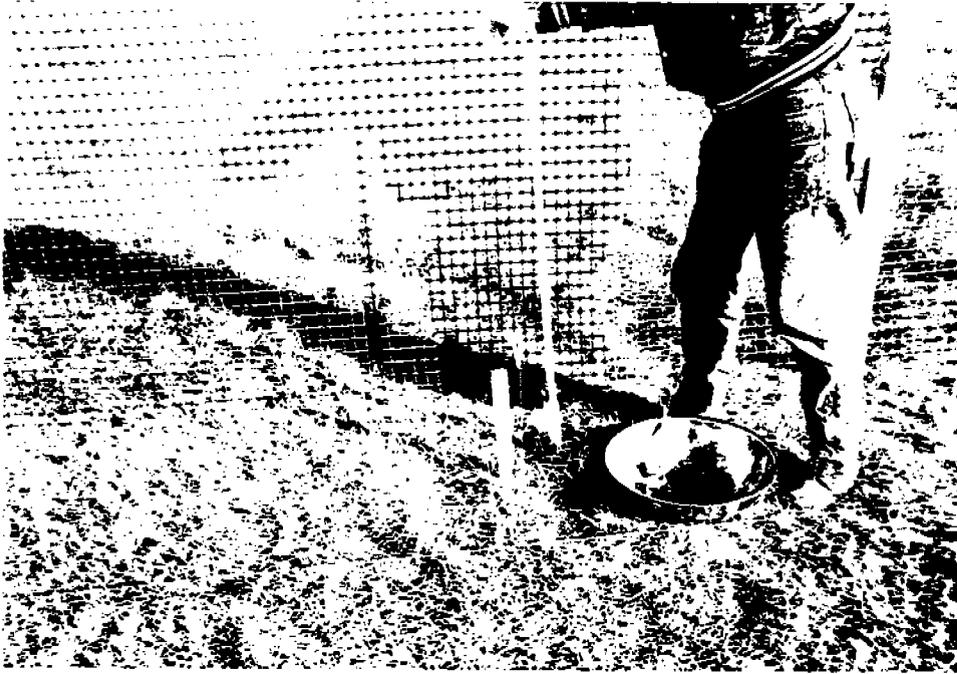
Photograph 8: Treatment area boundaries finalized. View looking northeast shows cleared treatment area with boundary fence completed.



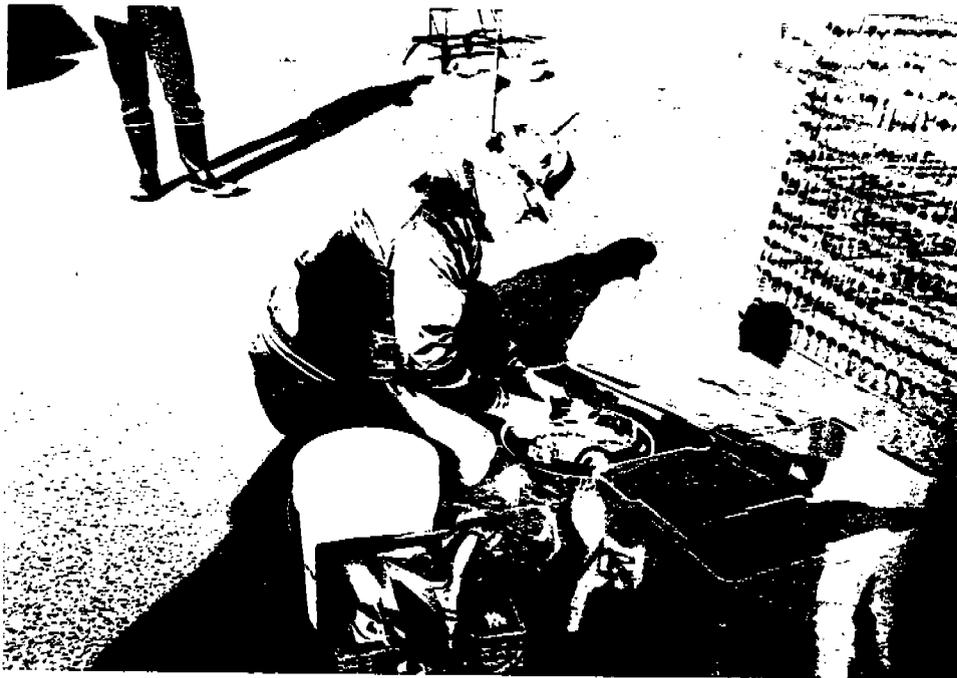
Photograph 9: Treatment area, trailer, and tank setup at site. View looking west shows cleared treatment area, FIFCO trailer and solution tanks.



Photograph 10: Preparation for pretreatment sampling. View shows FIFCO personnel prepping and decontaminating soil sampling equipment, including stainless-steel hand auger, bowl, and spoon.



Photograph 11: Initial pretreatment soil sampling. View shows FIFCO personnel conducting soil sampling at one of ABB-ES's baseline locations.



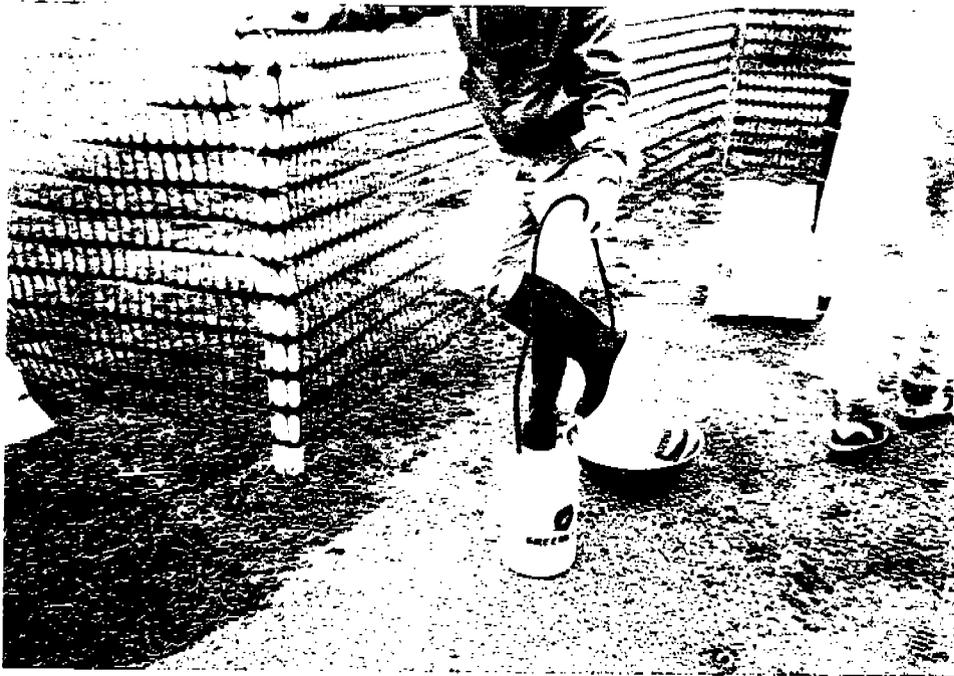
Photograph 12: Initial pretreatment soil sampling. View shows FIFCO personnel filling appropriate sample containers with soil from SWMU 15.



Photograph 13: Initial pretreatment soil sampling. View shows FIFCO personnel conducting decontamination procedures after collection of initial soil sample.



Photograph 14: Initial pretreatment soil sampling. View shows FIFCO personnel collecting appropriate equipment blank using stainless-steel hand auger.



Photograph 15: Initial pretreatment soil sampling. View shows FIFCO personnel collecting appropriate health and safety blank from PPE used during soil sampling.



Photograph 16: Preparation of treatment system piping. View shows FIFCO personnel fitting and gluing PVC piping together prior to construction of the bioaugmentation system.



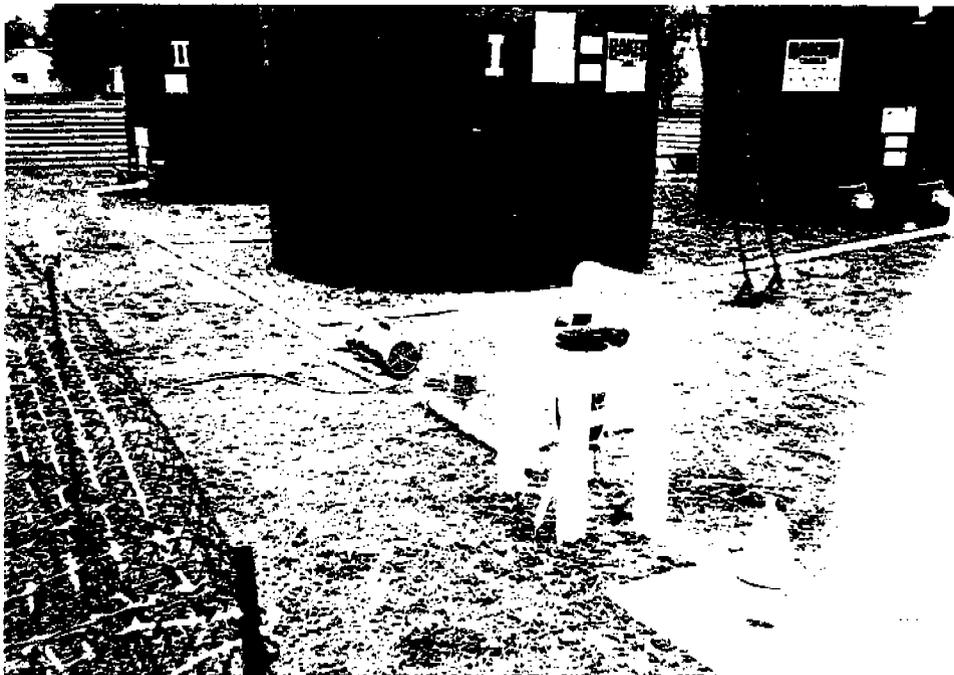
Photograph 17: Setup of irrigation piping system at the site. View looking north shows FIFCO personnel laying out and assembling 1-inch garden hose pipe at 2-foot intervals.



Photograph 18: Setup of irrigation piping system at the site. View looking northeast shows PVC-riser system partially in place. Risers consist of 1.25-inch PVC piping at the north and south ends.



Photograph 19: Treatment system complete. View looking north shows hose and PVC-riser irrigation system completed and in place.



Photograph 20: Solution tanks, pump, and filter setup at the site. View shows configuration of the tanks containing the microbial solution and the pipe, pump, and the filter system that disbursed the solution to the site.

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Photograph 21: Treatment system complete. View looking east shows hose and PVC-riser irrigation system completed and in place.

**APPENDIX C**  
**ANALYTICAL DATA**

US Naval Station, Mayport  
Old Pesticide Area (SMU 15) Surface Soil Data

Lab Sample Number:  
Site  
Locator  
Collect Date:

23953001  
GROUP I&II  
15SS11  
02-FEB-93

23953003  
GROUP I&II  
15SS21  
02-FEB-93

23953005  
GROUP I&II  
15SS31  
02-FEB-93

23953007  
GROUP I&II  
15SS41  
02-FEB-93

PESTICIDES/PCBs	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
alpha-BHC	1.4	U	ug/kg	1.4	3	U	ug/kg	3	14	U	ug/kg	14	2.8	U	ug/kg	2.8
beta-BHC	2.8	U	ug/kg	2.8	5.9	U	ug/kg	5.9	28	U	ug/kg	28	5.7	U	ug/kg	5.7
delta-BHC (Lindane)	1.4	U	ug/kg	1.4	3	U	ug/kg	3	14	U	ug/kg	14	2.8	U	ug/kg	2.8
Heptachlor	1.4	U	ug/kg	1.4	3	U	ug/kg	3	14	U	ug/kg	14	2.8	U	ug/kg	2.8
Aldrin	1.4	U	ug/kg	1.4	3	U	ug/kg	3	14	U	ug/kg	14	2.8	U	ug/kg	2.8
Heptachlor epoxide	1.4	U	ug/kg	1.4	3	U	ug/kg	3	14	U	ug/kg	14	2.8	U	ug/kg	2.8
Endosulfan I	1.4	U	ug/kg	1.4	3	U	ug/kg	3	14	U	ug/kg	14	2.8	U	ug/kg	2.8
Dieldrin	1.4	U	ug/kg	1.4	3	U	ug/kg	3	14	U	ug/kg	14	2.8	U	ug/kg	2.8
5,4-DDE	24	U	ug/kg	1.4	3	U	ug/kg	3	14	U	ug/kg	14	2.8	U	ug/kg	2.8
Endrin	2.8	U	ug/kg	2.8	5.9	U	ug/kg	5.9	28	U	ug/kg	28	5.7	U	ug/kg	5.7
Endosulfan II	2.8	U	ug/kg	2.8	5.9	U	ug/kg	5.9	28	U	ug/kg	28	5.7	U	ug/kg	5.7
4,4-DDD	2.8	U	ug/kg	2.8	5.9	U	ug/kg	5.9	28	U	ug/kg	28	5.7	U	ug/kg	5.7
Endosulfan sulfate	2.8	U	ug/kg	2.8	5.9	U	ug/kg	5.9	28	U	ug/kg	28	5.7	U	ug/kg	5.7
4,4-DDT	9.2	U	ug/kg	2.8	5.9	U	ug/kg	5.9	28	U	ug/kg	28	5.7	U	ug/kg	5.7
Methoxychlor	5.7	U	ug/kg	5.7	12	U	ug/kg	12	57	U	ug/kg	57	11	U	ug/kg	11
Endrin aldehyde	2.8	U	ug/kg	2.8	5.9	U	ug/kg	5.9	28	U	ug/kg	28	5.7	U	ug/kg	5.7
Endrin ketone	2.8	U	ug/kg	2.8	5.9	U	ug/kg	5.9	28	U	ug/kg	28	5.7	U	ug/kg	5.7
Chlordane	14	U	ug/kg	14	30	U	ug/kg	30	140	U	ug/kg	140	28	U	ug/kg	28
Chlorobenzilate	41	U	ug/kg	41	89	U	ug/kg	89	430	U	ug/kg	430	85	U	ug/kg	85
Diallate	81	U	ug/kg	81	180	U	ug/kg	180	850	U	ug/kg	850	170	U	ug/kg	170
Toxaphene	71	U	ug/kg	71	150	U	ug/kg	150	710	U	ug/kg	710	140	U	ug/kg	140
Isodrin	1.7	U	ug/kg	1.7	3.6	U	ug/kg	3.6	17	U	ug/kg	17	3.4	U	ug/kg	3.4
Kepons	85	U	ug/kg	85	180	U	ug/kg	180	850	U	ug/kg	850	170	U	ug/kg	170
Aroclor-1016	71	U	ug/kg	71	150	U	ug/kg	150	710	U	ug/kg	710	140	U	ug/kg	140
Aroclor-1221	140	U	ug/kg	140	300	U	ug/kg	300	1400	U	ug/kg	1400	280	U	ug/kg	280
Aroclor-1232	140	U	ug/kg	140	300	U	ug/kg	300	1400	U	ug/kg	1400	280	U	ug/kg	280
Aroclor-1242	71	U	ug/kg	71	150	U	ug/kg	150	710	U	ug/kg	710	140	U	ug/kg	140
Aroclor-1248	35	U	ug/kg	35	74	U	ug/kg	74	350	U	ug/kg	350	71	U	ug/kg	71
Aroclor-1254	35	U	ug/kg	35	74	U	ug/kg	74	350	U	ug/kg	350	71	U	ug/kg	71
Aroclor-1260	35	U	ug/kg	35	74	U	ug/kg	74	350	U	ug/kg	350	71	U	ug/kg	71

U = NOT DETECTED R = RESULT IS REJECTED  
J = ESTIMATED VALUE UJ = REPORTED QUANTITATION LIMIT IS ESTIMATED  
THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2,3 AND 1,3,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (8270) ANALYTICAL RUN.

US Naval Station, Mayport  
Old Pesticide Area (SNMU 15) Surface Soil Data

Lab Sample Number: RB147022 RB147007 RB147007DL  
 Site: HELP HELP HELP  
 Locator: 15S00401 15S00501 15S00501DL  
 Collect Date: 05-MAR-96 05-MAR-96 05-MAR-96

PESTICIDES/PSBs	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
alpha-BHC	.71	U	ug/kg	.71	27	U	ug/kg	.71	27	U	ug/kg	.71
beta-BHC	1.4	U	ug/kg	1.4	55	U	ug/kg	1.4	55	U	ug/kg	1.4
delta-BHC	.71	U	ug/kg	.71	27	U	ug/kg	.71	27	U	ug/kg	.71
gamma-BHC (Lindane)	.71	U	ug/kg	.71	27	U	ug/kg	.71	27	U	ug/kg	.71
Heptachlor	.71	U	ug/kg	.71	27	U	ug/kg	.71	27	U	ug/kg	.71
Aldrin	.71	U	ug/kg	.71	27	U	ug/kg	.71	27	U	ug/kg	.71
Heptachlor epoxide	.71	U	ug/kg	.71	27	U	ug/kg	.71	27	U	ug/kg	.71
Endosulfan I	.71	U	ug/kg	.71	27	U	ug/kg	.71	27	U	ug/kg	.71
Dieldrin	.71	U	ug/kg	.71	27	U	ug/kg	.71	27	U	ug/kg	.71
4,4-DDE	1.4	U	ug/kg	1.4	55	U	ug/kg	1.4	55	U	ug/kg	1.4
Endrin	1.4	U	ug/kg	1.4	55	U	ug/kg	1.4	55	U	ug/kg	1.4
Endosulfan II	1.4	U	ug/kg	1.4	55	U	ug/kg	1.4	55	U	ug/kg	1.4
4,4-DDD	1.4	U	ug/kg	1.4	55	U	ug/kg	1.4	55	U	ug/kg	1.4
Endosulfan sulfate	1.4	U	ug/kg	1.4	55	U	ug/kg	1.4	55	U	ug/kg	1.4
4,4-DDT	1.4	U	ug/kg	1.4	55	U	ug/kg	1.4	55	U	ug/kg	1.4
Methoxychlor	2.9	U	ug/kg	2.9	110	U	ug/kg	2.9	110	U	ug/kg	2.9
Endrin aldehyde	1.4	U	ug/kg	1.4	55	U	ug/kg	1.4	55	U	ug/kg	1.4
Endrin ketone	1.4	U	ug/kg	1.4	55	U	ug/kg	1.4	55	U	ug/kg	1.4
Chlordane	1.4	U	ug/kg	1.4	55	U	ug/kg	1.4	55	U	ug/kg	1.4
Chlorobenzilate	7.1	U	ug/kg	7.1	270	U	ug/kg	7.1	270	U	ug/kg	7.1
Dieldrin	21	U	ug/kg	21	820	U	ug/kg	21	820	U	ug/kg	21
Toxaphene	43	U	ug/kg	43	1600	U	ug/kg	43	1600	U	ug/kg	43
Isodrin	35	U	ug/kg	35	1400	U	ug/kg	35	1400	U	ug/kg	35
Repon	.71	U	ug/kg	.71	27	U	ug/kg	.71	27	U	ug/kg	.71
Aroclor-1016	43	U	ug/kg	43	1600	U	ug/kg	43	1600	U	ug/kg	43
Aroclor-1221	35	U	ug/kg	35	1400	U	ug/kg	35	1400	U	ug/kg	35
Aroclor-1232	71	U	ug/kg	71	2700	U	ug/kg	71	2700	U	ug/kg	71
Aroclor-1242	71	U	ug/kg	71	2700	U	ug/kg	71	2700	U	ug/kg	71
Aroclor-1248	35	U	ug/kg	35	1400	U	ug/kg	35	1400	U	ug/kg	35
Aroclor-1254	17	U	ug/kg	17	690	U	ug/kg	17	690	U	ug/kg	17
Aroclor-1260	17	U	ug/kg	17	690	U	ug/kg	17	690	U	ug/kg	17

U = NOT DETECTED R = RESULT IS REJECTED  
 J = ESTIMATED VALUE UJ = REPORTED QUANTITATION LIMIT IS ESTIMATED  
 THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2-; 1,3-; AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (8270) ANALYTICAL RUN.

US Naval Station, Mayport  
Old Pesticide Area (SWMU 15) Surface Soil Data

Lab Sample Number:  
Site  
Locator  
Collect Date:

RB147005DL  
HELP  
15S007010L  
05-MAR-96

RB147005  
HELP  
15S00701  
05-MAR-96

23953013  
GROUP1&11  
15SS71  
02-FEB-93

23953011  
GROUP1&11  
15SS61  
02-FEB-93

PESTICIDES/PCBs	ug/kg	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
alpha-BHC	14	140	U	ug/kg	140	35	U	ug/kg	35	350	U	ug/kg	350
beta-BHC	28	280	U	ug/kg	280	68	U	ug/kg	68	680	U	ug/kg	680
delta-BHC	14	140	U	ug/kg	140	35	U	ug/kg	35	350	U	ug/kg	350
gamma-BHC (Lindane)	14	140	U	ug/kg	140	35	U	ug/kg	35	350	U	ug/kg	350
Heptachlor	14	140	U	ug/kg	140	35	U	ug/kg	35	350	U	ug/kg	350
Aldrin	14	140	U	ug/kg	140	35	U	ug/kg	35	350	U	ug/kg	350
Heptachlor epoxide	14	140	U	ug/kg	140	35	U	ug/kg	35	350	U	ug/kg	350
Endosulfan I	14	140	U	ug/kg	140	35	U	ug/kg	35	350	U	ug/kg	350
Dieldrin	14	140	U	ug/kg	140	35	U	ug/kg	35	350	U	ug/kg	350
4,4-DDD	14	140	U	ug/kg	140	35	U	ug/kg	35	350	U	ug/kg	350
Endrin	28	280	U	ug/kg	280	68	U	ug/kg	68	680	U	ug/kg	680
Endosulfan II	28	280	U	ug/kg	280	68	U	ug/kg	68	680	U	ug/kg	680
4,4-DDD	28	280	U	ug/kg	280	68	U	ug/kg	68	680	U	ug/kg	680
Endosulfan sulfate	28	280	U	ug/kg	280	68	U	ug/kg	68	680	U	ug/kg	680
4,4-DDT	84	840	U	ug/kg	840	210	U	ug/kg	210	2100	U	ug/kg	2100
Methoxychlor	56	560	U	ug/kg	560	140	U	ug/kg	140	1400	U	ug/kg	1400
Endrin aldehyde	28	280	U	ug/kg	280	68	U	ug/kg	68	680	U	ug/kg	680
Endrin ketone	28	280	U	ug/kg	280	68	U	ug/kg	68	680	U	ug/kg	680
Chlordane	28	280	U	ug/kg	280	68	U	ug/kg	68	680	U	ug/kg	680
Chlorobenzilate	1100	11000	R	ug/kg	11000	350	U	ug/kg	350	3500	U	ug/kg	3500
Diallate	420	4200	U	ug/kg	4200	1000	U	ug/kg	1000	10000	U	ug/kg	10000
Toxaphene	830	8300	U	ug/kg	8300	2100	U	ug/kg	2100	21000	U	ug/kg	21000
Isodrin	690	6900	U	ug/kg	6900	1700	U	ug/kg	1700	17000	U	ug/kg	17000
Kepon	17	170	U	ug/kg	170	35	U	ug/kg	35	350	U	ug/kg	350
Aroclor-1016	830	8300	U	ug/kg	8300	2100	U	ug/kg	2100	21000	U	ug/kg	21000
Aroclor-1221	690	6900	U	ug/kg	6900	1700	U	ug/kg	1700	17000	U	ug/kg	17000
Aroclor-1232	1400	14000	U	ug/kg	14000	3500	U	ug/kg	3500	35000	U	ug/kg	35000
Aroclor-1242	1400	14000	U	ug/kg	14000	3500	U	ug/kg	3500	35000	U	ug/kg	35000
Aroclor-1248	690	6900	U	ug/kg	6900	1700	U	ug/kg	1700	17000	U	ug/kg	17000
Aroclor-1254	350	3500	U	ug/kg	3500	840	U	ug/kg	840	8400	U	ug/kg	8400
Aroclor-1260	350	3500	U	ug/kg	3500	840	U	ug/kg	840	8400	U	ug/kg	8400

U = NOT DETECTED R = RESULT IS REJECTED  
J = ESTIMATED VALUE UJ = REPORTED QUANTITATION LIMIT IS ESTIMATED  
THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2-; 1,3-; AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (8270) ANALYTICAL RUN.

US Naval Station, Mayport  
Old Pesticide Area (SMMU 15) Surface Soil Data

Lab Sample Number: 23953015 GROUP I&II M7902001 M7902002  
 Site Locator: 15SS81 15SS81D 15SS81D GROUP I&II GROUP I&II GROUP I&II  
 Collect Date: 02-FEB-93 02-FEB-93 20-SEP-94 20-SEP-94 20-SEP-94

PESTICIDES/PCBs	VALUE	DL	QUAL	UNITS	DL	VALUE	DL	QUAL	UNITS	DL	VALUE	DL	QUAL	UNITS	DL
alpha-BHC	14 U	14	U	ug/kg	14	14	U	U	ug/kg	14	1.8	1.8	U	ug/kg	1.8
beta-BHC	28 U	28	U	ug/kg	28	28	U	U	ug/kg	28	3.4	3.4	U	ug/kg	3.4
delta-BHC	14 U	14	U	ug/kg	14	14	U	U	ug/kg	14	1.8	1.8	U	ug/kg	1.8
gamma-BHC (Lindane)	14 U	14	U	ug/kg	14	14	U	U	ug/kg	14	1.8	1.8	U	ug/kg	1.8
Heptachlor	14 U	14	U	ug/kg	14	14	U	U	ug/kg	14	1.8	1.8	U	ug/kg	1.8
Aldrin	14 U	14	U	ug/kg	14	14	U	U	ug/kg	14	1.8	1.8	U	ug/kg	1.8
Heptachlor epoxide	14 U	14	U	ug/kg	14	14	U	U	ug/kg	14	1.8	1.8	U	ug/kg	1.8
Endosulfan I	14 U	14	U	ug/kg	14	14	U	U	ug/kg	14	1.8	1.8	U	ug/kg	1.8
Endosulfan II	14 U	14	U	ug/kg	14	14	U	U	ug/kg	14	1.8	1.8	U	ug/kg	1.8
4,4-DDD	260 J	260	J	ug/kg	260	63	J	J	ug/kg	63	63	63	J	ug/kg	63
Endrin	28 U	28	U	ug/kg	28	28	U	U	ug/kg	28	3.4	3.4	U	ug/kg	3.4
Endosulfan sulfate	28 U	28	U	ug/kg	28	28	U	U	ug/kg	28	3.4	3.4	U	ug/kg	3.4
4,4-DDT	28 U	28	U	ug/kg	28	28	U	U	ug/kg	28	3.4	3.4	U	ug/kg	3.4
Methoxychlor	110 J	110	J	ug/kg	110	7.1	J	J	ug/kg	7.1	7.1	7.1	J	ug/kg	7.1
Endrin aldehyde	56 U	56	U	ug/kg	56	56	U	U	ug/kg	56	7.2	7.2	U	ug/kg	7.2
Endrin ketone	28 U	28	U	ug/kg	28	28	U	U	ug/kg	28	3.4	3.4	U	ug/kg	3.4
Chlordane	28 U	28	U	ug/kg	28	28	U	U	ug/kg	28	3.4	3.4	U	ug/kg	3.4
Chlorobenzilate	1000	1000		ug/kg	1000	18			ug/kg	18	18	18		ug/kg	18
Diallate	420 U	420	U	ug/kg	420	420	U	U	ug/kg	420	54	54	U	ug/kg	54
Toxaphene	830 U	830	U	ug/kg	830	830	U	U	ug/kg	830	110	110	U	ug/kg	110
Isodrin	690 U	690	U	ug/kg	690	690	U	U	ug/kg	690	89	89	U	ug/kg	89
Kepon	830 U	830	U	ug/kg	830	17	U	U	ug/kg	17	1.8	1.8	U	ug/kg	1.8
Aroclor-1016	690 U	690	U	ug/kg	690	690	U	U	ug/kg	690	110	110	U	ug/kg	110
Aroclor-1221	1400 U	1400	U	ug/kg	1400	1400	U	U	ug/kg	1400	1400	1400	U	ug/kg	1400
Aroclor-1232	1400 U	1400	U	ug/kg	1400	1400	U	U	ug/kg	1400	1400	1400	U	ug/kg	1400
Aroclor-1242	690 U	690	U	ug/kg	690	690	U	U	ug/kg	690	690	690	U	ug/kg	690
Aroclor-1248	690 U	690	U	ug/kg	690	690	U	U	ug/kg	690	690	690	U	ug/kg	690
Aroclor-1254	350 U	350	U	ug/kg	350	350	U	U	ug/kg	350	350	350	U	ug/kg	350
Aroclor-1260	350 U	350	U	ug/kg	350	350	U	U	ug/kg	350	350	350	U	ug/kg	350

U = NOT DETECTED R = RESULT IS REJECTED  
 J = ESTIMATED VALUE UJ = REPORTED QUANTIFICATION LIMIT IS ESTIMATED  
 THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2-; 1,3-; AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (8270) ANALYTICAL RUN.

US Naval Station, Mayport  
Old Pesticide Area (SMU 15) Surface Soil Data

PESTICIDES/PCBs	ug/kg	M7867004			M7867006			M7867007			M7867009		
		VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL
alpha-BHC		3.5 U	ug/kg	3.5	.7 U	ug/kg	14 U	ug/kg	14	.7 U	ug/kg	14	
beta-BHC		6.8 U	ug/kg	6.8	1.4 U	ug/kg	27 U	ug/kg	27	1.4 U	ug/kg	27	
gamma-BHC (Lindene)		3.5 U	ug/kg	3.5	.7 U	ug/kg	14 U	ug/kg	14	.7 U	ug/kg	14	
Heptachlor		3.5 U	ug/kg	3.5	.7 U	ug/kg	14 U	ug/kg	14	.7 U	ug/kg	14	
Aldrin		3.5 U	ug/kg	3.5	.7 U	ug/kg	14 U	ug/kg	14	.7 U	ug/kg	14	
Heptachlor epoxide		3.5 U	ug/kg	3.5	.7 U	ug/kg	14 U	ug/kg	14	.7 U	ug/kg	14	
Endosulfan I		3.5 U	ug/kg	3.5	.7 U	ug/kg	14 U	ug/kg	14	.7 U	ug/kg	14	
Dieldrin		3.5 U	ug/kg	3.5	.7 U	ug/kg	14 U	ug/kg	14	.7 U	ug/kg	14	
4,4'-DDE		54	ug/kg	3.1	3.1	ug/kg	220	ug/kg	27	3.4	ug/kg	14	
Endrin		6.8 U	ug/kg	6.8	1.4 U	ug/kg	27 U	ug/kg	27	1.4 U	ug/kg	14	
Endosulfan II		6.8 U	ug/kg	6.8	1.4 U	ug/kg	27 U	ug/kg	27	1.4 U	ug/kg	14	
4,4'-DDD		6.8 U	ug/kg	6.8	1.4 U	ug/kg	27 U	ug/kg	27	1.4 U	ug/kg	14	
Endosulfan sulfate		6.8 U	ug/kg	6.8	1.4 U	ug/kg	27 U	ug/kg	27	1.4 U	ug/kg	14	
4,4'-DDT		18	ug/kg	14	1.8	ug/kg	56 J	ug/kg	57	4.4 J	ug/kg	14	
Methoxychlor		14 U	ug/kg	14	2.8 U	ug/kg	57 U	ug/kg	27	2.8 U	ug/kg	28	
Endrin aldehyde		6.8 U	ug/kg	6.8	1.4 U	ug/kg	27 U	ug/kg	27	1.4 U	ug/kg	14	
Endrin ketone		6.8 U	ug/kg	6.8	1.4 U	ug/kg	27 U	ug/kg	27	1.4 U	ug/kg	14	
Chlordane		35 U	ug/kg	35	1.4 U	ug/kg	27 U	ug/kg	27	1.4 U	ug/kg	14	
Chlorobenzilate		100 U	ug/kg	100	21 U	ug/kg	380	ug/kg	20	21 U	ug/kg	21	
Diallate		210 U	ug/kg	210	42 U	ug/kg	420 U	ug/kg	420	42 U	ug/kg	42	
Toxaphene		170 U	ug/kg	170	35 U	ug/kg	690 U	ug/kg	690	34 U	ug/kg	34	
Isodrin		3.5 U	ug/kg	3.5	.7 U	ug/kg	14 U	ug/kg	14	.7 U	ug/kg	14	
Kepon		210 UJ	ug/kg	42 UJ	42 UJ	ug/kg	840 UJ	ug/kg	42 UJ	42 UJ	ug/kg	42	
Aroclor-1016			ug/kg			ug/kg		ug/kg			ug/kg		
Aroclor-1221			ug/kg			ug/kg		ug/kg			ug/kg		
Aroclor-1232			ug/kg			ug/kg		ug/kg			ug/kg		
Aroclor-1242			ug/kg			ug/kg		ug/kg			ug/kg		
Aroclor-1248			ug/kg			ug/kg		ug/kg			ug/kg		
Aroclor-1254			ug/kg			ug/kg		ug/kg			ug/kg		
Aroclor-1260			ug/kg			ug/kg		ug/kg			ug/kg		

U = NOT DETECTED R = RESULT IS REJECTED  
 J = ESTIMATED VALUE UJ = REPORTED QUANTIFICATION LIMIT IS ESTIMATED  
 THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2-; 1,3-; AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (8270) ANALYTICAL RUN.

US Naval Station, Mayport  
Old Pesticide Area (SMMU 15) Surface Soil Data

Lab Sample Number: RB147012 RB147011 RB147011 M7867005  
 Site: NPLP NPLP NPLP GROUP1&II  
 Locator: 15S01301 15S01401 15S01401 15SS01501  
 Collect Date: 05-MAR-96 05-MAR-96 05-MAR-96 13-SEP-94

PESTICIDES/PCBs	VALUE	DL	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
alpha-BHC	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
beta-BHC	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
delta-BHC	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
gamma-BHC (Lindane)	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Heptachlor	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Aldrin	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Heptachlor epoxide	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Endosulfan I	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Bifenthrin	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
4,4-DDE	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Endrin	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Endosulfan II	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
4,4-DDD	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
4,4-DDT	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Methoxychlor	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Endrin aldehyde	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Endrin ketone	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Chlordane	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Chlorobenzilate	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Diallate	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Toxaphene	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Isodrin	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Kepon	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Aroclor-1016	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Aroclor-1221	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Aroclor-1232	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Aroclor-1242	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Aroclor-1248	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Aroclor-1254	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4
Aroclor-1260	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4	U	1.4	ug/kg	1.4

U = NOT DETECTED R = RESULT IS REJECTED  
 J = ESTIMATED VALUE UJ = REPORTED QUANTITATION LIMIT IS ESTIMATED  
 THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2-; 1,3-; AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (B270) ANALYTICAL RUN.

US Naval Station, Mayport  
Old Pesticide Area (SMU 15) Surface Soil Data

Lab Sample Number: M7867010 RA781002 RB147013 RA781002DL  
 Site: GROUP1&II NHELP NHELP NHELP  
 Locator: 15SS01601 15SS01601 15SS01601DL  
 Collect Date: 13-SEP-94 18-DEC-95 05-MAR-96 18-DEC-95

PESTICIDES/PCBs	VALUE	QUAL UNITS	DL									
alpha-BHC	140	ug/kg		140	ug/kg		7.2	U		7.2	U	
Beta-BHC	280	ug/kg		280	ug/kg		1.4	ug/kg		270	ug/kg	14
delta-BHC	140	ug/kg		140	ug/kg		7.2	U		7.2	U	7.2
gamma-BHC (Lindane)	140	ug/kg		140	ug/kg		7.2	U		7.2	U	7.2
Heptachlor	140	ug/kg		140	ug/kg		7.2	U		7.2	U	7.2
Aldrin	140	ug/kg		140	ug/kg		7.2	U		38	ug/kg	7.2
Heptachlor epoxide	140	ug/kg		140	ug/kg		7.2	U		7.2	U	7.2
Endosulfan I	140	ug/kg		140	ug/kg		7.2	U		7.2	U	7.2
Dieldrin	140	ug/kg		140	ug/kg		7.2	U		850	ug/kg	7.2
4,4-DDE	560	ug/kg		560	ug/kg		7.2	U		14	U	14
Endrin	280	ug/kg		280	ug/kg		1.4	U		14	U	14
Endosulfan II	280	ug/kg		280	ug/kg		1.4	U		14	U	14
4,4-DDD	280	ug/kg		280	ug/kg		1.4	U		14	U	14
Endosulfan sulfate	280	ug/kg		280	ug/kg		1.4	U		14	U	14
4,4-DDT	340	ug/kg		340	ug/kg		1.4	U		390	ug/kg	14
Methoxychlor	590	ug/kg		590	ug/kg		1.4	U		29	U	29
Endrin aldehyde	280	ug/kg		280	ug/kg		2.8	U		14	U	14
Endrin ketone	280	ug/kg		280	ug/kg		1.4	U		14	U	14
Chlordane	900	ug/kg		900	ug/kg		1.4	U		14	U	14
Chlorobenzilate	4300	ug/kg		4300	ug/kg		21	U		210	U	210
Diallate	8700	ug/kg		8700	ug/kg		43	U		430	U	430
Toxaphene	7200	ug/kg		7200	ug/kg		35	U		350	U	350
Teodrin	140	ug/kg		140	ug/kg		7.2	U		7.2	U	7.2
Kepon	8700	ug/kg		8700	ug/kg		43	U		350	U	350
Aroclor-1016	-	ug/kg		-	ug/kg		35	U		720	U	720
Aroclor-1221	-	ug/kg		-	ug/kg		72	U		720	U	720
Aroclor-1232	-	ug/kg		-	ug/kg		72	U		720	U	720
Aroclor-1242	-	ug/kg		-	ug/kg		35	U		350	U	350
Aroclor-1245	-	ug/kg		-	ug/kg		35	U		350	U	350
Aroclor-1254	-	ug/kg		-	ug/kg		17	U		170	U	170
Aroclor-1260	-	ug/kg		-	ug/kg		17	U		170	U	170

U = NOT DETECTED R = RESULT IS REJECTED  
 J = ESTIMATED VALUE UJ = REPORTED QUANTIFICATION LIMIT IS ESTIMATED  
 THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2,3,1,3, AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (8270) ANALYTICAL RUN.

US Naval Station, Mayport  
Old Pesticide Area (SMU 15) Surface Soil Data

Lab Sample Number:  
Site  
Locator  
Collect Date:

RB147013DL  
WELP  
15S01601DL  
05-MAR-96

M7867008  
GROUP I&II  
15SS01701  
13-SEP-94

M7867013  
GROUP I&II  
15SS01801  
13-SEP-94

RB147020  
WELP  
15S01801  
05-MAR-96

PESTICIDES/PCBs	ug/kg	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL
alpha-BHC	1.4	ug/kg	1.4	U	1.4	ug/kg	U	3.5	7.2	ug/kg	7.2
beta-BHC	2.7	ug/kg	2.7	U	2.7	ug/kg	U	6.8	14	ug/kg	14
delta-BHC	1.4	ug/kg	1.4	U	1.4	ug/kg	U	3.5	7.2	ug/kg	7.2
gamma-BHC (lindane)	1.4	ug/kg	1.4	U	1.4	ug/kg	U	3.5	7.2	ug/kg	7.2
Heptachlor	1.4	ug/kg	1.4	U	1.4	ug/kg	U	3.5	7.2	ug/kg	7.2
Aldrin	1.4	ug/kg	1.4	U	1.4	ug/kg	U	3.5	7.2	ug/kg	7.2
Heptachlor epoxide	1.7	ug/kg	1.4	U	1.4	ug/kg	U	3.5	7.2	ug/kg	7.2
Endosulfan I	1.4	ug/kg	1.4	U	1.4	ug/kg	U	3.5	7.2	ug/kg	7.2
Endosulfan II	1.4	ug/kg	1.4	U	1.4	ug/kg	U	3.5	7.2	ug/kg	7.2
4,4-DDE	110	ug/kg	1.4	U	1.4	ug/kg	U	3.5	7.2	ug/kg	7.2
Endrin	2.7	ug/kg	2.7	U	2.7	ug/kg	U	6.8	14	ug/kg	14
Endosulfan II	2.7	ug/kg	2.7	U	2.7	ug/kg	U	6.8	14	ug/kg	14
4,4-DDD	2.7	ug/kg	2.7	U	2.7	ug/kg	U	6.8	14	ug/kg	14
Endosulfan sulfate	2.7	ug/kg	2.7	U	2.7	ug/kg	U	6.8	14	ug/kg	14
4,4-DDT	30	ug/kg	2.7	U	2.7	ug/kg	U	6.8	14	ug/kg	14
Methoxychlor	5.7	ug/kg	5.7	U	5.7	ug/kg	U	14	29	ug/kg	29
Endrin aldehyde	2.7	ug/kg	2.7	U	2.7	ug/kg	U	6.8	14	ug/kg	14
Endrin ketone	2.7	ug/kg	2.7	U	2.7	ug/kg	U	6.8	14	ug/kg	14
Chlor-dane	2.7	ug/kg	2.7	U	2.7	ug/kg	U	6.8	14	ug/kg	14
Chlorobenzilate	260	ug/kg	14	U	14	ug/kg	U	35	72	ug/kg	72
Diallate	42	ug/kg	42	U	42	ug/kg	U	100	220	ug/kg	220
Toxaphene	84	ug/kg	84	U	84	ug/kg	U	210	430	ug/kg	430
Isodrin	69	ug/kg	69	U	69	ug/kg	U	170	350	ug/kg	350
Kepone	1.4	ug/kg	1.4	U	1.4	ug/kg	U	3.5	7.2	ug/kg	7.2
Aroclor-1016	69	ug/kg	69	U	69	ug/kg	U	1800	1800	ug/kg	1800
Aroclor-1221	140	ug/kg	140	U	140	ug/kg	U	3600	3600	ug/kg	3600
Aroclor-1232	140	ug/kg	140	U	140	ug/kg	U	3600	3600	ug/kg	3600
Aroclor-1242	69	ug/kg	69	U	69	ug/kg	U	1800	1800	ug/kg	1800
Aroclor-1248	69	ug/kg	69	U	69	ug/kg	U	1800	1800	ug/kg	1800
Aroclor-1254	34	ug/kg	34	U	34	ug/kg	U	860	860	ug/kg	860
Aroclor-1260	34	ug/kg	34	U	34	ug/kg	U	860	860	ug/kg	860

U = NOT DETECTED R = RESULT IS REJECTED  
J = ESTIMATED VALUE UJ = REPORTED QUANTIFICATION LIMIT IS ESTIMATED  
THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2-; 1,3-; AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (8270) ANALYTICAL RUN.

US Naval Station, Mayport  
Old Pesticide Area (SMMU 15) Surface Soil Data

Lab Sample Number: Site Locator Collect Date:	M7867015 GROUP I&II 15SS01901 13-SEP-94	M7902003 GROUP I&II 15SS01901 20-SEP-94	M7867016 GROUP I&II 15SS019010 13-SEP-94	M7902004 GROUP I&II 15SS019010 20-SEP-94	
VALUE	DL	VALUE	DL	VALUE	DL
ug/kg	QUAL UNITS	QUAL UNITS	QUAL UNITS	QUAL UNITS	QUAL UNITS
PESTICIDES/PCBs					
alpha-BHC	1.4 U	.75 U	1.4 U	.75 U	1.4 U
beta-BHC	2.8 U	1.5 U	2.8 U	1.5 U	2.8 U
delta-BHC	1.4 U	.75 U	1.4 U	.75 U	1.4 U
gamma-BHC (Lindane)	1.4 U	.75 U	1.4 U	.75 U	1.4 U
Heptachlor	1.4 U	.75 U	1.4 U	.75 U	1.4 U
Aldrin	1.4 U	.75 U	1.4 U	.75 U	1.4 U
Heptachlor epoxide	1.4 U	.75 U	1.4 U	.75 U	1.4 U
Endosulfan I	1.4 U	.75 U	1.4 U	.75 U	1.4 U
Bifenthrin	1.4 U	.75 U	1.4 U	.75 U	1.4 U
γ,γ-DDE	4.8 J	2.1 J	4.4 U	1.7 J	4.4 U
Endrin	2.8 U	1.5 U	2.8 U	1.5 U	2.8 U
Endosulfan II	2.8 U	1.5 U	2.8 U	1.5 U	2.8 U
γ,γ-DDD	2.8 U	1.5 U	2.8 U	1.5 U	2.8 U
Endosulfan sulfate	2.8 U	1.5 U	2.8 U	1.5 U	2.8 U
γ,γ-DDT	48	1.5 J	12 U	1.7 J	12 U
Methoxychlor	5.7 U	3 U	5.7 U	3 U	5.7 U
Endrin aldehyde	2.8 U	1.5 U	2.8 U	1.5 U	2.8 U
Endrin ketone	2.8 U	1.5 U	2.8 U	1.5 U	2.8 U
Chlordane	14 U	7.5 U	19 U	7.5 U	19 U
Chlorobenzilate	42 U	22 U	42 U	22 U	42 U
Diallate	85 U	45 U	85 U	45 U	85 U
Toxaphene	70 U	37 U	70 U	37 U	70 U
Isofluthrin	1.4 U	.75 U	1.4 U	.75 U	1.4 U
Kepon	85 UJ	45 UJ	85 UJ	45 UJ	85 UJ
Aroclor-1016	-	-	-	-	-
Aroclor-1221	-	-	-	-	-
Aroclor-1232	-	-	-	-	-
Aroclor-1242	-	-	-	-	-
Aroclor-1248	-	-	-	-	-
Aroclor-1254	-	-	-	-	-
Aroclor-1260	-	-	-	-	-

U = NOT DETECTED R = RESULT IS REJECTED  
J = ESTIMATED VALUE UJ = REPORTED QUANTITATION LIMIT IS ESTIMATED  
THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2-, 1,3-, AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (8270) ANALYTICAL RUN.

US Naval Station, Mayport  
Old Pesticide Area (SMU 15) Surface Soil Data

Lab Sample Number:  
Site  
Locator  
Collect Date:

M7867012  
GROUP1&I1  
15SS02001  
13-SEP-94

M7867017  
GROUP1&I1  
15SS02201  
13-SEP-94

M7867020  
GROUP1&I1  
15SS02101  
13-SEP-94

M7867014  
GROUP1&I1  
15SS02301  
13-SEP-94

PESTICIDES/PCBs	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
alpha-BHC	.73	U	ug/kg	.73	14	U	ug/kg	14	1.4	U	ug/kg	1.4	14000	U	ug/kg	14000
beta-BHC	1.4	U	ug/kg	1.4	28	U	ug/kg	28	2.8	U	ug/kg	2.8	28000	U	ug/kg	28000
delta-BHC	.73	U	ug/kg	.73	14	U	ug/kg	14	1.4	U	ug/kg	1.4	14000	U	ug/kg	14000
gamma-BHC (Lindane)	.73	U	ug/kg	.73	14	U	ug/kg	14	1.4	U	ug/kg	1.4	14000	U	ug/kg	14000
Heptachlor	.73	U	ug/kg	.73	14	U	ug/kg	14	1.4	U	ug/kg	1.4	14000	U	ug/kg	14000
Aldrin	.73	U	ug/kg	.73	14	U	ug/kg	14	1.4	U	ug/kg	1.4	14000	U	ug/kg	14000
Heptachlor epoxide	.73	U	ug/kg	.73	14	U	ug/kg	14	1.4	U	ug/kg	1.4	14000	U	ug/kg	14000
Endosulfan I	.73	U	ug/kg	.73	14	U	ug/kg	14	1.4	U	ug/kg	1.4	14000	U	ug/kg	14000
Bifenthrin	.73	U	ug/kg	.73	14	U	ug/kg	14	1.4	U	ug/kg	1.4	14000	U	ug/kg	14000
4,4-DDE	4.8	U	ug/kg	4.8	270	U	ug/kg	270	14	U	ug/kg	14	14000	U	ug/kg	14000
Endrin	1.4	U	ug/kg	1.4	28	U	ug/kg	28	2.8	U	ug/kg	2.8	28000	U	ug/kg	28000
Endosulfan II	1.4	U	ug/kg	1.4	28	U	ug/kg	28	2.8	U	ug/kg	2.8	28000	U	ug/kg	28000
4,4-DDD	1.4	U	ug/kg	1.4	28	U	ug/kg	28	2.8	U	ug/kg	2.8	28000	U	ug/kg	28000
Endosulfan sulfate	1.4	U	ug/kg	1.4	28	U	ug/kg	28	2.8	U	ug/kg	2.8	28000	U	ug/kg	28000
4,4-DDT	3.1	U	ug/kg	3.1	60	U	ug/kg	60	6.5	U	ug/kg	6.5	79000	U	ug/kg	79000
Methoxychlor	2.9	U	ug/kg	2.9	57	U	ug/kg	57	5.7	U	ug/kg	5.7	57000	U	ug/kg	57000
Endrin aldehyde	1.4	U	ug/kg	1.4	28	U	ug/kg	28	2.8	U	ug/kg	2.8	28000	U	ug/kg	28000
Endrin ketone	1.4	U	ug/kg	1.4	28	U	ug/kg	28	2.8	U	ug/kg	2.8	28000	U	ug/kg	28000
Chlordane	7.3	U	ug/kg	7.3	140	U	ug/kg	140	14	U	ug/kg	14	140000	U	ug/kg	140000
Chlorobenzilate	22	U	ug/kg	22	420	U	ug/kg	420	42	U	ug/kg	42	20000	U	ug/kg	20000
Diallate	43	U	ug/kg	43	850	U	ug/kg	850	85	U	ug/kg	85	50000	U	ug/kg	50000
Toxaphene	36	U	ug/kg	36	700	U	ug/kg	700	70	U	ug/kg	70	700000	U	ug/kg	700000
Isofluthrin	.73	U	ug/kg	.73	14	U	ug/kg	14	1.4	U	ug/kg	1.4	14000	U	ug/kg	14000
Kepon	43	U	ug/kg	43	850	U	ug/kg	850	85	U	ug/kg	85	50000	U	ug/kg	50000
Aroclor-1016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1221	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1232	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1242	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1248	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1254	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

U = NOT DETECTED R = RESULT IS REJECTED  
J = ESTIMATED VALUE UJ = REPORTED QUANTITATION LIMIT IS ESTIMATED  
THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2-; 1,3-; AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (8270) ANALYTICAL RUN.

US Naval Station, Mayport  
Old Pesticide Area (SMU 15) Surface Soil Data

Lab Sample Number:  
Site  
Locator  
Collect Date:

RA781008  
HELP  
15S02301  
18-DEC-95

RB147017  
HELP  
15S02301  
05-MAR-96

R8742005  
GROUP1&I1  
15S02401  
13-SEP-94

H7867019  
GROUP1&I1  
15S02501  
13-SEP-94

VALUE DL QUAL UNITS DL VALUE DL QUAL UNITS DL VALUE DL QUAL UNITS DL VALUE DL QUAL UNITS DL

PESTICIDES/PCBs	ug/kg	DL	QUAL	UNITS	DL	VALUE	DL	QUAL	UNITS	DL	VALUE	DL	QUAL	UNITS	DL	VALUE	DL	QUAL	UNITS	DL		
alpha-BHC	.87 U			ug/kg		.87			ug/kg		.73			ug/kg		.77			ug/kg		1.4	U
beta-BHC	1.7 U			ug/kg		1.7			ug/kg		1.4			ug/kg		1.5			ug/kg		2.7	U
delta-BHC	.87 U			ug/kg		.87			ug/kg		.73			ug/kg		.77			ug/kg		1.4	U
gamma-BHC (lindane)	.87 U			ug/kg		.87			ug/kg		.73			ug/kg		.77			ug/kg		1.4	U
Heptachlor	.87 U			ug/kg		.87			ug/kg		.73			ug/kg		.77			ug/kg		1.4	U
Aldrin	.87 U			ug/kg		.87			ug/kg		.73			ug/kg		.77			ug/kg		1.4	U
Heptachlor epoxide	.87 U			ug/kg		.87			ug/kg		.73			ug/kg		.77			ug/kg		1.4	U
Endosulfan I	.87 U			ug/kg		.87			ug/kg		.73			ug/kg		.77			ug/kg		1.4	U
Dieldrin	.87 U			ug/kg		.87			ug/kg		.73			ug/kg		.77			ug/kg		1.4	U
4,4-DDE	2.4 J			ug/kg		.87			ug/kg		.73			ug/kg		1.4			ug/kg		49	
Endrin	1.7 U			ug/kg		1.7			ug/kg		1.4			ug/kg		1.5			ug/kg		2.7	U
Endosulfan II	1.7 U			ug/kg		1.7			ug/kg		1.4			ug/kg		1.5			ug/kg		2.7	U
4,4-DDD	1.7 U			ug/kg		1.7			ug/kg		1.4			ug/kg		1.5			ug/kg		2.7	U
Endosulfan sulfate	1.9 U			ug/kg		1.7			ug/kg		1.4			ug/kg		1.6			ug/kg		17	
4,4-DDT	3.5 U			ug/kg		3.5			ug/kg		2.9			ug/kg		3.1			ug/kg		5.7	U
Methoxychlor	1.7 U			ug/kg		1.7			ug/kg		1.4			ug/kg		1.5			ug/kg		2.7	U
Endrin aldehyde	1.7 U			ug/kg		1.7			ug/kg		1.4			ug/kg		1.5			ug/kg		2.7	U
Endrin ketone	1.7 U			ug/kg		1.7			ug/kg		1.4			ug/kg		1.5			ug/kg		2.7	U
Chlordane	8.7 U			ug/kg		8.7			ug/kg		7.3			ug/kg		7.7			ug/kg		14	
Chlorobenzilate	26 U			ug/kg		26			ug/kg		22			ug/kg		23			ug/kg		42	U
Diallate	52 U			ug/kg		52			ug/kg		43			ug/kg		46			ug/kg		84	U
Toxaphene	43 U			ug/kg		43			ug/kg		36			ug/kg		38			ug/kg		69	U
Iso-drin	.87 U			ug/kg		.87			ug/kg		.73			ug/kg		.77			ug/kg		1.4	U
Kepone	52 U			ug/kg		52			ug/kg		43			ug/kg		46			ug/kg		84	U
Aroclor-1016	43 U			ug/kg		43			ug/kg		36			ug/kg		36			ug/kg		84	U
Aroclor-1221	87 U			ug/kg		87			ug/kg		73			ug/kg		75			ug/kg		84	U
Aroclor-1232	87 U			ug/kg		87			ug/kg		73			ug/kg		75			ug/kg		84	U
Aroclor-1242	43 U			ug/kg		43			ug/kg		36			ug/kg		36			ug/kg		69	U
Aroclor-1248	43 U			ug/kg		43			ug/kg		36			ug/kg		36			ug/kg		69	U
Aroclor-1254	21 U			ug/kg		21			ug/kg		17			ug/kg		17			ug/kg		1.4	U
Aroclor-1260	21 U			ug/kg		21			ug/kg		17			ug/kg		17			ug/kg		1.4	U

U = NOT DETECTED R = RESULT IS REJECTED  
J = ESTIMATED VALUE UJ = REPORTED QUANTITATION LIMIT IS ESTIMATED  
THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2-, 1,3-, AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (8270) ANALYTICAL RUN.

US Naval Station, Mayport  
Old Pesticide Area (SWMU 15) Surface Soil Data

Lab Sample Number:  
Site Locator  
Collect Date:

R8785002  
GROUP I&II  
15SS027010  
22-SEP-94

R8742003  
GROUP I&II  
15SS02801  
13-SEP-94

R8785001  
GROUP I&II  
15SS02701  
22-SEP-94

M7867018  
GROUP I&II  
15SS02601  
13-SEP-94

PESTICIDES/PCBs	VALUE	DL	QUAL	UNITS												
alpha-BHC	.71	1.4	U	ug/kg	.72	1.4	U	ug/kg	.72	1.4	U	ug/kg	.71	1.4	U	ug/kg
Beta-BHC	1.4	1.4	U	ug/kg												
delta-BHC	.71	.71	U	ug/kg	.72	.71	U	ug/kg	.72	.71	U	ug/kg	.71	.71	U	ug/kg
gamma-BHC (lindane)	.71	.71	U	ug/kg	.72	.71	U	ug/kg	.72	.71	U	ug/kg	.71	.71	U	ug/kg
Heptachlor	.71	.71	U	ug/kg	.72	.71	U	ug/kg	.72	.71	U	ug/kg	.71	.71	U	ug/kg
Aldrin	.71	.71	U	ug/kg	.72	.71	U	ug/kg	.72	.71	U	ug/kg	.71	.71	U	ug/kg
Heptachlor epoxide	.71	.71	U	ug/kg	.72	.71	U	ug/kg	.72	.71	U	ug/kg	.71	.71	U	ug/kg
Endosulfan I	.71	.71	U	ug/kg	.72	.71	U	ug/kg	.72	.71	U	ug/kg	.71	.71	U	ug/kg
Dieldrin	.71	.71	U	ug/kg	.72	.71	U	ug/kg	.72	.71	U	ug/kg	.71	.71	U	ug/kg
4,4-DDE	7.9	1.4	U	ug/kg	1.2	1.4	U	ug/kg	2.8	1.4	U	ug/kg	2.8	1.4	U	ug/kg
Endrin	1.4	1.4	U	ug/kg												
Endosulfan II	1.4	1.4	U	ug/kg												
4,4-DDD	1.4	1.4	U	ug/kg												
Endosulfan sulfate	1.4	1.4	U	ug/kg												
4,4-DDT	7.4	1.4	U	ug/kg	1.4	1.4	U	ug/kg	1.4	1.4	U	ug/kg	1.4	1.4	U	ug/kg
Methoxychlor	2.9	2.9	U	ug/kg												
Endrin aldehyde	1.4	1.4	U	ug/kg												
Endrin ketone	1.4	1.4	U	ug/kg												
Chlordane	7.1	7.1	U	ug/kg	7.2	7.1	U	ug/kg	7.1	7.1	U	ug/kg	7.1	7.1	U	ug/kg
Chlorobenzilate	21	21	U	ug/kg												
Diallate	42	42	U	ug/kg	43	43	U	ug/kg	43	43	U	ug/kg	43	43	U	ug/kg
Toxaphene	35	35	U	ug/kg												
Isodrin	.71	.71	U	ug/kg	.72	.71	U	ug/kg	.72	.71	U	ug/kg	.71	.71	U	ug/kg
Kepon	42	42	U	ug/kg	43	43	U	ug/kg	43	43	U	ug/kg	43	43	U	ug/kg
Aractor-1016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aractor-1221	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aractor-1232	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aractor-1242	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aractor-124B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aractor-1254	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aractor-1260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

U = NOT DETECTED R = RESULT IS REJECTED  
J = ESTIMATED VALUE UJ = REPORTED QUANTITATION LIMIT IS ESTIMATED  
THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2-; 1,3-; AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (8270) ANALYTICAL RUN.



US Naval Station, Mayport  
Old Pesticide Area (SMMU 15) Surface Soil Data

Lab Sample Number:  
Site  
Locator  
Collect Date:

RA781005  
HELP  
15S03201  
18-DEC-95

RB147016  
HELP  
15S03201  
05-MAR-96

RA781006  
HELP  
15S03201D  
18-DEC-95

RA781007  
HELP  
15S03301  
18-DEC-95

PESTICIDES/PBBS	VALUE	QUAL	UNITS	DL												
alpha-BHC	.75	U	ug/kg	.75	.73	U	ug/kg	.73	.75	U	ug/kg	.75	.74	U	ug/kg	.74
beta-BHC	1.5	U	ug/kg	1.5	1.4	U	ug/kg	1.4	1.5	U	ug/kg	1.5	1.4	U	ug/kg	1.4
delta-BHC	.75	U	ug/kg	.75	.73	U	ug/kg	.73	.75	U	ug/kg	.75	.74	U	ug/kg	.74
gamma-BHC (lindane)	.75	U	ug/kg	.75	.73	U	ug/kg	.73	.75	U	ug/kg	.75	.74	U	ug/kg	.74
Heptachlor	.75	U	ug/kg	.75	.73	U	ug/kg	.73	.75	U	ug/kg	.75	.74	U	ug/kg	.74
Aldrin	.75	U	ug/kg	.75	.73	U	ug/kg	.73	.75	U	ug/kg	.75	.74	U	ug/kg	.74
Heptachlor epoxide	.75	U	ug/kg	.75	.73	U	ug/kg	.73	.75	U	ug/kg	.75	.74	U	ug/kg	.74
Endosulfan I	.75	U	ug/kg	.75	.73	U	ug/kg	.73	.75	U	ug/kg	.75	.74	U	ug/kg	.74
Dieldrin	.75	U	ug/kg	.75	.73	U	ug/kg	.73	.75	U	ug/kg	.75	.74	U	ug/kg	.74
4,4-DBE	14	J	ug/kg	.75	.73	U	ug/kg	.73	.75	U	ug/kg	.75	.74	U	ug/kg	.74
Endosulfan II	1.5	U	ug/kg	1.5	1.4	U	ug/kg	1.4	1.5	U	ug/kg	1.5	1.4	U	ug/kg	1.4
4,4-DDD	1.5	U	ug/kg	1.5	1.4	U	ug/kg	1.4	1.5	U	ug/kg	1.5	1.4	U	ug/kg	1.4
Endosulfan sulfate	1.5	U	ug/kg	1.5	1.4	U	ug/kg	1.4	1.5	U	ug/kg	1.5	1.4	U	ug/kg	1.4
4,4-DDT	7	J	ug/kg	1.5	1.4	U	ug/kg	1.4	1.5	U	ug/kg	1.5	1.4	U	ug/kg	1.4
Methoxychlor	3	U	ug/kg	3	2.9	U	ug/kg	2.9	3	U	ug/kg	3	3	U	ug/kg	3
Endrin aldehyde	1.5	U	ug/kg	1.5	1.4	U	ug/kg	1.4	1.5	U	ug/kg	1.5	1.4	U	ug/kg	1.4
Endrin ketone	1.5	U	ug/kg	1.5	1.4	U	ug/kg	1.4	1.5	U	ug/kg	1.5	1.4	U	ug/kg	1.4
Chlordane	7.5	U	ug/kg	7.5	7.3	U	ug/kg	7.3	7.5	U	ug/kg	7.5	7.4	U	ug/kg	7.4
Chlorobenzilate	22	U	ug/kg	22												
Diallate	45	U	ug/kg	45	44	U	ug/kg	44	45	U	ug/kg	45	44	U	ug/kg	44
Toxaphene	37	U	ug/kg	37	36	U	ug/kg	36	37	U	ug/kg	37	36	U	ug/kg	36
Isodrin	.75	U	ug/kg	.75	.73	U	ug/kg	.73	.75	U	ug/kg	.75	.74	U	ug/kg	.74
Kepon	45	U	ug/kg	45	44	U	ug/kg	44	45	U	ug/kg	45	44	U	ug/kg	44
Aroclor-1016	37	U	ug/kg	37	36	U	ug/kg	36	37	U	ug/kg	37	36	U	ug/kg	36
Aroclor-1221	75	U	ug/kg	75	73	U	ug/kg	73	75	U	ug/kg	75	74	U	ug/kg	74
Aroclor-1232	75	U	ug/kg	75	73	U	ug/kg	73	75	U	ug/kg	75	74	U	ug/kg	74
Aroclor-1242	37	U	ug/kg	37	36	U	ug/kg	36	37	U	ug/kg	37	36	U	ug/kg	36
Aroclor-1248	37	U	ug/kg	37	36	U	ug/kg	36	37	U	ug/kg	37	36	U	ug/kg	36
Aroclor-1254	18	U	ug/kg	18	17	U	ug/kg	17	18	U	ug/kg	18	18	U	ug/kg	18
Aroclor-1260	18	U	ug/kg	18	17	U	ug/kg	17	18	U	ug/kg	18	18	U	ug/kg	18

U = NOT DETECTED R = RESULT IS REJECTED  
J = ESTIMATED VALUE UJ = REPORTED QUANTIFICATION LIMIT IS ESTIMATED  
ADDITIONAL LISTINGS OF RESULTS FOR 1,2-; 1,3-; AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (8270) ANALYTICAL RUN.



US Naval Station, Mayport  
Old Pesticide Area (SMU 15) Surface Soil Data

Lab Sample Number:  
Site  
Locator  
Collect Date:

RB147023 RB147004 RB147004DL RB147009  
WELP WELP WELP WELP  
15S03501 15S03701 15S03701DL 15S03801  
05-MAR-96 05-MAR-96 05-MAR-96 05-MAR-96  
QUAL UNITS QUAL UNITS QUAL UNITS QUAL UNITS  
VALUE VALUE VALUE VALUE DL DL DL DL

PESTICIDES/PCBs	ug/kg	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL	VALUE	QUAL UNITS	DL
alpha-BHC	.7 U		.72	ug/kg		.72	ug/kg		.69	U	
beta-BHC	1.4 U	1.4	1.4	ug/kg		1.4	ug/kg		1.3	U	
delta-BHC	.7 U	.7	.72	ug/kg		.72	ug/kg		.69	U	
gamma-BHC (Lindane)	.7 U	.7	.72	ug/kg		.72	ug/kg		.69	U	
Heptachlor	.7 U	.7	.72	ug/kg		.72	ug/kg		.69	U	
Aldrin	.7 U	.7	.72	ug/kg		.72	ug/kg		.69	U	
Heptachlor epoxide	.7 U	.7	.72	ug/kg		.72	ug/kg		.69	U	
Endosulfan I	.7 U	.7	.72	ug/kg		.72	ug/kg		.69	U	
Dieldrin	.7 U	.7	.72	ug/kg		.72	ug/kg		.69	U	
4,4'-DDE	8.9	.7	.72	ug/kg		.72	ug/kg		.69	U	
Endrin	1.4 U	1.4	.72	ug/kg		.72	ug/kg		.69	U	
Endosulfan II	1.4 U	1.4	1.4	ug/kg		1.4	ug/kg		.83	U	
4,4'-DDP	1.4 U	1.4	1.4	ug/kg		1.4	ug/kg		1.3	U	
Endosulfan sulfate	1.4 U	1.4	1.4	ug/kg		1.4	ug/kg		1.3	U	
4,4'-DDT	1.4 U	1.4	1.4	ug/kg		1.4	ug/kg		1.3	U	
Methoxychlor	1.4 U	1.4	1.4	ug/kg		1.4	ug/kg		1.3	U	
Endrin aldehyde	1.4 U	1.4	1.4	ug/kg		1.4	ug/kg		1.3	U	
Endrin ketone	2.8 U	2.8	1.4	ug/kg		1.4	ug/kg		1.3	U	
Chlordane	1.4 U	1.4	1.4	ug/kg		1.4	ug/kg		1.3	U	
Chlorobenzilate	1.4 U	1.4	1.4	ug/kg		1.4	ug/kg		1.3	U	
Diallate	21 U	21	7.2	ug/kg		7.2	ug/kg		6.9	U	
Toxaphene	42 U	42	43	ug/kg		43	ug/kg		41	U	
Isoodrin	34 U	34	35	ug/kg		35	ug/kg		34	U	
Kepon	.7 U	.7	.72	ug/kg		.72	ug/kg		.69	U	
Aroclor-1016	42 U	42	430	ug/kg		430	ug/kg		41	U	
Aroclor-1221	34 U	34	35	ug/kg		35	ug/kg		34	U	
Aroclor-1232	70 U	70	72	ug/kg		72	ug/kg		69	U	
Aroclor-1242	70 U	70	72	ug/kg		72	ug/kg		69	U	
Aroclor-1248	34 U	34	35	ug/kg		35	ug/kg		34	U	
Aroclor-1254	34 U	34	35	ug/kg		35	ug/kg		34	U	
Aroclor-1260	17 U	17	17	ug/kg		17	ug/kg		17	U	
	580	17	17	ug/kg		17	ug/kg		17	U	

U = NOT DETECTED R = RESULT IS REJECTED  
J = ESTIMATED VALUE UJ = REPORTED QUANTITATION LIMIT IS ESTIMATED  
THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2; 1,3; AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (B270) ANALYTICAL RUN.

US Naval Station, Mayport  
Old Pesticide Area (SMU 15) Surface Soil Date

Lab Sample Number: RB147010  
Site: HELP  
Locator: 15S03801D  
Collect Date: 05-MAR-96

VALUE QUAL UNITS DL

PESTICIDES/PCBs	ug/kg	VALUE	QUAL	UNITS	DL
alpha-BHC	ug/kg	7 U			
beta-BHC	ug/kg	1.3 U			
delta-BHC	ug/kg	7 U			
gamma-BHC (Lindane)	ug/kg	7 U			
Heptachlor	ug/kg	7 U			
Aldrin	ug/kg	7 U			
Heptachlor epoxide	ug/kg	7 U			
Endosulfan I	ug/kg	7 U			
Dieldrin	ug/kg	7 U			
4,4-DDE	ug/kg	7 U			
Endrin	ug/kg	1.3 U			
Endosulfan II	ug/kg	1.3 U			
4,4-DDD	ug/kg	1.3 U			
Endosulfan sulfate	ug/kg	1.3 U			
4,4-DDT	ug/kg	1.3 U			
Methoxychlor	ug/kg	2.8 U			
Endrin aldehyde	ug/kg	1.3 U			
Endrin ketone	ug/kg	1.3 U			
Chlordane	ug/kg	7 U			
Chlorobenzilate	ug/kg	21 U			
Dieldrin	ug/kg	42 U			
Toxaphene	ug/kg	34 U			
Isodrin	ug/kg	7 U			
Kepon	ug/kg	42 U			
Aroclor-1016	ug/kg	34 U			
Aroclor-1221	ug/kg	70 U			
Aroclor-1232	ug/kg	70 U			
Aroclor-1242	ug/kg	34 U			
Aroclor-1248	ug/kg	34 U			
Aroclor-1254	ug/kg	17 U			
Aroclor-1260	ug/kg	17 U			

U = NOT DETECTED R = RESULT IS REJECTED  
J = ESTIMATED VALUE UJ = REPORTED QUANTIFICATION LIMIT IS ESTIMATED  
THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2-; 1,3-; AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (8270) ANALYTICAL RUN.

US Naval Station, Mayport  
Old Pesticide Area (SMU 15) Sub-Surface Soil Data

Lab Sample Number:  
Site  
Locator  
Collect Date:

23953002  
GROUP1&I1  
15SS12  
02-FEB-93

23953004  
GROUP1&I1  
15SS22  
02-FEB-93

23953006  
GROUP1&I1  
15SS32  
02-FEB-93

23953008  
GROUP1&I1  
15SS42  
02-FEB-93

PESTICIDES/PCBS	VALUE	DL	QUAL	UNITS	DL	VALUE	DL	QUAL	UNITS	DL	VALUE	DL	QUAL	UNITS	DL
alpha-BHC	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U
beta-BHC	1.4	U	ug/kg	1.4	U	1.4	U	ug/kg	1.4	U	1.4	U	ug/kg	1.4	U
delta-BHC	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U
gamma-BHC (lindane)	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U
heptachlor	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U
Aldrin	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U
heptachlor epoxide	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U
Endosulfan I	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U
Dieldrin	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U
4,4-DDE	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U	.69	U	ug/kg	.69	U
Endrin	1.4	U	ug/kg	1.4	U	1.4	U	ug/kg	1.4	U	1.4	U	ug/kg	1.4	U
Endosulfan II	1.4	U	ug/kg	1.4	U	1.4	U	ug/kg	1.4	U	1.4	U	ug/kg	1.4	U
4,4-DDD	1.4	U	ug/kg	1.4	U	1.4	U	ug/kg	1.4	U	1.4	U	ug/kg	1.4	U
Endosulfan sulfate	1.4	U	ug/kg	1.4	U	1.4	U	ug/kg	1.4	U	1.4	U	ug/kg	1.4	U
4,4-DDT	1.4	U	ug/kg	1.4	U	1.4	U	ug/kg	1.4	U	1.4	U	ug/kg	1.4	U
Methoxychlor	2.7	U	ug/kg	2.7	U	2.7	U	ug/kg	2.7	U	2.7	U	ug/kg	2.7	U
Endrin aldehyde	1.4	U	ug/kg	1.4	U	1.4	U	ug/kg	1.4	U	1.4	U	ug/kg	1.4	U
Endrin ketone	1.4	U	ug/kg	1.4	U	1.4	U	ug/kg	1.4	U	1.4	U	ug/kg	1.4	U
Chlordane	6.9	U	ug/kg	6.9	U	6.9	U	ug/kg	6.9	U	6.9	U	ug/kg	6.9	U
Chlorobenzilate	21	U	ug/kg	21	U	21	U	ug/kg	21	U	21	U	ug/kg	21	U
Diallate	41	U	ug/kg	41	U	41	U	ug/kg	41	U	41	U	ug/kg	41	U
Toxaphene	34	U	ug/kg	34	U	34	U	ug/kg	34	U	34	U	ug/kg	34	U
Isodrin	.82	U	ug/kg	.82	U	.82	U	ug/kg	.82	U	.82	U	ug/kg	.82	U
Kepon	41	U	ug/kg	41	U	41	U	ug/kg	41	U	41	U	ug/kg	41	U
Aroclor-1016	34	U	ug/kg	34	U	34	U	ug/kg	34	U	34	U	ug/kg	34	U
Aroclor-1221	69	U	ug/kg	69	U	69	U	ug/kg	69	U	69	U	ug/kg	69	U
Aroclor-1232	69	U	ug/kg	69	U	69	U	ug/kg	69	U	69	U	ug/kg	69	U
Aroclor-1242	34	U	ug/kg	34	U	34	U	ug/kg	34	U	34	U	ug/kg	34	U
Aroclor-1248	34	U	ug/kg	34	U	34	U	ug/kg	34	U	34	U	ug/kg	34	U
Aroclor-1254	17	U	ug/kg	17	U	17	U	ug/kg	17	U	17	U	ug/kg	17	U
Aroclor-1260	17	U	ug/kg	17	U	17	U	ug/kg	17	U	17	U	ug/kg	17	U

U = NOT DETECTED R = RESULT IS REJECTED  
J = ESTIMATED VALUE UJ = REPORTED QUANTITATION LIMIT IS ESTIMATED  
THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2-; 1,3-; AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (8270) ANALYTICAL RUN.

US Naval Station, Myrtleport  
Old Pesticide Area (SMU 15) Sub-Surface Soil Data

Lab Sample Number:  
Site  
Locator  
Collect Date:

RB147024  
NHELP  
15800402  
05-MAR-96

23953010  
GROUP1811  
15SS52  
02-FEB-93

RB147008  
NHELP  
15800502  
05-MAR-96

RB147008D1  
NHELP  
15800502D1  
05-MAR-96

PESTICIDES/PCBs	RB147024	23953010	RB147008	RB147008D1
	VALUE	VALUE	VALUE	VALUE
	QUAL UNITS	QUAL UNITS	QUAL UNITS	QUAL UNITS
	DL	DL	DL	DL
alpha-BHC	.72 U	1.4 U	1.4 U	3.5 U
beta-BHC	1.4 U	2.7 U	1.4 U	6.8 U
delta-BHC	.72 U	1.4 U	1.4 U	3.5 U
gamma-BHC (Lindene)	.72 U	1.4 U	1.4 U	3.5 U
heptachlor	.72 U	1.4 U	1.4 U	3.5 U
Aldrin	.72 U	1.4 U	1.4 U	3.5 U
heptachlor epoxide	.72 U	1.4 U	1.4 U	3.5 U
Endosulfan I	.72 U	1.4 U	1.4 U	3.5 U
Dieldrin	.72 U	1.4 U	1.4 U	3.5 U
4,4'-DDE	1.2 U	1.4 U	1.4 U	4.7 U
Endrin	1.4 U	1.9 U	1.4 U	6.8 U
Endosulfan II	1.4 U	2.7 U	1.4 U	6.8 U
4,4'-DDD	1.4 U	2.7 U	1.4 U	6.8 U
Endosulfan sulfate	1.4 U	2.7 U	1.4 U	6.8 U
4,4'-DDT	1.4 U	2.7 U	1.4 U	6.8 U
Methoxychlor	2.9 U	5.5 U	2.8 U	14 U
Endrin aldehyde	1.4 U	2.7 U	1.4 U	6.8 U
Endrin ketone	1.4 U	2.7 U	1.4 U	6.8 U
Chlordane	7.2 U	180 U	1.4 U	420 U
Chlorobenzilate	22 U	41 U	21 U	100 U
Diallate	43 U	82 U	42 U	210 U
Toxaphene	36 U	69 U	34 U	170 U
Isodrin	.72 U	1.6 U	.7 U	3.5 U
kepone	43 U	82 U	210 U	170 U
Aroclor-1016	36 U	69 U	34 U	170 U
Aroclor-1221	72 U	140 U	70 U	350 U
Aroclor-1232	72 U	140 U	70 U	350 U
Aroclor-1242	36 U	69 U	34 U	170 U
Aroclor-1248	36 U	69 U	34 U	170 U
Aroclor-1254	17 U	34 U	17 U	84 U
Aroclor-1260	17 U	34 U	17 U	84 U

U = NOT DETECTED R = RESULT IS REJECTED  
J = ESTIMATED VALUE UJ = REPORTED QUANTITATION LIMIT IS ESTIMATED  
THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2-; 1,3-; AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (8270) ANALYTICAL RUN.

US Naval Station, Mayport  
Old Pesticide Area (SWMU 15) Sub-Surface Soil Data

Lab Sample Number:  
Site  
Locator  
Collect Date:

23953012  
GROUP1&I1  
15SS62  
02-FEB-93

23953014  
GROUP1&I1  
15SS72  
02-FEB-93

RB147006  
NELP  
15B00702  
05-MAR-96

23953017  
GROUP1&I1  
15SS82  
02-FEB-93

| PESTICIDES/PCBs     | VALUE | QUAL | UNITS | DL  |
|---------------------|-------|------|-------|-----|-------|------|-------|-----|-------|------|-------|-----|-------|------|-------|-----|
| alpha-BHC           | .69   | U    | ug/kg | .69 |
| beta-BHC            | 1.4   | U    | ug/kg | 1.4 |
| delta-BHC           | .69   | U    | ug/kg | .69 |
| gamma-BHC (Lindane) | .69   | U    | ug/kg | .69 |
| Heptachlor          | .69   | U    | ug/kg | .69 |
| Aldrin              | .69   | U    | ug/kg | .69 |
| Heptachlor epoxide  | .69   | U    | ug/kg | .69 |
| Endosulfan I        | .69   | U    | ug/kg | .69 |
| Dieldrin            | .69   | U    | ug/kg | .69 |
| 4,4-DDD             | .69   | U    | ug/kg | .69 |
| 4,4-DDD             | 1.4   | U    | ug/kg | 1.4 |
| Endosulfan II       | 1.4   | U    | ug/kg | 1.4 |
| 4,4-DDD             | 1.4   | U    | ug/kg | 1.4 |
| Endosulfan sulfate  | 1.4   | U    | ug/kg | 1.4 |
| 4,4-DDT             | 1.4   | U    | ug/kg | 1.4 |
| Methoxychlor        | 2.7   | U    | ug/kg | 2.7 |
| Endrin aldehyde     | 1.4   | U    | ug/kg | 1.4 |
| Endrin ketone       | 1.4   | U    | ug/kg | 1.4 |
| Chlordane           | 6.9   | U    | ug/kg | 6.9 |
| Chlorobenzilate     | 21    | U    | ug/kg | 21  |
| Diallate            | 41    | U    | ug/kg | 41  |
| Toxaphene           | 34    | U    | ug/kg | 34  |
| Isodrin             | .82   | U    | ug/kg | .82 |
| Kepone              | 41    | U    | ug/kg | 41  |
| Aroclor-1016        | 34    | U    | ug/kg | 34  |
| Aroclor-1221        | 69    | U    | ug/kg | 69  |
| Aroclor-1232        | 69    | U    | ug/kg | 69  |
| Aroclor-1242        | 34    | U    | ug/kg | 34  |
| Aroclor-1248        | 34    | U    | ug/kg | 34  |
| Aroclor-1254        | 17    | U    | ug/kg | 17  |
| Aroclor-1260        | 17    | U    | ug/kg | 17  |

U = NOT DETECTED R = RESULT IS REJECTED  
J = ESTIMATED VALUE UJ = REPORTED QUANTITATION LIMIT IS ESTIMATED  
THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2-; 1,3-; AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (8270) ANALYTICAL RUN.

US Naval Station, Mayport  
Old Pesticide Area (SMMU 15) Sub-Surface Soil Data

Lab Sample Number: Site Locator Collect Date:	23953018 GROUP1&11 15SS82D 02-FEB-93	RB147014 HELP 15801602 05-MAR-96	RB147014DL HELP 15801602DL 05-MAR-96	RA781009 HELP 15S02302 18-DEC-95	VALUE	DL	VALUE	DL	VALUE	DL	VALUE	DL
	QUAL UNITS	QUAL UNITS	QUAL UNITS	QUAL UNITS								
PESTICIDES/PCBs	ug/kg	ug/kg	ug/kg	ug/kg								
alpha-BHC	.69 U	.69	1.5	7.1 U	.86 U	7.1						
beta-BHC	1.4 U	1.4	110 R	1.4	1.7 U	1.4						
delta-BHC	.69 U	.69	1.3 J	.71	.86 U	.71						
gamma-BHC (Lindene)	.69 U	.69	1.3 J	.71	.86 U	.71						
Heptachlor	.69 U	.69	.71 U	.71	.86 U	.71						
Aldrin	.69 U	.69	3.8 J	.71	.86 U	.71						
Heptachlor epoxide	.69 U	.69	.71 U	.71	.86 U	.71						
Endosulfan I	.69 U	.69	.71 U	.71	.86 U	.71						
Dieldrin	.69 U	.69	160 R	.71	.86 U	.71						
4,4-DDD	.69 U	.69	1.4 U	.71	.86 U	.71						
Endrin	1.4 U	1.4	1.4 U	1.4	1.7 U	1.4						
Endosulfan II	1.4 U	1.4	1.4 U	1.4	1.7 U	1.4						
4,4-DDD	1.4 U	1.4	1.4 U	1.4	1.7 U	1.4						
Endosulfan sulfate	1.4 U	1.4	1.4 U	1.4	1.7 U	1.4						
4,4-DDT	1.4 U	1.4	1.4 U	1.4	1.7 U	1.4						
4,4-DDT	1.4 U	1.4	1.4 U	1.4	1.7 U	1.4						
Methoxychlor	1.4 U	1.4	99 R	1.4	1.7 U	1.4						
Endrin aldehyde	2.8 U	2.8	2.9 U	2.9	3.5 U	2.9						
Endrin ketone	1.4 U	1.4	1.4 U	1.4	1.7 U	1.4						
Chlorodane	1.4 U	1.4	1.4 U	1.4	1.7 U	1.4						
Chlorobenzilate	6.9 U	6.9	1.4 U	1.4	1.7 U	1.4						
Diallate	21 U	21	21 U	21	26 U	21						
Toxaphene	42 U	42	42 U	42	51 U	42						
Isodrin	35 U	35	35 U	35	42 U	35						
Kepon	.83 U	.83	.71 U	.71	.86 U	.71						
Aroclor-1016	42 U	42	420 U	420	51 U	42						
Aroclor-1221	35 U	35	35 U	35	42 U	35						
Aroclor-1232	69 U	69	71 U	71	86 U	71						
Aroclor-1248	69 U	69	71 U	71	86 U	71						
Aroclor-1254	35 U	35	35 U	35	42 U	35						
Aroclor-1260	17 U	17	17 U	17	21 U	17						

U = NOT DETECTED R = RESULT IS REJECTED  
J = ESTIMATED VALUE UJ = REPORTED QUANTITATION LIMIT IS ESTIMATED  
THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2-; 1,3-; AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (8270) ANALYTICAL RUN.

US Naval Station, Hightport  
Old Pesticide Area (SWMU 15) Sub-Surface Soil Data

Lab Sample Number: RB147018  
Site Locator: 15B02302  
Collect Date: 05-MAR-96

RB147019  
NHELP  
15B02302D  
05-MAR-96

23763004  
GROUP1&11  
MP15MS1S6  
15-JAN-93

23763005  
GROUP1&11  
MP15MS1S6  
15-JAN-93

PESTICIDES/PCBs	ug/kg	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL	VALUE	QUAL	UNITS	DL
alpha-BHC	.76 U	.76	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72
beta-BHC	1.5 U	1.5	1.4 U	U	ug/kg	1.4	1.4 U	U	ug/kg	1.4	1.4 U	U	ug/kg	1.4
delta-BHC	.76 U	.76	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72
gamma-BHC (lindane)	.76 U	.76	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72
Heptachlor	.76 U	.76	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72
Aldrin	.76 U	.76	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72
Heptachlor epoxide	.76 U	.76	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72
Endosulfan I	.76 U	.76	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72
Dieldrin	.76 U	.76	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72
4,4-DDE	.76 U	.76	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72
Endrin	.76 U	.76	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72
Endosulfan II	1.5 U	1.5	1.4 U	U	ug/kg	1.4	1.4 U	U	ug/kg	1.4	1.4 U	U	ug/kg	1.4
4,4-DDD	1.5 U	1.5	1.4 U	U	ug/kg	1.4	1.4 U	U	ug/kg	1.4	1.4 U	U	ug/kg	1.4
Endosulfan sulfate	1.5 U	1.5	1.4 U	U	ug/kg	1.4	1.4 U	U	ug/kg	1.4	1.4 U	U	ug/kg	1.4
4,4-DDT	1.5 U	1.5	1.4 U	U	ug/kg	1.4	1.4 U	U	ug/kg	1.4	1.4 U	U	ug/kg	1.4
Methoxychlor	3.1 U	3.1	2.9 U	U	ug/kg	2.9	2.9 U	U	ug/kg	2.9	2.9 U	U	ug/kg	2.9
Endrin aldehyde	1.5 U	1.5	1.4 U	U	ug/kg	1.4	1.4 U	U	ug/kg	1.4	1.4 U	U	ug/kg	1.4
Endrin ketone	1.5 U	1.5	1.4 U	U	ug/kg	1.4	1.4 U	U	ug/kg	1.4	1.4 U	U	ug/kg	1.4
Chlordane	7.6 U	7.6	7.2 U	U	ug/kg	7.2	7.2 U	U	ug/kg	7.2	7.2 U	U	ug/kg	7.2
Chlorobenzilate	23 U	23	21 U	U	ug/kg	21	21 U	U	ug/kg	21	21 U	U	ug/kg	21
Diallate	45 U	45	43 U	U	ug/kg	43	43 U	U	ug/kg	43	43 U	U	ug/kg	43
Toxaphene	38 U	38	35 U	U	ug/kg	35	35 U	U	ug/kg	35	35 U	U	ug/kg	35
Isodrin	.76 U	.76	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72	.72 U	U	ug/kg	.72
kepone	45 U	45	43 U	U	ug/kg	43	43 U	U	ug/kg	43	43 U	U	ug/kg	43
Aroclor-1016	38 U	38	35 U	U	ug/kg	35	35 U	U	ug/kg	35	35 U	U	ug/kg	35
Aroclor-1221	76 U	76	72 U	U	ug/kg	72	72 U	U	ug/kg	72	72 U	U	ug/kg	72
Aroclor-1232	76 U	76	72 U	U	ug/kg	72	72 U	U	ug/kg	72	72 U	U	ug/kg	72
Aroclor-1242	38 U	38	35 U	U	ug/kg	35	35 U	U	ug/kg	35	35 U	U	ug/kg	35
Aroclor-1248	38 U	38	35 U	U	ug/kg	35	35 U	U	ug/kg	35	35 U	U	ug/kg	35
Aroclor-1254	18 U	18	17 U	U	ug/kg	17	17 U	U	ug/kg	17	17 U	U	ug/kg	17
Aroclor-1260	18 U	18	17 U	U	ug/kg	17	17 U	U	ug/kg	17	17 U	U	ug/kg	17

U = NOT DETECTED R = RESULT IS REJECTED  
J = ESTIMATED VALUE UJ = REPORTED QUANTITATION LIMIT IS ESTIMATED  
THE ADDITIONAL LISTINGS OF RESULTS FOR 1,2-; 1,3-; AND 1,4-DICHLOROBENZENE WERE GENERATED FROM THE SVOC (B270) ANALYTICAL RUN.

**APPENDIX D**  
**DATA VALIDATION REPORTS**

# ***Environmental Data Services, Inc.***

*Specializing in Laboratory Data Validation*

## **Summary of Organic Data Validation Pesticides/PCBs, Including Kepone**

Client: ABB Environmental Services, Inc.  
Project Name: U.S. Naval Station Mayport, Mayport, Florida  
Project Number: CTO 028  
Contract Laboratory: Quality Analytical Laboratory  
SDG Number: SWMU 15-001 (M7867, M7902)  
Purchase Order Number: SE4-21-017  
NEESA Level: C  
Data Reviewer: Nancy Weaver  
Secondary Reviewer: Linda Harding  
Date Review Completed: February 9, 1995

Contractor Sample Number	Laboratory Sample Number	Sample Matrix
15R028	M7867001	Water
15SS01001	M7867004	Surface Soil
15SS01501	M7867005	Surface Soil
15SS01101	M7867006	Surface Soil
15SS01201	M7867007	Surface Soil
15SS01701	M7867008	Surface Soil
15SS01301	M7867009	Surface Soil
15SS01601	M7867010	Surface Soil
15SS01401	M7867011	Surface Soil
15SS02001	M7867012	Surface Soil
15SS01801	M7867013	Surface Soil
15SS02301	M7867014	Surface Soil
15SS01901	M7867015	Surface Soil
15SS01901D	M7867016	Surface Soil
15SS02201	M7867017	Surface Soil
15SS02601	M7867018	Surface Soil
15SS02501	M7867019	Surface Soil
15SS02101	M7867020	Surface Soil
15SS00901	M7902001	Surface Soil
15SS00901D	M7902002	Surface Soil
15SS0901MS	M7902001MS	Surface Soil

15SS0901MSD	M7902001MSD	Surface Soil
15SS01901	M7902003	Surface Soil
15SS01901D	M7902004	Surface Soil
15R030	M7902005	Surface Soil

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## I. Validation Procedure Summary

Data review and validation were performed in accordance with Naval Energy and Environmental Support Activity (NEESA) 20.2-047B (June 1988) using the USEPA National Functional Guidelines for Organic Data Review, (12/90, Revised 6/91) and criteria specified in the USEPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition (1986).

## II. Data Deliverables

1. All required deliverables including QA/QC summary forms and all necessary raw data were present in legible form in the data package.

Yes:  X  No:      

## III. Technical Holding Times

Technical holding times for all samples were verified from raw data and chain of custody forms.

1. Technical holding times were within the allowable limits shown below:

a. Water samples extracted < 7 days from date of sample collection; analyzed < 40 days from date of extraction.

Yes:  X  No:       N/A:      

b. Soil samples extracted < 14 days from date of sample collection; analyzed < 40 days from date of extraction.

Yes:  X  No:       N/A:      

Comment: Holding time criteria have been met and no action has been taken.

## IV. Calibration

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. Were initial calibration data reviewed and found to meet all method requirements?

Yes:  X  No:

The following calculations were verified for this data package:

<p>M7867 - Pest/PCB V6000B RTX-200 Mean RT Check 4,4'-DDE 9/6/94 Mean RT = (19.09 + 19.08 + 19.08 + 19.08 + 19.07)/5 = 19.08</p>	<p>M7867 - Pest/PCB - V6000B Area Ratio Check - RTX-200 4,4'-DDE 9/13/94 Component Area/Standard area = Area Ratio at 1.0 ppm cal std: 118393/533803 = 0.22179</p>	<p>M7867 - Pest/PCB - V6000B RTX-200 CCAL %D Check 4,4'-DDT (ICAL mass-CCAL mass/ICAL mass) * 100 = % Difference (60.90-63.28/60.90) * 100 = 3.9%</p>
<p>M7867 - Kepone - V6000B Mean RT Check - RTX200 9/18/94 Mean RT = (20.94 + 20.94 + 20.93 + 20.93 + 20.95)/5 = 20.93</p>	<p>M7867 - Kepone - V6000B ICAL Area Ratio Check 9/21/94 RTX-200 Component Area/Standard area = Area Ratio std @1.0 ppm: 139489/450402=0.30970</p>	<p>M7867 - Kepone - V6000B - RTX200 CCAL %D Check 10/08/94 (ICAL mass-CCAL mass/ICAL mass) * 100 = % Difference (100.50-98.03/100.50) * 100 = 2.5%</p>

2. Were continuing calibration data reviewed and found to meet all method requirements?

Yes: \_\_\_\_\_ No:  X

Comment: All %D values were less than 15.0%, with the exception of 4,4'-DDE on 10/20/94 which had a 15.5% and 18.7% D. These standards bracketed samples 15R030, 15SS00901, 15SS00901D, 15SS01901, and 15SS01901D, therefore, all 4,4'-DDE results were qualified as estimated "J" for positive results and "UJ" for non-detects. On 10/20/94, 4,4'-DDD had a 20.0% and 22.9% D, methoxychlor had a 16.4% and 16.1% D, and endrin ketone had a 17.52% D for column SPB-5. The %D values were acceptable on the RTX-200 column and there were no positive results reported for these compounds, therefore, no qualifications were required.

3. Did the laboratory meet the pesticide linearity check criteria?

Yes: \_\_\_\_\_ No:  X

Comment: The coefficient of determination for each calibration curve was greater than 0.995 with the exception of kepone which had a coefficient of 0.9911 on 9/21/94, therefore, all kepone results in batches M7902 and M7867 were qualified as estimated "UJ" since they were all non-detects.

4. Were the breakdowns of both 4,4-DDT and endrin less than 20%?

Yes:  X  No: \_\_\_\_\_

Comment: Breakdown criteria have been met and no action has been taken.

The following calculations were verified for this data package:

<p>M7867 - Pest/PCB V6000B RTX-200 Mean RT Check 4,4'-DDE 9/6/94 Mean RT = (19.09 + 19.08 + 19.08 + 19.08 + 19.07)/5 = 19.08</p>	<p>M7867 - Pest/PCB - V6000B Area Ratio Check - RTX-200 4,4'-DDE 9/13/94 Component Area/Standard area = Area Ratio at 1.0 ppm cal std: 118393/533803 = 0.22179</p>	<p>M7867 - Pest/PCB - V6000B RTX-200 CCAL %D Check 4,4'-DDT (ICAL mass-CCAL mass/ICAL mass) * 100 = % Difference (60.90-63.28/60.90) * 100 = 3.9%</p>
<p>M7867 - Kepone - V6000B Mean RT Check - RTX200 9/18/94 Mean RT = (20.94 + 20.94 + 20.93 + 20.93 + 20.95)/5 = 20.93</p>	<p>M7867 - Kepone - V6000B ICAL Area Ratio Check 9/21/94 RTX-200 Component Area/Standard area = Area Ratio std @1.0 ppm: 139489/450402 = 0.30970</p>	<p>M7867 - Kepone - V6000B - RTX200 CCAL %D Check 10/08/94 (ICAL mass-CCAL mass/ICAL mass) * 100 = % Difference (100.50-98.03/100.50) * 100 = 2.5%</p>

2. Were continuing calibration data reviewed and found to meet all method requirements?

Yes:  No:

Comment: All %D values were less than 15.0%, with the exception of 4,4'-DDE on 10/20/94 which had a 15.5% and 18.7% D. These standards bracketed samples 15R060, 19SS00901, 19SS00901D, 19SS01901, and 19SS01901D, therefore, all 4,4'-DDE results were qualified as estimated "J" for positive results and "UJ" for non-detects. On 10/20/94, 4,4'-DDD had a 20.0% and 22.9% D, methoxychlor had a 16.4% and 16.1% D, and endrin ketone had a 17.52% D for column SPB-5. The %D values were acceptable on the RTX-200 column and there were no positive results reported for these compounds, therefore, no qualifications were required.

3. Did the laboratory meet the pesticide linearity check criteria?

Yes:  No:

Comment: The coefficient of determination for each calibration curve was greater than 0.995 with the exception of kepone which had a coefficient of 0.9911 on 9/21/94, therefore, all kepone results in batches M7902 and M7867 were qualified as estimated "UJ" since they were all non-detects.

4. Were the breakdowns of both 4,4-DDT and endrin less than 20%?

Yes:  No:

Comment: Breakdown criteria have been met and no action has been taken.

Sample ID's  
should be  
IS

5. Were the surrogate retention time shifts within specified limits?

Yes: X No: \_\_\_\_\_

Comment: Retention time criteria have been met and no action has been taken.

## V. Blanks

### A. Laboratory Blanks

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. A method blank analysis was performed for every 20 samples of a similar matrix type in each SDG.

Yes: X No: \_\_\_\_\_

2. Laboratory method blanks were found to be clean of target compound contamination at detectable concentrations.

Yes: X No: \_\_\_\_\_

3. If analytes were detected in the blanks, the associated samples were found to be free of those analytes at detectable concentrations.

Yes: \_\_\_\_\_ No: \_\_\_\_\_ NA: X

Comment: Blank criteria have been met and no action has been taken. Pesticide blanks PBLK01, PBLK02, PBLK20, PBLK26, PBLK30, and kepone blanks KBLK01, KBLK02, KBLK20, KBLK26, and KBLK30 were free of contamination.

### B. Field Blanks

1. Field blanks were found to be clean of target compound contamination at detectable concentrations.

Yes: X No: \_\_\_\_\_ N/A: \_\_\_\_\_

2. If analytes were detected in the blanks, the associated samples were found to be free of those analytes at detectable concentrations.

Yes: \_\_\_\_\_ No: \_\_\_\_\_ N/A: X

Comment: Rinsate blanks 15R028 and 15R030 were both free of contamination.

## VI. Surrogate Spike Compounds

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. The surrogate spike %R values were within the QC advisory limits for TCX and DCB.

Yes: X No: \_\_\_\_\_

Comment: Surrogate criteria have been met and no action has been taken. Due to dilutions, surrogates were not recovered for samples 15SS01201, 15SS01601, 15SS02301, and 15SS02101. No action was taken by the reviewer on this basis.

## VII. Matrix Spikes/Matrix Spike Duplicates (MS/MSD)

One hundred percent of the results on the summary forms were checked to ensure that reported results met required quality control criteria.

1. For every 20 samples in an SDG, one field sample of each type was spiked for MS/MSD analysis.

Yes: X No: \_\_\_\_\_

2. MS/MSD sample I.D.: 15SS00901

3. MS/MSD sample results met the criteria specified below.

Yes: X No: \_\_\_\_\_

### MS/MSD Criteria

	Water		Soil/Sediment	
	<u>%R</u>	<u>RPD</u>	<u>%R</u>	<u>RPD</u>
gamma-BHC (Lindane)	56-123	15	46-127	50
Heptachlor	40-131	20	35-130	31
Aldrin	40-120	22	34-132	43
Dieldrin	52-126	18	31-134	38
Endrin	56-121	21	42-139	45
4,4'-DDT	38-127	27	23-134	50

4. 0 of 12 %R results were out of QC limits.  
0 of 6 RPD results were out of QC limits.

Comment: MS/MSD criteria have been met and no action has been taken.  
MS/MSD analysis is not required for kepone analysis.

### VIII. Blank Spikes

One hundred percent of the results on the summary forms were checked to ensure that reported results met required quality control criteria.

1. For every 20 samples in an SDG, one blank sample of each type was spiked for BS analysis.

Yes:  X  No:      

2. Blank Spike sample I.D.: BS093041

3. Blank spike sample results were within acceptable QC limits.

Yes:  X  No:       NA:      

Comment: BS criteria have been met and no action has been taken.

### IX. Laboratory Control Samples (LCS)

Laboratory control charts were provided for each analysis.

1. For every batch, one LCS of each type was analyzed.

Yes:  X  No:       N/A:

2. LCS sample I.D.: BS091941, BS093041, BS092041, and BW092642
3. The percent recoveries for the LCS compounds were within acceptable limits.

Yes:  X       No:            N/A:     

Comment: The LCS' performed on 10/07/94, 10/20/94, and 10/21/94, were acceptable.

#### X. Field Duplicates

1. The following duplicate set was analyzed with this SDG:
  - a. 15SS01901 and 15SS01901D
  - b. 15SS00901 and 15SS00901D
2. Comment: The following summarizes field duplicate results:

Compound	15SS01901	15SS01901D	RPD
4,4'-DDE	2.1 ug/kg	1.7 ug/kg	21%
4,4'-DDT	1.5 ug/kg	1.7 ug/kg	13%

Compound	15SS00901	15SS00901D	RPD
4,4'-DDE	63 ug/kg	60 ug/kg	4.9%
4,4'-DDT	7.1 ug/kg	7.4 ug/kg	4.1%

#### XI. Target Compound Identification

All reported sample compounds were checked to ensure that identification criteria were met.

1. Sample analysis met the following criteria:
  - a. The retention times of single component pesticides were within the required retention time windows on both columns.

Yes:            No:            N/A:  X

## XII. Compound Quantitation and Reported CRQLS

1. The lower of the two concentrations calculated from each single component pesticide is reported on Form I.

Yes:  X  No:      N/A:     

2. CRQL values were adjusted to reflect all sample volumes, sample dilutions, concentrations, cleanup activities, and dry weight factors not accounted for by the method.

Yes:  X  No:      N/A:     

3. Was second column confirmation performed when compounds were detected above reporting limits?

Yes:  X  No:      N/A:     

Comment: The 25% criteria between columns was exceeded for several compounds. The following summarizes these exceedences:

Sample	Compound	% D	Qualifier
15SS01201	4,4'-DDT	36.7	"J"
15SS01301	4,4'-DDT	31.4	"J"
15SS01901	4,4'-DDE	41.8	"J"
15SS00901	4,4'-DDT	25.4	"J"
15SS00901D	4,4'-DDT	32.9	"J"
15SS01901	4,4'-DDT	67.2	"J"
15SS01901D	4,4'-DDT	32.0	"J"

## XIII. Overall Assessment of Data

The final validated results represent the compilation of all quality control qualification. With the exception of the quality control anomalies presented in Section IV and XII (Calibration and Compound Quantitation) and the resulting qualifiers, the analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags.

## Organic Data Qualifiers

- U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."
- NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

## Summary of Organic Data Validation Herbicides

Client: ABB Environmental Services, Inc.  
 Project Name: U.S. Naval Station Mayport, Mayport, Florida  
 Project Number: CTO 028  
 Contract Laboratory: Quality Analytical Laboratory  
 SDG Number: SWMU 15-001 (M7867, M7902)  
 Purchase Order Number: SE4-21-017  
 NEESA Level: C  
 Data Reviewer: Nancy Weaver  
 Secondary Reviewer: Linda Harding  
 Date Review Completed: February 9, 1995

Contractor Sample Number	Laboratory Sample Number	Sample Matrix
15R028	M7867001	Water
15SS01001	M7867004	Surface Soil
15SS01501	M7867005	Surface Soil
15SS01101	M7867006	Surface Soil
15SS01201	M7867007	Surface Soil
15SS01701	M7867008	Surface Soil
15SS01301	M7867009	Surface Soil
15SS01601	M7867010	Surface Soil
15SS01401	M7867011	Surface Soil
15SS02001	M7867012	Surface Soil
15SS01801	M7867013	Surface Soil
15SS02301	M7867014	Surface Soil
15SS01901	M7867015	Surface Soil
15SS01901D	M7867016	Surface Soil
15SS02201	M7867017	Surface Soil
15SS02601	M7867018	Surface Soil
15SS02501	M7867019	Surface Soil
15SS02101	M7867020	Surface Soil
15SS00901	M7902001	Surface Soil
15SS00901D	M7902002	Surface Soil
15SS0901MS	M7902001MS	Surface Soil
15SS0901MSD	M7902001MSD	Surface Soil

15SS01901	M7902003	Surface Soil
15SS01901D	M7902004	Surface Soil
15R030	M7902005	Surface Soil

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## I. Validation Procedure Summary

Data review and validation were performed in accordance with Naval Energy and Environmental Support Activity (NEESA) 20.2-047B (June 1988) using the USEPA National Functional Guidelines for Organic Data Review, (12/90, Revised 6/91) and criteria specified in the USEPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition (1986).

## II. Data Deliverables

1. All required deliverables including QA/QC summary forms and all necessary raw data were present in legible form in the data package.

Yes:  X  No:      

## III. Technical Holding Times

Technical holding times for all samples were verified from raw data and chain of custody forms.

1. Technical holding times were within the allowable limits shown below:

a. Water samples extracted <7 days from date of sample collection; analyzed <40 days from date of extraction.

Yes:  X  No:       N/A:      

b. Soil samples extracted <14 days from date of sample collection; analyzed <40 days from date of extraction.

Yes:  X  No:       N/A:      

Comment: Holding time criteria have been met and no action has been taken.

## IV. Calibration

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. Were initial calibration data reviewed and found to meet all method requirements?

Yes:  X  No:

The following calculations were verified for this data package:

M7867 - Herbicides Inst.V3400 RTX-5 Mean RT Check 2,4-D 10/10/94 Mean RT = (17.55 + 17.50 + 17.50 + 17.49 + 17.49)/5 = 17.51	M7867 - Herbicides - Inst.V3400 Area Ratio Check 2,4-D 10/13/94 Component Area/Standard area = Area Ratio at 1.0 ppm cal std: 80506/279803 = 0.28772	M7867 - Herbicides - Inst.V3400 RTX-5 CCAL %D Check Dinoseb 10/10/94 (ICAL mass-CCAL mass/ICAL mass) * 100 = % Difference (105.3-97.3/105.3) * 100 = 7.6%
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2. Were continuing calibration data reviewed and found to meet all method requirements?

Yes:  X  No:      

Comment: Calibration criteria have been met and no action has been taken. All %D values were less than 15.0%.

3. Did the laboratory meet the herbicide linearity check criteria?

Yes:       No:  X

Comment: The coefficient of determination for each calibration curve was greater than 0.995 with the exception of 2,4,5-T which had a coefficient of 0.9921 on 10/13/94, therefore, all samples results in batch M7867 were qualified as estimated "UJ" since they were all non-detects.

4. Were the surrogate retention time shifts within specified limits?

Yes:  X  No:      

Comment: Retention time criteria have been met and no action has been taken.

## V. Blanks

### A. Laboratory Blanks

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. A method blank analysis was performed for every 20 samples of a similar matrix type in each SDG.

Yes:  X  No:

2. Laboratory method blanks were found to be clean of target compound contamination at detectable concentrations.

Yes:  X  No:

3. If analytes were detected in the blanks, the associated samples were found to be free of those analytes at detectable concentrations.

Yes:   No:   NA:  X

Comment: Blank criteria have been met and no action has been taken. Herbicide blanks HBLK01, HBLK19, HBLK20, HBLK26, and HBLK03 were free of contamination.

#### B. Field Blanks

1. Field blanks were found to be clean of target compound contamination at detectable concentrations.

Yes:  X  No:   N/A:

2. If analytes were detected in the blanks, the associated samples were found to be free of those analytes at detectable concentrations.

Yes:   No:   N/A:  X

Comment: Rinsate blanks 15R028 and 15R030 were both free of contamination.

#### VI. Surrogate Spike Compounds

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. The surrogate spike %R values were within the QC advisory limits for 3,5-Dichlorobenzoic Acid.

Yes:  X  No:

Comment: Surrogate criteria have been met and no action has been taken.

**VII. Matrix Spikes/Matrix Spike Duplicates (MS/MSD)**

One hundred percent of the results on the summary forms were checked to ensure that reported results met required quality control criteria.

1. For every 20 samples in an SDG, one field sample of each type was spiked for MS/MSD analysis.

Yes:   X        No:       

2. MS/MSD sample I.D.: 15SS00901

3. MS/MSD sample results met acceptable QC criteria.

Yes:   X        No:       

Comment: MS/MSD criteria have been met and no action has been taken.

**VIII. Blank Spikes**

One hundred percent of the results on the summary forms were checked to ensure that reported results met required quality control criteria.

1. For every 20 samples in an SDG, one blank sample of each type was spiked for BS analysis.

Yes:   X        No:       

2. Blank Spike sample I.D.: BS100341

3. Blank spike sample results were within acceptable QC limits.

Yes:             No:             NA:   X  

**IX. Laboratory Control Samples (LCS)**

Laboratory control charts were provided for each analysis.

1. For every batch, one LCS of each type was analyzed.

Yes:   X        No:             N/A:       

2. LCS sample I.D.: W09194B1, W09264B1, S09204B1, S10034B1, and S09194B1

3. The percent recoveries for the LCS compounds were within acceptable limits.

Yes:  X  No:   N/A:

Comment: The LCS' performed on 10/10/94, 10/12/94, and 10/19/94, were acceptable.

#### X. Field Duplicates

1. The following duplicate set was analyzed with this SDG:

- a. 15SS01901 and 15SS01901D
- b. 15SS00901 and 15SS00901D

2. Comment: There were no positive results reported for either duplicate pair.

#### XI. Target Compound Identification

All reported sample compounds were checked to ensure that identification criteria were met.

1. Sample analysis met the following criteria:

- a. The retention times of herbicides were within the required retention time windows on both columns.

Yes:   No:   N/A:  X

Comment: There were no positive results reported for any of the samples.

#### XII. Compound Quantitation and Reported CRQLS

1. The lower of the two concentrations calculated from each herbicide is reported on Form I.

Yes:   No:   N/A:  X

2. CRQL values were adjusted to reflect all sample volumes, sample dilutions, concentrations, cleanup activities, and dry weight factors not accounted for by the method.

Yes:  X  No:   N/A:

Comment: The laboratory raised the reporting limits for 2,4-D for samples 15SS01101, 15SS01201, 15SS01701, 15SS01601, 15SS02001, 15SS02301, 15SS01901D, 15SS02201, 15SS02601, 15SS02501, and 15SS02101 due to interferences. The reviewer qualified these values as estimated "UJ" since they were all non-detects.

3. Was second column confirmation performed when compounds were detected above reporting limits?

Yes: \_\_\_\_\_ No: \_\_\_\_\_ N/A:  X

Comment: There were no positive results reported for any of the samples.

### XIII. Overall Assessment of Data

The final validated results represent the compilation of all quality control qualification. With the exception of the quality control anomalies presented in Section IV and XII (Calibration and Compound Quantitation) and the resulting qualifiers, the analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags.

## Summary of Organic Data Validation Organophosphorus Pesticides

Client:	ABB Environmental Services, Inc.
Project Name:	U.S. Naval Station Mayport, Mayport, Florida
Project Number:	CTO 028
Contract Laboratory:	Quality Analytical Laboratory
SDG Number:	SWMU 15-001 (M7867, M7902)
Purchase Order Number:	SE4-21-017
NEESA Level:	C
Data Reviewer:	Nancy Weaver
Secondary Reviewer:	Linda Harding
Date Review Completed:	February 9, 1995

Contractor Sample Number	Laboratory Sample Number	Sample Matrix
15R028	M7867001	Water
15SS01001	M7867004	Surface Soil
15SS01501	M7867005	Surface Soil
15SS01101	M7867006	Surface Soil
15SS01201	M7867007	Surface Soil
15SS01701	M7867008	Surface Soil
15SS01301	M7867009	Surface Soil
15SS01601	M7867010	Surface Soil
15SS01401	M7867011	Surface Soil
15SS02001	M7867012	Surface Soil
15SS01801	M7867013	Surface Soil
15SS02301	M7867014	Surface Soil
15SS01901	M7867015	Surface Soil
15SS01901D	M7867016	Surface Soil
15SS02201	M7867017	Surface Soil
15SS02601	M7867018	Surface Soil
15SS02501	M7867019	Surface Soil
15SS02101	M7867020	Surface Soil
15SS00901	M7902001	Surface Soil
15SS00901D	M7902002	Surface Soil
15SS0901MS	M7902001MS	Surface Soil
15SS0901MSD	M7902001MSD	Surface Soil

15SS01901	M7902003	Surface Soil
15SS01901D	M7902004	Surface Soil
15R030	M7902005	Surface Soil

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## I. Validation Procedure Summary

Data review and validation were performed in accordance with Naval Energy and Environmental Support Activity (NEESA) 20.2-047B (June 1988) using the USEPA National Functional Guidelines for Organic Data Review, (12/90, Revised 6/91) and criteria specified in the USEPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition (1986).

## II. Data Deliverables

1. All required deliverables including QA/QC summary forms and all necessary raw data were present in legible form in the data package.

Yes:  X  No:      

## III. Technical Holding Times

Technical holding times for all samples were verified from raw data and chain of custody forms.

1. Technical holding times were within the allowable limits shown below:

a. Water samples extracted <7 days from date of sample collection; analyzed <40 days from date of extraction.

Yes:  X  No:       N/A:      

b. Soil samples extracted <14 days from date of sample collection; analyzed <40 days from date of extraction.

Yes:  X  No:       N/A:      

Comment: Holding time criteria have been met and no action has been taken.

## IV. Calibration

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. Were initial calibration data reviewed and found to meet all method requirements?

Yes:  X  No:

The following calculations were verified for this data package:

M7867 - Organo Pests GC#6 RTX-35 Mean RT Check Phorate 10/6/94 Mean RT = $(13.35 + 13.35 + 13.35 + 13.35 + 13.35)/5 = 13.35$	M7867 - Organo Pests - GC#6 Area Ratio Check Sulfotepp 10/6/94 Component Area/Standard area = Area Ratio at 1.0 ppm cal std: $119936/243998 = 0.49155$	M7867 - Organo Pests - GC#6 RTX-35 CCAL %D Check Famphur 10/7/94 (ICAL mass-CCAL mass/ICAL mass) * 100 = % Difference $(1.96-2.06/1.96) * 100 = 5.5\%$
--	--	---

2. Were continuing calibration data reviewed and found to meet all method requirements?

Yes: \_\_\_\_\_ No:  X

Comment: All %D values were less than 15.0%, with the exception of famphur on 10/07/94 which was 52.2%. The reviewer qualified all samples analyzed before and after this failing standard as estimated "UJ" since they were all non-detects. This includes all samples in M7867 with the exception of 15SS02501 and 15SS02101. For batch M7902, phorate had a %D of 16.6% and 16.1% on 10/26/94. This affected sample 15R030 which was analyzed between these two standards, therefore, phorate was qualified as estimated "UJ" since this compound was undetected.

3. Did the laboratory meet the pesticide linearity check criteria?

Yes: \_\_\_\_\_ No:  X

Comment: The coefficient of determination for each calibration curve was greater than 0.995 with the exception of methyl parathion which had a coefficient of 0.9947 on 10/26/94, therefore, all methyl parathion results in batch M7902 were qualified as estimated "UJ" since they were all non-detects.

4. Were the surrogate retention time shifts within specified limits?

Yes:  X  No: \_\_\_\_\_

Comment: Retention time criteria have been met and no action has been taken.

## V. Blanks

### A. Laboratory Blanks

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. A method blank analysis was performed for every 20 samples of a similar matrix type in each SDG.  
Yes:  X  No:
  
2. Laboratory method blanks were found to be clean of target compound contamination at detectable concentrations.  
Yes:  X  No:
  
3. If analytes were detected in the blanks, the associated samples were found to be free of those analytes at detectable concentrations.  
Yes:       No:       NA:  X

Comment: Blank criteria have been met and no action has been taken. Pesticide blanks OBLK19, OBLK20, OBLK26, and OBLK30 were free of contamination.

#### B. Field Blanks

1. Field blanks were found to be clean of target compound contamination at detectable concentrations.  
Yes:  X  No:       N/A:
  
2. If analytes were detected in the blanks, the associated samples were found to be free of those analytes at detectable concentrations.  
Yes:       No:       N/A:  X

Comment: Rinsate blanks 15R028 and 15R030 were both free of contamination.

#### VI. Surrogate Spike Compounds

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. The surrogate spike %R values were within the QC advisory limits for aspon.  
Yes:  X  No:

Comment: Surrogate criteria have been met and no action has been taken.

## VII. Matrix Spikes/Matrix Spike Duplicates (MS/MSD)

One hundred percent of the results on the summary forms were checked to ensure that reported results met required quality control criteria.

1. For every 20 samples in an SDG, one field sample of each type was spiked for MS/MSD analysis.

Yes:  X  No:

2. MS/MSD sample I.D.: 15SS00901
3. MS/MSD sample results met acceptable QC criteria.

Yes:  X  No:

Comment: MS/MSD criteria have been met and no action has been taken.

## VIII. Blank Spikes

One hundred percent of the results on the summary forms were checked to ensure that reported results met required quality control criteria.

1. For every 20 samples in an SDG, one blank sample of each type was spiked for BS analysis.

Yes:   No:  X

2. Blank Spike sample I.D.: None.
3. Blank spike sample results were within acceptable QC limits.

Yes:   No:   NA:  X

## IX. Laboratory Control Samples (LCS)

Laboratory control charts were provided for each analysis.

1. For every batch, one LCS of each type was analyzed.

Yes:  X  No:   N/A:

2. LCS sample I.D.: W09194B1, W09264B1, S09204B1, and S09304B1

3. The percent recoveries for the LCS compounds were within acceptable limits.

Yes:  X  No:       N/A:      

Comment: The LCS' performed on 10/07/94, 10/25/94, and 10/26/94, were acceptable.

#### X. Field Duplicates

1. The following duplicate set was analyzed with this SDG:

- a. 15SS01901 and 15SS01901D
- b. 15SS00901 and 15SS00901D

2. Comment: There were no positive results reported for either duplicate pair.

#### XI. Target Compound Identification

All reported sample compounds were checked to ensure that identification criteria were met.

1. Sample analysis met the following criteria:

- a. The retention times of single component pesticides were within the required retention time windows on both columns.

Yes:       No:       N/A:  X

#### XII. Compound Quantitation and Reported CRQLS

1. The lower of the two concentrations calculated from each single component pesticide is reported on Form I.

Yes:       No:       N/A:  X

2. CRQL values were adjusted to reflect all sample volumes, sample dilutions, concentrations, cleanup activities, and dry weight factors not accounted for by the method.

Yes:       No:       N/A:  X

3. Was second column confirmation performed when compounds were detected above reporting limits?

Yes: \_\_\_\_\_ No: \_\_\_\_\_ N/A:  X

Comment: There were no positive results reported for any of the samples.

### **XIII. Overall Assessment of Data**

The final validated results represent the compilation of all quality control qualification. With the exception of the quality control anomalies presented in Section IV (Calibration) and the resulting qualifiers, the analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags.

## Organic Data Qualifiers

- U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."
- NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

# ***Environmental Data Services, Inc.***

*Specializing in Laboratory Data Validation*

## **Summary of Organic Data Validation Pesticides/PCBs, Including Kepone**

Client: ABB Environmental Services, Inc.  
Project Name: U.S. Naval Station Mayport, Mayport, Florida  
Project Number: CTO 028  
Contract Laboratory: Quality Analytical Laboratory  
SDG Number: SWMU 15-002 (R8742, R8785)  
Purchase Order Number: SE4-21-017  
NEESA Level: C  
Data Reviewer: Nancy Weaver  
Secondary Reviewer: Linda Harding  
Date Review Completed: February 9, 1995

Contractor Sample Number	Laboratory Sample Number	Sample Matrix
15SS02801	M8742003	Surface Soil
15SS02901	M8742004	Surface Soil
15SS02401	M8742005	Surface Soil
15SS03001	M8742006	Surface Soil
15SS02701	M8785001	Surface Soil
15SS02701MS	M8785001MS	Surface Soil
15SS02701MSD	M8785001MSD	Surface Soil
15SS02701D	M8785002	Surface Soil

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## I. Validation Procedure Summary

Data review and validation were performed in accordance with Naval Energy and Environmental Support Activity (NEESA) 20.2-047B (June 1988) using the USEPA National Functional Guidelines for Organic Data Review, (12/90, Revised 6/91) and criteria specified in the USEPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition (1986).

## II. Data Deliverables

1. All required deliverables including QA/QC summary forms and all necessary raw data were present in legible form in the data package.

Yes:   X                        No:       

## III. Technical Holding Times

Technical holding times for all samples were verified from raw data and chain of custody forms.

1. Technical holding times were within the allowable limits shown below:

a. Water samples extracted <7 days from date of sample collection; analyzed <40 days from date of extraction.

Yes:                             No:                             N/A:   X  

b. Soil samples extracted <14 days from date of sample collection; analyzed <40 days from date of extraction.

Yes:   X                        No:                             N/A:       

Comment: Holding time criteria have been met and no action has been taken.

## IV. Calibration

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. Were initial calibration data reviewed and found to meet all method requirements?

Yes:   X                        No:

The following calculations were verified for this data package:

<p>R8742 - Pest/PCB DB-5 Mean RT Check VAR3400 Dieldrin 10/7/94 Mean RT = (24.78 + 24.78 + 24.78 + 24.80 + 24.79)/5 = 24.79</p>	<p>R8742 - Pest/PCB - VAR3400 Area Ratio Check - DB-5 Heptachlor 10/7/94 Component Area/Standard area = Area Ratio at 0.05 ppm cal std: 341336/268935 = 1.2692</p>	<p>R8742 - Pest/PCB - VAR3400 DB-5 CCAL %D Check 10/12/94 Alpha-BHC (ICAL mass-CCAL mass/ICAL mass) * 100 = % Difference (46.16-48.57/46.16) * 100 = 5.2%</p>
<p>R8742 - Kepone - VAR3600 Mean RT Check -RTX200 10/4/94 Mean RT = (15.18 + 15.18 + 15.19 + 15.19 + 15.22)/5 = 15.19</p>	<p>R8742 - Kepone - VAR3600 ICAL Area Ratio Check 10/4/94 RTX-200 Component Area/Standard area = Area Ratio std @0.50 ppm: 184542/350704 = 0.52620</p>	<p>R8742 - Kepone - VAR3600 - RTX200 CCAL %D Check 10/11/94 (ICAL mass-CCAL mass/ICAL mass) * 100 = % Difference (470.30-500.20/470.30) * 100 = 6.4%</p>

2. Were continuing calibration data reviewed and found to meet all method requirements?

Yes: \_\_\_\_\_ No:  X

Comment: All %D values were less than 15.0%, with the exception of kepone on 10/11/94 for R8742 which had a 23.5% D. All kepone results in R8742 were qualified due to linearity problems, therefore, no further action was taken. DCB also had a 20.0%D on 10/11/94, however, since this is a surrogate compound, no action is taken.

3. Did the laboratory meet the pesticide linearity check criteria?

Yes: \_\_\_\_\_ No:  X

Comment: The coefficient of determination for each calibration curve was greater than 0.995 with the exception of kepone which had a coefficient of 0.9909 on 10/4/94, therefore, all kepone results in batch R8742 was qualified as estimated "UJ" since they were all non-detects. DCB had coefficients of 0.9908 and 0.9920 on 10/4/94 and 10/25/94, respectively. TCX had a 0.9923 coefficient on 10/25/94. Since DCB and TCX are surrogate compounds, no action is taken by the reviewer.

4. Were the breakdowns of both 4,4-DDT and endrin less than 20%?

Yes:  X  No: \_\_\_\_\_

Comment: Breakdown criteria have been met and no action has been taken.

5. Were the surrogate retention time shifts within specified limits?

Yes:  X  No:

Comment: Retention time criteria have been met and no action has been taken.

## V. Blanks

### A. Laboratory Blanks

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. A method blank analysis was performed for every 20 samples of a similar matrix type in each SDG.

Yes:  X  No:

2. Laboratory method blanks were found to be clean of target compound contamination at detectable concentrations.

Yes:  X  No:

3. If analytes were detected in the blanks, the associated samples were found to be free of those analytes at detectable concentrations.

Yes:   No:   NA:  X

Comment: Blank criteria have been met and no action has been taken. Pesticide and kepone blanks 9SB10923 and 9SB11004 were free of contamination.

### B. Field Blanks

1. Field blanks were found to be clean of target compound contamination at detectable concentrations.

Yes:   No:   N/A:  X

2. If analytes were detected in the blanks, the associated samples were found to be free of those analytes at detectable concentrations.

Yes:   No:   N/A:  X

Comment: There were no field blanks analyzed with this SDG.

## VI. Surrogate Spike Compounds

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. The surrogate spike %R values were within the QC advisory limits for TCX and DCB.

Yes:   X              No:       

Comment: Surrogate criteria have been met and no action has been taken.

## VII. Matrix Spikes/Matrix Spike Duplicates (MS/MSD)

One hundred percent of the results on the summary forms were checked to ensure that reported results met required quality control criteria.

1. For every 20 samples in an SDG, one field sample of each type was spiked for MS/MSD analysis.

Yes:   X              No:       

2. MS/MSD sample I.D.: 15SS02701

3. MS/MSD sample results met the criteria specified below.

Yes:   X              No:       

### MS/MSD Criteria

	Water		Soil/Sediment	
	<u>%R</u>	<u>RPD</u>	<u>%R</u>	<u>RPD</u>
gamma-BHC (Lindane)	56-123	15	46-127	50
Heptachlor	40-131	20	35-130	31
Aldrin	40-120	22	34-132	43
Dieldrin	52-126	18	31-134	38
Endrin	56-121	21	42-139	45
4,4'-DDT	38-127	27	23-134	50

4. 0 of 12 %R results were out of QC limits.  
0 of 6 RPD results were out of QC limits.

Comment: MS/MSD criteria have been met and no action has been taken.  
MS/MSD analysis is not required for kepone analysis.

### VIII. Blank Spikes

One hundred percent of the results on the summary forms were checked to ensure that reported results met required quality control criteria.

1. For every 20 samples in an SDG, one blank sample of each type was spiked for BS analysis.

Yes: \_\_\_\_\_ No:  X

2. Blank Spike sample I.D.: None

3. Blank spike sample results were within acceptable QC limits.

Yes: \_\_\_\_\_ No: \_\_\_\_\_ NA:  X

### IX. Laboratory Control Samples (LCS)

Laboratory control charts were provided for each analysis.

1. For every batch, one LCS of each type was analyzed.

Yes:  X  No: \_\_\_\_\_ N/A: \_\_\_\_\_

2. LCS sample I.D.: 9SL10923, 9WL10927, and 9WL20927

3. The percent recoveries for the LCS compounds were within acceptable limits.

Yes:  X  No: \_\_\_\_\_ N/A: \_\_\_\_\_

Comment: The LCS' performed on 10/12/94 and 10/25/94 were acceptable.

### X. Field Duplicates

1. The following duplicate set was analyzed with this SDG:

a. 15SS02701 and 15SS02701D

2. Comment: The following summarizes field duplicate results:

Compound	15SS02701	15SS02701D	RPD
4,4'-DDE	1.2 ug/kg	0.67 ug/kg	57%

## XI. Target Compound Identification

All reported sample compounds were checked to ensure that identification criteria were met.

1. Sample analysis met the following criteria:
  - a. The retention times of single component pesticides were within the required retention time windows on both columns.

Yes: \_\_\_\_\_ No: \_\_\_\_\_ N/A:  X

## XII. Compound Quantitation and Reported CRQLS

1. The lower of the two concentrations calculated from each single component pesticide is reported on Form I.

Yes: \_\_\_\_\_ No:  X  N/A: \_\_\_\_\_

Comment: The higher value was reported for 4,4'-DDT in samples 15SS02901 and 15SS02401, therefore, the reviewer amended the Form Is to reflect the lower value.

2. CRQL values were adjusted to reflect all sample volumes, sample dilutions, concentrations, cleanup activities, and dry weight factors not accounted for by the method.

Yes:  X  No: \_\_\_\_\_ N/A: \_\_\_\_\_

3. Was second column confirmation performed when compounds were detected above reporting limits?

Yes:  X  No: \_\_\_\_\_ N/A: \_\_\_\_\_

Comment: The 25% criteria between columns was exceeded for 4,4'-DDE (31%) in sample 15SS02701D, therefore, this compound was qualified as estimated "J."

## XIII. Overall Assessment of Data

The final validated results represent the compilation of all quality control qualification. With the exception of the quality control anomalies presented in Section IV and XII (Calibration and Compound Quantitation) and the resulting qualifiers, the analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags.

## Organic Data Qualifiers

- U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."
- NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

## Summary of Organic Data Validation Herbicides

Client: ABB Environmental Services, Inc.  
Project Name: U.S. Naval Station Mayport, Mayport, Florida  
Project Number: CTO 028  
Contract Laboratory: Quality Analytical Laboratory  
SDG Number: SWMU 15-002 (R8742, R8785)  
Purchase Order Number: SE4-21-017  
NEESA Level: C  
Data Reviewer: Nancy Weaver  
Secondary Reviewer: Linda Harding  
Date Review Completed: February 9, 1995

Contractor Sample Number	Laboratory Sample Number	Sample Matrix
15SS02801	M8742003	Surface Soil
15SS02901	M8742004	Surface Soil
15SS02401	M8742005	Surface Soil
15SS03001	M8742006	Surface Soil
15SS02701	M8785001	Surface Soil
15SS02701MS	M8785001MS	Surface Soil
15SS02701MSD	M8785001MSD	Surface Soil
15SS02701D	M8785002	Surface Soil

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## I. Validation Procedure Summary

Data review and validation were performed in accordance with Naval Energy and Environmental Support Activity (NEESA) 20.2-047B (June 1988) using the USEPA National Functional Guidelines for Organic Data Review, (12/90, Revised 6/91) and criteria specified in the USEPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition (1986).

## II. Data Deliverables

1. All required deliverables including QA/QC summary forms and all necessary raw data were present in legible form in the data package.

Yes:  X  No:      

## III. Technical Holding Times

Technical holding times for all samples were verified from raw data and chain of custody forms.

1. Technical holding times were within the allowable limits shown below:

a. Water samples extracted < 7 days from date of sample collection; analyzed < 40 days from date of extraction.

Yes:       No:       N/A:  X

b. Soil samples extracted < 14 days from date of sample collection; analyzed < 40 days from date of extraction.

Yes:  X  No:       N/A:      

Comment: Holding time criteria have been met and no action has been taken.

## IV. Calibration

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. Were initial calibration data reviewed and found to meet all method requirements?

Yes:  X  No:

The following calculations were verified for this data package:

R8742 - Herbicides Inst. VAR3400 DB-1701 Mean RT Check Silvex 10/14/94 Mean RT = $(24.97 + 24.97 + 24.98 + 24.97)/5 = 24.97$	R8742 - Herbicides - Inst. VAR3400 DB-1701 Area Ratio Check 2,4,5-T 10/17/94 Component Area/Standard area = Area Ratio at 5.0 ppb cal std: $85432/405980 = 0.21043$	R8742 - Herbicides - Inst. VAR3400 DB-1701 CCAL %D Check Dinoseb 10/15/94 (ICAL mass-CCAL mass/ICAL mass) * 100 = % Difference $(2.34-2.18/2.34) * 100 = 6.6\%$
---	--	--

2. Were continuing calibration data reviewed and found to meet all method requirements?

Yes:  No:

Comment: All %D values were less than 15.0%, with the exception of 2,4,5-TP (silvex) on 10/18/94 which had a 16.0%D, therefore, all samples analyzed following this failing standard (all samples in R8785) were qualified as estimated "UJ" since they were all non-detects.

3. Did the laboratory meet the herbicide linearity check criteria?

Yes:  No:

Comment: Linearity check criteria have been met and no action has been taken. The coefficient of determination for each calibration curve was greater than 0.995.

4. Were the surrogate retention time shifts within specified limits?

Yes:  No:

Comment: Retention time criteria have been met and no action has been taken.

## V. Blanks

### A. Laboratory Blanks

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. A method blank analysis was performed for every 20 samples of a similar matrix type in each SDG.

Yes:  No:

2. Laboratory method blanks were found to be clean of target compound contamination at detectable concentrations.

Yes:  X  No:

3. If analytes were detected in the blanks, the associated samples were found to be free of those analytes at detectable concentrations.

Yes:   No:   NA:  X

Comment: Blank criteria have been met and no action has been taken. Herbicide blanks HSB10922 and HSB11005 were free of contamination.

### B. Field Blanks

1. Field blanks were found to be clean of target compound contamination at detectable concentrations.

Yes:   No:   N/A:  X

2. If analytes were detected in the blanks, the associated samples were found to be free of those analytes at detectable concentrations.

Yes:   No:   N/A:  X

Comment: There were no field blanks analyzed with this SDG.

### VI. Surrogate Spike Compounds

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. The surrogate spike %R values were within the QC advisory limits for 3,5-Dichlorobenzoic Acid and 2,4-Dichlorophenylacetic Acid.

Yes:  X  No:

Comment: Surrogate criteria have been met and no action has been taken.

### VII. Matrix Spikes/Matrix Spike Duplicates (MS/MSD)

One hundred percent of the results on the summary forms were checked to ensure that reported results met required quality control criteria.

1. For every 20 samples in an SDG, one field sample of each type was spiked for MS/MSD analysis.

Yes:  X  No:

2. MS/MSD sample I.D.: 15SS02701

3. MS/MSD sample results met acceptable QC criteria.

Yes:  X  No:

Comment: MS/MSD criteria have been met and no action has been taken.

### VIII. Blank Spikes

One hundred percent of the results on the summary forms were checked to ensure that reported results met required quality control criteria.

1. For every 20 samples in an SDG, one blank sample of each type was spiked for BS analysis.

Yes:   No:  X

2. Blank Spike sample I.D.: None

3. Blank spike sample results were within acceptable QC limits.

Yes:   No:   NA:  X

### IX. Laboratory Control Samples (LCS)

Laboratory control charts were provided for each analysis.

1. For every batch, one LCS of each type was analyzed.

Yes:  X  No:   N/A:

2. LCS sample I.D.: HSB10922 and HSB11005

3. The percent recoveries for the LCS compounds were within acceptable limits.

Yes:  X  No:   N/A:

Comment: The LCS' performed on 10/14/94 and 10/18/94 were acceptable.

**X. Field Duplicates**

1. The following duplicate set was analyzed with this SDG:
  - a. 15SS02701 and 15SS02701D
2. Comment: There were no positive results reported for either sample.

**XI. Target Compound Identification**

All reported sample compounds were checked to ensure that identification criteria were met.

1. Sample analysis met the following criteria:
  - a. The retention times of herbicides were within the required retention time windows on both columns.

Yes: \_\_\_\_\_ No: \_\_\_\_\_ N/A:  X

Comment: There were no positive results reported for any of the samples.

**XII. Compound Quantitation and Reported CRQLS**

1. The lower of the two concentrations calculated from each herbicide is reported on Form I.  
Yes: \_\_\_\_\_ No: \_\_\_\_\_ N/A:  X
2. CRQL values were adjusted to reflect all sample volumes, sample dilutions, concentrations, cleanup activities, and dry weight factors not accounted for by the method.  
Yes: \_\_\_\_\_ No: \_\_\_\_\_ N/A:  X
3. Was second column confirmation performed when compounds were detected above reporting limits?

Yes: \_\_\_\_\_ No: \_\_\_\_\_ N/A:  X

Comment: There were no positive results reported for any of the samples.

### **XIII. Overall Assessment of Data**

The final validated results represent the compilation of all quality control qualification. With the exception of the quality control anomalies presented in Section IV (Calibration) and the resulting qualifiers, the analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags.

## Organic Data Qualifiers

- U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."
- NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

## Summary of Organic Data Validation Organophosphorus Pesticides

Client: ABB Environmental Services, Inc.  
Project Name: U.S. Naval Station Mayport, Mayport, Florida  
Project Number: CTO 028  
Contract Laboratory: Quality Analytical Laboratory  
SDG Number: SWMU 15-002 (R8742, R8785)  
Purchase Order Number: SE4-21-017  
NEESA Level: C  
Data Reviewer: Nancy Weaver  
Secondary Reviewer: Linda Harding  
Date Review Completed: February 9, 1995

Contractor Sample Number	Laboratory Sample Number	Sample Matrix
15SS02801	M8742003	Surface Soil
15SS02901	M8742004	Surface Soil
15SS02401	M8742005	Surface Soil
15SS03001	M8742006	Surface Soil
15SS02701	M8785001	Surface Soil
15SS02701MS	M8785001MS	Surface Soil
15SS02701MSD	M8785001MSD	Surface Soil
15SS02701D	M8785002	Surface Soil

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## II. Data Deliverables

1. All required deliverables including QA/QC summary forms and all necessary raw data were present in legible form in the data package.

Yes:   X              No:       

## III. Technical Holding Times

Technical holding times for all samples were verified from raw data and chain of custody forms.

1. Technical holding times were within the allowable limits shown below:

- a. Water samples extracted <7 days from date of sample collection; analyzed <40 days from date of extraction.

Yes:                   No:                   N/A:   X  

- b. Soil samples extracted <14 days from date of sample collection; analyzed <40 days from date of extraction.

Yes:   X              No:                   N/A:       

Comment: Holding time criteria have been met and no action has been taken.

## IV. Calibration

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. Were initial calibration data reviewed and found to meet all method requirements?

Yes:   X              No:

The following calculations were verified for this data package:

R8742 - Organo Pests GC#6 RTX-35 Mean RT Check Phorate 10/6/94 Mean RT = $(13.35 + 13.35 + 13.35 + 13.35 + 13.35)/5 = 13.35$	R8742 - Organo Pests - GC#6 Area Ratio Check Thionazin 10/6/94 Component Area/Standard area = Area Ratio at 1.0 ppm cal std: $143250/243998 = 0.58709$	R8742 - Organo Pests - GC#6 RTX-35 CCAL %D Check Dimethoate 10/7/94 (ICAL mass-CCAL mass/ICAL mass) * 100 = % Difference $(4.04-3.93/4.04) * 100 = 2.7\%$
--	--	--

2. Were continuing calibration data reviewed and found to meet all method requirements?

Yes: \_\_\_\_\_ No:  X

Comment: All %D values were less than 15.0%, with the exception of sulfotepp on 10/07/94 which was 15.7%. The reviewer qualified all samples analyzed before and after this failing standard as estimated "UJ" since they were all non-detects. This includes all samples in R8742.

3. Did the laboratory meet the pesticide linearity check criteria?

Yes:  X  No: \_\_\_\_\_

Comment: Linearity check criteria have been met and no action has been taken. The coefficient of determination for each calibration curve was greater than 0.995.

4. Were the surrogate retention time shifts within specified limits?

Yes:  X  No: \_\_\_\_\_

Comment: Retention time criteria have been met and no action has been taken.

## V. Blanks

### A. Laboratory Blanks

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. A method blank analysis was performed for every 20 samples of a similar matrix type in each SDG.

Yes:  X  No: \_\_\_\_\_

2. Laboratory method blanks were found to be clean of target compound contamination at detectable concentrations.

Yes:  X  No:

3. If analytes were detected in the blanks, the associated samples were found to be free of those analytes at detectable concentrations.

Yes:   No:   NA:  X

Comment: Blank criteria have been met and no action has been taken. Pesticide blanks OBLK27 and OBLK29 were free of contamination.

### B. Field Blanks

1. Field blanks were found to be clean of target compound contamination at detectable concentrations.

Yes:   No:   N/A:  X

2. If analytes were detected in the blanks, the associated samples were found to be free of those analytes at detectable concentrations.

Yes:   No:   N/A:  X

Comment: There were no field blanks analyzed with this SDG.

### VI. Surrogate Spike Compounds

One hundred percent of the results on summary forms were checked to ensure that reported results met required quality control criteria.

1. The surrogate spike %R values were within the QC advisory limits for aspon.

Yes:  X  No:

Comment: Surrogate criteria have been met and no action has been taken.

### VII. Matrix Spikes/Matrix Spike Duplicates (MS/MSD)

One hundred percent of the results on the summary forms were checked to ensure that reported results met required quality control criteria.

1. For every 20 samples in an SDG, one field sample of each type was spiked for MS/MSD analysis.

Yes:  X  No:

2. MS/MSD sample I.D.: 15SS02701

3. MS/MSD sample results met acceptable QC criteria.

Yes:  X  No:

Comment: MS/MSD criteria have been met and no action has been taken.

### VIII. Blank Spikes

One hundred percent of the results on the summary forms were checked to ensure that reported results met required quality control criteria.

1. For every 20 samples in an SDG, one blank sample of each type was spiked for BS analysis.

Yes:   No:  X

2. Blank Spike sample I.D.: None.

3. Blank spike sample results were within acceptable QC limits.

Yes:   No:   NA:  X

### IX. Laboratory Control Samples (LCS)

Laboratory control charts were provided for each analysis.

1. For every batch, one LCS of each type was analyzed.

Yes:  X  No:   N/A:

2. LCS sample I.D.: S09274B1 and S09294B1

3. The percent recoveries for the LCS compounds were within acceptable limits.

Yes:  X  No:   N/A:

Comment: The LCS' performed on 10/06/94 and 10/07/94 were acceptable.

**X. Field Duplicates**

1. The following duplicate set was analyzed with this SDG:
  - a. 15SS02701 and 15SS02701D
2. Comment: There were no positive results reported for either duplicate pair.

**XI. Target Compound Identification**

All reported sample compounds were checked to ensure that identification criteria were met.

1. Sample analysis met the following criteria:
  - a. The retention times of single component pesticides were within the required retention time windows on both columns.

Yes: \_\_\_\_\_ No: \_\_\_\_\_ N/A:   X

**XII. Compound Quantitation and Reported CRQLS**

1. The lower of the two concentrations calculated from each single component pesticide is reported on Form I.

Yes: \_\_\_\_\_ No: \_\_\_\_\_ N/A:   X
2. CRQL values were adjusted to reflect all sample volumes, sample dilutions, concentrations, cleanup activities, and dry weight factors not accounted for by the method.

Yes: \_\_\_\_\_ No: \_\_\_\_\_ N/A:   X
3. Was second column confirmation performed when compounds were detected above reporting limits?

Yes: \_\_\_\_\_ No: \_\_\_\_\_ N/A:   X

Comment: There were no positive results reported for any of the samples.

### **XIII. Overall Assessment of Data**

The final validated results represent the compilation of all quality control qualification. With the exception of the quality control anomalies presented in Section IV (Calibration) and the resulting qualifiers, the analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags.

## Organic Data Qualifiers

- U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
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- R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

**APPENDIX E**  
**FIELD LOGBOOK**



12/18/95

Interim Measures at SNMU15

Obody JDF

Objective:

Collect soil samples at SNMU15

Personnel:

Srin Kuchibotla, ABB-ES

Mike Jaynes, ABB-ES

0830 Arrival on-site. Mike Jaynes preparing

sample bottles and equipment for field work.

0925 Preparing sampling bottles. Labeling and

taping of sample bottles in progress.

1015 Arrival on-site. No subcontractor or

client personnel on-site. Mike and

Srin working on locating samples on

the ground. Mike mentioned that the

map may be improperly scaled. Mike

and Srin try to eyeball the sample

locations at the site.

1115 Locating sample locations still in progress.

1145 Taking photographs of located samples.

1215 Secure equipment and depart site.

Sample locations identified at site and

stakes have been laid at identified locations

Few sample locations questionable and

we may revisit these locations after

lunch.

1315 Arrival on-site after lunch. Fifth Co Personnel

Photographs using Digital Camera

③

6 Location of ABB-SS Samples at SWMM15

7 "

8 "

② 12/19

on-site. Two personnel from ECT and three personnel from BioTerra on-site. Harry Doo of SOUTHDN arrives on-site. He mentioned that he would be on point of contact for the services to be performed on-site. Fines and source samples collected.

14:30 Repeating sample locations because of improper locations earlier. The ECT personnel are using Building 48-A as the baseline for the work to be performed at the site.

As shown on our map the building 48-A is ~~not~~ <sup>not in line with</sup> ~~lined up~~ with the asphalt parking area. The asphalt parking lot is 10 feet ahead of the building. Therefore sample locations MPT-15-SS32, MPT-15-SS33 and MPT-15-SS33 have been redigged. They are drawn in 10 feet to suit the 10 feet ~~protection~~ <sup>protection</sup> of asphalt parking lot. The ECT personnel mentioned that their area of work is 120X180 feet using Building 48-A

eastern edge as the baseline.

15:00 Called Frank L. to verify sample locations because we felt the sample locations are outside the area of work of FifthCo and ECT. Frank L. will verify with Southdn and Reggi. and call us back at the site.

15:15 Frank L. calls back and mentions that the area of work for FifthCo and ECT has been moved 20 feet to the east ~~of~~ and twenty feet to the north of the Building 48-A eastern edge baseline.

② This puts our samples in the area of work. Some samples are on the border of the area of work. ECT personnel mentioned that they would be sampling for DDT, DDE and Dieldrene event for a few days. Samples will be sent to the laboratory. Samples will also be collected for biological verification, bug count et al. Frank L. informed about sampling of ECT. Frank mentioned that we may need more information and may need to verify sampling events with FifthCo before sampling.

④

Sampling results to be provided to Cheryl Mitchell. ABB-ES to obtain results from Cheryl Mitchell.

1600 Return to site. Revisit sample locations using tape to verify whether samples have been placed at correct locations.

1630 Sampling begins. Sample MFT-15-SS31 moved 10 feet east as requested by Frank L. to place it on the edge of the Fifthto Work Zone.

Sample ID.	Time	Source
15Y001	13:15	Source
15R001	13:25	Rinsate
15S03101	17:10	Soil
15S01601	17:15	"
15S03401	17:20	"
15S03501	17:20	"
15S03201	17:25	"
15S03201D	17:25	"
15S03201MS	17:25	"
15S03201MSD	17:25	"
15S03301	17:30	"
15S03301	17:40	"
15S02302	17:45	"

17:55 Arrive in trailer. Mike Jaynes preparing

⑤

Chain of Custody for sample shipping. Sam working on placing sample bottles in cooler.

1630 Sample shipping preparations almost complete.

1700 Depart site for FedEx. End of day

FRANCOIS KUCHIKOZA  
12/19/95

⑥

12/19/95 Interim measures at SUMMUS Raining 70°F

Objective: Observe interim measured at SUMMUS.

Personnel: Srin Kuchibhotla, ABB-ES  
Mike Jaynes, ABB-ES

0715 Called Harry Dep at BQG to inform him about conversation with Frank L.

yesterday. Asked him to verify information with Harold McGill of Sedlin

and inform FiffCo about moving of working area 20 feet to the east

and north. The east ~~west~~ 12/19 western baseline of work area is in line

with the eastern edge of Building 48-A.

0855 Arrive on site. Bacteria trailer from yesterday still on-site. No personnel on site.

0915 Mike and Srin to work on some of the trailer work that may need to be completed. Verification of doc and cleaning in progress.

1100 Arrival on-site. Ken Ottedal and Bill Edwards of Bac-Terra on-site. Bacteria is the product of FIFCO International that is applied at the sites. Ken mentioned that they would be mobilizing

⑦

Today and setting up equipment. One black tank (for water and fuel) brought onto site. Ken mentioned that the large tank placed yesterday will be taken back. Trailers of FIFCO arrived on-site.

1200 Depart site for lunch. Field work may not begin until tomorrow. FiffCo to install trailer and equipment today. Ken informed by Srin to call Harry McGill for minor changes.

Photographs Taken with Roll - Kodak  
27 Site before construction work (North-South)

26 Site before construction work (East-West)

Photographic Taken with Digital Camera  
9 Site prior to start of work (12/19)

10 " " " " " "

1600 Arrival on-site. No personnel on-site. Two more black tanks located at site.

1630 Depart site for SUMMUS and 7. Trailer and three tanks located on-site. End of day

~~Srinives  
12/19/95  
KULL B OUT A~~

(8)

12/20/95 SWMUV5 Cloudy 50°F  
 Objective: Observe Bioaugmentation at SWMUV5  
 Personnel: Srin Kuchibotta, ABB-ES  
 0800 Arrival on-site. No personnel observed onsite. Porta-let being placed at site, by personnel using fork lift.  
 0815 Depart site.  
 1015 Arrival on-site. Four personnel on-site. Personnel pumping fire hose on road into tanks beside trailer. Pat and Bill of PiffCo are inside trailer. They are making up their trailer. The personnel pumping water into the tanks are Colson employees. Pat mentioned that they would be laying out the grid for their piping today. Piping is expected to arrive on-site this afternoon. Mentioned to Pat to call Mike Davenport to verify if there are any changes. Frank and Peggy's name provided to Pat as a reference to contact and requested that Mike be mentioned about his conversation with Frank.  
 1030 Pat mentioned that he would verify with Mike prior to beginning work at site. Depart site.

(9)

1330 Arrival on-site. Four Bacteria personnel on-site. Bacteria personnel mixing the bacteria into the water in the tanks. Trailer still being set by personnel. Pat mentioned that they may be laying the grid for the piping tomorrow. Tanks are ready for use according to Bacteria.  
 1400 Depart site.  
 1515 Arrival on-site. Pat, Ken, and Bill and one more Bacteria person on-site. Ken mentioned that they had spoken with Mike Davenport and Mike had informed them about the work zone being moved 20 feet to the east and 20 feet to the north. They mentioned that they were hoping to complete their mobilization today and start work tomorrow. The trees located north (SE) east of Building 48-A are now in the work zone and Ken mentioned he would speak with Mike about removing the trees, so they could layout their piping. Ken also mentioned that they will now the grass at the site prior to laying out the piping. A concrete structure was

just outside the eastern edge of the work zone. The work zone still remains 120x180 feet.

1530 Change order work and other minor details being ironed out with the Navy according to Ken and Pat.

1600 Depart site. End of day.

SRINIVAS  
12/20/95  
FULTON

12/21/95 Sunny 50°F  
Objective: Bioaugmentation at SUMM15  
Personnel: Srin Kichibella, ASB - ES

0830 Arrival on-site. No personnel on-site. Three tanks and a Spawmaster trailer at the site.

0900 Depart site. Still no personnel at site.

0945 Arrival on-site. No personnel on-site. Everything arrived at personnel.

1015 Colijon personnel arrive on-site. Personnel taking piping to be used ~~at~~ 12/2 that was used for pumping water into the tanks back to their facility.

1100 Depart site.

1300 Arrival on-site. Backeria working on setting up the work zone on the site. Also a fencing contractor on-site to assist them in fencing off the work area. Bill and Pat of FULTON on site. Lawn mower and PVC piping have arrived on-site. Fence will be fixed ~~at~~ outside work zone and around the tanks and trailer.

1340 Ken and other FULTON personnel arrive on-site. Ken informed me that they were coming back from a meeting with Michael Baumgart

⑫

and that Mike had mentioned to them they the Navy would assist in removing the trees that are in the work zone. Personnel still working on identifying work zone at the site. The eastern edge of the work zone being laid 20 feet from the western edge of Building 48-A. Personnel (Bill and Pat) still working on moving grass in work area. The samples collected by us (MPF 55-23, MPF-55-5533 and MPF-15-55-35) are outside their work zone. Need to discuss with Frank L.

1630 Called F.L. Frank mentioned that he had verified the information and everything was okay. Samples south of 23 and east of 7 are for further defining the area of contamination, therefore, F.L. thinks it is okay. Bacteria personnel are wearing dust masks during operation of the lawn mower.

1700 Arrived on-site. Personnel have finished moving. Approximately 30 percent of the work zone. Personnel to revisit the site tomorrow and finish remaining moving and preparation of the site for laying the piping.

⑬

11 Photographs using Digital Camera  
blowing if grass at site  
12  
13 Tractor and tanks setup at site  
Photographs using Camera - Roll  
25 Moving of grass at site  
24 Trailer ~~at~~ (S) traps and tank setup at site  
1730 End of day. Depart site.

SPRINKLES EACH KEYS  
12/21/95

at site. She may need to mow more often because the nutrient being used may grow the grass faster. Many personnel cutting palm trees using a chain saw. The trees are being cut <sup>at</sup> ground level. Mike wanted to remove trees using a bulldozer. Pat mentioned that they were requested not to remove soil from one area to another on the site. Mike will verify this information and return to site. Navy personnel to remove trees using a bulldozer at the site. The cut trees will be piled in the bulldozer for disposal. Personnel still mowing grass and Navy personnel cutting trees at site. Arrival at trailer. Mike arrives to trailer and mentions that he wants to find out about disposal of the grass from the site. He also mentioned that it was improper to work on Saturday and he would check into that. A call received on the evening machine from Elaine Morrison requesting on feedback for cutting trees. Called back and left.

12/22/95 Sunny 40°F  
 Objective: Observe Bioaugmentation at SUMU15.  
 Personnel: Sr in Kuchibotta, ABB-ES  
 0900 Arrival on site. Four Bacteria personnel on site. Pat and Bill working on mowing grass at the site. John Billington mentions that they may be working on Saturday. They plan on laying out the infiltration gallery to about 40 percent of the site. Sampling may be performed on Tuesday.  
 0930 Depart site  
 1000 Arrival on site. Personnel still working on site. mowing. Fencing personnel arrive on site to layout the fence at Site. Bacteria personnel mowing free marks (cut marks) during mowing.  
 1100 Mowing almost complete. Mike Pavenport arrives on site. Mike is arranging removal of palm trees on site. Grass mowed to really low level.  
 1115 Many personnel arrive on site for cutting of palm trees. Mike mentioned he did not approve of cutting of grass and the palm trees at site. Cheryl may need to change the frequency of mowing.

16

Photographs using Digital Camera

14 Moved area at site.  
15 Many cutting palm trees using chain saw

16 " "

17 Site South - North after morning

(S) 12/22

Photographs using Camera - Kelll

18 Site Northeast - Followed after morning

17 Site East - West after morning

SR1211105

KUCHA80720

12/22/95

Photographs using Camera - Kelll

21 Moved area at site

22 Many personnel cutting plants using chain saw.

21 Site North - South after morning

20 Site Northeast - Southeast after clearing

19 site East West after clearing

18 " "

SR1211105

KUCHA80720

12/22/95

17

hen a message saying that it was too late and that the trees have been cut. Mike mentioned at the trailer that he had decided to cut the trees after the contractor told him that the trees needed to be cut from ground level so they could lay piping over the trees. I told Mike that was fine and about moving it around the site that was okay according to regulations and Terry Hauer (talked to Terry about it) mentioned that regulations said having soil around was okay on site. Off-site is not permitted. Also the horizontal wells one to two feet was not approved because contamination was at the surface.

Report taken for lunch

1300 Arrive at Trailer - Called Mike and Mike mentioned he was talking to Cheryl and said that the Contractor should not be working over the weekend. Also the grass was not cut and trees cut down were not a concern and Mike mentioned we would take care of it later.

1400 Arrived at site. Badena almost completed

(18)

The morning the cut trees and shrubs have been removed from the site and placed north of the work zone. Mike talked to Pat about not working on Saturday. Pat to convey message to John and Ken.

1500 Mike and leaving personnel depart site. Site has been fenced and Saterna personnel giving final touches to the mowing.

1600 Arrive on-site. Complete taking photos of the site. Moved grasses into bags. Katerina placed beside trailer in bags. Katerina personnel awaiting arrival of Ken and John.

1630 John had mentioned that two tanks had ~~been~~ in them and one tank had fertilizer in it. John and Ken have not arrived at site. End of day

SRINIVAS K  
12/22/95

1807/18

(19)

12/26/95 Sunny 67° F  
Objective: Basene braugmentation at SUMV15  
Personnel: Srin Kuchibotta, ABS-ES

1800 Arrival on site. John and two other FittCo personnel on-site. Personnel working on laying out piping at the site. John mentioned that he is planning on sampling this afternoon

1015 Southern Bell personnel arrive onsite.

1030 Depart site for cameras

1145 Arrival onsite. FittCo personnel still working on laying pipe at the site

1215 Depart site. Only two FittCo technicians and Southern Bell Tech at site.

1300 Arrival on-site. FittCo personnel working on laying out piping at site. They are laying out the solid pipe first

1400 Personnel still working on laying piping. Pat using plumbers glue for gluing the solid 2" PVC together. At each intersection in the centres and edges of the network

a riser is being provided for spraying the nutrients and bacteria. The riser is the same technique as spray irrigation.

20

- 20 Photographs using Digital Camera
- 21 Plumbers glue being used for piping
- 21 Decontamination of equipment
- 22 Sampling of surface soil at MPT-15-SS23
- 23 " "
- 24 Decontamination of bowl
- 25 Decontamination of hand auger
- 26 Placing soil sample in jar (MPT-15-SS200)
- 27 Return to work (2) 12/26 Equipment blank  
being collected

28 (Sun) 12/26/95

- Photographs using Camera - Roll 1
- 17 Piping being glued together at site
- 16 Decontamination of equipment
- 15 Sampling of surface soil at MPT-15-SS23
- 14 " "

- 13 Decontamination of bowl
- 12 Decontamination of hand auger
- 11 Collection of surface sample into jar -  
(MPT-15-SS2302)
- 10 Equipment blank being collected.
- 9 " "

SR WILSON KUMBARA  
12/26/95

21

- 1430 Duane Durgan of ECT arrives onsite  
Duane proposes to revisit the samples  
collected by AES-ES. The proposed  
sample locations by Fiftale to be  
collected after the grid for the  
spray irrigation is laid out. The samples  
to be collected today will be  
analyzed for 8080 only. Duane  
said he would be collecting one  
duplicate and one equipment blank.

1500 Duane working on setting up decon  
pad. John mentioned that they will  
collect samples every four days for the  
first 28 days, weekly after that up to  
60 days and then weekly thereafter. They  
hope to get done in 60 days. The  
samples collected will be the control  
samples only and will be analyzed  
for EPA Method 8080. John also  
mentioned that they would use  
the center riser to spray in a circle  
and the risers on the outside will  
spray inside.

- 1530 Sampling begins Duane decontaminating hand  
auger, bowl and spoon.



1750 @ 12/16

Frame collecting equipment blank.  
Reinforced water being used for  
collection of blank. Personnel getting  
ready to wrap up day. End of day

(24)

SRINIVAS KURTHOTA  
12/16/95  
12/16

(25)

12/21/95	SVMU 15	Sunny 60°F
Objective:	Erbene Bioremediation at SVMU 15.	
Personnel:	Srin Kurthota, ABS-ES	
0830	Arrival onsite. Waiting arrival of Fiffalo personnel	
0900	Depart site	
1000	Arrival on-site. No personnel at site. Depart for SVMU 6 & 7 to download well sentinals.	
1100	Arrival on-site. Fiffalo personnel still not at site.	
1130	Observe Fiffalo personnel arrive on-site.	
1150	Pass by site. Personnel working on setting up equipment for the day.	
1210	Depart site for lunch	
1300	Arrive on-site. Personnel working on setting up risers at the site. They intend on laying risers and later laying perforated piping at site.	
1400	Depart site. Personnel still working on finishing risers work. Personnel also laying horizon (2) leaky pipe at	

(26)

Site. Laying of ~~leaky pipe~~ <sup>SP 1/2" x 7/8" 12/27/95</sup> leaky pipe will complete application of site.  
1500 Annual onsite. Personnel working on laying leaky pipe at site. Leaky pipe will tie into one pipe whereas risers will be supplied the nutrients and bacteria through PVC piping.

1600 John arrives at site Pipe laying still in progress

1630 John mentioned that they would be laying the pipe north-south <sup>riser</sup> east-west. The pipe being laid is  $\odot$  1/2 inch garden hose type pipe with slot openings. This pipe is being laid approximately two feet apart <sup>apart</sup> the pipes would be tied into  $\odot$  1/2 inch PVC pipe.

The risers <sup>risers</sup> have been laid in a 5 rows by 2 column pattern. The PVC piping for the risers is 1/2 inch on the east <sup>SP 1/2" x 7/8" 12/27/95</sup> end, 3/4 inch on the west end, and 1/2 inch on the eastern edge of the work zone. The sprinklers on the outside will spray the water inward

and the sprinklers in the center will perform a circular motion. End of day  
SP 1/2" x 7/8" 12/27/95 EUCH1807A

(27)

Photographs using Digital Camera  
29 Leaky pipe laid at site  
30 Riser padder laid at site

SP 1/2" x 7/8" 12/27/95 EUCH1807A

Photographs using Camera - Fall  
8 Leaky pipe laid at site  
7 Riser network at site

SP 1/2" x 7/8" 12/27/95 EUCH1807A

12/28/95

SWMU 15

12/29 Cloudy 60°F

Objective: Observe Bioaugmentation at SWMU 15

Personnel: Srin Kuchibhotla, PBB-ES

1000 Arrival on-site. Personnel awaiting

arrival of John. Two Fifthco personnel on-site. Personnel working on the

2 foot internal piping network and

finishing the riser system. Pat mentioned that piping will be laid only in north-south direction.

1245 Arrival on-site. Personnel still

working on the piping. John mentioned that basis of piping in north-south direction is fine.

1330 Depart site.

1430 Arrival on-site. Riser network almost complete. Personnel giving final touches to the riser network.

1530 John arrives at site. John mentioned that they will not be sampling until Tuesday and that they would try to complete the network by Friday evening.

horizontal piping by Friday evening. Also if the network is complete, John anticipated running the system using water. This will help evaluate the integrity of the system.

1615 Photographs using Digital Camera

1620 Photograph of riser being put together

1622 Site at end of day 12/28

1623 Site at end of day 12/28

1630 Photographs using Camera - Roll 1

1635 Site at end of day 12/28

1640 Site at end of day 12/28

1630 John mentioned that the system could be up and running in January 1996. End of day

SRINIVAS KUCHIBHOTLA  
12/29/95

(30)

1/2/96 SMMU 15 Cloudy 60°F  
Objective: Observe Bieaugmentation at SMMU 15.

Personnel: Seán Kuchibotta, ABB-ES, John, Pat and Bill at site. Mobilization to begin work in progress. Depart site.  
10:45 Arrival on-site. John mentioned that Duane from ECT may be on site this afternoon to conduct the Control and Confirmatory Soil Sample. Depart site.

12:30 Arrival on-site. Pending rain on-site. Duane arrives on-site. Sampling postponed to next day. John said his personnel have to give the layout its finishing touches. The 1 inch black perforated piping still needs to be connected to the 3 inch supplying hose and all the piping needs to be connected to the pump. The system of the riser and 2 feet spacing liuh piping network is similar to an irrigation system. Duane had John Edwards on ECT Engineer along with him.

(31)

13:00 Cheryl arrives on-site and departs because it is raining. Depart site for hauler. John provided me their data obtained from ENCO for the samples collected at our sample locations. Synopsis of the results noted on a piece of paper. A hard copy of results will be provided to me later (next day).  
Sample ID MPT-15-SS35 had PCBs detected at 14.7 mg/kg in the Fifth Co. Collected Surficial Soil sample.

14:15 Called Frank L. and discussed results with him. Requested by Frank to provide him a copy of the piping network at the site. Told him that I would loan a copy with a hard copy of Fifth Co results.

15:30 Arrival on-site. Bacteria permeance have departed site.  
16:00 Arrival at Cheryl Mitchell's office. Cheryl discussed details at site. She may visit the site tomorrow. Discussed Pumping details with Cheryl. End of day.  
End of day

12:00 PM 1/2/96  
KUC 14/15/96

1/3/96 SWMU15 Cloudy 50°F

Objective: Observe bioaugmentation at SWMU15.  
Personnel: Srin Kuchibella, ABS-ES

0930 Arrival on-site. Duane Dungen and Pat working on performing the sampling at site. John supervising on activities at site. Bill working on finalizing the piping details at the site. John Edwards regenerating the maps at site. John Edwards & Duane over ECT

0945 Called Cheryl Mitchell. She will arrive at site this morning. Sample locations of Bacteria have been moved 20 feet to the north and 20 feet to the east. Sample nos. CSS-01F to CSS-012F. These are control samples @ 1/3 the confirmatory samples. John mentioned that they would be providing me a new copy of the workplan tomorrow. One copy for Tallahassee. John Edwards will sign and seal the engineering portion. Duane Dungen the geology portion and Mike Lester is the industrial hygienist. ECT doing the registration and sign and seal work.

Photographs using Digital Camera  
Decommissioning for control and confirmatory samples  
Pump and air filter setup.

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100

Decommissioning setup at site.  
Piping network at site.  
Decommissioning of auger.  
Collection of Health and Safety sample.  
Health and Safety sample collected.  
Decommissioning left off decom.  
Photographs using normal Canon-bolt.

4 Piping @ 1/3 Pump and air filter setup  
3 Decommissioning of auger  
2 Collection of Health and Safety samples

~~Srin Kuchibella~~  
1/3/96  
KUCHIBELLA

1030 Sampling of soil still in progress. John mentioned that they were planning on finishing the piping network today. System startup expected tomorrow. Our sample IDs are MT-15-SS3 and MT-15-SS4

will not be collected during the 4 day, 7 day sampling events. This is due to moving of the grid by 20 feet north and 20 feet east. Tanks are 6500 gallon tanks filled up to 500 gallons. Three tanks are on-site.

1045 Cheryl Mitchell arrived on-site. Cheryl looked at site and departed. Duane collecting soil samples at site.

1115 Depart site. Duane mentioned that he was collecting one duplicate one replicate and one health and safety sample. Health and Safety sample will be collected off the roofs. The health and safety sample is a water sample.

1140 Arrival on-site. Duane had collected approximately 9 samples. Faxed copy of new figures to Frank Lesene. Duane using some soil to place spoon and

1150 bowl on after collecting the soil sample. Collection of soil samples still in progress. Collection of health and safety sample in progress. Health and safety sample involves collection of water sample 1/3 after rinsing 1/3 used to rinse the gloves and boots of personnel working at site. 1/3 on the site.

1310 Collection of samples complete. Duane and John with rest of team may not do the next set of sampling. Deane water being collected in 55 gallon drums. Duane and John depart site. Borrowed copies of conventions and latest figures from John Backera for our files. Also take lab results from John.

1430 John and other Backera personnel to work on conventions and complete work and field investigations at Summit 15.

1530 Depart site. Collected copy of ENCO results from Cheryl at Staff 1/3. Site 1/3. Civil

1600 Return to trailer. Depart site.  
 Also obtained copies of information available for irrigation system from John, Bacteria.

1615 End of day. Depart trailer  
 Photograph with Roll Camera, 1 - Site of day  
 End of Roll 1.

SRINIVAS KUCHIBOTLA  
 1/3/96

1/4/96 Sunny 60°F  
 Observe Bioaugmentation at SWMUIS  
 Personnel: Srin Kuchibotla, ABB-ES

0830 Arrival on site. Bacteria not at site

1000 Arrival on site. Bacteria personnel Bill and Pat working on connections for the sprinkler system on site. Connections to the irrigation system still need to be done. Fifco personnel plan on completing the connections and starting the treatment today

1300 Arrival on site. Pat and Bill working on sprinkler system. Pat mentions that the head provided by the pump is not adequate for the sprinkler system. Therefore they are working on dividing the sprinkler system into two and using them in turns

1330 Depart site. Connections for irrigation system still not complete

1500 Arrival on site. Personnel still working on pump.

1600 End of day. Depart site.  
 SRINIVAS KUCHIBOTLA  
 1/4/96

(38)

1/1/96

SWMU15

Objective: Observe bioaugmentation at SWMU15

Steady 30°F

Personnel: Sin Kuchibola, ABB-ES

0830 Arrival on-site. John of Fitlo

informs me that they had irrigated the area on Friday 1/5/96. Cheryl and another Staff Civil person were on site to

observe the irrigation.

0930 Called Cheryl. She mentioned she was at the site when the system was functioning and events were fine on Friday.

0945 Arrival on-site. Fitlo personnel not at site. John of 0830 had mentioned that the weather was too low for the bacteria to function and that they had sized

operations till the next day. Also the irrigation system has been separated into three portions and that these portions would be operated in cycles or turns. Downloaded

(39)

Photographs from Digital Camera into computer in the office. The receiver

Digital Camera to start at 10:00 AM. Install them on-site.

1830 Arrived on-site. End of day  
1845 Depart site. End of day

~~SP, 1/1/96 KUCHIBOLA~~

1/19/66 SWMU 15

Objective: Erosion Recontourment at SWMU 15

Personnel: Sr. Kuchibotta, ASB-ES

0930 Fifth personnel, John, Pat and Bill working at site. John

Called at 0925 informed me that they plan on collecting their first set of 4 day samples today. They had operated the system on Friday and they mentioned that the backhaul may have worked through the weekend on the PCB in the soil. The system was not operating on the weekend.

John also mentioned that Duane of ECT would be collecting their samples after 1130 this afternoon. They may operate the system based on the weather at 1500 or 1600 hrs today. Took the temperature on the thermometer at three levels, surface 2 inches and 6 inches. Temperature of

soil 40-42°F.

0145 Depart site. Heavy rain and thunder

0900 Return to site. Heavy rain and thunder

McSill at site. Heavy rain and thunder

evolving the contractors work

Sampling at site complete.

Soil temperature 52-55°F.

Photographs using Digital Camera

1 Piping network at site

2 " " "

3 " " "

4 Photographs using camera - Roll 2

27 Piping network at site

28 " " "

0115 Depart site. End of day

SRINIVAS KUCHIBOTTA  
1/19/66

1/10/96

Objective: Observe Bioraummentation at SUMV 15

Personnel: Srin Kuchibotta, ABB-ES

0710 Arrival on-site. No personnel at site. Temperature of soil between 40-44°F for 2 to 6 inches. Depart site.

1330 Arrival at site. Pat and Bill on site working on the piping. Pat mentions that some of the sprinkler pipes were leaking and therefore had to be left at site. 80% of 10 had to be fixed. No irrigation in progress. Temperature of soil 50-55°F. Depart site.

1700 Arrival on-site. Personnel not at site. Soil Temperature between 55-59°F. Depart site. End of day.

Srinivas Kuchibotta  
1/10/96

1/11/96

SUMV 15

Objective: Observe Bioraummentation at SUMV 15.

Personnel: Srin Kuchibotta, ABB-ES

1540 Arrival on-site. Five personnel Pat and Bill at site. Sprinkler system was turned on. Digital Camera and Film Roll 1100 being used at other site (SUMV 14), therefore, we may need to have some missing numbers or gaps in the film on Camera numbers. Photographs using Digital Camera.

18 Sprinkler system turned on at site.

19 Piping network at site.

20 Photographs using Camera Roll 2.

21 Sprinkler system at site.

22 Piping network near pump.

Bill Pat and Bill mention that the system would be turned on again on Friday. They also mentioned they will not be working on Martin Luther King Holiday. 18 Momentary soil temperature between 55°F and 60°F.

Srinivas Kuchibotta  
1/11/96

(11)

1/2/96

SWMU15

Objective: Obsene bioaugmentation at SWMU15.

Personnel: Srin Kuchibotta ABB-ES

1500 Arrival at site. Pat and Bill working on completing @ 1/2 piping at site. System was not turned on. Pat and Bill will not work on 1/15/96. Soil temperature between 55-58°F. End of day.

~~SWMU15 KUCHIBOTTA  
1/2/96~~

(45)

1/15/96

SWMU15

Objective: Install another floor warmer in work zone or closer to the work zone.

Personnel: Srin Kuchibotta, ABB-ES

DBUS Connection for 1/11/96..

Photograph using camera - Roll 2

22 Sprinkler system cuts SWMU15.

14:30 Soil Temperature outside is 65°F. Inside at the northwestern corner soil temp is 68.1°F. End of day.

~~SPRINKLER KUCHIBOTTA  
1/15/96~~

1/19/96

Sunny 60°F

Objective: Observe bioaugmentation at site

Personnel: Srin Kuchibotla, ABB-ES

1530 Arrival at site. John mentioned that they had obtained two more sets of data from two more sampling events. Results will be provided in a report type format to the Navy, Staff Unit and ABB-ES. Soil temperature outside 60-62°F. End of day. Thermometer in work zone not working.

Srinivas Kuchibotla  
1/19/96

1/23/96

Sunny 60°F

Objective: Obtain soil temperatures at site and on update on bioaugmentation.

Personnel: Srin Kuchibotla, ABB-ES

1030 Arrival at site. John and Kat at site. John said that he would provide the data within a report in the next few weeks. Soil temperature outside is 60°F. Soil temperature checked at three locations on the westside of the property. Soil temperature approximately 62-63°F. Soil temperature checked in areas where there is no vegetation. 1100 Depart site. End of day.

Srinivas Kuchibotla  
1/23/96

(48)

1/24/98

SUM 15 Sunny 65°F  
Objective: Check soil temperatures at work zone outside

Personnel: Srin Kuchibolla, ABS-ES

0945 Arrival at site. No personnel at site

1015 John and Pat of Fico arrive at Site. Soil temperature outside approx. 59-60°F. Soil temperature checked along the eastern and south border. Soil temperatures were outside the work zone. Temperature was between 58-60°F.

1030 Checking temperatures in work zone. Soil temperatures along the <sup>long</sup> <sup>work zone</sup> <sup>(close to edge)</sup> <sup>borders</sup> were 60-62°F. All other work zones (north, south and east) closer to the edges were 59-60°F.

1030 John mentioned that the western side was warmer due to lesser vegetation. Also the irrigation system has not been used since the first week. The irrigation system was used to saturate the soil with bacteria initially and due to excessive bacteria pumping problems had to need air the <sup>next time</sup> 1/24

(49)

north work zone. Therefore, use of the irrigation system was stopped. John also mentioned that they had a log book (currently not available in trailer). They log in the book times and frequency of bacteria spraying. Also amounts of bacteria used ~~was~~ noted. Data to be provided in their final report after completion of the project.

1045 Depart site End of day

*Summary*  
1/21/98  
1/22/98

50

1/25/96  
 Objective: Check soil temperature  
 Personnel: Spin Kuchibolla, ABB-ES  
 10:30 Arrival at site. No personnel at site. Checked soil temperature outside. Approximately 50°F. Depart. End of day.

SPINUS KUCHIBOLLA  
 1/25/96

51

1/26/96  
 Objective: Check soil temperature  
 Personnel: Spin Kuchibolla, ABB-ES  
 10:45 Arrival at site. Soil temperature in vegetated area, approximately 60°F. Depart. End of day.

SPINUS KUCHIBOLLA  
 1/26/96

(52)

1/27/96

OBJECTIVE:

CHECK SOIL TEMP. AT PARTICIPATE AREA (RUN 15) SURVEILLATION DEMO. PERSONNEL ON-SITE: NINE MEN (800-ES)

1630 RETURN ON-SITE, NO PATROLL OR FIDO PERSONNEL ON-SITE SOIL TEMP. AT SURFACE - 63°F \*WILL LEAVE THERMOMETER IN VEGETATED AREA NOT OUTSIDE THE WORK ZONE FOR DAILY TEMP. READINGS.

1645 DEPART SITE

SWIM 15

CLEAR = 70°F

CHECK SOIL TEMP. AT PARTICIPATE AREA (RUN 15) SURVEILLATION DEMO. PERSONNEL ON-SITE: NINE MEN (800-ES)

1630 RETURN ON-SITE, NO PATROLL OR FIDO PERSONNEL ON-SITE SOIL TEMP. AT SURFACE - 63°F \*WILL LEAVE THERMOMETER IN VEGETATED AREA NOT OUTSIDE THE WORK ZONE FOR DAILY TEMP. READINGS.

1645 DEPART SITE

D. Jayman

1/30/96

(53)

1/31/96

SWIM 15

PERVY  
CLEAR = 60°F

OBJECTIVE: CHECK SOIL TEMP AT PARTICIPATE AREA

PERSONNEL ON-SITE: NINE MEN (800-ES) 0930 RETURN AT SITE, NO OTHER PERSONNEL ON-SITE.

0945 DEPART SITE SOIL TEMP. - 59°F 1530 RETURN AT SITE, NO OTHER PERSONNEL ON-SITE.

1545 SOIL TEMP. - 69°F ALL PERSONNEL OFF-SITE

D. Jayman

1/31/96

7/1/96

Objective

SWMU15

Observe soil temperatures at

Sunny 70°F

Personnel

Srin Kuchibotta, ABB-ES

0900 Arrival onsite

Fifco truck onsite.

No personnel at site.

0915

Depart site.

1615

Arrival onsite. No personnel onsite.

Temperature of soil 63°F. Depart site.

End of day

~~SRINIVAS KUCHIBOTLA  
2/1/96~~

7/2/96

Objective

SWMU15

Observe soil temperatures at site.

Sunny 65°F

Personnel

Srin Kuchibotta, ABB-ES  
Bill Edwards, Fifco

1045

Arrival onsite. Bill Edwards of Fifco

was onsite. Bill said that he was

here waiting for phone calls

No activity onsite like sprinklers

working etc. Temperature of soil

outside work zone in vegetated

area was 64°F. Depart site.

1630

Arrival onsite. No personnel at site.

Checked soil temperature - 64°F.

Depart site. End of day.

Temperature checked outside

work zone in vegetated area.

~~SRINIVAS KUCHIBOTLA  
7/2/96~~

(58)

2/5/96

Sumv 15

Cloudy 30°F

Objective: Observe soil temperature at site.

Personnel: Shin Kuchibotta, ABS-ES

0845 Arrival at site. Bill of F. ~~6:45~~

Exit at site. No activity at

site. Soil temperature at site

46°F at surface and 48°F at

depth of 6 inches. Temperature

checked in vegetated area

outside work zone. Depart site

Outside temperature 30-32°F.

1630 Arrival onsite. Soil temperature at surface

52°F and 53°F at a depth of 6 inches.

Depart site. No personnel at

site. End of day

~~Shin Kuchibotta  
2/5/96~~

(57)

2/8/96

Sumv 15

Sunny 65°F

Objective: Observe soil temperatures at site.

Personnel: Shin Kuchibotta, ABS-ES

0830 Arrival at site. No personnel at

site. Soil temperature at site

52°F at surface and 54°F 6 inches

below surface. Depart site

1145 Arrival at site. No personnel at

site. Personnel collecting

soil samples at the site.

Soil samples being collected by

Pat and Bill of Fisco. II

Photographs using Digital Camera

12 Collection of soil sample.

13 Dismantling equipment at site.

~~14~~ 2/8

1240 Depart site.

1700 Arrival onsite. No personnel at

site. Soil temperature 60°F at

surface and 62°F six inches

below ground surface.

1715 End of day. Depart site

Shin Kuchibotta  
2/8/96

2/13/96 SWMU 15 Sunny 70°F  
Objective: Logging Phone Call from Conversation with John Burlington

Personnel: Srin Kuchibotta, PBB-ES  
1330 Talked to Pat at Fifco. Trailer over the phone. Pat mentioned that they may be close to completing recontamination at the site and I may want to speak with John Burlington to get the exact details. He also mentioned that they were dismantling two tanks this week at site.

1400 Called John at the Days Inn. John mentioned that the most recent set of sampling indicated that contamination ~~was~~ 2/3 levels had decreased or were close to that presented in our implementation plan. They were planning another round of sampling in the next ten days. The results from ~~the~~ previous sampling events indicated one currently being submitted to Department of Navy.

1600 Called Cheryl Mitchell and informed her about the conversation with John. Also, informed Terry Hansen at ABB, Tallahassee.  
1630 Called Harold McGill. Harold mentioned that he would speak to John about the results. He may be able to provide us a copy through Tol ~~Sk~~ 2/13/96. Provided Harold phone numbers to reach John. Also informed him I could be reached at the Jacksonville office until ~~at~~ 2/13 any field work commences.  
1645 End of day

SKIN/1688 KUCH/1672  
2/13/96

60

3/4/96

Summ 15

WEATHER: CLEAR, WIND ≈ 75°F  
OBSERVING: LOCATE FENCE TRAVERSEANCE  
EVALUATION SAMPLE LOCATIONS  
PERSONNEL: MIKE JONES (CROSS-ES)  
RICHARD STEPHENS (CROSS-ES)

1400 AT TANKER CHECKING SAMPLE  
BOTTLE COUNT AND SAMPLING  
EQUIPMENT.

VIA MESSAGE IT IS REVEALED THE  
PFCO WANTS SPLITS OF OUR

SAMPLES AT SUMM 15 TOMORROW.  
1430 CALL FRANK LESBUE IN TALK TO  
SEE IF THIS IS LEGIT.

1600 PETER SEVENTAL CALLS AND CALL  
BEARS FROM SAN ANTONIO, TX.  
RESPOND, AND MARIO MULL (SUMM  
ON), IT IS DETERMINED THAT  
PFCO CAN COLLECT SPLITS AS  
LONG AS THEY DO NOT IMPROVE  
OUR PROGRESS.

1615 AT SUMM 15 TO LOCATE SAMPLE  
LOCATIONS.

1545 REC. SAMPLES (19) LOCATED AND STORED  
1800 REC. PERSONNEL OFF-SITE.

*Richard O. Gayne*  
3/4/96

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3/5/96

Summ 15

WEATHER: CLM. A FEW ≈ 70°F  
OBSERVING: COLLECT FENCE TRAVERSEANCE  
EVALUATION SAMPLES FENCE FENCES  
EQUIPMENTATION DEMONSTRATION.

PERSONNEL: MIKE JONES (CROSS-ES)  
RICHARD STEPHENS (CROSS-ES)  
0800 RETURN AT TANKER. BEGIN TO  
PREP SAMPLES, COLLECT AND  
SAMPLING EQUIPMENT.

COLLECT SOURCE TANK (15400Z)

0810 COLLECT TANKS QUANT (15400Z)

\* ANALYSIS FENCE WILL BE  
\* METERS) WILL BE TEST/PCO 8000.

0830 MOB TO SUMM 15, WILL GAIN  
ICE ON THE WAY

0855 EMPLOYE AT THE SITE, NO  
FIFCO PERSONNEL PRESENT. JOHN  
DELMONTE WAS TO HAVE BEEN  
ON-SITE SOMETIME TODAY TO  
OBTAIN GREAT SAMPLING.

0915 SET-UP SAMPLING BOTTLES + EQUIPMENT  
PACKS APPROX FOR THE MEN  
X. STATEMENTS WILL BE THE MEN  
SAMPLED, I WILL BE MAKING  
THE BOTTLES AND SERVICE CUSTOM.

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3/5/96

clear, windy = 75°F

SAMPLES (CONT.)	TIME	INTERVAL
1550230 (LAUNDRY GR.)	1200	0-1'
1550230* (DINO)	1210	1-2'
15501801	1500	0-1'
1550230 (LAUNDRY GR.)	1500	0-1'
15500401	1510	0-1'
1550350 (LAUNDRY GR.)	1515	0-1'
15500402	1520	1-2'

- SAMPLES STORED ON ICE, WILL BE  
 SAMPLED TOMORROW.  
 1545 1. COLLINGTON OFF-SITE.  
 1550 TRANSITION TO GW SAMPLING.  
 SET-UP ON MONITORING WELL  
 MPT-15-MW015.  
 T.O. - 13.42'  
 DTW - 6.40'  
 WC - 7.02'  
 1 WELL VOLUME = 7.02(16.3) = 114 gal.  
 3 WELL VOLUME = 1.14(3) = 3.42 gal.  
 A MINIMUM OF 3.5 GALLONS WILL  
 BE PURGED W/ PUMPATOR STROU-  
 PATTON REVIEWED, SEE TABLE ON  
 TOP OF NEXT PAGE.

3/5/96

clear, very windy = 75°F

TIME	MPT-15 VOL	MPT-15 METERS	MPT-15 METERS	MPT-15 METERS	MPT-15 METERS	MPT-15 METERS
1620	0	0.72	7.11	10°	450	19.27
1625	10	0.54	7.36	10°	468	17.30
1630	20	0.63	7.36	19.4°	500	7.70
1635	30	0.72	7.56	19.4°	420	4.42
1640	40	0.72	7.56	19.4°	420	2.80

- APPROX. 4 GALLONS PURGED, REC. RATE  
 METERS STABILIZED.  
 SAMPLE TIME - 1645  
 T.O. - 15.60/01  
 MPT-15 - 15.60/01  
 1648 CLOSED UP WELL  
 1650 MPT TO NEXT WELL - MPT-15-MW015.  
 1700 MPT-15-MW015 (MPT-15-MW015)  
 T.O. - 14.76'  
 DTW - 6.03'  
 WC - 8.93'  
 1 WELL VOLUME = 8.93(16.3) = 146 gal.  
 3 WELL VOLUME = 1.46(3) = 4.37 gal.  
 A MINIMUM OF 4.5 GALS. WILL BE  
 PURGED, SEE TABLE ON NEXT PAGE.

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3/5/96

TIME	VOL.	STILL CORR. VALUE	TEMP. °C	PH	COND. µMHO/CM	TEMP. °C	TURB. NTU
1706	0	Flow: RATE 0.90	19.7	7.26	480	480	9.50
1710	1.0	0.80	19.7	7.29	480	480	5.80
1715	2.0	0.78	19.5	7.31	480	480	3.28
1720	3.0	0.84	19.6	7.25	780	780	5.15
1725	4.0	0.75	19.5	7.21	1380	1380	4.72
1728	4.5	0.78	19.5	7.18	1870	1870	5.55
1731	5.0	0.60	19.5	7.16	2070	2070	5.22
1734	5.5	0.78	19.5	7.16	2200	2200	5.22
1737	6.0	0.84	19.4	7.15	2450	2450	4.12
1740	6.7	0.78	19.4	7.15	2500	2500	3.48

APPROX. 6.7 GALS PURGED, APPROXIMATIONS FULLY STABILIZED. CONDUCTIVITY CONTINUED TO RISE, BUT EVENTUALLY PLATEAUED A BIT.

SAMPLE TIME - 1740  
 " I.P. - 15600401, P, 15, 1550  
 ANALYSES - 1657/1000 8080  
 1800 CLEAN UP ENTIRE SITE, LOAD ALL SAMPLING EQUIPMENT FOR DECON BACK AT TRAILER (Tomorrow).  
 1810 MOB TO TRAILER, UNLOAD, AND PERMIT SITE.

Richard O. Jayne  
 3/5/96

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3/6/96

SUNDAY 15

WEATHER: PARTLY CLOUDY, STILL BREEZY & HOT  
 OBSERVING: PECK AND SPIN SAMPLES AND DECON SAMPLING EQUIPMENT.  
 PERSONNEL: MIKE JAYNES (DECON-ES), RICHARD JAYNES (DECON-ES)  
 0700 ARRIVE AT TRAILER TO DECON PACKING PROCEDURES AND TOUCH WORK.  
 0845 PERMIT WORK (COC, SMO SHEET, ETC) COMPLETE, SAMPLES PREP AND READY FOR INTERPRET. WE WILL START TO RED-EX ON OUR WAY OUT OF TOWN.  
 0900 FINN KILPATRICK ON-SITE. DECON SET-UP FOR DECON.  
 0945 S. KILPATRICK HAS GATHERED ITEMS HE CANE FOR AND PERMITS SITE.  
 1100 DECON COMPLETE, DECON DE-MOB - LOADING OF EQUIPMENT  
 1230 PERMIT SITE. HEAD FOR RED-EX.  
 1330 DROP SAMPLES AT RED-EX, HEAD FOR HOME, MISSION COMPLETE

Richard O. Jayne  
 3/6/96

**APPENDIX F**  
**RESPONSE TO REGULATORY COMMENTS**

## 1.0 INTRODUCTION

A technology demonstration, *in situ* bioaugmentation of soil containing pesticides, was conducted at solid waste management unit (SWMU) 15 at U.S. Naval Station (NAVSTA) Mayport, Florida under the Navy Environmental Leadership Program (NELP). NELP was created to promote the use of new and innovative technologies in the areas of compliance, conservation, cleanup, and pollution prevention within the Navy. NAVSTA Mayport was selected to participate in NELP because activities at this station are representative of similar activities at other naval stations.

FIFCO International was selected as the contractor for the Navy and implemented an *in situ* bioaugmentation process for degradation of 4,4'-dichlorodiphenyltrichloroethane (DDT), 4,4'-dichlorodiphenyldichloroethene (DDE), and chlordane detected in soil samples collected from the site. ABB Environmental Services, Inc. (ABB-ES), was contracted by the Department of the Navy, Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) to provide technical oversight for the technology demonstration.

The purpose of this document is to respond to comments by the Florida Department of Environmental Protection (FDEP) concerning the draft report (June 1997), entitled *NELP Program Technology Evaluation Report for SWMU 15, NAVSTA Mayport, Florida* (ABB-ES, 1997). The U.S. Environmental Protection Agency declined to comment on the report.

The following correspondence was received from FDEP.

- September 4, 1997, Correspondence from James H. Cason, P.G. Remedial Project Manager, FDEP, to Mr. David Driggers, Department of the Navy, SOUTHNAVFACENGCOM, Subject: Draft Technology Evaluation Report: Naval Environmental Leadership Program Technology Evaluation Report for Solid Waste Management Unit 15.

The following chapter provides point-by-point responses to FDEP's comments.

## 2.0 RESPONSE TO FDEP COMMENTS

2.1 Comment 1. The technology demonstration occurred during the colder winter months; as such, I am unsure as to the value of any conclusions regarding the efficacy of the technology type. It could be argued that the observed results could result from merely the physical mixing of the site soil or by the "hot spot" nature of the contamination. Accordingly, I must conclude that the demonstration did not adequately establish that the bioremediation method(s) were responsible for any positive observed effects at SWMU 15.

Comment acknowledged.

2.2 Comment 2. This technology would have been better demonstrated on a site where the extent of contamination was more uniform in concentration and areal extent.

Comment acknowledged.

2.3 Comment 3. Because of the variable and questionable nature of the data, does the Navy intend to utilize it in the evaluation of the status of SWMU 15 and if so, how will this be done.

4,4-Dichlorodiphenyltrichloroethane (DDT), 4,4-dichlorodiphenyldichloroethane (DDD), and 4,4-dichlorodiphenyldichloroethene (DDE) were not detected in the technology demonstration performance evaluation samples at concentrations that exceed FDEP soil cleanup goals. Beta-benzene hexachloride, chlordane and Aroclor-1260 were detected in performance samples at concentrations that exceed FDEP soil cleanup goals.

4,4-DDT was detected at two sampling locations, MPT-15-SS07 (1,500  $\mu\text{g}/\text{kg}$  in 1993) and MPT-15-SS23 (790,000 micrograms per kilogram [ $\mu\text{g}/\text{kg}$ ] in 1994) at concentrations exceeding the ecological benchmark (1,000  $\mu\text{g}/\text{kg}$ ) (ABB-ES, 1996a). 4,4-DDT was not detected in the performance evaluation sample for location MPT-15-SS07 (March 1996) at a concentration that exceeds the detection limit.

The concentration of 4,4-DDT detected in the environmental sample from MPT-15-SS23 that was collected in 1994 also exceeded the FDEP industrial soil cleanup goal (12,000  $\mu\text{g}/\text{kg}$ ). The technology demonstration baseline sample collected in 1995 from within 12 inches from this sample location contained 4,4-DDT at a concentration of 1.9  $\mu\text{g}/\text{kg}$  and the performance evaluation sample collected in March 1996 contained 1.4  $\mu\text{g}/\text{kg}$ .

Based on the analytical results for the RFI (ABB-ES, 1996a), and technology demonstration, the engineering control recommended in the Group II Corrective Measure report (ABB-ES, 1996b), to eliminate the potential for human and ecological receptors to contact pesticide-impacted soil at SWMU 15 appears to be appropriate. The interim measure, which was conducted in the last quarter of 1997, consisted of the placement of a geotextile liner and crushed limerock (Bechtel, 1997).

The analytical results compiled in the NELP Technology Evaluation report provides a comprehensive set of data for evaluating the pesticides and polychlorinated biphenyls (PCBS) detected in surface and subsurface soil samples at SWMU 15 as

of the last sampling date. It is possible that natural biodegradation is occurring at the site and the concentrations detected could change over time.

Therefore, should future site use require the removal of all or any part of the engineering control, the analytical results in this report should be reviewed and compared to the appropriate regulatory criteria for the anticipated use. The review should determine whether or not the chemicals detected at the site are compatible with the anticipated use, and if additional surface and subsurface soil sampling should be conducted to further evaluate the site. The review should also consider whether or not human health and ecological risk assessment should be conducted.

## REFERENCES

- ABB-Environmental Services, Inc. (ABB-ES). 1996a. *Resource Conservation and Recovery Act Facility Investigation, Group II Solid Waste Management Units (Final), U.S. Naval Station, Mayport, Florida (Final)*. Prepared for Southern Division Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), North Charleston, South Carolina. (January).
- ABB-ES, 1996b. *Corrective Measure Study Group II Solid Waste Management Units, U.S. Naval Station, Mayport, Florida (Final)*. Prepared for SOUTHNAVFAC-ENGCOM, North Charleston, South Carolina. (January).
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