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# Corrective Measures Study Investigation Report

## SWMU 53

Naval Station Roosevelt Roads  
RCRA/HSWA Permit No. PR2170027203  
Ceiba, Puerto Rico



Prepared For  
**Department of the Navy**  
**Atlantic Division**  
**Naval Facilities Engineering Command**  
**Norfolk, Virginia**

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**FINAL**  
**CORRECTIVE MEASURES STUDY INVESTIGATION REPORT**

**SWMU 53**

**NAVAL STATION ROOSEVELT ROADS**  
**RCRA/HSWA PERMIT NO. PR2170027203**  
**CEIBA, PUERTO RICO**

**CONTRACT TASK ORDER 0099**

**NOVEMBER 24, 2003**

*Prepared for:*

**DEPARTMENT OF THE NAVY**  
**ATLANTIC DIVISION**  
**NAVAL FACILITIES**  
**ENGINEERING COMMAND**  
*Norfolk, Virginia*

*Under the:*

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**TABLE OF CONTENTS**

	<u>Page</u>
<b>LIST OF ACRONYMS AND ABBREVIATIONS.....</b>	<b>iv</b>
<b>1.0 INTRODUCTION .....</b>	<b>1-1</b>
1.1 Objective of the CMS Investigation Report .....	1-1
1.2 Facility and Site Description.....	1-1
1.2.1 Facility Description .....	1-1
1.2.2 SWMU 53 – Building 64 (Malaria Control Building) .....	1-2
1.3 Regulatory Framework and SWMU 53 Investigation History .....	1-2
1.4 Findings of Previous Investigations for SWMU 53 .....	1-4
1.5 Current Site Conditions .....	1-5
1.6 Report Organization.....	1-5
<b>2.0 CMS FIELD INVESTIGATION METHODOLOGIES.....</b>	<b>2-1</b>
2.1 Sampling Procedures .....	2-1
2.1.1 Surface Soil .....	2-1
2.1.2 Quality Assurance/Quality Control Samples .....	2-1
2.2 Surface Soil Investigation.....	2-2
2.3 Quality Assurance/Quality Control Samples .....	2-3
2.4 Laboratory Analyses.....	2-3a
2.5 Data Validation .....	2-4
2.6 Surveying.....	2-4
<b>3.0 NATURE AND EXTENT OF CONTAMINATION.....</b>	<b>3-1</b>
3.1 Surface Soil .....	3-2
3.2 QA/QC Samples.....	3-4
<b>4.0 CONCLUSIONS AND RECOMMENDATIONS.....</b>	<b>4-1</b>
4.1 Conclusions .....	4-1
4.2 Recommendations .....	4-1
<b>5.0 REFERENCES.....</b>	<b>5-1</b>

**LIST OF TABLES**

2-1	Summary of Sampling and Analytical Program
2-2	Summary of Sampling and Analytical Program – QA/QC
2-3	Method Performance Limits, Modified Appendix IX Pesticides List
2-4	Method Performance Limits, Modified Appendix IX Metals List
3-1	Summary of Organic Detections in Surface Soil
3-2	Summary of Inorganic Detections in Surface Soil
3-3	Summary of Analytical Results in QA/QC Samples

**TABLE OF CONTENTS**  
**(Continued)**

**LIST OF FIGURES**

- 1-1 Regional Location Map
- 1-2 SWMU/AOC Location Map
  
- 2-1 Additional Surface Soil Sample Locations - SWMU 53
  
- 3-1 Pesticide Investigation Results in Surface Soil
- 3-2 Lead, Zinc, and Copper Investigation Results in Surface Soil

**LIST OF APPENDICES**

- A Chain of Custody Records
- B Field Notes from SWMU 53 CMS Field Investigation
- C Data Validation Report Narratives

## LIST OF ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
Baker	Baker Environmental, Inc.
bgs	below ground surface
CAOs	Corrective Action Objectives
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMS	Corrective Measures Study
CMSI	Corrective Measures Study Investigation
CTO	Contract Task Order
D	Duplicate Sample
DDT	dichlorodiphenyltrichloroethane
DoN	Department of the Navy
DRMO	Defense Reutilization and Marketing Office
ER	Equipment Rinsate
FB	Field Blank
GPS	Global Positioning System
IR	Installation Restoration
LANTDIV	Atlantic Division, Naval Facilities Engineering Command
µg/kg	micrograms per kilogram
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MHSPE	Dutch Ministry of Housing, Spatial Planning and Environment
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NEESA	Naval Energy and Environmental Support Activity
NSRR	Naval Station Roosevelt Roads
QA/QC	Quality Assurance/Quality Control
RBCs	Risk-based Concentrations
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
SAP	Sampling and Analysis Plan
SWMU	Solid Waste Management Unit
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank

## **1.0 INTRODUCTION**

This document presents results from the Corrective Measure Study (CMS) Investigation performed in March 2003, for Solid Waste Management Unit (SWMU) 53, Naval Station Roosevelt Roads (NSRR), Ceiba, Puerto Rico. This report is prepared under the Corrective Action provisions of the NSRR's Resource Conservation and Recovery Act (RCRA) Permit No. PR2170027203, and includes the results from the investigation conducted under the RCRA Facility Investigation (RFI), as well as the Sampling and Analysis Investigation as described in Sections 1.4. This report has been prepared by Baker Environmental, Inc. (Baker) under contract to the Atlantic Division, Naval Facilities Engineering Command (LANTDIV) Contract Number N62470-95-D-6007, Contract Task Order (CTO) 099.

### **1.1 Objective of the CMS Investigation Report**

The objective of the CMS Investigation Report is to delineate the chlordane and heptachlor epoxide concentrations at SWMU 53 detected in soil during the RFI investigation in February 2002 (Baker, 2002), as well as to delineate previous detections of lead, copper, and zinc to assist in evaluating ecological risks.

### **1.2 Facility and Site Description**

This section contains a description of the physical layout and a background history of NSRR, as well as a description of the physical layout of SWMU 53.

#### **1.2.1 Facility Description**

NSRR occupies over 8,600 acres on the northern side of the east coast of Puerto Rico, along Vieques Passage with Vieques Island lying to the east about 10 miles off the harbor entrance. The north entrance to NSRR is about 35 miles east along the coast road (Route 3) from San Juan. The closest large town is Fajardo (population approximately 37,000), which is about 10 miles north of NSRR off Route 3. Ceiba (population approximately 17,000) adjoins the west boundary of NSRR (see Figure 1-1).

NSRR was commissioned in 1943 as a Naval Operations Base, and redesignated a Naval Station in 1957. The current primary mission of NSRR is provision of full support for Atlantic Fleet weapons training and development activities.

### **1.2.2 SWMU 53 – Building 64 (Malaria Control Building)**

SWMU 53 is located at NSRR as shown on Figure 1-2. The Malaria Control Building (Building 64) was built in 1942 and condemned in 1980. The building is presently unoccupied and lies on approximately 1/8 acre. The building structure itself is 21 feet by 18 feet in dimension, and occupies about 10 percent of the total SWMU 53 acreage. This SWMU is located on a gentle slope (approximately 5-7% grade) from southeast (upgradient) to the northwest (downgradient) approximately 200 feet away from Forrestal Drive. The building was utilized to store pesticides, such as aldrin, and dichlorodiphenyltrichloroethane (DDT). It is not known if stocks of pesticides were maintained in the building for the entire duration. Although no direct evidence exists, it is assumed that mixing and other preparation for pesticide use was also performed at the building. No wastes are known to have been disposed of at the unit and there are no known releases related to this unit. No other use of the site was identified. The information gathered from the visual site inspection by Baker and environmental staff at NSRR revealed that there are no known wastes dumped at this facility, nor is there any evidence of source contamination (Baker, 2000a). Baker observed signs of possible past leakage of chemicals on the storage shelves inside the building, and identified migration pathways along the floor leading to the outside. With this information, along with the activities known to have taken place at this SWMU, a site characterization was performed to determine whether a release of hazardous waste including hazardous constituents has occurred, is likely to have occurred, or is likely to occur.

### **1.3 Regulatory Framework and SWMU 53 Investigation History**

In 1943, NSRR was commissioned as a Naval Operations Base. NSRR continued in this status until 1957, when it was redesignated a Naval Station with the mission of providing full support for Atlantic Fleet weapons training and development activities. Until 1993 all environmental operations, with the exception of underground storage tanks (USTs), were conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulations as part of the Department of the Navy's (DoN) Installation Restoration (IR) Program. On October 20, 1994, a Final RCRA Part B permit was issued by the United States

Environmental Protection Agency (USEPA) Region II to the Defense Reutilization and Marketing Office (DRMO), NSRR. This corrective action provisions of the permit required RFI activities at 25 SWMUs and 4 Areas of Concern (AOCs).

RCRA regulations provide a procedure to investigate and remediate areas that may have been affected by a release of hazardous wastes. The first steps for investigating a site are the RCRA Facility Assessment (RFA) and the RFI. These assessments and investigations are studies on a property to determine if there has been a release of hazardous waste and to quantify any releases that have occurred. If these studies determine that a release has occurred, a CMS is performed to identify the most appropriate corrective measure for a given site.

A RFA was performed in 1988 and updated in 1993 by A.T. Kearney, Inc. for the USEPA to identify SWMUs and AOCs, and to assess the potential for the release of hazardous constituents from any areas or units. The RFA identified 47 SWMUs and 4 AOCs, and recommended additional investigation at 25 of the SWMUs and all four AOCs.

Building 64 (Malaria Control Building) at SWMU 53 was first listed as a SWMU in the May 31, 2000 RCRA Quarterly Progress Report (Baker, 2000b). Attachment two of the aforementioned report contained the Phase I Environmental Assessment Report for SWMUs 53. A Draft Sampling and Analysis Plan (SAP) was submitted for SWMUs 53 and 54 on August 4, 2000 (Baker, 2000c), and was approved by the USEPA on October 10, 2000. The associated field investigation was conducted in December 2000 in accordance with the EPA approved sampling and analysis plan. The Draft Sampling and Analysis Report for SWMUs 53 and 54 was submitted on April 11, 2001. The EPA commented on this report on July 5, 2001, requesting that a RFI work plan be submitted to further address the elevated levels of metals concentrations, including arsenic and lead, as well as the elevated levels of 4,4'-DDT found at SWMU 53. The comment letter also requested the submission of a Final Sampling and Analysis Report for SWMUs 53 and 54. The Final Sampling and Analysis Report was submitted on August 27, 2001. The Final RFI Work Plan for SWMUs 53 and 54 was submitted on December 6, 2001 (Baker, 2001a), and was approved by the EPA on January 3, 2002. The RFI field investigation was conducted in February and March 2002 in accordance with the EPA approved RFI work plan. The Draft RFI Report for SWMUs 53 and 54 was submitted on July 17, 2002 with contingent approval given by the EPA on September 19, 2002 pending the performance of a CMS.

The EPA requested that the Navy submit a Draft CMS Work Plan within 60 days of receipt of their September 19, 2002 letter for SWMUs 53 and 54. The CMS Work Plan for SWMU 53 was to incorporate the delineation of the chlordane and heptachlor epoxide contamination in the surface soil, as well as to present a proposal for the removal of chlordane, heptachlor epoxide, arsenic, lead, and 4,4-DDT contaminated soil throughout the site. A Draft CMS Work Plan was submitted on November 27, 2002. The EPA commented on this work plan on February 19, 2003, requesting that a revised CMS work plan be submitted. On March 7, 2003, a Final CMS Work Plan was submitted for SWMUs 53 and 54 (Baker, 2003a). The CMS investigation at SWMU 53 was conducted on March 23, 2003, after the Navy received verbal acceptance on the proposed sampling methods presented in the Final CMS Work Plan mentioned above. This report focuses on the findings of the CMS investigation.

#### **1.4 Findings of Previous Investigations for SWMU 53**

Based on results of the 2000 SAP and 2002 RFI field investigations, arsenic, lead, and 4,4-DDT, the three primary COCs identified from the Sampling and Analysis Report (Baker, 2001b), were delineated at SWMU 53.

During the 2002 RFI, arsenic, chlordane, and heptachlor epoxide were found to exceed the EPA Region III Residential RBCs in surface soil. Chlordane and heptachlor epoxide were found in sample 53SB14 on the outer edge of the investigated area during the 2002 RFI, and therefore, were not delineated. Heptachlor epoxide was detected in a very small quantity below EPA Region III Residential RBC, during the 2000 investigation, however was found to exceed the EPA Region III Residential RBC during the 2002 investigation. Due to the location of this sample on the outer edge of the investigation area, this contaminant was not delineated. Chlordane was not detected in the 2000 investigation. Copper and zinc were both detected at elevated levels in samples collected during the 2000 investigation. A few zinc results were found to exceed the EPA Region III Residential RBCs, as well as the two times the average detected background criteria.

Arsenic was detected in the subsurface soil at a level higher than the EPA Region III Residential RBC but lower than twice the average detected background level. No other compound exceeded any RBC in the subsurface soil.

## **1.5 Current Site Conditions**

Building 64 is currently inactive, as well as being uninhabitable and unsafe. The secondary growth vegetation around the perimeter of the building has not been maintained, and therefore, has overgrown the entire perimeter of the building. Access to the site is via overhead utility right-of-way.

## **1.6 Report Organization**

Section 1.0 of this document includes this introduction, as well as the objective of this CMS Investigation Report and a facility and site description. Also included in Section 1.0, is the regulatory framework and investigation history of SWMU 53, as well as the findings of the previous investigations conducted at SWMU 53, and current site conditions. Section 2.0 provides a description of the CMS investigation methodologies conducted during the March 2003 field investigation. Section 2.0 also discusses the sampling procedures, a description of sampling locations for all media, as well as the laboratory analyses and data validation conducted during this investigation. Section 3.0 discusses the nature and extent of contamination for the surface soil samples from the CMS investigation, as well as applicable results from the RFI Report and Sampling and Analysis Report. A summary of findings and conclusions are presented in Section 4.0 along with recommendations for SWMU 53. The report references are listed in Section 5.0.

## **2.0 CMS FIELD INVESTIGATION METHODOLOGIES**

The CMS field investigation at SWMU 53 consisted of the collection of surface soil samples for the purpose of delineating the extent of chlordane, heptachlor, heptachlor epoxide, lead, copper, and zinc within the surface soil. It should be noted that additional analytes (heptachlor, copper, and zinc) were included in this investigation to assist in evaluating the site with respect to ecological receptors. These analytes were not requested by the EPA, rather initiated by the Navy. The methods and procedures utilized during the CMS field investigation are presented in the following subsections.

### **2.1 Sampling Procedures**

All surface soil sampling at SWMU 53 was performed in accordance with the verbal acceptance of the CMS work plan by the EPA via e-mail on March 13, 2003, of the Navy's sampling strategy found within the Final CMS Work Plan (Baker, 2003a). The procedures utilized for the surface soil program are described in the following subsections.

#### **2.1.1 Surface Soil**

Surface soil samples were collected using new disposable stainless steel spoons. During sample collection, vegetation (grass and roots), rocks and twigs, if present were removed. Surface soil samples were collected between 0 and 1 foot below ground surface (bgs) as required by EPA Region II guidelines. Surface soils samples were collected and placed directly into the laboratory prepared sample container. Samples were collected and analyzed for chlordane, heptachlor, heptachlor epoxide, lead, copper, and zinc as presented in Table 2-1. Samples were labeled and kept in coolers on ice and under strict chain-of-custody until delivered to the laboratory. Chain-of-custody forms for environmental media samples are provided as Appendix A.

#### **2.1.2 Quality Assurance/Quality Control Samples**

Quality Assurance/Quality Control (QA/QC) samples were collected during the CMS sampling program. These samples were obtained to:

- (1) ensure that the new stainless steel spoons were free of contamination (i.e., equipment rinsate blank);
- (2) evaluate field methodology (i.e., duplicate samples); and,
- (3) establish field background conditions (i.e., field blanks).

Several types of field QA/QC samples were collected and analyzed including duplicate samples, equipment rinsate samples, field blanks, and matrix spike/matrix spike duplicate (MS/MSD). These QA/QC samples are defined below:

- Duplicate Sample (D): Two samples collected simultaneously into separate containers from the same source under identical conditions. One duplicate sample was collected for every 10 environmental samples collected for each media type.
- Equipment Rinsate Sample (ER): Sample obtained by running laboratory supplied deionized water over/through sample collection equipment after it was decontaminated. One equipment rinsate sample (53ER01) was taken by running deionized water over a new stainless steel spoon to determine if it was free of contamination.
- Field Blank (FB): Samples were obtained from each water source utilized during the field program. The water source used during the field program included the laboratory supplied deionized water utilized to collect equipment rinsate blanks.
- Matrix Spike/Matrix Spike Duplicate): MS/MSDs are not field samples but are laboratory derived, and are collected to evaluate the matrix effect of the sample upon the analytical methodology. An MS and MSD must be performed for each group of samples of a similar matrix. MS/MSD samples were collected at a frequency of five percent.

## **2.2 Surface Soil Investigation**

A total of 26 surface soil samples, including three duplicate samples, were collected at SMWU 53 to address and delineate the high detections of select metals and pesticides from previous

investigations mentioned above. Baker requested that the mainland laboratory extract all 26 surface soil samples, including three duplicate samples, at the same time due to holding time requirements. However, of the ten samples requiring pesticide analysis, the laboratory was instructed to only analyze surface soil samples (53SS07, 53SS08, and 53SS08D) to assist in delineating the heptachlor, heptachlor epoxide, and/or chlordane found at 53SB14. If these locations did not contain detections of pesticides above either of the USEPA Region III RBCs, and/or the Ecological Surface Soil Screening values, then the analysis of the remaining surface soil samples for pesticides analysis was not necessary as described in the Final CMS Work Plan for SWMUs 53 and 54 (Baker, 2003a). The sample location 53SS07 did contain a detection of chlordane above the Ecological Screening value while none of the detections from 53SS08 exceeded any of the screening criteria. The lack of any exceedance of criteria from 53SS08 along with the results from 53SB02 provides a line of delineation to the west of 53SB14. Therefore, the lab was instructed to analyze (53SS09, 53SS10, and 53SS11) for the pesticide analysis to assist in delineating the detection of chlordane above the screening criteria from sample 53SS07. It should be noted that this was a deviation from the work plan that stated that if 53SS07 and 53SS08 exceeded the screening criteria for heptachlor, heptachlor epoxide, and chlordane that 53SS09 through 53SS13 would be analyzed. Since both of the samples (53SS07 and 53SS08) did not exceed the criteria as instructed in the work plan it was not necessary to analyze samples 53SS12 and 53SS13 that were located further west of the delineation realized from the results from 53SB02 and 53SS08 with respect to sample 53SB14. The remaining samples collected were not analyzed for pesticides because of the delineation accomplished in samples 53SS07 through 53SS11. However, of the remaining samples, 17 surface soil samples including two duplicate samples were analyzed for lead, copper, and zinc as presented in Table 2-1. The location of the additional samples collected during the CMS investigation are depicted on Figure 2-1. Appendix B provides the field notes taken during the CMS investigation conducted in March 2003.

### **2.3 Quality Assurance/Quality Control Samples**

One equipment rinsate sample (53ER01) was collected during this investigation by running lab grade deionized water through a stainless steel spoon. This sample was analyzed for chlordane, heptachlor, and heptachlor epoxide as presented in Table 2-2, as well as for lead, copper, and zinc.

One field blank sample was collected and analyzed for chlordane, heptachlor, and heptachlor epoxide as presented in Table 2-2, as well as for lead, copper, and zinc. The field blank sample collected (53FB01), consisted of lab grade deionized water supplied by the analytical laboratory.

#### **2.4 Laboratory Analyses**

All samples were submitted to Severn Trent Laboratories, Inc. in Savannah, Georgia for analysis of parameters discussed above. The same firm was retained for this investigation that performed

the laboratory analysis for the previous RFI investigation. This ensured a consistency of techniques. The method performance limits for the modified pesticides and metals list can be found in Tables 2-3 and 2-4, respectively.

## **2.5 Data Validation**

A detailed and independent data validation was performed by Heartland Environmental Services, Inc. from St. Charles, Missouri to verify the qualitative and quantitative reliability of the data presented and adherence to stated analytical protocols. This review included a detailed review and interpretation of all the data generated by the laboratory for data quality Level D deliverables. The primary tools that were utilized by the experienced data validation personnel included analytical method operating procedures, Statement of Work for CLP guidance documents, EPA Region II guidelines for data validation, Naval Energy and Environmental Support Activity (NEESA) Level D requirements, established criteria, and professional judgement.

The data validation report stated that a minimum of 10% of all laboratory calculations have been verified as part of this evaluation. The same firm was retained for this investigation that performed the laboratory analysis for the previous RFI investigation. This ensured a consistency of techniques. Copies of the narratives from the data validation reports associated with this investigation are provided as Appendix C.

## **2.6 Surveying**

All surface soil sampling locations were flagged in the field and surveyed for horizontal locations utilizing a Global Positioning System (GPS) unit. Figure 2-1 presents the locations of all surface soil samples collected during this investigation, as well as all samples collected at this site since the sampling and analysis investigation.

### **3.0 NATURE AND EXTENT OF CONTAMINATION**

This section presents an overview of chemical analytical results obtained from samples collected during the March 2003 CMS field investigation, as well as the results of surface soil samples that contained the same analysis from the December 2000 Sampling and Analysis Plan investigation, and the February 2002 RFI mentioned in Section 1.4. The ecological risk assessment presented in Section 3.0 of the Draft CMS Final Report (Baker, 2003), identified two sample locations exceeding the ecological screening value for kepone and one sample location exceeding the ecological screening value for 4,4'-DDE. It was identified that one of the locations (53SB14) had additional samples collected further away from this location during the Corrective Measures Study Investigation (CMSI). However, the requested analysis on these samples was limited to chlordane, heptachlor, and heptachlor epoxide as presented in the CMS work plan (Baker, 2003a). Due to this finding in the development of the ecological risk assessment, Baker communicated with the lab to see if they had results for these two constituents from the samples collected during the CMSI. The lab indicated that they did have results for these two constituents available, and therefore, Baker has included these results in the discussion in the following paragraphs. This data is not validated, but included in this report for delineation purposes only, not for evaluation of risks. The objective of this section is to characterize the nature and delineate the extent of chlordane, heptachlor, heptachlor epoxide, kepone, 4,4'-DDE, lead, zinc, and copper.

The SWMU 53 area surface soil sample results (Heptachlor, Heptachlor epoxide, chlordane, kepone, and 4,4'-DDE) detected in surface soil samples were compared with their respective risk-based concentrations (RBCs) for both industrial and residential conditions as determined by EPA Region III (EPA, 2003). The pesticides results were also compared to their respective Ecological Surface Soil Screening Values. Plant and invertebrate-based toxicological thresholds for organochlorine pesticides were not available from other literature sources (e.g., USEPA 1999 and 2000). For these chemicals, Dutch Ministry of Housing, Spatial Planning and Environment (MHSPE) Soil standards (MHSPE 1994) were used as surface soil screening values. MHSPE soil standards were derived assuming a minimum default soil organic carbon content of 2.0 percent (MHSPE 1994). For those pesticides lacking a soil standard, background-based values from Friday (1998) were used as surface soil screening values. Because background-based values do not represent effect concentrations, their use as surface soil screening values represents a source of uncertainty, as presented in the screening-level ERA in Section 3.0 of the Draft CMS Final

Report for SWMU 53 (Baker, 2003b). The ecological screening criteria was used to help determine potential risk from pesticides to ecological receptors at the site. The Appendix IX metal compounds (copper, lead, and zinc) detected in the surface soil samples were compared with their respective RBCs, as well as their corresponding Ecological Surface Soil Screening Values. The Ecological Surface Soil Screening Values were taken from literature-based toxicological benchmarks presented in the Toxicological thresholds for earthworms and plants (Efroymson et al. 1997a, and 1997b). These values are expressed as dry weight concentrations, and when more than one screening value was available from the two sources mentioned above, the minimum value was conservatively selected as the surface soil screening value. This ecological screening criteria was used to help determine potential risk from metals to ecological receptors at the site.

The following subsections only discuss the results of the abovementioned pesticides and metals constituents for the purpose of showing delineation at this site for those constituents, as per the Final CMS Work Plan for SWMUs 53 and 54 (Baker, 2003). An in-depth human health and ecological risk analysis of these constituents is provided in the Draft CMS Final Report for SWMU 53 (Baker, 2003b).

### **3.1 Surface Soil**

A total of 25 surface soil samples, including four duplicate samples, have been collected at SWMU 53 from the past three investigations and analyzed for heptachlor, heptachlor epoxide, and chlordane, as presented in Table 3-1. Also included in the discussion below is the results of kepone (2002 RFI and 2003 CMS investigation only) and 4,4'-DDE from all three field investigations. As mentioned in Section 3.0, the March 2003 kepone and 4,4'-DDE analytical results are unvalidated, therefore, were only included in this report for delineation purposes only not for evaluation of risks. A total of 36 surface soil samples, including five duplicate samples, have been collected from SWMU 53 during the past three field investigations and analyzed for metals. Copper and zinc were analyzed in 32 of the 36 samples, while lead was analyzed in all 36 samples as presented in Table 3-2. However, the results from six samples (53SB01-00, 53SB02-00, 53SB02-00D, 53SB03-00, 53SB04-00, and 53SB04-00D) all contained results that were qualified with an "R" qualifier. This qualifier means that the data was rejected by the data validator, and therefore, is unusable. These samples were deemed unusable because the

corresponding matrix spike recovery for lead for these samples was greater than the 200% allowed by laboratory protocols.

Of the five pesticides presented in Table 3-1, heptachlor epoxide, chlordane, kepone, and 4,4'-DDE contained detections above at least one of the listed criteria. Figure 3-1 shows the sample locations and analytical results for chlordane, heptachlor, heptachlor epoxide, kepone, and 4,4'-DDE at SWMU 53. The locations of these exceedance are restricted to three areas of the site.

The first area (53SB14 and 53SS07) is located to the north and northeast off the northeast corner of Building 64. Sample locations 53SB14 and 53SS07 had positive detections of pesticides (chlordane, heptachlor epoxide, and kepone) above at least one of the criteria. This area of the site has been encircled by samples (53SB02, 53SS08, 53SS10, 53SS09, and 53SS03) with non-detections or detections below the listed criteria providing delineation of chlordane and heptachlor epoxide at this location of the site as shown on Figure 3-1. There is uncertainty associated with the delineation of kepone to the west of 53SB14 since the samples collected from previous investigations were not analyzed for kepone. This uncertainty will be addressed during the development of the Corrective Measure Implementation Design package and the remediation of the site.

The second area (53SB09) is located to the west of the southwest corner of the building. Sample location 53SB09 had positive detections of chlordane and kepone in excess of the listed criteria as shown on Figure 3-1. The delineation of chlordane has been accomplished in this area except to the south. There were no other samples in the vicinity of this area that were analyzed for Kepone. This leads to an uncertainty of delineation of kepone in this area. These uncertainties will be addressed during the development of the Corrective Measure Implementation Design package and the remediation of the site.

The final area (53SS02) is located at the northwest corner of Building 64. Sample location 53SS02 exceeded the listed criteria for 4,4'-DDE as shown on Figure 3-1. This area of the site has been delineated through the fixed base laboratory analysis of samples 53SS01 and 53SB02 along with samples 53SB10, 53SB11, 53SB12, and 53SB07 that were analyzed in the field with the EnviroGard DDT in soil test kit. The EnviroGard DDT in soil test kit does not differentiate between 4,4'-DDT and other organochlorines (4,4'-DDD, 4,4'-DDE, DDA, chloropropylate, chlorobenzilate, dicofol, and tertadifon) which if present can generate a positive detection for

DDT in soil. Since all of these samples were non-detect for DDT in soil it can be assumed that they are also non-detect for DDE.

All three metal constituents contained detections that exceeded at least one of the listed criteria. Figure 3-2 shows the sample locations and analytical results for copper, lead, and zinc at SWMU 53. Copper exceeded both the Ecological Surface Soil Screening value of 50 milligrams per kilogram (mg/kg) in 31 of the 32 samples, with concentrations ranging from 61 mg/kg in sample 53SS18, to 120J mg/kg (53SS05), as presented in Table 3-2. Figure 3-2 also demonstrates that the March 2003 CMS field investigation did not delineate the extent of copper contamination across the site with respect to the Ecological Surface Soil Screening value. Lead contained detections that exceeded both industrial and residential RBCs in only 6 of the 30 samples as presented in Table 3-2. These samples are located adjacent to Building 64 as presented on Figure 3-2. The lead detections also exceeded the Ecological Surface Soil Screening value in 15 of the 30 samples. Figure 3-2 demonstrates that although the lead results have been delineated with respect to the RBC criteria across the site, however, they have not been delineated with respect to the Ecological Screening value on the eastern and southern sides of Building 64. Zinc contained detections that exceeded the residential RBCs, as well as the Ecological Surface Soil Screening value. The concentrations of zinc were above the residential RBCs in 4 of the 30 samples, while they were above the Ecological Surface Soil Screening value in 31 of the 32 samples, as presented in Table 3-2. The detections of zinc ranged from 58 mg/kg in sample 53SS28 to 5,800 mg/kg in sample 53SS06. Figure 3-2 demonstrates that although zinc concentrations have been delineated with respect to the residential RBCs, they have not been delineated across the site with respect to the Ecological Surface Soil Screening value. The exceedances of the Ecological Surface Soil Screening value at SWMU 53 are addressed in Section 3.0 of the Draft CMS Final Report for SWMU 53 (Baker, 2003b).

### **3.2 QA/QC Samples**

One equipment rinsate and one field blank samples were collected during the March 2003 CMS field investigation and analyzed for the abovementioned pesticides and metals. There were no detections of organics in either sample collected, however, there was one detection of zinc found in both samples that ranged from 0.0034J milligrams per liter (mg/L) in sample 53FB01, to 0.0038J mg/L in sample 53ER01, as presented in Table 3-3. The zinc detection found in the field blank sample indicates that zinc is most likely not related to the site, rather it was most likely

introduced into the equipment rinsate sample from the lab grade deionized water that was used for the field blank.

## **4.0 CONCLUSIONS AND RECOMMENDATIONS**

The following subsections provide the conclusions and recommendations for SWMU 53 as determined from the findings of the investigations discussed previously.

### **4.1 Conclusions**

This section of the report provides overall conclusions regarding SWMU 53 based on results of this and past field investigations. As mentioned in Section 1.1, the primary objective of this report was to provide delineation of the previous chlordane and heptachlor epoxide concentrations detected during the RFI investigation in February 2002 (Baker, 2002), as well as to provide delineation of the lead, copper, and zinc within the surface soil at this site.

Based on the results of the 2003 CMS field investigation at SWMU 53, it is clear that delineation of heptachlor, heptachlor epoxide, chlordane, and 4,4'-DDE has occurred within the surface soil as presented in Section 3.0. Kepone has not been delineated west of Building 64 as mentioned in Section 3.1. Although surface soil sample 53SS07 did contain a concentration of chlordane which exceeded the Ecological Surface Soil Screening value, surface soil samples 53SS08, 53SS09, 53SS10, and 53SS11 encompassed 53SS07 and did not contain detections of any of the pesticides above the listed criteria.

Lead, copper, and zinc were all detected above either the Ecological Surface Soil Screening values, with the exception of 53SS29, for the surface soil samples collected during the March 2003 CMS field investigation. There were no exceedances of the EPA Region III RBCs from surface soil samples collected during the March 2003 investigation. Therefore, all three metals have been delineated when compared to their respective EPA RBC values, but they have not been delineated when compared to their Ecological Surface Soil Screening values. There appears to be a potential risk to ecological receptors as a result of the levels of the abovementioned three metals. A detailed evaluation of human health and ecological risks is provided in the Draft CMS Final Report for SWMU 53 (Baker, 2003b).

### **4.2 Recommendations**

It is recommended that a CMS be completed to develop remedial alternatives for the pesticides and metals presented in this report that are present in the soil at SWMU 53 above the USEPA

Region III RBCs and Ecological Surface Soil Screening values. The CMS will develop corrective action objectives (CAOs) dealing with human health and ecological receptors.

## 5.0 REFERENCES

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## **TABLES**

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TABLE 2-1

**SUMMARY OF SAMPLING AND ANALYTICAL PROGRAM  
SWMU 53 - BUILDING 64 (MALARIA CONTROL BUILDING)  
CORRECTIVE MEASURES STUDY INVESTIGATION  
NAVAL STATION ROOSEVELT ROADS, CEIBA, PUERTO RICO**

Sample Media	Sample Designation	Sample Depth (ft bgs)	Analysis Requested Solid Samples		Comments
			App IX Pest <sup>(1)</sup>	App IX Metals <sup>(2)</sup>	
Surface Soil	53SS07	0.00 - 1.00	X	X	
	53SS08	0.00 - 1.00	X		
	53SS08D	0.00 - 1.00	X		Duplicate
	53SS08MS/MSD	0.00 - 1.00	X		Matrix Spike/Matrix Spike Duplicate
	53SS09	0.00 - 1.00	X		
	53SS10	0.00 - 1.00	X		
	53SS11	0.00 - 1.00	X		
	53SS12	0.00 - 1.00	X <sup>(3)</sup>		
	53SS13	0.00 - 1.00	X <sup>(3)</sup>	X	
	53SS14	0.00 - 1.00	X <sup>(3)</sup>		
	53SS15	0.00 - 1.00	X <sup>(3)</sup>		
	53SS16	0.00 - 1.00	X <sup>(3)</sup>		
	53SS17	0.00 - 1.00		X	
	53SS17D	0.00 - 1.00		X	Duplicate
	53SS18	0.00 - 1.00		X	
	53SS19	0.00 - 1.00		X	
	53SS20	0.00 - 1.00		X	
	53SS21	0.00 - 1.00		X	
	53SS22	0.00 - 1.00		X	
	53SS23	0.00 - 1.00		X	
	53SS24	0.00 - 1.00		X	
	53SS25	0.00 - 1.00		X	
	53SS26	0.00 - 1.00		X	
	53SS27	0.00 - 1.00		X	
	53SS27D	0.00 - 1.00		X	Duplicate
	53SS27MS/MSD	0.00 - 1.00		X	Matrix Spike/Matrix Spike Duplicate
	53SS28	0.00 - 1.00		X	
	53SS29	0.00 - 1.00		X	

**Notes:**

ft bgs - feet below ground surface.

<sup>(1)</sup> - Appendix IX Pesticides (Chlordane, Heptachlor, and Heptachlor Epoxide) only.

<sup>(2)</sup> - Appendix IX Metals (Lead, Copper, and Zinc) only.

<sup>(3)</sup> - This sample was extracted at the laboratory but not analyzed due to the delineation of the pesticides in samples 53SS09 through 53SS11.

**TABLE 2-2**

**SUMMARY OF SAMPLING AND ANALYTICAL PROGRAM - QA/QC  
 SWMU 53 - BUILDING 64 (MALARIA CONTROL BUILDING)  
 CORRECTIVE MEASURES STUDY INVESTIGATION  
 NAVAL STATION ROOSEVELT ROADS, CEIBA, PUERTO RICO**

Sample ID	Analysis Requested Aqueous Samples				Comments
	Lead	Copper	Zinc	Pesticides <sup>(1)</sup>	
<b>SWMU 53 - Equipment Rinsates</b>					
53ER01	X	X	X	X	Stainless Steel Spoon
<b>SWMU 53 - Field Blanks</b>					
53FB01	X	X	X	X	Lab Grade Deionized H <sub>2</sub> O

**Notes:**

<sup>(1)</sup> - Appendix IX Pesticides (Chlordane, Heptachlor, and Heptachlor Epoxide) only.

**TABLE 2-3**

**METHOD PERFORMANCE LIMITS  
MODIFIED APPENDIX IX PESTICIDES LIST AND CONTRACT  
REQUIRED QUANTITATION LIMITS (CRQL)**

<b>Pesticides</b>	<b>Quantitation Limits*</b>		<b>Method Number</b>
	<b>Water (mg/L)</b>	<b>Low Soil (mg/kg)</b>	
Chlordane	0.5	17	8081
Heptachlor	0.05	1.7	8081
Heptachlor epoxide	0.05	1.7	8081

\* Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, will be higher.

µg/kg - micrograms per kilogram.

µg/L - micrograms per liter.

**TABLE 2-4**

**METHOD PERFORMANCE LIMITS  
MODIFIED APPENDIX IX METALS LIST AND CONTRACT  
REQUIRED QUANTITATION LIMITS (CRQL)**

<b>Inorganics</b>	<b>Quantitation Limits*</b>		<b>Method Number</b>	<b>Method Description</b>
	<b>Water (mg/L)</b>	<b>Low Soil (mg/kg)</b>		
Copper	20	2.0	6010	Inductively Coupled Plasma
Lead	5.0	0.5	6010	Inductively Coupled Plasma
Zinc	20	2.0	6010	Inductively Coupled Plasma

Note:

\* Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, will be higher.

µg/kg - micrograms per kilogram.

µg/L - micrograms per liter.

**TABLE 3-1**

**SUMMARY OF ORGANIC DETECTIONS IN SURFACE SOIL  
SWMU 53 - BUILDING 64 (MALARIA CONTROL BUILDING)  
CORRECTIVE MEASURES STUDY INVESTIGATION  
NAVAL STATION ROOSEVELT ROADS, CEIBA, PUERTO RICO**

Site ID	USEPA Region III	USEPA Region III	Ecological	53SS01	53SS02	53SS03	53SS04	53SS05	53SS06
Sample ID	Industrial	Residential	Surface Soil	53SS01	53SS02	53SS03	53SS04	53SS05	53SS06
Sample Date	RBCs	RBCs	Screening	12/13/00	12/13/00	12/13/00	12/13/00	12/13/00	12/13/00
Sample Depth (ft bgs)	(ug/kg)	(ug/kg)	Values	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Investigation			(ug/kg)	SAP	SAP	SAP	SAP	SAP	SAP
<b>App. IX Pesticides (ug/kg)</b>									
Heptachlor	640	140	100	19 U	220 U	4 U	39 U	2.2 U	19 U
Heptachlor epoxide	310	70.2	100	19 UJ	220 UJ	4 UJ	39 UJ	2.2 UJ	3.2 J
Chlordane	8,200	1,825	100	190 U	2,200 U	40 U	390 U	22 U	190 U
Kepone <sup>(1)</sup>	360	80	100	NA	NA	NA	NA	NA	NA
4,4'-DDE <sup>(1)</sup>	8,400	1,900	400	300 J	<u>970</u>	28	310	8	140 J

**Notes:**

ft bgs - feet below ground surface.

ug/kg - micrograms per kilogram.

J - Results are qualified as estimated.

U - Not Detected.

UJ - Report quantitation limit is qualified as estimated.

D - "D" at the end of the sample ID designates a duplicate sample.

SAP - December 2000 Sampling and Analysis Plan Field Investigation.

RFI - February 2002 RFI Field Investigation.

CMSI - March 2003 CMS Field Investigation.

NA - Not Analyzed.

<sup>(1)</sup> - This data was not validated. It is used for delineation purposes only.

**TABLE 3-1**

**SUMMARY OF ORGANIC DETECTIONS IN SURFACE SOIL  
SWMU 53 - BUILDING 64 (MALARIA CONTROL BUILDING)  
CORRECTIVE MEASURES STUDY INVESTIGATION  
NAVAL STATION ROOSEVELT ROADS, CEIBA, PUERTO RICO**

Site ID	USEPA Region III	USEPA Region III	Ecological	53SS06	53SB01	53SB02	53SB02	53SB03	53SB04
Sample ID	Industrial	Residential	Surface Soil	53SS06D	53SB01-00	53SB02-00	53SB02-00D	53SB03-00	53SB04-00
Sample Date	RBCs	RBCs	Screening	12/13/00	12/14/00	12/14/00	12/14/00	12/14/00	12/14/00
Sample Depth (ft bgs)	(ug/kg)	(ug/kg)	Values	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Investigation			(ug/kg)	SAP	SAP	SAP	SAP	SAP	SAP
<b>App. IX Pesticides (ug/kg)</b>									
Heptachlor	640	140	100	37 U	2.3 U	24 U	4.6 U	2.1 U	0.34 J
Heptachlor epoxide	310	70.2	100	37 UJ	2.3 U	24 U	4.6 U	2.1 U	4.4 U
Chlordane	8,200	1,825	100	370 U	23 U	240 U	46 U	21 U	44 U
Kepon <sup>(1)</sup>	360	80	100	NA	NA	NA	NA	NA	NA
4,4'-DDE <sup>(1)</sup>	8,400	1,900	400	360 J	4.5 U	47 J	25 J	0.5 J	19

**Notes:**

ft bgs - feet below ground surface.

ug/kg - micrograms per kilogram.

J - Results are qualified as estimated.

U - Not Detected.

UJ - Report quantitation limit is qualified as estimated.

D - "D" at the end of the sample ID designates a duplicate sample.

SAP - December 2000 Sampling and Analysis Plan Field Investigation.

RFI - February 2002 RFI Field Investigation.

CMSI - March 2003 CMS Field Investigation.

NA - Not Analyzed.

<sup>(1)</sup> - This data was not validated. It is used for delineation purposes only.

TABLE 3-1

**SUMMARY OF ORGANIC DETECTIONS IN SURFACE SOIL  
SWMU 53 - BUILDING 64 (MALARIA CONTROL BUILDING)  
CORRECTIVE MEASURES STUDY INVESTIGATION  
NAVAL STATION ROOSEVELT ROADS, CEIBA, PUERTO RICO**

Site ID	USEPA Region III	USEPA Region III	Ecological	53SB04	53SB05	53SB06	53SB09	53SB14	53SB16
Sample ID	Industrial	Residential	Surface Soil	53SB04-00D	53SB05-00	53SB06-00	53SB09-00	53SB14-00	53SB16-00
Sample Date	RBCs	RBCs	Screening	12/14/00	12/13/00	12/13/00	02/15/02	02/15/02	02/15/02
Sample Depth (ft bgs)	(ug/kg)	(ug/kg)	Values	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Investigation			(ug/kg)	SAP	SAP	SAP	RFI	RFI	RFI
<b>App. IX Pesticides (ug/kg)</b>									
Heptachlor	640	140	100	2.2 U	190 U	1.9 U	10 UJ	1.7 J	2.3 UJ
Heptachlor epoxide	310	70.2	100	2.2 U	190 UJ	0.43 J	5.6 J	<b>160</b>	2.3 U
Chlordane	8,200	1,825	100	22 U	1,900 U	19 U	630	<b>2,700</b>	23 U
Kepone <sup>(1)</sup>	360	80	100	NA	NA	NA	<b>440</b> J	<b>380</b> J	230 U
4,4'-DDE <sup>(1)</sup>	8,400	1,900	400	11	390 J	32	79	21 U	4.4 U

**Notes:**

- ft bgs - feet below ground surface.
- ug/kg - micrograms per kilogram.
- J - Results are qualified as estimated.
- U - Not Detected.
- UJ - Report quantitation limit is qualified as estimated.
- D - "D" at the end of the sample ID designates a duplicate sample.
- SAP - December 2000 Sampling and Analysis Plan Field Investigation.
- RFI - February 2002 RFI Field Investigation.
- CMSI - March 2003 CMS Field Investigation.
- NA - Not Analyzed.
- <sup>(1)</sup> - This data was not validated. It is used for delineation purposes only.

**TABLE 3-1**

**SUMMARY OF ORGANIC DETECTIONS IN SURFACE SOIL  
SWMU 53 - BUILDING 64 (MALARIA CONTROL BUILDING)  
CORRECTIVE MEASURES STUDY INVESTIGATION  
NAVAL STATION ROOSEVELT ROADS, CEIBA, PUERTO RICO**

Site ID	USEPA Region III	USEPA Region III	Ecological	53SB17	53SS07	53SS08	53SS08	53SS09	53SS10	53SS11
Sample ID	Industrial	Residential	Surface Soil	53SB17-00	53SS07	53SS08	53SS08D	53SS09	53SS10	53SS11
Sample Date	RBCs	RBCs	Screening	02/15/02	03/23/03	03/23/03	03/23/03	03/23/03	03/23/03	03/23/03
Sample Depth (ft bgs)	(ug/kg)	(ug/kg)	Values	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Investigation			(ug/kg)	RFI	CMSI	CMSI	CMSI	CMSI	CMSI	CMSI
<b>App. IX Pesticides (ug/kg)</b>										
Heptachlor	640	140	100	2 UJ	1.9 U	1.8 U	1.9 U	2.0 U	2.1 U	2.0 U
Heptachlor epoxide	310	70.2	100	2 U	8.4 J	1.8 U	1.9 U	2.9	2.1 U	2.0 U
Chlordane	8,200	1,825	100	20 U	780	18 U	19	20 U	21 U	20 U
Kepone <sup>(1)</sup>	360	80	100	200 U	190 U	NA	190 U	200 U	210 U	200 U
4,4'-DDE <sup>(1)</sup>	8,400	1,900	400	3.8 U	2.5 J	NA	0.92 J	9.4	1.0 J	0.59 J

**Notes:**

ft bgs - feet below ground surface.

ug/kg - micrograms per kilogram.

J - Results are qualified as estimated.

U - Not Detected.

UJ - Report quantitation limit is qualified as estimated.

D - "D" at the end of the sample ID designates a duplicate sample.

SAP - December 2000 Sampling and Analysis Plan Field Investigation.

RFI - February 2002 RFI Field Investigation.

CMSI - March 2003 CMS Field Investigation.

NA - Not Analyzed.

<sup>(1)</sup> - This data was not validated. It is used for delineation purposes only.

**TABLE 3-1**

**SUMMARY OF ORGANIC DETECTIONS IN SURFACE SOIL  
SWMU 53 - BUILDING 64 (MALARIA CONTROL BUILDING)  
CORRECTIVE MEASURES STUDY INVESTIGATION  
NAVAL STATION ROOSEVELT ROADS, CEIBA, PUERTO RICO**

Site ID	Number	Range	Number	Range	Number	Range	Location
Sample ID	Exceeding	Exceeding	Exceeding	Exceeding	Exceeding	Exceeding	of
Sample Date	USEPA Region III	USEPA Region III	USEPA Region III	USEPA Region III	Ecological	Ecological	Maximum
Sample Depth (ft bgs)	Industrial	Industrial	Residential	Residential	Surface Soil	Surface Soil	Detection
Investigation	RBCs	RBCs	RBCs	RBCs	Screening	Screening	
					Values	Values	
<b>App. IX Pesticides (ug/kg)</b>							
Heptachlor	0/25		0/25		0/25		53SB14-00
Heptachlor epoxide	0/25		1/25	160	1/25	160	53SB14-00
Chlordane	0/25		1/25	2,700	2/25	630 - 2,700	53SB14-00
Kepone <sup>(1)</sup>	2/9	380J - 440J	2/9	380J - 440J	2/9	380J - 440J	53SB09-00
4,4'-DDE <sup>(1)</sup>	0/24		0/24		1/24	970	53SS02

**Notes:**

ft bgs - feet below ground surface.

ug/kg - micrograms per kilogram.

J - Results are qualified as estimated.

U - Not Detected.

UJ - Report quantitation limit is qualified as estimated.

D - "D" at the end of the sample ID designates a duplicate sample.

SAP - December 2000 Sampling and Analysis Plan Field Investigation.

RFI - February 2002 RFI Field Investigation.

CMSI - March 2003 CMS Field Investigation.

NA - Not Analyzed.

<sup>(1)</sup> - This data was not validated. It is used for delineation purposes only.

TABLE 3-2

**SUMMARY OF INORGANIC DETECTIONS IN SURFACE SOIL  
SWMU 53 - BUILDING 64 (MALARIA CONTROL BUILDING)  
CORRECTIVE MEASURES STUDY INVESTIGATION  
NAVAL STATION ROOSEVELT ROADS, CEIBA, PUERTO RICO**

Site ID	USEPA Region III	USEPA Region III	Ecological	53SS01	53SS02	53SS03	53SS04	53SS05	53SS06	53SS06
Sample ID	Industrial	Residential	Surface Soil	53SS01	53SS02	53SS03	53SS04	53SS05	53SS06	53SS06D
Sample Date	RBCs	RBCs	Screening	12/13/00	12/13/00	12/13/00	12/13/00	12/13/00	12/13/00	12/13/00
Sample Depth (ft bgs)	(mg/kg)	(mg/kg)	Values	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Investigation			(mg/kg)	SAP	SAP	SAP	SAP	SAP	SAP	SAP
<b>App. IX Metals (mg/kg)</b>										
Copper	4,100	310	50	<u>87</u> J	<u>84</u> J	<u>79</u> J	<u>70</u> J	<u>120</u> J	<u>99</u> J	<u>110</u> J
Lead	400 <sup>(1)</sup>	400 <sup>(1)</sup>	50	<u>300</u>	<u>120</u>	<u>2,500</u>	<u>3,600</u>	<u>900</u>	<u>3,900</u>	<u>470</u>
Zinc	31,000	2,300	50	<u>580</u>	<u>350</u>	<u>2,200</u>	<u>3,100</u>	<u>3,300</u>	<u>5,800</u>	<u>1,600</u>

**Notes:**

- ft bgs - feet below ground surface.
- mg/kg - milligrams per kilogram.
- NA - Not Analyzed.
- <sup>(1)</sup> - 1996 Soil Screening Guidance.
- R - Result is rejected and unusable.
- J - Results are qualified as estimated.
- D - "D" at the end of the sample ID designates a duplicate sample.
- SAP - December 2000 Sampling and Analysis Plan Field Investigation.
- RFI - February 2002 RFI Field Investigation.
- CMSI - March 2003 CMS Field Investigation.

TABLE 3-2

**SUMMARY OF INORGANIC DETECTIONS IN SURFACE SOIL  
SWMU 53 - BUILDING 64 (MALARIA CONTROL BUILDING)  
CORRECTIVE MEASURES STUDY INVESTIGATION  
NAVAL STATION ROOSEVELT ROADS, CEIBA, PUERTO RICO**

Site ID	USEPA Region III	USEPA Region III	Ecological	53SB01	53SB02	53SB02	53SB03	53SB04	53SB04
Sample ID	Industrial	Residential	Surface Soil	53SB01-00	53SB02-00	53SB02-00D	53SB03-00	53SB04-00	53SB04-00D
Sample Date	RBCs	RBCs	Screening	12/14/00	12/14/00	12/14/00	12/14/00	12/14/00	12/14/00
Sample Depth (ft bgs)	(mg/kg)	(mg/kg)	Values	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Investigation			(mg/kg)	SAP	SAP	SAP	SAP	SAP	SAP
<b>App. IX Metals (mg/kg)</b>									
Copper	4,100	310	50	<u>83</u>	<u>85</u>	<u>69</u>	<u>68</u>	<u>75</u>	<u>86</u>
Lead	400	400	50	11 R	150 R	220 R	81 R	120 R	210 R
Zinc	31,000	2,300	50	<u>83</u> J	<u>1,000</u> J	<u>530</u> J	<u>300</u> J	<u>530</u> J	<u>750</u> J

**Notes:**

- ft bgs - feet below ground surface.
- mg/kg - milligrams per kilogram.
- NA - Not Analyzed.
- <sup>(1)</sup> - 1996 Soil Screening Guidance.
- R - Result is rejected and unusable.
- J - Results are qualified as estimated.
- D - "D" at the end of the sample ID designates a duplicate sample.
- SAP - December 2000 Sampling and Analysis Plan Field Investigation.
- RFI - February 2002 RFI Field Investigation.
- CMSI - March 2003 CMS Field Investigation.

TABLE 3-2

**SUMMARY OF INORGANIC DETECTIONS IN SURFACE SOIL  
SWMU 53 - BUILDING 64 (MALARIA CONTROL BUILDING)  
CORRECTIVE MEASURES STUDY INVESTIGATION  
NAVAL STATION ROOSEVELT ROADS, CEIBA, PUERTO RICO**

Site ID	USEPA Region III	USEPA Region III	Ecological	53SB05	53SB06	53SB07	53SB12	53SB15	53SB19	53SS07
Sample ID	Industrial	Residential	Surface Soil	53SB05-00	53SB06-00	53SB07-00	53SB12-00	53SB15-00	53SB19-00	53SS07
Sample Date	RBCs	RBCs	Screening	12/13/00	12/13/00	02/15/02	02/15/02	02/15/02	02/15/02	03/23/03
Sample Depth (ft bgs)	(mg/kg)	(mg/kg)	Values	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Investigation			(mg/kg)	SAP	SAP	RFI	RFI	RFI	RFI	CMSI
<b>App. IX Metals (mg/kg)</b>										
Copper	4,100	310	50	<u>89</u> J	<u>76</u> J	NA	NA	NA	NA	<u>79</u>
Lead	400	400	50	<u>2,200</u>	<u>55</u>	<u>200</u>	12	3.7	23	46
Zinc	31,000	2,300	50	<u>2,400</u>	<u>120</u>	NA	NA	NA	NA	<u>100</u>

**Notes:**

ft bgs - feet below ground surface.

mg/kg - milligrams per kilogram.

NA - Not Analyzed.

<sup>(1)</sup> - 1996 Soil Screening Guidance.

R - Result is rejected and unusable.

J - Results are qualified as estimated.

D - "D" at the end of the sample ID designates a duplicate sample.

SAP - December 2000 Sampling and Analysis Plan Field Investigation.

RFI - February 2002 RFI Field Investigation.

CMSI - March 2003 CMS Field Investigation.

TABLE 3-2

**SUMMARY OF INORGANIC DETECTIONS IN SURFACE SOIL  
SWMU 53 - BUILDING 64 (MALARIA CONTROL BUILDING)  
CORRECTIVE MEASURES STUDY INVESTIGATION  
NAVAL STATION ROOSEVELT ROADS, CEIBA, PUERTO RICO**

Site ID	USEPA Region III	USEPA Region III	Ecological	53SS13	53SS17	53SS17	53SS18	53SS19	53SS20	53SS21	53SS22
Sample ID	Industrial	Residential	Surface Soil	53SS13	53SS17	53SS17D	53SS18	53SS19	53SS20	53SS21	53SS22
Sample Date	RBCs	RBCs	Screening	03/23/03	03/23/03	03/23/03	03/23/03	03/23/03	03/23/03	03/23/03	03/23/03
Sample Depth (ft bgs)	(mg/kg)	(mg/kg)	Values	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Investigation			(mg/kg)	CMSI	CMSI	CMSI	CMSI	CMSI	CMSI	CMSI	CMSI
<b>App. IX Metals (mg/kg)</b>											
Copper	4,100	310	50	<u>82</u>	<u>68</u>	<u>71</u>	<u>61</u>	<u>98</u>	<u>74</u>	<u>63</u>	<u>91</u>
Lead	400	400	50	8.4	34	25	<u>53</u>	24	<u>70</u>	<u>54</u>	<u>190</u>
Zinc	31,000	2,300	50	<u>99</u>	<u>100</u>	<u>85</u>	<u>130</u>	<u>100</u>	<u>240</u>	<u>200</u>	<u>670</u>

**Notes:**

ft bgs - feet below ground surface.

mg/kg - milligrams per kilogram.

NA - Not Analyzed.

<sup>(1)</sup> - 1996 Soil Screening Guidance.

R - Result is rejected and unusable.

J - Results are qualified as estimated.

D - "D" at the end of the sample ID designates a duplicate sample.

SAP - December 2000 Sampling and Analysis Plan Field Investigation.

RFI - February 2002 RFI Field Investigation.

CMSI - March 2003 CMS Field Investigation.

TABLE 3-2

**SUMMARY OF INORGANIC DETECTIONS IN SURFACE SOIL  
SWMU 53 - BUILDING 64 (MALARIA CONTROL BUILDING)  
CORRECTIVE MEASURES STUDY INVESTIGATION  
NAVAL STATION ROOSEVELT ROADS, CEIBA, PUERTO RICO**

Site ID	USEPA Region III	USEPA Region III	Ecological	53SS23	53SS24	53SS25	53SS26	53SS27	53SS27	53SS28	53SS29
Sample ID	Industrial	Residential	Surface Soil	53SS23	53SS24	53SS25	53SS26	53SS27	53SS27D	53SS28	53SS29
Sample Date	RBCs	RBCs	Screening	03/23/03	03/23/03	03/23/03	03/23/03	03/23/03	03/23/03	03/23/03	03/23/03
Sample Depth (ft bgs)	(mg/kg)	(mg/kg)	Values	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Investigation			(mg/kg)	CMSI	CMSI	CMSI	CMSI	CMSI	CMSI	CMSI	CMSI
<b>App. IX Metals (mg/kg)</b>											
Copper	4,100	310	50	<u>86</u>	<u>72</u>	<u>64</u>	<u>100</u>	<u>82</u>	<u>82</u>	<u>62</u>	39
Lead	400	400	50	2.7	<u>100</u>	7.1	19	12	12	7.1	2.6
Zinc	31,000	2,300	50	<u>63</u>	<u>220</u>	<u>65</u>	<u>160</u>	<u>85</u>	<u>93</u>	<u>58</u>	48

**Notes:**

- ft bgs - feet below ground surface.
- mg/kg - milligrams per kilogram.
- NA - Not Analyzed.
- <sup>(1)</sup> - 1996 Soil Screening Guidance.
- R - Result is rejected and unusable.
- J - Results are qualified as estimated.
- D - "D" at the end of the sample ID designates a duplicate sample.
- SAP - December 2000 Sampling and Analysis Plan Field Investigation.
- RFI - February 2002 RFI Field Investigation.
- CMSI - March 2003 CMS Field Investigation.

**TABLE 3-2**

**SUMMARY OF INORGANIC DETECTIONS IN SURFACE SOIL  
SWMU 53 - BUILDING 64 (MALARIA CONTROL BUILDING)  
CORRECTIVE MEASURES STUDY INVESTIGATION  
NAVAL STATION ROOSEVELT ROADS, CEIBA, PUERTO RICO**

Site ID	Number	Range	Number	Range	Number	Range	Location
Sample ID	Exceeding	Exceeding	Exceeding	Exceeding	Exceeding	Exceeding	of
Sample Date	USEPA Region III	USEPA Region III	USEPA Region III	USEPA Region III	Ecological	Ecological	Maximum
Sample Depth (ft bgs)	Industrial	Industrial	Residential	Residential	Surface Soil	Surface Soil	Detection
Investigation	RBCs	RBCs	RBCs	RBCs	Screening	Screening	
					Values	Values	
<b>App. IX Metals (mg/kg)</b>							
Copper	0/32		0/32		31/32	61 - 120J	53SS05
Lead	6/30	470 - 3,900	6/30	470 - 3,900	15/30	53 - 3,900	53SS06
Zinc	0/32		4/32	2,400 - 5,800	31/32	58 - 5,800	53SS06

**Notes:**

ft bgs - feet below ground surface.

mg/kg - milligrams per kilogram.

NA - Not Analyzed.

<sup>(1)</sup> - 1996 Soil Screening Guidance.

R - Result is rejected and unusable.

J - Results are qualified as estimated.

D - "D" at the end of the sample ID designates a duplicate sample.

SAP - December 2000 Sampling and Analysis Plan Field Investigation.

RFI - February 2002 RFI Field Investigation.

CMSI - March 2003 CMS Field Investigation.

**TABLE 3-3**

**SUMMARY OF ANALYTICAL RESULTS IN QA/QC SAMPLES  
SWMU 53 - BUILDING 64 (MALARIA CONTROL BUILDING)  
CORRECTIVE MEASURES STUDY INVESTIGATION  
NAVAL STATION ROOSEVELT ROADS, CEIBA, PUERTO RICO**

Sample ID	53ER01	53FB01
Sample Date	3/23/03	3/23/03

**App. IX Pesticides (ug/L)**

Heptachlor	0.05 U	0.05 U
Heptachlor epoxide	0.05 U	0.05 U
Chlordane	0.5 U	0.5 U

**App. IX Metals - Total (mg/L)**

Copper	0.02 U	0.02 U
Lead	0.005 U	0.005 U
Zinc	0.0038 J	0.0034 J

**Notes:**

ug/L - micrograms per liter.

mg/L - milligrams per liter.

J - Estimated value.

U - Not Detected.

## **FIGURES**

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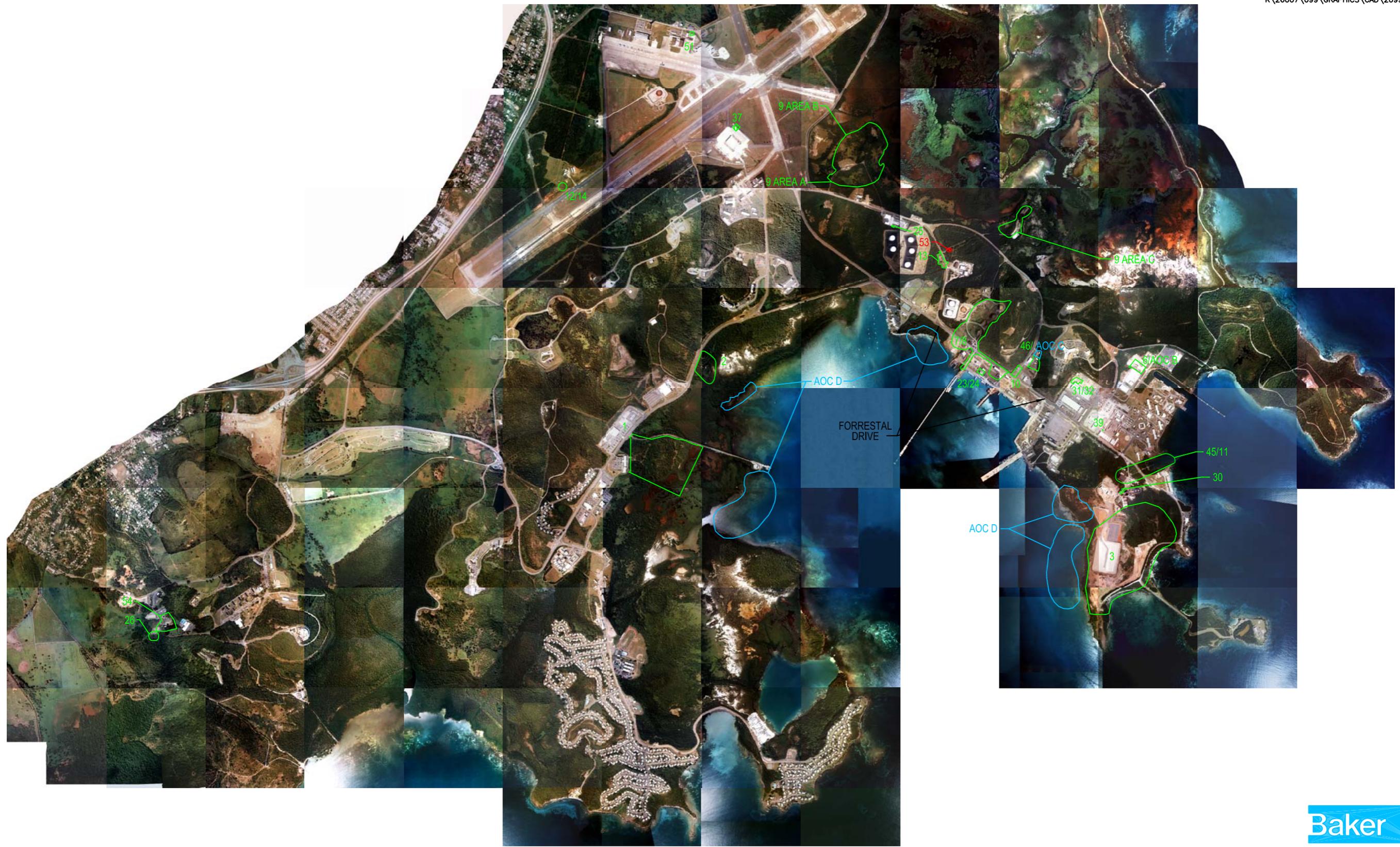


Baker

FIGURE 1-1  
REGIONAL LOCATION MAP

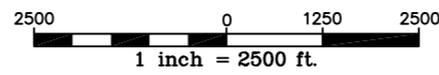
NAVAL STATION ROOSEVELT ROADS  
PUERTO RICO

SOURCE: METRODATA, INC., 1999.



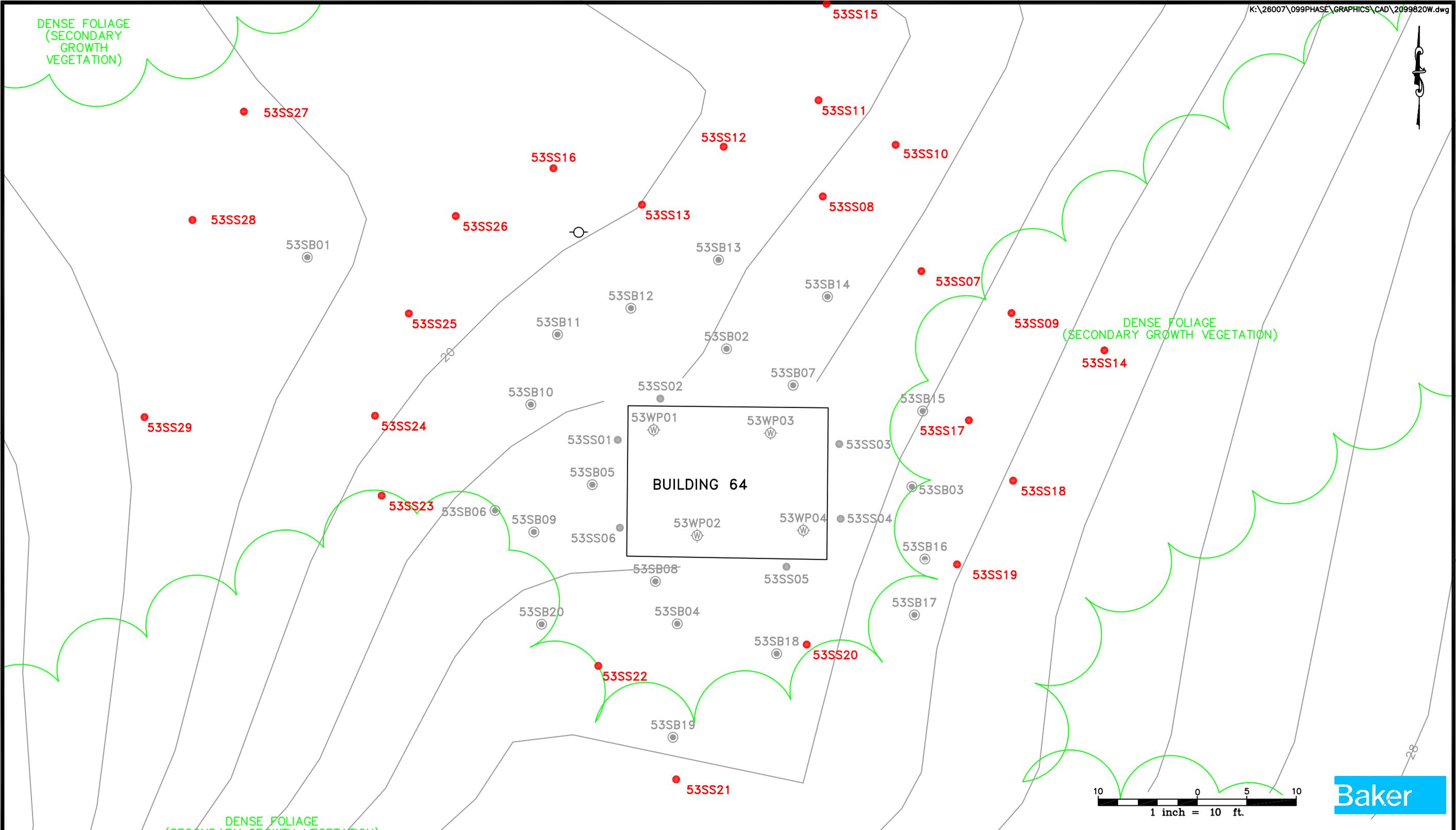
**LEGEND**

- 1 - SWMUs
- AOC D - AOCs
- 53 - AREA OF WHICH THIS REPORT PERTAINS TO



**FIGURE 1-2**  
**SWMU/AOC LOCATION MAP**  
 NAVAL STATION ROOSEVELT ROADS  
 PUERTO RICO

SOURCE: GEO-MARINE, INC., SEPTEMBER 6, 2000.



10 0 5 10  
1 inch = 10 ft.

**LEGEND**

- WIPE SAMPLE LOCATION (SAMPLING AND ANALYSIS INVESTIGATION, 2000)
- ADDITIONAL SURFACE SOIL SAMPLE LOCATION (CMS INVESTIGATION, 2003)
- SURFACE SOIL SAMPLE LOCATION (SAMPLING AND ANALYSIS INVESTIGATION, 2000)
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (SAMPLING AND ANALYSIS INVESTIGATION, 2000)
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (RFI, 2002)
- OVERHEAD ELECTRIC UTILITY POLE
- BUILDING
- GROUND SURFACE CONTOUR LINE
- TREE LINE

SOURCE: DEPT. OF THE NAVY, SEPTEMBER 1999.

**FIGURE 2-1**  
**ADDITIONAL SURFACE SOIL SAMPLE LOCATIONS**  
**CORRECTIVE MEASURES STUDY INVESTIGATION**  
**SWMU 53, BUILDING 64**  
**(MALARIA CONTROL BUILDING)**  
**NAVAL STATION ROOSEVELT ROADS**  
**PUERTO RICO**

DENSE FOLIAGE (SECONDARY GROWTH VEGETATION)

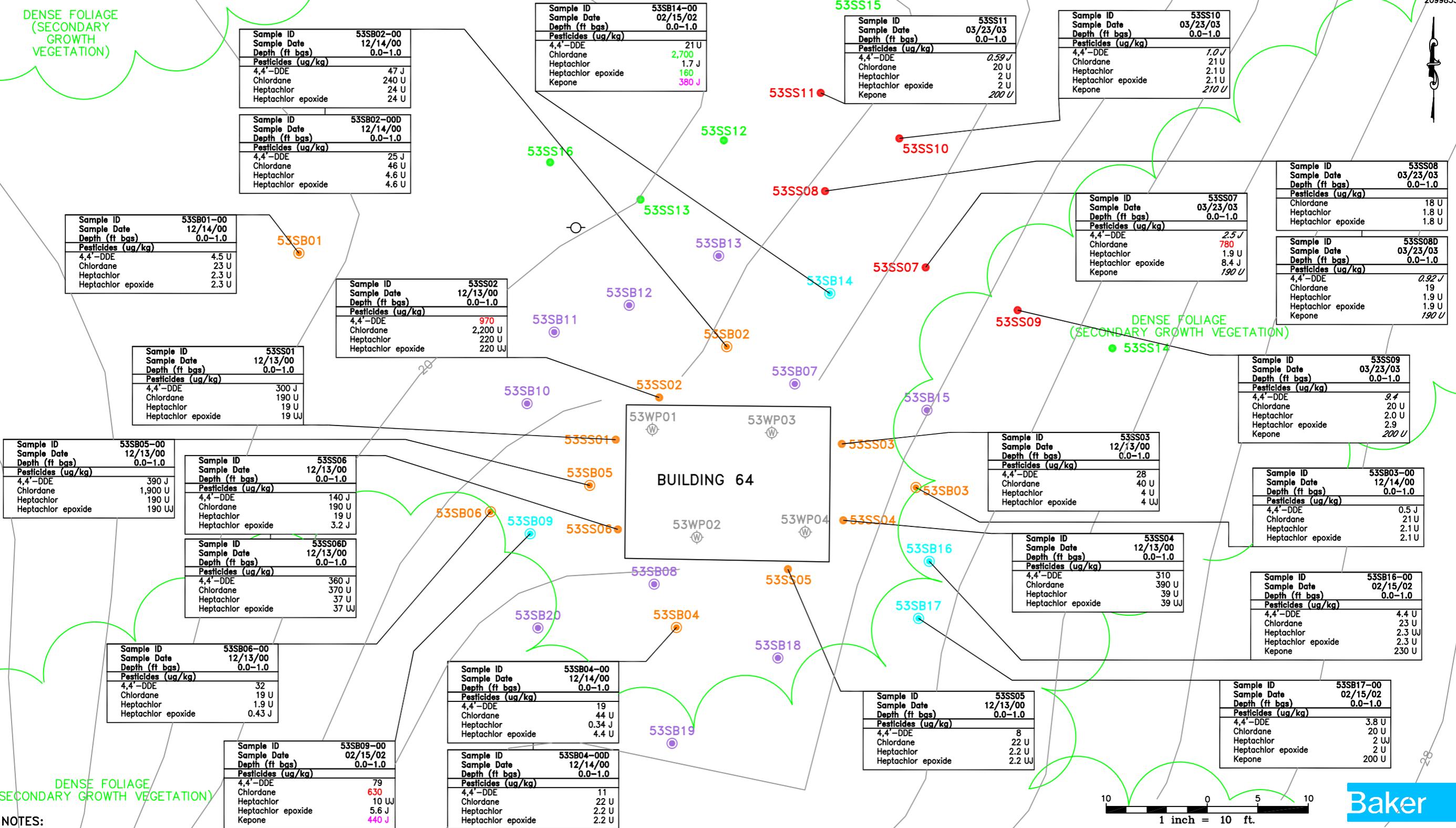
DENSE FOLIAGE (SECONDARY GROWTH VEGETATION)

DENSE FOLIAGE (SECONDARY GROWTH VEGETATION)

NOTES:  
ITALICS DATA NOT VALIDATED.

53SS12 ADDITIONAL SURFACE SOIL SAMPLE LOCATION COLLECTED DURING CMS INVESTIGATION BUT NOT ANALYZED DUE TO DELINEATION OF PESTICIDES IN SAMPLES 53SS09, 53SS10, AND 53SS11. THIS SAMPLE WAS FIELD ANALYZED FOR 4,4'-DDT ONLY (INCLUDING OTHER ORGANOCHLORINES). THE RESULT OF THE FIELD ANALYSIS INDICATED <0.2 ppm FOR 4,4'-DDT. THE FOLLOWING COLOR CODING ONLY APPLIES TO THE RESULTS PROVIDED IN THE BOXES ABOVE. EXCEEDS EPA REGION III INDUSTRIAL AND RESIDENTIAL RBCs, AS WELL AS THE ECOLOGICAL SURFACE SOIL SCREENING VALUE. EXCEEDS EPA REGION III RESIDENTIAL RBC AND ECOLOGICAL SURFACE SOIL SCREENING VALUES. EXCEEDS ECOLOGICAL SURFACE SOIL SCREENING VALUE.

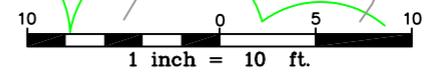
SOURCE: DEPT. OF THE NAVY, SEPTEMBER 1999.

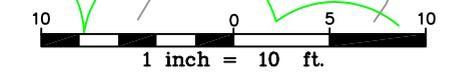
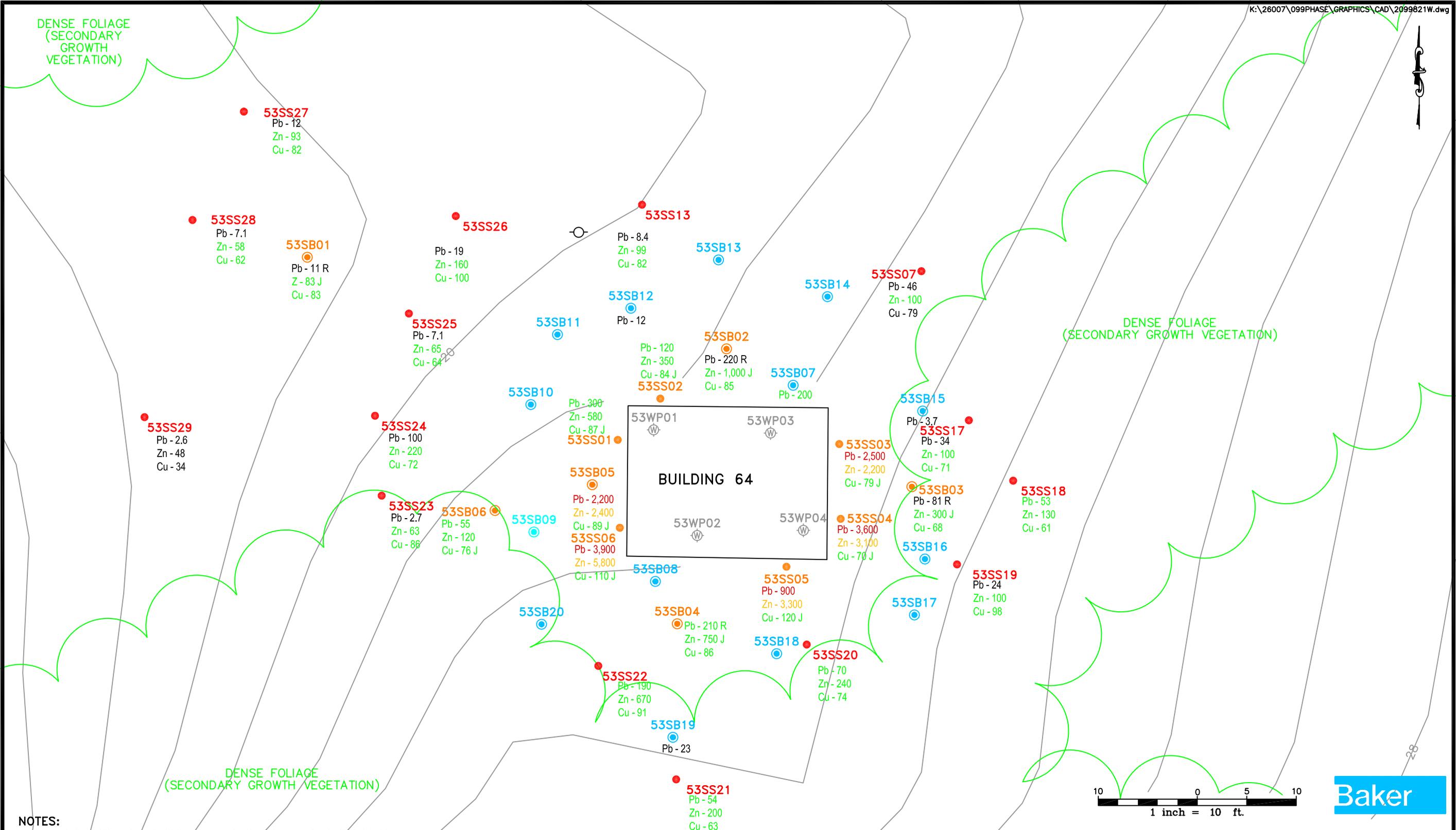


**LEGEND**

- - WIPE SAMPLE LOCATION (SAMPLING AND ANALYSIS INVESTIGATION, 2000)
- - SURFACE SOIL SAMPLE LOCATION (SAMPLING AND ANALYSIS INVESTIGATION, 2000)
- - ADDITIONAL SURFACE SOIL SAMPLE LOCATION (CMS INVESTIGATION, 2003)
- - SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (SAMPLING AND ANALYSIS INVESTIGATION, 2000)
- - SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (RFI, 2002)
- - OVERHEAD ELECTRIC UTILITY POLE
- ▭ - BUILDING
- - GROUND SURFACE CONTOUR LINE
- - TREE LINE

**FIGURE 3-1**  
PESTICIDE INVESTIGATION RESULTS IN SURFACE SOIL CORRECTIVE MEASURES STUDY INVESTIGATION SWMU 53, BUILDING 64 (MALARIA CONTROL BUILDING)  
NAVAL STATION ROOSEVELT ROADS  
PUERTO RICO





**NOTES:**  
**Pb - 2,200** EXCEEDS EPA REGION III INDUSTRIAL AND RESIDENTIAL RBCs, AS WELL AS THE ECOLOGICAL SURFACE SOIL SCREENING VALUE.  
**Zn - 2,400** EXCEEDS EPA REGION III RESIDENTIAL RBC, AS WELL AS THE ECOLOGICAL SURFACE SOIL SCREENING VALUE.  
**Cu - 86** EXCEEDS THE ECOLOGICAL SURFACE SOIL SCREENING VALUE.

**LEGEND**

	- WIPE SAMPLE LOCATION (SAMPLING AND ANALYSIS INVESTIGATION, 2000)		<b>53SS04</b> Pb - 3,600 Zn - 3,100 Cu - 70 J
	- SURFACE SOIL SAMPLE LOCATION (SAMPLING AND ANALYSIS INVESTIGATION, 2000)		
	- ADDITIONAL SURFACE SOIL SAMPLE LOCATION (CMS INVESTIGATION, 2003)		
	- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (SAMPLING AND ANALYSIS INVESTIGATION, 2000)		
	- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION (RFI, 2002)		
	- OVERHEAD ELECTRIC UTILITY POLE		
	- BUILDING		
	- GROUND SURFACE CONTOUR LINE		
	- TREE LINE		
	SOURCE: DEPT. OF THE NAVY, SEPTEMBER 1999.		

Pb - LEAD  
 Zn - ZINC  
 Cu - COPPER  
 ALL CONCENTRATION LISTED AS mg/Kg

**FIGURE 3-2**  
**LEAD, ZINC, AND COPPER INVESTIGATION RESULTS**  
 IN SURFACE SOIL  
 CORRECTIVE MEASURES STUDY INVESTIGATION  
 SWMU 53, BUILDING 64  
 (MALARIA CONTROL BUILDING)  
 NAVAL STATION ROOSEVELT ROADS  
 PUERTO RICO

**APPENDIX A**  
**Chain of Custody Records**

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ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

STL Savannah  
5102 LaRoche Avenue  
Savannah, GA 31404

Website: www.stl-inc.com  
Phone: (912) 354-7858  
Fax: (912) 352-0165

**SEVERN  
TRENT**

**STL**

○ Alternate Laboratory Name/Location

Phone:  
Fax:

PROJECT REFERENCE <b>CLEAN II CTO-099</b>	PROJECT NO. <b>Swmu 53</b>	PROJECT LOCATION (STATE) <b>PR</b>	MATRIX TYPE	REQUIRED ANALYSIS								PAGE <b>1</b>	OF <b>3</b>	
STL (LAB) PROJECT MANAGER <b>ANGIE WEIMERSKIRK</b>	P.O. NUMBER	CONTRACT NO.	COMPOSITE (C) OR GRAB (G) INDICATE AQUEOUS (WATER) SOLID OR SEMISOLID AIR NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	<input checked="" type="checkbox"/>	STANDARD REPORT DELIVERY <input checked="" type="checkbox"/>									
CLIENT (SITE) PM <b>MARK KIMES</b>	CLIENT PHONE <b>412-269-2009</b>	CLIENT FAX <b>412-337-3995</b>												DATE DUE <b>28 DAY TAT</b>
CLIENT NAME <b>BAKER</b>	CLIENT E-MAIL <b>mkimes@mbakercorp.com</b>	EXPEDITED REPORT DELIVERY (SURCHARGE) <input type="checkbox"/>												DATE DUE _____
CLIENT ADDRESS <b>100 AIRSIDE DR, MOON TWP., PA, 15108</b>	COMPANY CONTRACTING THIS WORK (if applicable) <b>CH2M Hill</b>	NUMBER OF COOLERS SUBMITTED PER SHIPMENT:												REMARKS

**APP IX POST - Chloroform, Heptachlor, Heptachlor Epoxide**  
**APP IX Metals - Lead, Copper, Zinc**

**PRESERVATIVE**

SAMPLE		SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	NUMBER OF CONTAINERS SUBMITTED								REMARKS		
DATE	TIME							1	2	3	4	5	6	7	8		9	10
3/23/03	0821	53SS07	G	X				1										
	0828	53SS08	G	X				1										
	0828	53SS08D	G	X				1										
	0828	53SS08 MS/MSD	G	X				1										
	0818	53SS09	G	X				1										EXTRACT & HOLD FOR ANALYSIS
	0825	53SS10	G	X				1										EXTRACT & HOLD FOR ANALYSIS
	0835	53SS11	G	X				1										EXTRACT & HOLD FOR ANALYSIS
	0847	53SS12	G	X				1										EXTRACT & HOLD FOR ANALYSIS
	0900	53SS13	G	X				1*		1								* EXTRACT & HOLD FOR ANALYSIS
	0818	53SS14	G	X				1										EXTRACT & HOLD FOR ANALYSIS
	0838	53SS15	G	X				1										EXTRACT & HOLD FOR ANALYSIS
	0905	53SS16	G	X				1										EXTRACT & HOLD FOR ANALYSIS

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
			<i>Mark E. Kimes</i>	3/24/03	1500			
RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
<i>Mark E. Kimes</i>	3/21/03	0900						

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT YES <input type="radio"/> NO <input type="radio"/>	CUSTODY SEAL NO.	STL SAVANNAH LOG NO. <b>5382058</b>	LABORATORY REMARKS
<i>Wendy H. Davis</i>	3/24/03	9:46				



ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

**SEVERN**  
**TRENT** **STL**

**STL Savannah**  
5102 LaRoche Avenue  
Savannah, GA 31404

Website: www.stl-inc.com  
Phone: (912) 354-7858  
Fax: (912) 352-0165

Alternate Laboratory Name/Location

Phone:  
Fax:

PROJECT REFERENCE <b>CLEAN II CTO-099</b>		PROJECT NO. <b>Swmu 53</b>	PROJECT LOCATION (STATE) <b>PR</b>	MATRIX TYPE	REQUIRED ANALYSIS										PAGE <b>3</b>	OF <b>3</b>		
STL (LAB) PROJECT MANAGER <b>ANGIE WEIMERSKIRK</b>		P.O. NUMBER	CONTRACT NO.	COMPOSITE (C) OR GRAB (G) INDICATE AQUEOUS (WATER) SOLID OR SEMISOLID AIR NONAQUEOUS LIQUID (OIL, SOLVENT,...) <b>APP X Metals - Lead, Copper, Zinc</b>	1	PRESERVATIVE											STANDARD REPORT DELIVERY <input checked="" type="radio"/>	DATE DUE <b>28 DAY TAT</b>
CLIENT (SITE) PM <b>MARK KIMES</b>		CLIENT PHONE <b>412-269-2009</b>	CLIENT FAX <b>412-337-3995</b>														EXPEDITED REPORT DELIVERY (SURCHARGE) <input type="radio"/>	DATE DUE _____
CLIENT NAME <b>BAKER</b>		CLIENT E-MAIL <b>mkimes@mbakercorp.com</b>															NUMBER OF COOLERS SUBMITTED PER SHIPMENT:	
CLIENT ADDRESS <b>100 Airside Dr. Moon Twp., PA 15108</b>		COMPANY CONTRACTING THIS WORK (if applicable) <b>CH2M Hill</b>															REMARKS	
SAMPLE		SAMPLE IDENTIFICATION												NUMBER OF CONTAINERS SUBMITTED		REMARKS		
DATE	TIME																	
<b>3/23/03</b>	<b>0941</b>	<b>5355 27 D</b>																
	<b>0941</b>	<b>5355 27 MS/MSD</b>																
	<b>0937</b>	<b>5355 28</b>																
	<b>0933</b>	<b>5355 29</b>																
RELINQUISHED BY: (SIGNATURE)		DATE	TIME	RELINQUISHED BY: (SIGNATURE)		DATE	TIME	RELINQUISHED BY: (SIGNATURE)		DATE	TIME	RELINQUISHED BY: (SIGNATURE)		DATE	TIME			
<i>Mark E. Kimes</i>		<b>3/24/03</b>	<b>1500</b>	<i>Mark E. Kimes</i>		<b>3/24/03</b>	<b>1500</b>	<i>Mark E. Kimes</i>				<i>Mark E. Kimes</i>						
RECEIVED BY: (SIGNATURE)		DATE	TIME	RECEIVED BY: (SIGNATURE)		DATE	TIME	RECEIVED BY: (SIGNATURE)		DATE	TIME	RECEIVED BY: (SIGNATURE)		DATE	TIME			
<i>Mark E. Kimes</i>		<b>3/24/03</b>	<b>0900</b>	<i>Mark E. Kimes</i>				<i>Mark E. Kimes</i>				<i>Mark E. Kimes</i>						

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE) <i>Allyson D...</i>	DATE <b>3/25/03</b>	TIME <b>9:46</b>	CUSTODY INTACT YES <input type="radio"/> NO <input type="radio"/>	CUSTODY SEAL NO.	STL SAVANNAH LOG NO. <b>5382058</b>	LABORATORY REMARKS
--	------------------------	---------------------	---	------------------	--	--------------------



**APPENDIX B**  
**Field Notes from SWMU 53 CMS Field Investigation**

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**APPENDIX B.1**  
**Field Notes from Jon Edel – Site Manager**

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Sunday

March 23, 2003

Projects (continued)

- 0645 MEK and I arrived on base at Naval Station Roosevelt Roads.
- 0750 MEK and I arrived at Swmu 53 to conduct field investigation.
- 0755 MEK and I begin staking out the sample locations we are to collect during this investigation.
- 0818 MEK and I collected samples 535514 and 535509.
- 0821 Sample 535507 was collected.
- 0825 We collected sample 535510.
- 0828 Samples 535508, 535508b, and 535508 ms/msd were collected.
- 0835 Sample 535511 was collected.
- 0838 Sample 535515 was collected.
- 0847 We collected sample 535512.
- 0900 Sample 535513 was collected.
- 0905 Sample 535516 was collected.
- 0933 We collected sample 535529.
- 0937 We collected sample 535528.
- 0941 Samples 535527, 535527b, and 535527 ms/msd were collected.
- 0943 Sample 535526 was collected.
- 0946 Sample 535525 was collected.
- 0950 We collected 535524.

Sunday

March 23, 2003

- 0953 Sample 535523 was collected.  
1000 MBK and I ran to get ice for  
Samples at Marina.  
1015 MBK and I arrive back at SUMU  
53 to continue sampling.  
1023 Sample 535522 was collected.  
1026 Sample 535521 was collected.  
1029 Sample 535520 was collected.  
1032 We collected 535519.  
1035 We collected 535518.  
1038 Sample 535517, and 535517A  
were collected.  
1730 MBK and I are collecting the  
QA/QC samples 53FB01 and  
53FB01. Weather today was  
hot and sunny all day.

~~Jon C. Edel~~

**APPENDIX C**  
**Data Validation Report Narratives**

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# HEARTLAND

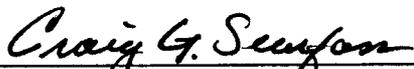
ENVIRONMENTAL SERVICES, INC.

## Data Validation Report

SDG#: PRNS57  
Date: May 8, 2003  
Client Name: Baker Environmental, Inc.  
Project/Site Name: Roosevelt Roads CTO-99  
Date Sampled: March 23, 2003  
Number of Samples: 2 Aqueous Sample(s) with 0 MS(s)/MSD(s)  
20 Non-Aqueous Sample(s) with 2 MS(s)/MSD(s)  
Laboratory: STL Savannah  
Validation Guidance: National Functional Guidelines for Organic Data Review, Region II  
QA/QC Level: NEESA D  
Method(s) Utilized: SW846 Third Edition  
Analytical Fractions: Pesticides, Copper, Lead, and Zinc

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

  
\_\_\_\_\_  
Paul B. Hamburg, President

5-8-03.  
\_\_\_\_\_  
Date

SDG# PRNS57

Samples and Fractions Reviewed

Sample Identifications

Analytical Fractions

CH2M HILL ID	MATRIX	PEST		MET	
53SS08	SOIL		X		
53SS08 MS	SOIL		X		
53SS08 MSD	SOIL		X		
53SS08D	SOIL		X		
53SS07	SOIL		X		
53ER01	WATER	X		X	
53FB01	WATER	X		X	
53SS13	SOIL				X
53SS17	SOIL				X
53SS17D	SOIL				X
53SS18	SOIL				X
53SS19	SOIL				X
53SS20	SOIL				X
53SS21	SOIL				X
53SS22	SOIL				X
53SS23	SOIL				X
53SS24	SOIL				X
53SS25	SOIL				X
53SS26	SOIL				X
53SS27	SOIL				X
53SS27 MS	SOIL				X
53SS27 MSD	SOIL				X
53SS27D	SOIL				X
53SS28	SOIL				X
53SS29	SOIL				X
53SS07	SOIL				X
Total Billable Samples (Water/Soil)		2	5	2	19

PEST= Pesticides  
 MET= Cu, Pb, Zn

## **DATA ASSESSMENT NARRATIVES**

# DATA ASSESSMENT NARRATIVE

## PESTICIDES/AROCLORS

### General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the USEPA CLP OLM04.2 pesticides/aroclors method; the Region II Functional Guidelines for Organic Data Review, 9/94; and DQO Level IV requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

### SDG # PRNS57

A validation was performed on the pesticides/aroclors Data from SDG PRNS57. The data was evaluated based on the following parameters:

- \* • Data Completeness
- \* • Holding Times
- \* • Calibration
- \* • Blanks
- \* • Surrogate Recoveries
- \* • Matrix Spike/Matrix Spike Duplicates
- \* • Field Duplicates
- \* • Laboratory Control Standard
- \* • Compound Identification
- Compound Quantitation

\* - All criteria were met for this parameter.

### Compound Identification results

The differences between the two column for sample 82058-19(50%) was greater than 25% but less than 90%. All positive results are qualified as estimated, "J"

### System Performance and Overall Assessment

The data, as reported, required qualifications.

## SUMMARY OF DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>COMPOUND ID</u>	<u>DL</u>	<u>QL</u>
82058-19 (53SS07)	heptachlor epoxide	P	J

- \* DL denotes the Form I qualifier supplied by the laboratory
- QL denotes the qualifier used by the data validation firm
- + in the DL column denotes a positive result
- in the DL column denotes a non detect result

# DATA ASSESSMENT NARRATIVE

## METALS

### General

The inorganic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 methods for Metals and the Evaluation of Metals Data for the Contract Laboratory Program for Region II Jan 1992, and DQO Level IV requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

### SDGs # PRNS57

A validation was performed on the Metals Data from SDG PRNS57. The data was evaluated based on the following parameters.

- \* ● Data Completeness
- \* ● Holding Times
- \* ● Calibrations
- \* ● Blanks
- \* ● Interferences
- \* ● Matrix Spike Recovery
- \* ● Matrix Duplicates
- \* ● Field Duplicates
- \* ● Laboratory Control Samples
- \* ● Serial Dilutions

\* - All criteria were met for this parameter.

All results with a "B" qualifier that have not been previously flagged will be changed to a "J" qualifier. These results fall between the Instrument Detection Limit (IDL) and the Contract Required Detection Limit (CRDL) and may have an element of uncertainty associated with them due to the variability of IDLs.

## SUMMARY OF DATA QUALIFICATIONS

Sample ID  
all "B" results

Analyte  
all analytes

DL  
B

QL  
J



**HEARTLAND**  
ENVIRONMENTAL SERVICES, INC.

**Data Validation Report**

SDG#: PRNS60  
Date: May 23, 2003  
Client Name: Michael Baker Jr., Inc..  
Project/Site Name: Roosevelt Roads CTO-99  
Date Sampled: March 23, 2003  
Number of Samples: 3 Non- Aqueous Sample(s) with 0 MS(s)/MSD(s)  
Laboratory: STL Savannah  
Validation Guidance: National Functional Guidelines for Organic Data Review, Region II  
QA/QC Level: NEESA D  
Method(s) Utilized: SW846 Third Edition  
Analytical Fractions: Appendix IX Pesticides

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

  
Paul R. Humburg, President

5-23-02  
Date

**SDG# PRNS60**

**Samples and Fractions Reviewed**

Sample Identifications      Analytical Fraction

CH2M HILL ID	MATRIX	PEST	
53SS09	SOIL		X
53SS10	SOIL		X
53SS11	SOIL		X
Total Billable Samples (Water/Soil)		0	3

PEST= Appendix IX Pesticides

# DATA ASSESSMENT NARRATIVE

## PESTICIDES/AROCLORS

### General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the USEPA CLP OLM04.2 pesticides/aroclors method; the Region II Functional Guidelines for Organic Data Review, 9/94; and DQO Level IV requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

### SDG # PRNS60

A validation was performed on the pesticides/aroclors Data from SDG PRNS60. The data was evaluated based on the following parameters:

- \* • Data Completeness
- \* • Holding Times
- \* • Calibration
- \* • Blanks
- \* • Surrogate Recoveries
- \* • Matrix Spike/Matrix Spike Duplicates
- \* • Field Duplicates
- \* • Laboratory Control Standard
- \* • Compound Identification
- \* • Compound Quantitation

\* - All criteria were met for this parameter.

### System Performance and Overall Assessment

The data, as reported, required no qualifications.

## SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID                      COMPOUND ID                      DL    QL  
Data stands as reported without qualification.

- \* DL denotes the Form I qualifier supplied by the laboratory
- QL denotes the qualifier used by the data validation firm
- + in the DL column denotes a positive result
- in the DL column denotes a non detect result