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NSWC CRANE
5090.3a

ADDENDUM 1 to the Interim Measures Report

Removal and Disposal of Contaminated Soil at the Mine Fill A Battery Site

NSWC Crane
Crane, Indiana

Revision 1

May 2005

Prepared for

Southern Division
Naval Facilities Engineering Command
North Charleston, South Carolina
29419-9010

TOLTEST, INC.

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

IN REPLY REFER TO:

5090
Ser 095/5162
17 MAY 2005

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

Dear Mr. Ramanauskas:

Crane Division, Naval Surface Warfare Center (NSWC Crane) submits, for your review and approval, the Draft Interim Measures Report (IMR) for Mine Fill A (MFA) Battery Addendum 1 Revision 1 dated May 2005. One copy of the report is provided as enclosure (1). Enclosure (2) is the required certification statement.

NSWC Crane point of contact is Mrs. Christine D. Freeman, Code RP3-CF, telephone 812-854-4423.

Sincerely,

James M. Hunsicker

JAMES M. HUNSICKER
Manager, Environmental Protection
By direction of the Commanding Officer

Enclosures: 1. Draft Addendum 1 IMR for MFA Battery Rev. 1
2. Certification Statement

Copy to:
Administrative Record
IDEM (Griffin)
SOUTHNAVFACENGCOM (Code ES32)
SOUTHNAVFACENGCOM ROICC (w/o encls)
TOLTEST Odon (w/o encls)

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

SIGNATURE

MANAGER, ENVIRONMENTAL PROTECTION
BY DIRECTION OF THE COMMANDING OFFICER
TITLE

5/16/05
DATE

ADDENDUM 1 to the INTERIM MEASURES REPORT REMOVAL AND DISPOSAL OF CONTAMINATED SOIL FROM THE MINE FILL A BATTERY SITE

NSWC CRANE
CRANE, INDIANA

Revision 1

May 2005

ENVIRONMENTAL JOB ORDER CONTRACT
N68950-96-D-0052
DELIVERY ORDER #FC04
TolTest Job No. 75318.01

Prepared for

SOUTHERN DIVISION
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5/5/05

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Project Manager/Environmental Specialist

APPROVED BY:

5-5-05

Shayne Newsome — Date
Quality Control Officer

EXECUTIVE SUMMARY

TolTest Inc. (TolTest) has prepared this addendum for Southern Division, Naval Facilities Engineering Command. This addendum documents the actions completed for the identification and disposal of contaminated soil at the Mine Fill A (MFA) Battery Site, Naval Surface Warfare Center (NSWC) Crane in Crane, Indiana. The report summarizes the work actions performed pursuant to the requirements of the approved *Final Interim Measures Work Plan, Mine Fill A Battery Site [TolTest 2001a].*

The scope of work included collection and analysis of three pre-excavation site characterization samples from the area previously identified as the Soil Area. One sample was obtained from an area of known contamination and the remaining samples were obtained from locations with a similar soil type.

Analytical results indicated that contamination was present above TCLP regulatory limits. Consequently 20 tons of contaminated soil was removed and disposed of at the Environmental Quality Company (EQ), Michigan Disposal Waste Treatment Plant in Belleville, Michigan. Subsequent to excavation activities, TetraTech NUS obtained four soil samples from the area of excavation. Laboratory analysis revealed that southern-most of the four samples had elevated levels of explosive compounds, metals, and semi-volatile organic compounds.

To further investigate the lead contamination, the MFA investigative area will be increased to include the MFA Battery Area. Additional ground water, surface, and subsurface soil sampling for lead will be conducted during a RCRA Facility Investigation.

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ACRONYMS

AHA	Activity Hazard Analysis
CFR	Code of Federal Regulations
CFS	Confirmatory Soil Sample
EPD	Environmental Protection Department
EQ	the Environmental Quality Company
IMR	Interim Measures Report
LCS	laboratory control spike
LCSD	laboratory control spike duplicate
MFA	Mine Fill A
mg/kg	mili-grams per kilo-gram
MS	matrix spike
MSD	matrix spike duplicate
NSWC	Naval Surface Warfare Center
OSHA	Occupational Safety and Health Administration
PES	pre-excavation soil sample
PRG	preliminary remedial goal
RPD	relative percent difference
SSHP	Site Safety and Health Plan
TolTest	TolTest, Inc.
U.S. EPA	United States Environmental Protection Agency
WP	Work Plan

1.0 INTRODUCTION

This Mine Fill A (MFA) Battery Site Cleanup Interim Measures Report (IMR) addendum has been prepared by TolTest, Inc. (TolTest) for the Naval Surface Warfare Center (NSWC) Crane, Indiana. This report documents work performed at the area identified in the original MFA Battery Site IMR [TolTest, 2002] as the Soil Area. This work was performed pursuant to the requirements of the approved *Interim Measures Work Plan (WP)* [TolTest, 2001], which includes the *Site Safety and Health Plan* (SSHP), *Sampling and Analysis Plan*, and *Quality Assurance Project Plan*. TolTest performed the fieldwork May 21, 2004.

The Battery Site is located on the south end of MFA approximately 140 feet outside the perimeter fence. The site consists of two areas: 1) Battery Area - where batteries were dumped on the ground surface; and 2) Soil Area - an adjacent area where soil and construction debris was dumped in small mounds. The origin of the debris or the dates it was placed is unknown. A reasonable assumption was made by personnel from the NSWC Crane Environmental Protection Department (EPD) that the mounded soil in the Soil Area originated from within MFA, possibly from the installation of road culverts.

1.1 SITE BACKGROUND

A representative of EPD discovered the Battery Site in the early 1990s. At that time, the batteries were recognizable as AA household type and their numbers were estimated to be in the thousands. Just prior to MFA Battery Site cleanup operations in June of 2002, the batteries were all but unrecognizable and only their inner cores were visible on the ground surface. The size of the Battery Area was approximately 3,500 square feet.

The Soil Area had no apparent unusual characteristics: no staining was present and no odor was detectable. The size of the Soil Area was approximately 2,355 square feet consisting of several soil mounds, none exceeding four feet in height. The potential for the waste from either of these areas to be a listed or characteristic waste was unknown.

After excavating the contaminated soil from the Battery Area, a suspicious looking vein of very dark soil with bits of debris in it was detected underneath the rubble of the Soil Area. Analysis of a leached extract from this sample revealed that lead contamination was present at 58.8 mg/kg, which exceeded the regulatory limit for toxicity. This sample was identified as Confirmatory Soil Sample (CFS) 021.

1.2 SCOPE OF WORK

The scope of work for this Addendum included:

- Obtain a sample of the soil from the area of CFS-021 and analyze it for the full Appendix IX list of parameters;
- Excavate a trench on either side of CFS-021 to determine if this vein of soil was isolated or was spread throughout the area;
- Obtain one soil sample from each trench for analysis of arsenic, lead and chromium;
- Excavate and dispose of up to 20 tons (the contract limit) of contaminated soil.

1.3 WASTE MANAGEMENT

Wastes associated with this scope of work included rinse water from decontamination of the sampling equipment and decontamination of the bucket of the backhoe. Wastewater was mixed in with the contaminated soil that was loaded for disposal.

Contaminated soil disposal (discussed in Section 3.0) was accomplished through The Environmental Quality Company (EQ), Michigan Disposal Waste Treatment Plant in Belleville, Michigan.

1.4 PERMITTING/NOTIFICATION

The NSWC Crane facility required issuance of an Excavation and Trenching Permit, which was secured through the Officer In Charge of Construction, Public Works Department, Code 094, Building 2516.

1.5 TRAINING REQUIREMENTS

Personnel responsible for collecting field samples were required to be familiar with all required methods and procedures. Personnel in charge of reducing, evaluating, and reviewing the laboratory field data had a working knowledge of the analytical methods employed.

All field personnel were trained as described in the *SSHP*. Required training included the following:

- OSHA 40-hour Hazardous Waste and Emergency Response Training per 29 CFR 1910.120, updated by annual 8-hour refresher training.
- OSHA 8-hour supervisor's training course in Hazardous Waste Site Safety per 29 CFR 1910.120(e) (field management personnel only).
- Site-specific training.
- Respiratory protection training.
- The individual responsible for the safe package, labeling and shipping of hazardous environmental samples met the training requirements specified in U. S. DOT 49 CFR 172.700, Subpart H.

1.6 ENVIRONMENTAL PROTECTION

The soil-sampling event was conducted on May 21, 2004. At the end of the sampling event, the open trenches were covered with plastic sheeting to prevent infiltration of rain water (**Photo 1, Appendix A-A**) and the bucket of the backhoe, which was the only part of the equipment that came into contact with the contaminated soil, was wrapped in plastic sheeting (**Photo 2**). At the conclusion of excavation and sampling activities, the top of the work site was graded (**Photo 3**) and rocks and boulders were placed back on the slope to stabilize the soil (**Photo 4**).

2.0 SITE CHARACTERIZATION SAMPLING

Three soil samples were obtained May 21, 2004 and identified as Pre-Excavation Sample (PES)-013, PES-014, and PES-015. A plan view of the site with sample locations is shown in **Figure A-1**.

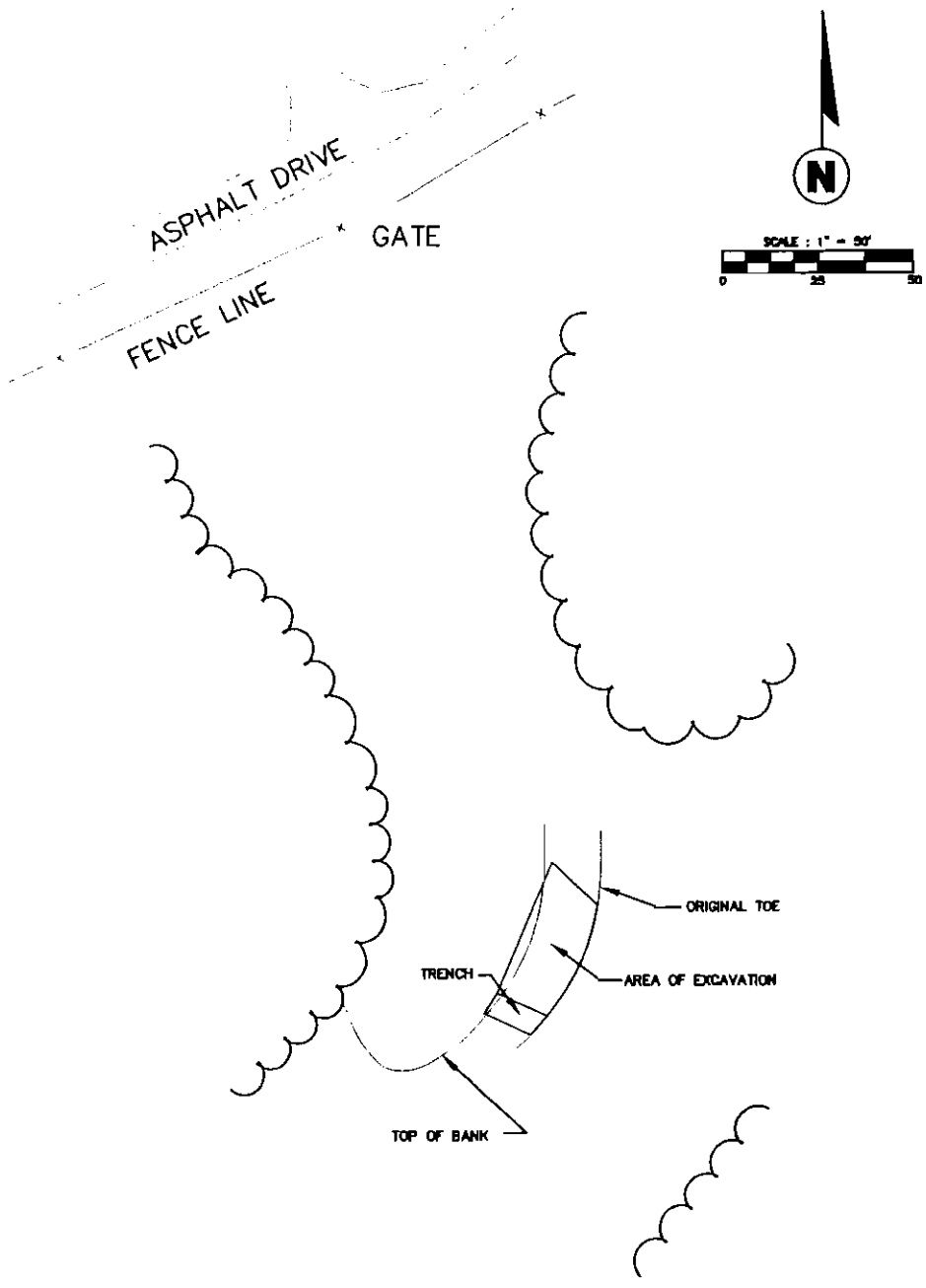
A Certified Professional Geologist was employed to log the soil types in order to compare the analytical results from these three samples to the NSWC Crane Basewide Background Soil Investigation Report [TtNUS, 2001]. The geologist's soil description and field notes are provided in **Appendix A-B**.

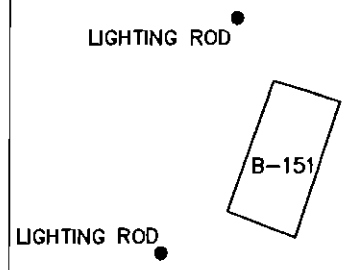
Sample PES-013 was obtained from the same location that CFS-021 had been obtained from in the investigation of 2002. This sample was located at the base of the slope of the Soil Area. This sample was analyzed for the full Appendix IX parameter list to determine if other contaminants besides metals were present.

The vein of soil that PES-013 was obtained from was easily tracked due to its dark color relative to the surrounding soil and the debris that was found in it, such as bits of metal and glass (**Photo 5**). In an effort to determine the extent of this vein of soil, two trenches were dug into the fill material on either side of PES-013. Each trench was approximately two-feet deep, seven feet long, and created a V-shape with PES-013 at the point of the V. Each trench was dug from the bottom of the slope to the top of the slope. The vein of dark soil was readily apparent in both trenches. Sample PES-014 was obtained in the south trench and PES-015 was obtained in the north trench, each approximately five feet up the slope from PES-013. These two samples were analyzed for total arsenic, chromium, and lead.

2.1 ANALYTICAL RESULTS

No Appendix IX constituents, other than metals, were detected in PES-013. Arsenic was detected in all three samples above the U.S. EPA Region 9 Preliminary Remedial Goal (PRG) Industrial Soil Screening Level (SSL). Cadmium was detected in PES-013 above the Residential SSL but below the Industrial SSL. Lead was detected in all three samples above the Industrial SSL and also at a level that could potentially exhibit toxic characteristics. **Table A-1** provides the results of the metals analysis for the three samples. The results of all analyses are provided in **Appendix A-C**.





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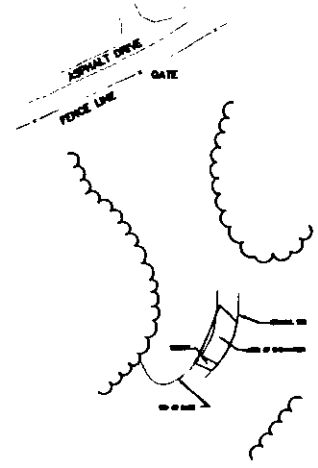

LEGEND

- LIGHTING RODS
- TREELINE

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FIGURE A-1

MINE FILL A
BATTERY SITE

NSWC CRANE, IN.

TOLTEST PROJECT NO: 75318.01	SHEET NO.
DRAWING NO: MFA	1
DRAWN BY: DRB	
DATE: 12/8/2004	

TABLE A-1 METALS RESULTS						
All results in mg/kg	SOIL SCREENING LEVEL			PES SAMPLE #		
	U.S. EPA R9 PRGs		TCLP			
CONSTITUENT	Residential	Industrial	VALUE*	013	014	015
Antimony	31	410	NA	2.6 B	NAD	NAD
Arsenic	0.39	2.7	100	7.7	23.4	20.4
Barium	5,400	100,000	2,000	808	NAD	NAD
Beryllium	150	1,900	NA	0.58 B	NAD	NAD
Cadmium	37	810	20	109	NAD	NAD
Chromium	210	450	100	64.8	66.9	106
Cobalt	4,700	100,000	NA	10.5	NAD	NAD
Copper	3,100	41,000	NA	841	NAD	NAD
Lead	400	750	100	5,040	44,300	3,580
Mercury	23	510	4	0.13B	NAD	NAD
Nickel	1,600	41,000	NA	31.2	NAD	NAD
Selenium	390	10,000	20	5.5 B	NAD	NAD
Silver	390	10,000	100	2.3	NAD	NAD
Thallium	5.2	67	NA	2.0 U	NAD	NAD
Tin	47,000	100,000	NA	254	NAD	NAD
Vanadium	550	7,200	NA	43.2	NAD	NAD
Zinc	23,000	100,000	NA	3,450	NAD	NAD

NA = not applicable
NAD = not analyzed
U.S. EPA Region 9 PRGs updated 10/1/02
*TCLP Values are the RCRA regulatory limits multiplied by 20. If the totals results listed exceed the TCLP Values the sample could potentially exhibit toxic characteristics.

3.0 EXCAVATION OF CONTAMINATED SOIL

TolTest's contract with the Navy limited the amount of contaminated soil that could be excavated and disposed of to 20 tons. The soil was classified as a hazardous waste based on the lead content detected in the PES. A copy of the Uniform Hazardous Waste Manifest, the Generator Approval Notification, and the Land Disposal Restriction & Certification Form are included in **Appendix A-D**.

Pre-excavation activities were commenced on September 20, 2004 by removing the small trees and boulders that were in the work area (**Photo 6**). The soil at the site was very dry which allowed easy removal of any soil adhering to the roots or boulders. Overburden soil and rock was removed from above the seam of contamination and placed to the side.

Excavation of the vein of contaminated soil was commenced and completed on September 21, 2004. Excavation was started at the north end of the slope and proceeded to the south. The soil was loaded with the front bucket of the backhoe and dumped into a dump trailer (**Photo 7**). An earthen ramp was constructed to facilitate dumping the soil into the trailer. Plastic sheeting (visible in **Photo 7**) was placed under the backhoe and dump trailer to collect any spillage and prevent cross contamination.

Excavation continued until approximately 20 tons of contaminated soil had been loaded into the dump trailer. To confirm the weight, the truck was weighed at the NSWC Crane scrap yard scales. The net weight of the load was 20.65 tons. The truck then proceeded to the EQ facility to dispose of the soil. A copy of the completed disposal manifest is included in **Appendix A-D**.

The vein of contaminated soil was still visible in a trench on the south end of the slope (**Photo 8**). The aerial extent of this contamination was not determined.

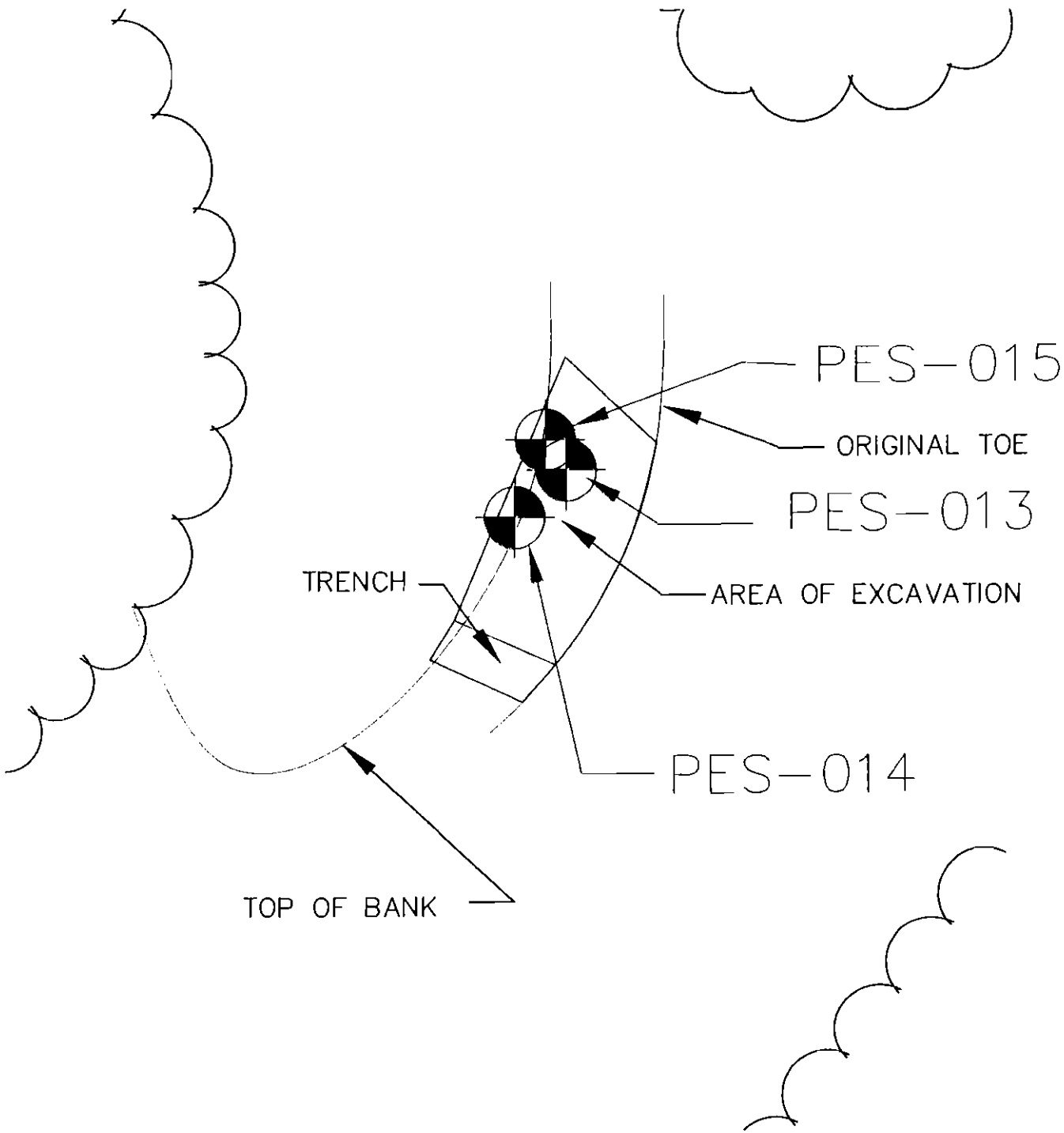
The front and back buckets of the backhoe were decontaminated by scraping them clean, which was easily accomplished due to the dry nature of the soil. This soil and the decontamination water generated during the sampling event (approximately three gallons) were emptied into the dump trailer.

The area of excavation, the original toe of the slope, and the trench cut into the south end of the slope are illustrated in **Figure A-2**.

3.1 POST-EXCAVATION SAMPLING

Tetra-Tech NUS personnel obtained four soil samples from the area of excavation after the 20 tons of soil were removed by TolTest (**Photo 9**). These samples were analyzed for metals, volatile organic compounds, semi-volatile organic compounds, herbicides, and explosive compounds. Sample 12SB21 was obtained from the vein of contamination in the trench that TolTest dug at the south end of the area of excavation (illustrated in **Photo 8)**.

Analytical results indicate that all compounds except herbicides were detected in one or more of the four samples. The highest levels of any compound encountered were detected in sample 12SB21. The TetraTech NUS narrative of this sampling event, including data tables and site maps, is provided in **Appendix A-E**.



LEGEND

TREELINE

SAMPLE LOCATIONS

N

SCALE : 1" = 20'

0 10 20

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FIGURE A-2

SOIL EXCAVATION

MINE FILL A BATTERY SITE

CRANE, IN.

TOLTEST PROJECT NO: 75318.01	SHEET NO.
DRAWING NO: MFA	2
DRAWN BY: DMB	
DATE: 12/9/2004	

4.0 QUALITY CONTROL

4.1 FIELD QUALITY CONTROL

TolTest implemented quality control measures in the field and ensured that the procedures for sample collection, equipment decontamination, sample labeling, sample shipping, and chain of custody documentation were performed according to plan requirements. TolTest ensured that quality control samples (i.e. blanks and duplicates) were obtained at the required intervals.

Soil excavation activities were completed in a manner that satisfied contract requirements and were protective of the surrounding environment.

4.2 DATA QUALITY CONTROL

Three regular soil samples, one soil duplicate, and one equipment rinse blank were obtained on May 21, 2004 and submitted to Laucks Testing Laboratories for analysis. One soil sample (PES-013) was analyzed for Appendix IX parameters. All other samples were analyzed for arsenic, chromium, and lead.

The data was validated according to the guidelines specified in the *Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program, NEESA 20.2-047B June 1988* report, the *Quality Assurance Project Plan for Mine Fill A Battery Site Cleanup at the Naval Surface Warfare Center, Appendix C of the Interim Measures Work Plan for Mine Fill A Battery Site Cleanup, NSWC, Crane, IN, February 2001,* and applicable test method quality control requirements. The objective of the data validation is to determine whether or not the laboratory data results meet quality control requirements in accordance with Level C quality control requirements.

4.2.1 Soil

Test Method 8081A (Pesticides)

A. Holding Time
Samples were analyzed within the hold time requirements.

B. LCS/LCSD
The laboratory control spike (LCS) sample showed acceptable recovery results for most of the target analytes reported. The percent recovery for Methoxychlor exceeded the upper quality control limit. The sample result was non-detect for this analyte and the matrix spike/matrix spike dupkicate (MS/MSD) percent recoveries for this analyte were within the quality control limits.

C. MS/MSD
The MS/MSD pair showed acceptable recovery results for the target analytes reported. The relative percent difference (RPD) results for endrin aldehyde was outside the quality control limit. The MS and MSD both had acceptable recovery results and no further action was taken.

D. Method Blank
The target analytes were not detected above the reporting limits in the method blanks.

E. Surrogate Recoveries
The individual surrogate recoveries for the samples were within given quality control limits.

F. Calibration Requirements
The initial and continuing calibration results met the quality requirements for the analytes reported. The %D value for 4,4-DDT on the column DB-35ms exceeded the quality control limits, however the %D for this analyte was within the control limits on the second column.

G. 4,4-DDT and Endrin Degradation
The degradation of 4,4-DDT or Endrin was within the quality control limit.

H. Sample Calculations
The selected sample calculations were validated and showed comparable results to the reported laboratory results.

I. Method Summary
The data results for this method meet the quality control requirements outlined for Level C data validation.

Test Method 8082 (PCBs)

A. Holding Time
Samples were analyzed within the hold time requirements.

B. LCS/LSCD
The LCS sample showed acceptable recovery results for the target analytes reported.

C. MS/MSD
The MS/MSD pair showed acceptable recovery results for the target analytes reported. The RPD result for Arochlor 1016 was outside the quality control limit. The MS and MSD both had acceptable recovery results and no further action was taken.

D. Surrogate Recoveries
The individual surrogate recoveries for the samples were within given quality control limits.

E. Method Blanks
The target analytes were not detected above the reporting limits in the method blanks.

F. Calibration Requirements
The initial and continuing calibration requirements were within the quality control limits for the analytes reported.

G. Sample Calculations
The selected sample calculations were validated and showed comparable results to the reported laboratory results.

H. Method Summary
The data results for this method meet the quality control requirements outlined for Level C data validation.

Test Method 8151A (Herbicides)

A. Holding Time
Samples were analyzed within the hold time requirements.

B. LCS/LCSD
The LCS sample showed acceptable recovery results for the target analytes reported.

C. MS/MSD
The MS/MSD pair showed acceptable recovery results for the target analytes reported. The RPD results were within the quality control limits.

D. Surrogate Recoveries
The individual surrogate recoveries for the samples were within given quality control limits.

E. Calibration Requirements
The initial and continuing calibration requirements were within the quality control limits for the analytes reported.

F. Method Blanks
The target analytes were not detected above the reporting limits in the method blanks.

H. Sample Calculations
The selected sample calculations were validated and showed comparable results to the reported laboratory results.

I. Method Summary
The data results for this method meet the quality control requirements outlined for Level C data validation.

Test Method 8260B (VOC)

A. Holding Time
Samples were analyzed within the hold time requirements.

B. LCS/LCSD
The LCS sample showed acceptable recovery results for the target analytes reported.

C. MS/MSD
The MS/MSD pair showed acceptable recovery results for the majority of the target analytes reported. The MS sample percent recovery results for 1,2-dibromo-3-chloropropane and 1,2,4-trichlorobenzene were below the lower quality control limit. The MSD sample percent recovery results for1,2-dibromomethane, chlorobenzene, 1,2-dibromo-3-chloropropane, 1,1,1,2-tetrachloroethane and 1,2,4-trichlorobenzene were below the lower quality control limit. The RPD results for carbon tetrachloride, 1,2-dibromoethane, 1,2,4-trichlorobenzene were outside the quality control limits. The LCS percent recoveries for these compounds were within the quality control limits. The sample results were non-detect for these compounds.

D. Internal Standards
The internal standard retention times and areas were within the quality control requirements. The internal standard area for fluorobenzene in the MS sample was less than the lower limit.

E. BFB Tuning Requirements
The BFB tuning requirements were within the minimum frequency and acceptance criteria quality control limits.

F. Surrogate Recoveries
The individual surrogate recoveries for the samples were within given quality control limits.

G. Method Blanks
The target analytes were not detected above the reporting limits in the method blanks.

H. Calibration Requirements
The initial and continuing calibration requirements were within the quality control limits for the analytes reported.

I. Sample Calculations
The selected sample calculations were validated and showed comparable results to the reported laboratory results.

J. Method Summary
The data results for this method meet the quality control requirements outlined for Level C data validation.

Test Method 8270 (SVOC)

A. Holding Time
Samples were analyzed within the hold time requirements.

B. LCS/LCSD
The LCS sample showed acceptable recovery results for the majority of target analytes reported. The percent recovery for bis(2-chloroethoxy)methane, 2-chloronapthalene and benzidine were below the lower quality control limit. The MS/MSD showed acceptable recoveries for bis(2-chloroethoxy)methane and 2-chloronapthalene.

C. MS/MSD
The MS/MSD pair showed acceptable recovery results for the majority of the target analytes reported. The percent recovery in both the MS and MSD for 3,3'-dichlorobenzidine and benzidine were below the lower quality control limit. The LCS showed an acceptable recovery for 3,3'-dichlorobenzidine. Benzidine recoveries in both the MS/MSD pair and LCS were outside the quality control limits and for this analyte the data is not usable. Benzidine was not detected in the field sample. The laboratory case narrative explained that this analyte is "not an analyte of concern and is not a recommended spiked analyte in the DOD Quality Assurance Manual, no further action was taken."

D. DFTPP Tuning Requirements
The DFTPP tuning requirements were within the minimum frequency and acceptance criteria quality control limits.

E. Surrogate Recoveries
The individual surrogate recoveries for the samples were within given quality control limits.

F. Method Blanks
The target analytes were not detected above the reporting limits in the method blanks. Di-n-butylphthalate was detected in the method blank below the reporting limit and the sample was flagged accordingly.

G. Internal Standards
The internal standard retention times and areas were within the quality control requirements.

H. Calibration Requirements
The initial and continuing calibration requirements were within the quality control limits for the analytes reported.
I. Sample Calculations
The selected sample calculations were validated and showed comparable results to the reported laboratory results.

J. Method Summary
The data results for this method meet the quality control requirements outlined for Level C data validation.

Test Method 6010 (ICP Metals)

A. *Holding Time*
Samples were analyzed within the hold time requirements.

B. *LCS/LCSD*
The LCS sample showed acceptable recovery results for the target analytes reported.

C. *MS/MSD*
The MS/MSD pair showed acceptable recovery results for most of the target analytes reported. The MS recoveries for cadmium, copper, lead and zinc were outside the quality control limits. The field sample concentrations for these analytes was greater than four times the spike amount and no further action was taken. The MS recoveries for tin and antimony were outside the control limits. A post-digestive spike was performed and the recovery results were within the control limits. The RPD results were within the quality control limits for most of the target analytes. The RPD results for lead, nickel, tin and zinc were outside the limits.

D. *Method Blank*
The target analytes were not detected above the reporting limits in the method blanks.

E. Calibration Requirements
The initial and continuing calibration requirements were within the quality control limits for the analytes reported.

F. Sample Calculations
The selected sample calculations were validated and showed comparable results to the reported laboratory results.

G. Method Summary
The data results for this method meet the quality control requirements outlined for Level C data validation.

Test Method 8015 (Volatile Organics)

A. Holding Time
Samples were analyzed within the hold time requirements.

B. LCS/LCSD
The LCS sample showed acceptable recovery results for the target analytes reported.

C. MS/MSD
The MS/MSD pair showed acceptable recovery results for the target analytes reported. The RPD results were within the quality control limits.

D. Surrogate Recoveries
The individual surrogate recoveries for the samples were within given quality control limits for the LCS, method blank and MS samples. The field sample and the MSD had low surrogate recoveries.

E. Calibration Requirements
The initial and continuing calibration requirements were within the quality control limits for the analytes reported.

F. Method Blanks
The target analytes were not detected above the reporting limits in the method blanks.

H. Sample Calculations
The selected sample calculations were validated and showed comparable results to the reported laboratory results.

I. Method Summary
The data results for this method meet the quality control requirements outlined for Level C data validation.

Test Method 7471A (Mercury)

A. Holding Times
Samples were analyzed within the hold time requirements.

B. LCS/LCSD
The LCS sample showed acceptable recovery results for the target analytes reported.

C. MS/MSD
The MS/MSD percent recovery was below the quality control limits. The RPD was outside the control limits. The LCS recovery was within the quality control limits so no further action was taken.

D. Method Blank
The target analytes were not detected above the reporting limits in the method blanks.

E. Calibration Requirements
The initial and continuing calibration requirements were within the quality control limits for the analytes reported.

F. Sample Calculations
The selected sample calculations were validated and showed comparable results to the reported laboratory results.

G. Method Summary
The data results for this method meet the quality control requirements outlined for Level C data validation.

Test Method 9034 (Insoluble Sulfide)

A. Holding Times
Samples were analyzed within the hold time requirements.

B. LCS/LCSD
The LCS/LCSD samples showed acceptable recovery results for the target analytes reported. The RPD results were within the quality control limits.

C. Method Blank
The target analytes were not detected above the reporting limits in the method blanks.

D. MS/MSD
The MS/MSD percent recoveries were below the quality control limits. The LCS/LCSD recoveries were within the quality control limits so no further action was taken.

E. Sample Calculations
The selected sample calculations were validated and showed comparable results to the reported laboratory results.

F. Method Summary
The data results for this method meet the quality control requirements outlined for Level C data validation.

Test Method 9012A (Total Cyanide)

A. Holding Times
Samples were analyzed within the recommended hold time requirements.

B. LCS/LCSD
The LCS low level spike percent recovery was below the quality control limits. The LCS high level spike percent recovery was within the quality control level. Samples were reanalyzed and the results were comparable.

C. Calibration Requirements
The initial and continuing calibration requirements were within the quality control limits for the analytes reported.

D. Method Blank
The target analytes were not detected above the reporting limits in the method blanks.

E. MS/MSD
The MS/MSD percent recoveries were outside the quality control limits. The samples were reanalyzed and the lab reported the samples had similar results.

F. Sample Calculations
The selected sample calculations were validated and showed comparable results to the reported laboratory results.

G. Method Summary
The data results for this method meet the quality control requirements outlined for Level C data validation.

4.2.2 Water

Test Method 6010 (ICP Metals)

A. Hold Time
Samples were analyzed within the hold time requirements.

B. Method Blank
The target analytes were not detected above the reporting limits in the method blanks.

C. MS/MSD
The MS/MSD pair showed acceptable recovery results for the target analytes reported. The RPD results were within the quality control limits.

D. Calibration Requirements
The initial and continuing calibration requirements were within the quality control limits for the analytes reported.

E. Sample Results
The rinse blank results yielded non-detect results for arsenic and chromium and lead were detected below the reporting limits.

F. Method Summary
The data results for this method meet the quality control requirements outlined for Level C data validation.

4.2.3 Conclusion

Based on the evaluation of the information in the analytical data deliverables, the laboratory data reported meet the quality control guidelines for the selected test methods except as noted previously.

A table of analytical quality control exceedences for this data is presented in **Appendix F**.

5.0 SAFETY

5.1 GENERAL SAFETY

TolTest was responsible for the safety and health provisions of its employees while working at the MFA Battery Site. These provisions were provided through the development and implementation of TolTest's *Health and Safety Procedures Manual [TolTest 2001b]*, the WP and the SSHP. All personnel on site were informed of this plan and any potential health and safety hazards of the operation.

5.2 ACTIVITY HAZARD ANALYSIS

Activity Hazard Analyses (AHAs) were prepared for each definable feature of work. The Site Safety and Health Officer was responsible for reviewing the AHA with all the field personnel involved in a specific task. The following describes each task/operation in terms of the definable features associated with each major phase of work. AHAs were prepared for each major phase of work and are presented in Appendix D of the WP. Definable features of work included the following:

- Site delineation and pre-excavation sampling
- Equipment decontamination
- Site restoration

6.0 CONCLUSIONS AND RECOMMENDATIONS

A vein of contaminated soil exhibiting toxic characteristic for metals contamination was identified at the Mine Fill A Battery Site. Approximately 20 tons of this soil was excavated and disposed of as a hazardous waste. Visual evidence of this vein of contamination was observed in a trench dug on the south end of the excavation area.

Analysis of soil samples obtained after excavation activities confirms that contaminated soil is still present at the site. Results of this analysis indicate that the level of antimony and lead in sample 12SB21 and lead in 12SB23 exceeds Industrial Cleanup goals. The level of arsenic in all four samples exceeds the Industrial Cleanup goal, however these results should be compared to base-wide background conditions.

The vein of contaminated soil is easily discernable from other soil types at the site; therefore TolTest recommends that additional exploration trenches be dug in an attempt to determine the horizontal extend of this vein.

To further investigate the lead contamination, the MFA investigative area will be increased to include the MFA Battery Area. Additional ground water, surface, and subsurface soil sampling for lead will be conducted during the RCRA Facility Investigation to be performed at MFA, Mine Fill B, Cast High Explosives/B-146 Incinerator, and Pyrotechnic Test Area (TtNUS, 2002).

7.0 REFERENCE DOCUMENTS

[TolTest 2001] Final Interim Measures Work Plan, Mine Fill A Battery Site Cleanup at the Naval Surface Warfare Center Crane, Indiana. January 2001.

[TolTest 2002] Interim Measures Report, Removal and Disposal of Contaminated Soil at the Mine Fill A Battery Site, TolTest Inc. December 2002.

[TtNUS, 2001] Basewide Background Soil Investigation Report, Tetra Tech NUS, Inc. January 2001.

APPENDIX A-A
PHOTOGRAPHS

Photo 1 – Plastic sheeting protecting exploration trenches

Photo 2 – Plastic sheeting over bucket of backhoe

Photo 3 – Top of work site graded

Photo 4 – Boulders placed back on slope following excavation

Photo 5 – Vein of contaminated soil (just above yellow clay)

Photo 6 – Removing boulders and trees from the slope

Photo 7 – Loading the dump truck

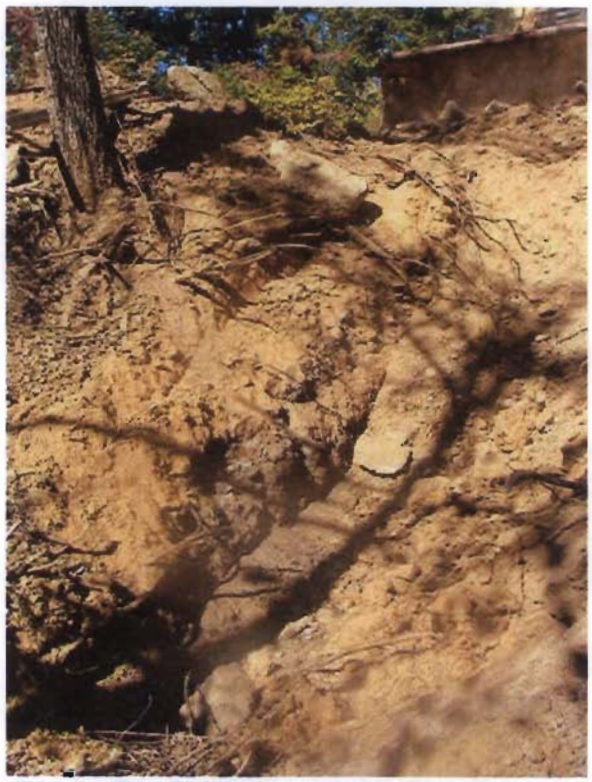


Photo 8 – Trench at south end of slope

Photo 9 – TetraTech personnel obtaining post-excavation samples

APPENDIX A-B

Geologist's Soil Description and Field Notes

MEMO

Date: May 25, 2004

To: Peter Chevalier
TolTest Inc.

cc:

From: Andy Duwelius
LPG 1426

Subject: **Mine Fill A Soil Description, NSWC Crane**

This memorandum presents the description of soils encountered during the May 21, 2004 soil sampling event conducted at the Naval Surface Warfare Center, Crane Division in Martin County Indiana. Sampling was conducted along the southeast perimeter of a small landfill area associated with the Mine Fill A facility. A representative sample was collected and described by a licensed professional geologist from each distinct layer exposed during excavation activities. Soil material descriptions were made using the United States Department of Agriculture (USDA) Soil Classification Service descriptive procedures. The description included the sample texture, color (including mottling), structure, moisture content, consistency, carbonate content, and presence of other significant features, including fill sequences. Field notes taken during the investigation are included as an Attachment.

Three distinct Units are recognized in the unconsolidated surficial soil materials. These units are:

Unit 1 – Fill material of silt loam and silty clay loam texture, containing surficial sandstone boulders, concrete and asphalt debris;

Unit 2 – Fill material of silt loam texture, containing brick, wood, and siltstone fragments; and metal and organic debris;

Unit 3 – Silty clay loam and weathered parent material

Unit 1 consists of a surficial fill material placed as cover material. Thc fill material is brown and has a silt loam texture. In addition, surficial and partially buried sandstone boulders and concrete and asphalt debris appear to have been used to stabilize the slope along this section of the landfill.

Unit 2, underlying Unit 1, consists of a dark grayish brown, very dark gray to black silt loam fill material that has been reported by TolTest to contain lead at a concentration exceeding hazardous waste levels. The fill material is easily identified by the presence of anthropogenic material, including metallic debris, brick fragments and wood. This unit is 0.1 to 0.6 feet thick and roughly follows the contour of the landfill slope. It was not determined if this layer extends back into the landfill. This unit may be representative of anthropogenic material being pushed down slope during fill / disposal activities.

Unit 3, underlying Unit 2, consists of a yellow brown and brownish yellow silty clay loam interbedded with weathered siltstone and sandstone pebbles and cobbles. This unit appears to represent the original ground surface on which debris from the Mine Fill A facility was landfilled. The complete stratigraphy and thickness of these unconsolidated materials was not determined due to its limited exposure in the excavation.

ATTACHMENT

①

May 21, 2004 Friday
Dumelins

TOLTEST:
Soil Sampling NSWC Crane
Mine Fill A Facility

0930 Arrived on site
- waiting on Backhoe

1310 Backhoe arrived on site

L.F. Slope stabilized w/ vegitation & Sandstone boulders and concrete & Asphalt debris.

Sample location #13 (Fill)

Silt loam, mixed dk gry brn (10YR 4/2) to Blk (10YR 2/1) moist, loose, structureless slightly calcareous, contains trace granules, rootles, & wood, abundant metal debris (e.g. nails)

②

Sample location #14 (Fill)

Silt loam, v. dk gry (10YR 3/1) moist, loose, structureless sl calc, contains granules T/O, abundant metal debris, & trace brick frags

Sample location #15 (Fill)

Silt loam, v. dk gry brn (10YR 3/2) moist, loose, contains granules T/O and abundant metal debris

Profile

Layer 1: Silt loam to Silty Clay loam, brn (10YR 4/3) moist, friable, sl plastic non-calc to v sl calc, contains rootlets T/O
* cover material 1 to 2.5 ft thick

Joel A. Dumelins
5-21-04

③

5-21-04 TOLTEST CONT.

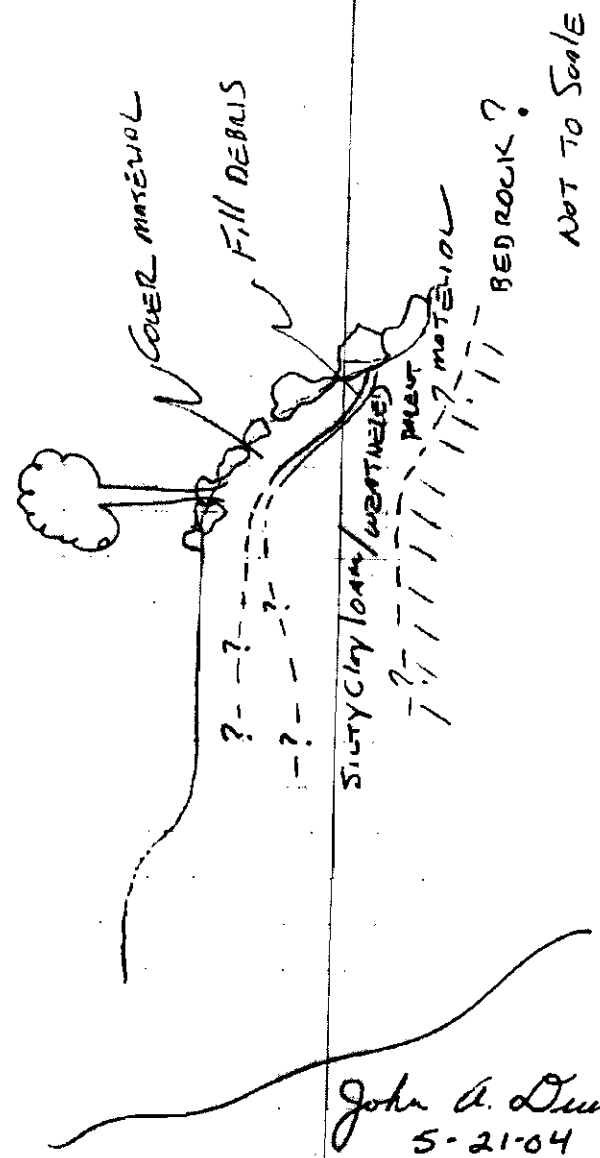
GRADUAL CONTACT TO:

LAYER 2: FILL MATERIAL 0.1 TO 0.6' THICK
- LAYER FOLLOWS CONTOUR OF SUBSTRATUM/SLOPE CONTOUR

CLEAR CONTACT TO:

LAYER 3:
SILTY CLAY LOAM + WEATHERED PARENT MATERIAL (FRAGIPAN?) MIXED YELL BRN (10YR 5/8) + BRN YELL (10YR 6/6), MOIST, SL STICKY TO FRIABLE, NON-CALC, CONTAINS SILTSTONE SANDSTONE PEBBLES (C) + COBBLES
- NOT FULLY PENETRATED

④



John A. Dunnelin
5-21-04

APPENDIX A-C

Analytical Data Sheets

ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE ID

BAT-PES-013

Lab Name: LAUCKS TESTING LABS

SDG No.: TOL01

Matrix: (soil/water) SOIL

Lab Sample ID: 0405353-01

Sample wt/vol: 15 (g/ml) g

Lab File ID: X6250477.D

% Moisture: 28

Date Collected: 05/21/04

Extraction: SONC

Date Received: 05/21/04

Concentrated Extract Volume: 5000 (uL)

Date Prepared: 06/02/04

Dilution Factor: 1.0

Date Analyzed: 06/26/04

CONCENTRATION UNITS:

CAS NO.	COMPOUND	ug/kg	Q	RL
319-84-6	alpha-BHC	1.8	U	1.8
319-85-7	beta-BHC	1.8	U	1.8
319-86-8	delta-BHC	1.8	U	1.8
58-89-9	gamma-BHC (Lindane)	1.8	U	1.8
76-44-8	Heptachlor	1.8	U	1.8
309-00-2	Aldrin	1.8	U	1.8
1024-57-3	Heptachlor epoxide	1.8	U	1.8
5103-74-2	gamma-Chlordane	1.8	U	1.8
5103-71-9	alpha-Chlordane	1.8	U	1.8
959-98-8	Endosulfan I	1.8	U	1.8
60-57-1	Dieldrin	3.8	U	3.8
72-55-9	4,4'-DDE	3.8	U	3.8
72-20-8	Endrin	3.8	U	3.8
33213-65-9	Endosulfan II	3.8	U	3.8
72-54-8	4,4'-DDD	3.8	U	3.8
1031-07-8	Endosulfan sulfate	3.8	U	3.8
50-29-3	4,4'-DDT	3.8	U	3.8
72-43-5	Methoxychlor	18	U	18
7421-93-4	Endrin aldehyde	3.8	U	3.8
53494-70-5	Endrin ketone	3.8	U	3.8
12674-11-2	Aroclor-1016	22	U	22
11104-28-2	Aroclor-1221	22	U	22
11141-16-5	Aroclor-1232	22	U	22
53469-21-9	Aroclor-1242	22	U	22
12672-29-6	Aroclor-1248	22	U	22
11097-69-1	Aroclor-1254	22	U	22
11096-82-5	Aroclor-1260	22	U	22
8001-35-2	Toxaphene	46	U	46
465-73-6	isodrin	3.8	U	3.8

RL = Reporting Limit

ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE ID

MFABATPES013

Lab Name: LAUCKS TESTING LABS

SDG No.: TOL01

Matrix: (soil/water) SOIL

Lab Sample ID: 0405353-01

Sample wt/vol: 15 (g/ml) g

Lab File ID: L6100421.D

% Moisture: 28

Date Collected: 05/21/04

Extraction: SONC

Date Received: 05/21/04

Concentrated Extract Volume: 5000 (uL)

Date Prepared: 06/01/04

Dilution Factor: 1.0

Date Analyzed: 06/11/04

CONCENTRATION UNITS:

CAS NO.	COMPOUND	ug/kg	Q	RL
94-75-7	2,4-D	3.8	U	3.8
93-72-1	2,4,5-TP	3.8	U	3.8
93-76-5	2,4,5-T	3.8	U	3.8
88-85-7	Dinoseb	3.8	U	3.8
70-30-4	Hexachlorophene	2.4	U	2.4

RL = Reporting Limit

SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET

PES-013

Lab Name: Laucks Testing Labs

SDG No.: TOL01

Matrix: (soil/water) SOIL

Lab Sample ID: 0405353-01

Sample wt/vol: 3.5 (g/ml) G

Lab File ID: B0602011.D

Level: (low/med) LOW

Date Received: 05/21/04

% Moisture: not dec. 28

Date Analyzed: 06/02/04

GC Column: DB-624 ID: 0.18 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	6	U
75-01-4	Vinyl chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	20	U
75-15-0	Carbon disulfide	6	U
75-09-2	Methylene chloride	6	U
156-60-5	trans-1,2-Dichloroethene	6	U
75-34-3	1,1-Dichloroethane	6	U
156-59-2	cis-1,2-Dichloroethene	6	U
78-93-3	2-Butanone	20	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon tetrachloride	6	U
71-43-2	Benzene	6	U
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	6	U
78-87-5	1,2-Dichloropropane	6	U
75-27-4	Bromodichloromethane	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U
108-10-1	4-Methyl-2-pentanone	20	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
79-00-5	1,1,2-Trichloroethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	20	U
124-48-1	Dibromochloromethane	6	U
106-93-4	1,2-Dibromoethane	6	U
108-90-7	Chlorobenzene	6	U
100-41-4	Ethylbenzene	6	U
100-42-5	Styrene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
75-25-2	Bromoform	6	U
96-18-4	1,2,3-Trichloropropane	6	U
74-88-4	Iodomethane	20	U
107-13-1	Acrylonitrile	20	U

SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET

PES-013

Lab Name: Laucks Testing Labs

SDG No.: TOL01

Matrix: (soil/water) SOIL

Lab Sample ID: 0405353-01

Sample wt/vol: 3.5 (g/ml) G

Lab File ID: B0602011.D

Level: (low/med) LOW

Date Received: 05/21/04

% Moisture: not dec. 28

Date Analyzed: 06/02/04

GC Column: DB-624 ID: 0.18 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND (ug/L or ug/Kg)	UG/KG	Q
79-34-5	1,1,2,2-Tetrachloroethane	6	U
108-05-4	Vinyl acetate	20	U
75-71-8	Dichlorodifluoromethane	6	U
110-57-6	trans-1,4-Dichloro-2-butene	20	U
74-95-3	Dibromomethane	6	U
107-02-8	Acrolein	20	U
107-05-1	Allyl chloride	20	U
126-99-8	Chloroprene	20	U
126-98-7	Methacrylonitrile	20	U
80-62-6	Methyl methacrylate	20	U
97-63-2	Ethyl methacrylate	20	U
120-82-1	1,2,4-Trichlorobenzene	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U
1330-20-7	Xylene (total)	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

PES-013

Lab Name: Laucks Testing Labs Contract:

Lab Code: Case No.: SAS No.: SDG No.: TOL01

Matrix: (soil/water) SOIL Lab Sample ID: 0405353-01

Sample wt/vol: 15 (g/ml) G Lab File ID: L0615006.D

Level: (low/med) LOW Date Received: 05/21/04

% Moisture: 28 decanted:(Y/N) N Date Extracted: 06/02/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 06/15/04

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH:

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
123-91-1	1,4-Dioxane	460	U
62-75-9	n-Nitrosodimethylamine	460	U
110-86-1	Pyridine	460	U
109-06-8	2-Picoline	460	U
10595-95-6	n-Nitrosomethylethylamine	460	U
66-27-3	Methyl methanesulfonate	460	U
55-18-5	n-Nitrosodiethylamine	460	U
62-50-0	Ethyl methanesulfonate	460	U
108-95-2	Phenol	460	U
62-53-3	Aniline	460	U
76-01-7	Pentachloroethane	460	U
111-44-4	Bis(2-Chloroethyl)ether	460	U
95-57-8	2-Chlorophenol	460	U
541-73-1	1,3-Dichlorobenzene	460	U
106-46-7	1,4-Dichlorobenzene	460	U
100-51-6	Benzyl alcohol	460	U
95-50-1	1,2-Dichlorobenzene	460	U
95-48-7	2-Methylphenol	460	U
108-60-1	Bis(2-chloroisopropyl)ether	460	U
98-86-2	Acetophenone	460	U
1319-77-3	3,4-Methylphenol	460	U
621-64-7	n-Nitroso-di-n-propylamine	460	U
930-55-2	n-Nitrosopyrrolidine	460	U
95-53-4	o-Toluidine	460	U
59-89-2	n-Nitrosomorpholine	460	U
67-72-1	Hexachloroethane	460	U
98-95-3	Nitrobenzene	460	U
100-75-4	n-Nitrosopiperidine	460	U
78-59-1	Isophorone	460	U
88-75-5	2-Nitrophenol	460	U
105-67-9	2,4-Dimethylphenol	460	U
126-68-1	O,O,O-Triethyl phosphorothioate	460	U
65-85-0	Benzoic acid	390	J
111-91-1	bis(2-Chloroethoxy)methane	460	U
120-83-2	2,4-Dichlorophenol	460	U
120-82-1	1,2,4-Trichlorobenzene	460	U
91-20-3	Naphthalene	460	U

FORM I SV-1

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

PES-013

Lab Name: Laucks Testing Labs Contract:

Lab Code: Case No.: SAS No.: SDG No.: TOL01

Matrix: (soil/water) SOIL Lab Sample ID: 0405353-01

Sample wt/vol: 15 (g/ml) G Lab File ID: L0615006.D

Level: (low/med) LOW Date Received: 05/21/04

% Moisture: 28 decanted:(Y/N) N Date Extracted: 06/02/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 06/15/04

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH:

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-65-0	2,6-Dichlorophenol	460	U
106-47-8	4-Chloroaniline	460	U
1888-71-7	Hexachloropropene	460	U
87-68-3	Hexachlorobutadiene	460	U
122-09-8	a,a-Dimethylphenylethylamine	930	U
924-16-3	n-Nitrosodi-n-butylamine	460	U
106-50-3	1,4-Phenylenediamine	460	U
59-50-7	4-Chloro-3-methylphenol	460	U
120-58-1	cis-Isosafrole	460	U
91-57-6	2-Methylnaphthalene	460	U
77-47-4	Hexachlorocyclopentadiene	460	U
95-94-3	1,2,4,5-Tetrachlorobenzene	460	U
120-58-1	trans-Isosafrole	460	U
88-06-2	2,4,6-Trichlorophenol	460	U
95-95-4	2,4,5-Trichlorophenol	460	U
94-59-7	Safrole	460	U
91-58-7	2-Chloronaphthalene	460	U
88-74-4	2-Nitroaniline	460	U
130-15-4	1,4-Naphthoquinone	460	U
131-11-3	Dimethylphthalate	460	U
99-65-0	m-Dinitrobenzene	460	U
606-20-2	2,6-Dinitrotoluene	460	U
208-96-8	Acenaphthylene	460	U
99-09-2	3-Nitroaniline	460	U
83-32-9	Acenaphthene	460	U
51-28-5	2,4-Dinitrophenol	930	U
100-02-7	4-Nitrophenol	460	U
608-93-5	Pentachlorobenzene	460	U
132-64-9	Dibenzofuran	460	U
121-14-2	2,4-Dinitrotoluene	460	U
134-32-7	1-Naphthylamine	460	U
58-90-2	2,3,4,6-Tetrachlorophenol	460	U
91-59-8	2-Naphthylamine	460	U
84-66-2	Diethylphthalate	460	U
297-97-2	Thionazin	460	U
86-73-7	Fluorene	460	U
7005-72-3	4-Chlorophenyl-phenylether	460	U

FORM I SV-2

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

PES-013

Lab Name: Laucks Testing Labs Contract:

Lab Code: Case No.: SAS No.: SDG No.: TOL01

Matrix: (soil/water) SOIL Lab Sample ID: 0405353-01

Sample wt/vol: 15 (g/ml) G Lab File ID: L0615006.D

Level: (low/med) LOW Date Received: 05/21/04

% Moisture: 28 decanted:(Y/N) N Date Extracted: 06/02/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 06/15/04

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH:

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-55-8	5-Nitro-o-toluidine	460	U
100-01-6	4-Nitroaniline	460	U
534-52-1	4,6-Dinitro-2-methylphenol	460	U
86-30-6	n-Nitrosodiphenylamine	460	U
122-66-7	1,2-Diphenylhydrazine	460	U
3689-24-5	Sulfotepp	460	U
2303-16-4	Diallate A	460	U
298-02-2	Phorate	460	U
99-35-4	1,3,5-Trinitrobenzene	460	U
62-44-2	Phenacetin	460	U
2303-16-4	Diallate B	460	U
101-55-3	4-Bromophenyl-phenylether	460	U
118-74-1	Hexachlorobenzene	460	U
60-51-5	Dimethoate	460	U
92-67-1	4-Aminobiphenyl	460	U
87-86-5	Pentachlorophenol	460	U
82-68-8	Pentachloronitrobenzene	460	U
23950-58-5	Pronamide	460	U
298-04-4	Disulfoton	460	U
85-01-8	Phenanthrene	460	U
120-12-7	Anthracene	460	U
86-74-8	Carbazole	460	U
298-00-0	Methyl parathion	460	U
84-74-2	Di-n-butylphthalate	700	B
56-38-2	Ethyl parathion	460	U
56-57-5	4-Nitroquinoline-1-oxide	460	U
91-80-5	Methapyrilene	460	U
465-73-6	Isodrin	460	U
206-44-0	Fluoranthene	460	U
92-87-5	Benzidine	460	U
129-00-0	Pyrene	460	U
140-57-8	Aramite A	460	U
140-57-8	Aramite B	460	U
60-11-7	p-(Dimethylamino)azobenzene	460	U
510-15-6	Chlorobenzilate	460	U
52-85-7	Famphur A	460	U
85-68-7	Butylbenzylphthalate	460	U

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

PES-013

Lab Name: Laucks Testing Labs Contract:

Lab Code: Case No.: SAS No.: SDG No.: TOL01

Matrix: (soil/water) SOIL Lab Sample ID: 0405353-01

Sample wt/vol: 15 (g/ml) G Lab File ID: L0615006.D

Level: (low/med) LOW Date Received: 05/21/04

% Moisture: 28 decanted:(Y/N) N Date Extracted: 06/02/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 06/15/04

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH:

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
143-50-0	Kepone	460	U
53-96-3	2-Acetylaminofluorene	460	U
52-85-7	Famphur B	930	U
119-93-7	3,3'-Dimethylbenzidine	460	U
91-94-1	3,3'-Dichlorobenzidine	460	U
56-55-3	Benzo[a]anthracene	460	U
117-81-7	bis(2-Ethylhexyl)phthalate	170	J
218-01-9	Chrysene	460	U
117-84-0	Di-n-octylphthalate	460	U
57-97-6	7,12-Dimethylbenz(a)anthracene	460	U
205-99-2	Benzo[b]fluoranthene	460	U
207-08-9	Benzo[k]fluoranthene	460	U
50-32-8	Benzo[a]pyrene	460	U
56-49-5	3-Methylcholanthene	460	U
193-39-5	Indeno[1,2,3-cd]pyrene	460	U
53-70-3	Dibenz[a,h]anthracene	460	U
191-24-2	Benzo[g,h,i]perylene	460	U

INORGANICS ANALYSIS DATA SHEET

Lab Name: Laucks Testing Labs
SDG No. : TOL01
Matrix : SOIL

Sample ID : MFA-BAT-PES-013
Lab Sample ID: 0405353-01
Date Received: 05/21/04

Analyte	Result	Units	Prepped	Analyzed	Limit	Method
Cyanide (Method 9012)	0.6 U	mg/kg	06/03/04	06/10/04	0.6	SW 9012

INORGANICS ANALYSIS DATA SHEET

Lab Name: Laucks Testing Labs Sample ID : MFA-BAT-PES-013
SDG No. : TOL01 Lab Sample ID: 0405353-01
Matrix : SOIL Date Received: 05/21/04

Analyte	Result	Units	Prepped	Analyzed	Limit	Method
Sulfide as S	14. U	mg/kg DB	05/28/04	05/28/04	14.	9030B/9034

SC 3

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MFA-BAT-PES-013

Name: Laucks Laboratories Contract: NSWC Crane MFA B

Lab Code: LAUCKS Case No.: SAS No.: SDG No.: TOL01

Matrix (soil/water): SOIL Lab Sample ID: 0405353-01

Level (low/med): LOW Date Received: 5/21/04

% Solids: 72.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	2.6	B	N	P
7440-38-2	Arsenic	7.7			P
7440-39-3	Barium	808			P
7440-41-7	Beryllium	0.58	B		P
7440-43-9	Cadmium	109			P
7440-47-3	Chromium	64.8			P
7440-50-8	Copper	841			P
7440-48-4	Cobalt	10.5			P
7439-92-1	Lead	5040		*	P
7440-02-0	Nickel	31.2		*	P
7782-49-2	Selenium	5.5	B		P
7440-22-4	Silver	2.3			P
7439-97-6	Mercury	0.13	B	N	CV
7440-28-0	Thallium	2.0	U		P
7440-31-5	Tin	254		N*	P
7440-62-2	Vanadium	43.2			P
7440-66-6	Zinc	3450		E	P

Color Before: Brown Clarity Before: Texture: Medium

Color After: Yellow Clarity After: Artifacts:

Comments:

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MFA-BAT-PES-014

Lab Name: Laucks Laboratories Contract: NSWC Crane MFA B

Lab Code: LAUCKS Case No.: SAS No.: SDG No.: TOL01

Matrix (soil/water): SOIL Lab Sample ID: 0405353-02

Level (low/med): LOW Date Received: 5/21/04

% Solids: 75.7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	23.4			P
7440-47-3	Chromium	66.9			P
7439-92-1	Lead	44300		*	P

Color Before: Brown Clarity Before: Texture: Medium

Color After: Yellow Clarity After: Artifacts:

Comments:

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MFA-BAT-PES-015

Lab Name: Laucks Laboratories Contract: NSWC Crane MFA B

Lab Code: LAUCKS Case No.: SAS No.: SDG No.: TOL01

Matrix (soil/water): SOIL Lab Sample ID: 0405353-03

Level (low/med): LOW Date Received: 5/21/04

% Solids: 81.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	20.4			P
7440-47-3	Chromium	106			P
7439-92-1	Lead	3580		*	P

Color Before: Brown Clarity Before: Texture: Medium

Color After: Yellow Clarity After: Artifacts:

Comments:

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MFA-BAT-PES-0FD

Lab Name: Laucks Laboratories Contract: NSWC Crane MFA B

Lab Code: LAUCKS Case No.: SAS No.: SDG No.: TOL01

Matrix (soil/water): SOIL Lab Sample ID: 0405353-04

Level (low/med): LOW Date Received: 5/21/04

% Solids: 76.7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	23.9			P
7440-47-3	Chromium	74.7			P
7439-92-1	Lead	79900		*	P

Color Before: Brown Clarity Before: Texture: Medium

Color After: Yellow Clarity After: Artifacts:

Comments:

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

MFA-BAT-RB052104

Lab Name: Laucks Laboratories Contract: NSWC Crane MFA B

Lab Code: LAUCKS Case No.: SAS No.: SDG No.: TOL01

Matrix (soil/water): WATER Lab Sample ID: 0405353-05

Level (low/med): LOW Date Received: 5/21/04

% Solids:

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.4	U		P
7440-47-3	Chromium	5.1	B		P
7439-92-1	Lead	5.3	B		P

Color Before: Colorless Clarity Before: Clear Texture:

Color After: Colorless Clarity After: Clear Artifacts:

Comments:

TOLTEST INC.

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

Cascades

Chain of Custody Record

41071 Page 1 of ____

Project No.: 75318.01	Client: Navy, NSWC Crane		
P.O. No.: 61003	Project/Location: MFA Battery Site		
Project Mgr.: P. Chevalier	Sampler's Name Peter J. Chevalier		
Phone No. 812 636 8501	Sampler's Signature Peter J. Chevalier		

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	App IX	metals (3)							Preserved Yes/No	LAB USE ONLY Lab #
								Parameters									
1	MFA-BAT-PES-013	5/21/04	1414	G	soil	at location of known contamination		✓			'		1 9	6 oz	Cove rs		
2	MFA-BAT-PES-014		1451	G	soil	up slope to the left	1		✓								
3	MFA-BAT-PES-015		1503	G	soil	up slope to the right	1		✓								
4	MFA-BAT-PES-FD		—		soil	Field dup	1		✓								
5	MFA BAT-RB052104		1520	G	liquid	rinse blank	1		✓								
6																	
7																	
8																	
9																	
10																	

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
	[signature]	5/21/04 1800		
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time

LAB USE ONLY

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

TAT _____

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

Rev. 4/99

APPENDIX A-D
WASTE DISPOSAL FORMS

WASTE MANAGEMENT DIVISION
MICHIGAN DEPARTMENT OF
ENVIRONMENTAL QUALITY

DO NOT WRITE IN THIS SPACE
ATT. ☐ DIS. ☐ REJ. ☐ PR. ☐

Part 121 of Act 451, 1994, as amended.

Failure to file may subject you to criminal and/or civil penalties under Sections 324.11151 to 324.12116 MCL.

Please print or type.

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. IN5170023498 — Manifest Document No. 04039

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
NAVAL SURFACE WARFARE CENTI
C/O CRANE NAVAL FACILITY
300 HWY. 361
CODE RP3-TB, BLDG. 3245
CRANE, IN 47522-5001

4. Generator's Phone (812) 854-1177 6153

A. State Manifest Document Number MI 9717252

B. State Generator's ID

5. Transporter 1 Company Name: Beelman Trucking Co.

6. US EPA ID Number: ILD007814825

C. State Transporter's ID

D. Transporter's Phone: 800-541-5910

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address
MICHIGAN DISPOSAL WASTE TREATMENT PLANT
49350 N. I-94 SERVICE DRIVE
BELLEVILLE, MI 48111

10. US EPA ID Number: MID 000 724 631

G. State Facility's ID

H. Facility's Phone: (800) 592-5489

	11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID NUMBER)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a.	HM X HAZARDOUS WASTE SOLID, N.O.S., 8, NA3077, PGIII	001	DT	41,300	P	D007
b.						
c.						
d.						

J. Additional Descriptions for Materials Listed Above
11a. 081004MBE / D008 / ERG#171 / LEAD CONTAMINATED SOIL

K. Handling Codes
a.
b.
c.
d.

15. Special Handling Instructions and Additional Information
EMERGENCY CONTACT#: ( ) - 812-854-1225

TR# 2164 TR# 3815

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR; if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

GENERATOR

Printed/Typed Name	Signature	Date (Month Day Year)
Jerry L McCracken	Jerry L McCracken	09 21 04

17. Transporter 1 Acknowledgment of Receipt of Materials

Printed/Typed Name	Signature	Date (Month Day Year)
Tony Rushing	Tony Rushing	09 21 04

18 Transporter 2 Acknowledgment of Receipt of Materials

Printed/Typed Name	Signature	Date (Month Day Year)

TRANSPORTER

19. Discrepancy Indication Space

FACILITY

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Date (Month Day Year)
BRYAN SCHULTZ	[illegible]	09 21 04

ALL SPILLS MUST BE REPORTED TO THE MICHIGAN POLLUTION EMERGENCY ALERTING SYSTEM, IN MICHIGAN AT 1-800-292-4706 OR OUT OF STATE AT 517-373-7660 AND THE NATIONAL RESPONSE CENTER 1-800-424-8802 24 HOUR PER DAY.

EPA Form 8700-22 (Rev. 9/88) — WASTE MANAGEMENT DIVISION — EQP-51

CERTIFICATE OF DISPOSAL

This certificate is to verify the wastes specified on Manifest # MI9717252

have been properly disposed of in accordance with all local, state and federal regulations.

"Disposed of" means either: 1) Burial or 2) Processed as specified in 40 CFR et seq.

FACILITY NAME: *(Please check one)*

☒ Michigan Disposal Waste Treatment Plant (EPA I.D. # MID000724831)

☐ Wayne Disposal, Inc. (EPA I.D. # MID048090633)

ADDRESS: 49350 N. I-94 Service Drive
Belleville, Michigan 48111

PHONE NUMBER: 1-800-592-5489

FAX NUMBER: 1-800-592-5329

Authorized Signature: _____

THE ENVIRONMENTAL QUALITY COMPANY 49350 N. I-94 SERVICE DRIVE BELLEVILLE MICHIGAN 48111

FORM1020 (3/96)

Land Disposal Restriction & Certification Form

Please check the appropriate facility:

Michigan Disposal Waste Treatment Plant	49350 N. I-94 Service Drive, Belleville, MI 4811	MID 000 724 831
Wayne Disposal, Inc. Site #2 Landfill	49350 N. I-94 Service Drive, Belleville, MI 4811	MID 048 090 633
EQ Detroit, Inc.	1923 Frederick Street, Detroit, MI 48211	MID 980 991 566
EQ Resource Recovery, Inc.	36345 Van Born Road, Romulus, MI 48174	MID 060 975 844
EQ North Carolina	1005 Investment Blvd, Apex, NC 27502	NCD 982 170 292
EQ Florida, Inc.	7202 East 8th Ave, Tampa, FL 33619	FLD 981 932 494

Generator Name: NAVAL SURFACE WARFARE CENTER Generator U.S. EPA #: IN5170023498

Address: ~~P.O. BOX 310~~ ~~CRANE VILLAGE, IN 47522~~ 300 Hwy 361 Code KP3-JM B3245 Crane, IN 47522

State Manifest#: MI9717252 Manifest Doc. #: 04039

Instructions

Column 1: Identify all U.S. EPA hazardous waste codes that apply to this waste shipment.
Column 2: Choose the appropriate treatability group: Non-Wastewater (NWW) or Wastewater (WW).
Column 3: Enter the appropriate Subcategory, if applicable, and also enter "Contaminated Soil" or "Debris" if the waste will be treated using one of the alternative treatment technologies provided by 268.49(c) - soil, or 268.45 - debris.
Column 4: Enter the letter of the appropriate paragraph from pages 1-2 of this form.
Column 5: For F001-F005, F039, D001-D043, Debris & Contaminated Soil: please enter the Reference Number(s) for any constituents in your waste stream subject to treatment. The Reference Number(s) can be found in the EQ Resource Guide. LDR/UHC Constituent Table.

Manifest Line Item	U.S. EPA Hazardous Waste Code(s)	NWW or WW	Subcategory	How Must the Waste be Managed?	Reference Number(s) of Hazardous Constituents contained in the waste. Complete for F001-F005, F039, D001-D043, Soil & Debris wastes.
11.A	D007 D008	NWW		A	126 128 202 204

I hereby certify that all information submitted on this and all associated documents is complete and accurate to the best of my knowledge and information.

Generator Signature Jerry L. McCracken Title Env. Prot Spec

Printed Name Jerry L. McCracken Date 9/21/04

How Must the Waste Be Managed?

S. THIS CONTAMINATED SOIL *DOES / DOES NOT* (circle one) CONTAIN LISTED HAZARDOUS WASTE AND *DOES / DOES NOT* (circle one) EXHIBIT A CHARACTERISTIC OF HAZARDOUS WASTE AND *IS SUBJECT TO / COMPLIES WITH* (circle one) THE SOIL TREATMENT STANDARDS AS PROVIDED BY 268.49 (c) OR THE UNIVERSAL TREATMENT STANDARDS. I certify under penalty of law that I have personally examined and am familiar with the treament technology and operation of the treatment process used to support this certification and believe that it has been maintained and operated properly so as to comply with treatment standards specified in 40 CFR 268.49 without impermissible dilution of the prohibited wastes. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.

THE ENVIRONMENTAL QUALITY COMPANY ®

Generator Approval Notification **September 13, 2004**

Customer: EQ - INDIANAPOLIS
Fax: (317) 247-7170

THOMAS J. BRENT
NAVAL SURFACE WARFARE CENTER
C/O CRANE NAVAL FACILITY
300 HWY. 361
CODE RP3-TB, BLDG. 3245
CRANE, IN 47522-5001

This Generator Approval Notification acknowledges the acceptability of waste material(s) into the EQ environmental protection facility identified below and ensures that this facility has the appropriate permit(s) issued by federal and state regulatory agencies to properly transport, treat, and/or dispose of the waste material(s).

EQ FACILITY: Michigan Disposal Waste Treatment Plant (MID000724831)
49350 North I-94 Service Drive, Belleville, Michigan 48111

Approval Number: 091004MBE

Generator EPA ID #: IN5170023498 **Approved Container:** TONS **Expires On:** 9/10/2005
Waste Common Name: LEAD CONTAMINATED SOIL
Comments: 2 LOADS, 1 TIME ONLY

Primary Waste Code: D007
Secondary Waste Codes:
D008

The Approval(s) listed above are based upon characterization information supplied to EQ by the Customer and the generator (if other than the Customer). The Customer is ultimately responsible for the accuracy and completeness of all such information, whether provided by the Customer or the generator. The Customer must notify the EQ Resource Team immediately upon knowledge of any changes to this information. This Approval and all wastes which are transported, delivered, or tendered to EQ under this Approval shall be subject to the attached Standard Terms and Conditions.

The Approval(s) will expire on the date(s) noted. Any new Approvals obtained from EQ on future business will be valid for a period of one (1) year from the date of issuance. Within 60 days of the Approval Expiration Date, you will be notified of the requirements for recertification.

APPENDIX A-E
TETRATECH NUS SAMPLING NARRATIVE

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-11-4-030

November 23, 2004

Project No. N6878

Mr. William Gates (Code ES31)
Commander, Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
P.O. Box 190010
North Charleston, South Carolina 29119-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order No. 0357

Subject: Surface Soil Confirmation Sampling at SWMU 12 – MFA Battery Site

Dear Mr. Gates:

Enclosed is a copy of the surface soil confirmation sampling information for the SWMU 12 – MFA Battery Site.

Please contact me at (412) 921-8308 (email: basinskir@ttnus.com) regarding any questions or comments.

Sincerely,

Ralph R. Basinski
Task Order Manager

Enclosures

cc: Mr. Tom Brent, NSWC Crane (letter and 1 copy of enclosures)
Ms. Christine Freeman, NSWC Crane (letter and 1 copy of enclosures)
Ms. Debra Humbert, TtNUS (letter only)
Mr. Mark Perry, TtNUS (letter and 1 copy of enclosures)
Mr. Ralph Basinski, TtNUS (letter and 1 copy of enclosures)
File Copy – CTO 0357 (letter only)

POST EXCAVATION CONFIRMATION SAMPLING AT SWMU 12 – MFA BATTERY SITE

The Battery Site is located at the southern end of SWMU 12 (MFA) at NSWC Crane. The size of the Battery Area is approximately 3,500 square feet. Soil removal and subsequent sampling has previously occurred at the Battery Site. An additional Round of soil excavation was conducted. The purpose of this additional sampling was confirmation sampling following the completion of the Round of soil excavation.

On September 21, 2004 TtNUS field personnel collected four confirmation soil samples (12SS210002 through 12SS240002) immediately following the removal of soil by Tol Test, Inc. The soil removal occurred on the east side of the slope that drops down into a larger depressed area of the site. The soil was removed by backhoe and loaded into a semi tractor trailer and transported off-site for proper disposal. The soil samples were collected at a depth of 0 – 2 feet bgs. The samples were sent to Laucks Testing Laboratories and analyzed for target analyte list (TAL) metals plus tin. Metals analyses except mercury were conducted using SW846 method 6020. Mercury analyses were conducted using SW846 method 7471A. Samples to be analyzed for VOCs were collected first using 5-gram EnCore™ samplers. Sample aliquots for the other analyses were collected by disposable plastic trowels and placed into 8 ounce wide-mouth glass jars with Teflon lined plastic caps. All samples were immediately placed on ice for preservation. The four surveyed sampling locations are shown on Figure 1. A summary of positive detections is presented in Table 1. Descriptive statistics are presented in Table 2. Table 3 presents all analytical data, and Table 4 presents survey data for the four sample locations.

The analyses results show the southern most soil sample 12SS210002 recorded the highest concentrations for most of the contaminants of concern regarding energetics and inorganics.

ENERGETICS

Soil sample 12SS210002 was the only sample of the four that had detectable energetic concentrations. RDX was the highest at 6.1 mg/kg. HMX was also detected at 1.7 mg/kg. 1,3,5-trinitrobenzene was detected at 0.84 mg/kg.

INORGANICS

The lead result at soil sample 12SS210002 was 429,000 mg/kg. The other three soil samples ranged from 366 – 3,230 mg/kg for lead. Antimony was notably higher at this soil sample location at 3,610 mg/kg, while the other three samples ranged from 11.4 – 213 mg/kg. The mercury concentration of 0.31 mg/kg was also higher at location 12SS210002. The other three locations ranged from 0.034 – 0.069 mg/kg for mercury. Silver (18.5 mg/kg) was only detected at 12SS210002. The tin concentration at 12SS210002 was 838 mg/kg while the other three locations ranged from 12.4 – 90.7 mg/kg.

TABLE 1

SUMMARY OF CHEMICALS DETECTED
SURFACE SOIL CONFIRMATION SAMPLES
SWMU 12 - MFA BATTERY SITE
NSWC CRANE, CRANE, INDIANA

SITE	MINE FILL A	MINE FILL A	MINE FILL A	MINE FILL A
SWMU	12	12	12	12
LOCATION	12SB21	12SB22	12SB23	12SB24
NSAMPLE	12SS210002	12SS220002	12SS230002	12SS240002
SAMPLE	12SS210002	12SS220002	12SS230002	12SS240002
SUBMATRIX	SS	SS	SS	SS
SACODE	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2
QC TYPE	NM	NM	NM	NM
SAMPLE DATE	9/21/2004	9/21/2004	9/21/2004	9/21/2004
VALIDATED	Y	Y	Y	Y
COLLECTION METHOD	GRAB	GRAB	GRAB	GRAB
Volatile Organics (ug/kg)				
DICHLORODIFLUOROMETHANE	15	10	14	5
METHYLENE CHLORIDE	1.6 UJ	2 J	2 J	1 J
Semivolatile Organics (ug/kg)				
BENZO(A)ANTHRACENE	5 J	14	16	8
BENZO(A)PYRENE	3.47 U	14	17	12
BENZO(B)FLUORANTHENE	54	13	17	19
BENZO(G,H,I)PERYLENE	13	14	13	25
BENZO(K)FLUORANTHENE	6 J	11	10	4 J
CHRYSENE	110	14	16	12
DI-N-BUTYL PHTHALATE	170 J	75.7 UJ	76.4 UJ	74.1 UJ
FLUORANTHENE	45	13	23	11
INDENO(1,2,3-CD)PYRENE	11	11	11	17
NAPHTHALENE	38	7 J	3.76 U	3.65 U
PHENANTHRENE	140 J	9 J	15 J	11 J
PYRENE	22	22	36	19
Energetics (mg/kg)				
1,3,5-TRINITROBENZENE	0.84	0.25 U	0.25 U	0.25 U
HMX	1.7	0.25 U	0.25 U	0.25 U
RDX	6.1	0.25 U	0.25 U	0.25 U
Inorganics (mg/kg)				
ALUMINUM	8780 J	13200 J	18700 J	19600 J
ANTIMONY	3610 J	11.4 J	34.1 J	213 J
ARSENIC	94.2 J	5.4 J	7.6 J	158 J
BARIUM	505 J	313 J	147 J	97.3 J
CADMIUM	5.8 J	6.3 J	0.81 U	0.75 U
CALCIUM	5400 J	9150 J	2550 J	7590 J
CHROMIUM	48.5 J	50.2 J	18.3 J	51.7 J
COBALT	6.2 J	13.6 J	12.9 J	12 J
COPPER	345 J	292 J	26.2 J	27.9 J
IRON	29500 J	32200 J	18700 J	51200 J
LEAD	429000 J	506 J	3230 J	366 J
MAGNESIUM	1720 J	2750 J	1580 J	1710 J
MANGANESE	516	1340	1400	451
MERCURY	0.31	0.069 J	0.042 J	0.034 J
NICKEL	17.3 J	30.5 J	15.9 J	23.9 J
POTASSIUM	558 J	2000 J	1160 J	1980 J
SELENIUM	0.29 U	0.37 U	0.49 J	0.61 J
SILVER	18.5 J	0.72 U	0.24 U	0.08 U
SODIUM	298 J	370 J	51 U	78.2 J
THALLIUM	6.4 J	0.18 U	0.29 U	0.23 U
TIN	838 J	90.7 J	12.4 J	45.2 J
VANADIUM	16.8 J	23.5 J	31.4 J	42.7 J
ZINC	2050 J	2490 J	156 J	206 J

TABLE 2

SUMMARY OF DESCRIPTIVE STATISTICS
SURFACE SOIL CONFIRMATION SAMPLES
SWMU 12 - MFA BATTERY SITE
NSWC CRANE, CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration	Average of Positive Hits	Sample of Maximum Detect
Volatile Organics (ug/kg)							
DICHLORODIFLUOROMETHANE	4/4	5	15	0	11.0	11.0	12SS210002
METHYLENE CHLORIDE	3/4	1 J	2 J	1.6	1.45	1.67	12SS220002, 12SS230002
Semivolatile Organics (ug/kg)							
BENZO(A)ANTHRACENE	4/4	5 J	16	0	10.8	10.8	12SS230002
BENZO(A)PYRENE	3/4	12	17	3.47	11.2	14.3	12SS230002
BENZO(B)FLUORANTHENE	4/4	13	54	0	25.8	25.8	12SS210002
BENZO(G,H,I)PERYLENE	4/4	13	25	0	16.3	16.3	12SS240002
BENZO(K)FLUORANTHENE	4/4	4 J	11	0	7.75	7.75	12SS220002
CHRYSENE	4/4	12	110	0	38.0	38.0	12SS210002
DI-N-BUTYL PHTHALATE	1/4	170 J	170 J	74.1 - 76.4	70.8	170	12SS210002
FLUORANTHENE	4/4	11	45	0	23.0	23.0	12SS210002
INDENO(1,2,3-CD)PYRENE	4/4	11	17	0	12.5	12.5	12SS240002
NAPHTHALENE	2/4	7 J	38	3.65 - 3.76	12.2	22.5	12SS210002
PHENANTHRENE	4/4	9 J	140 J	0	43.8	43.8	12SS210002
PYRENE	4/4	19	36	0	24.8	24.8	12SS230002
Energetics (mg/kg)							
1,3,5-TRINITROBENZENE	1/4	0.84	0.84	0.25	0.304	0.840	12SS210002
HMX	1/4	1.7	1.7	0.25	0.519	1.70	12SS210002
RDX	1/4	6.1	6.1	0.25	1.62	6.10	12SS210002
Inorganics (mg/kg)							
ALUMINUM	4/4	8780 J	19600 J	0	15070	15070	12SS240002
ANTIMONY	4/4	11.4 J	3610 J	0	967	967	12SS210002
ARSENIC	4/4	5.4 J	158 J	0	66.3	66.3	12SS240002
BARIUM	4/4	97.3 J	505 J	0	266	266	12SS210002
CADMIUM	2/4	5.8 J	6.3 J	0.75 - 0.81	3.22	6.05	12SS220002
CALCIUM	4/4	2550 J	9150 J	0	6173	6173	12SS220002
CHROMIUM	4/4	18.3 J	51.7 J	0	42.2	42.2	12SS240002
COBALT	4/4	6.2 J	13.6 J	0	11.2	11.2	12SS220002
COPPER	4/4	26.2 J	345 J	0	173	173	12SS210002
IRON	4/4	18700 J	51200 J	0	32900	32900	12SS240002
LEAD	4/4	366 J	429000 J	0	108276	108276	12SS210002
MAGNESIUM	4/4	1580 J	2750 J	0	1940	1940	12SS220002
MANGANESE	4/4	451	1400	0	927	927	12SS230002
MERCURY	4/4	0.034 J	0.31	0	0.114	0.114	12SS210002
NICKEL	4/4	15.9 J	30.5 J	0	21.9	21.9	12SS220002
POTASSIUM	4/4	558 J	2000 J	0	1425	1425	12SS220002
SELENIUM	2/4	0.49 J	0.61 J	0.29 - 0.37	0.358	0.550	12SS240002
SILVER	1/4	18.5 J	18.5 J	0.08 - 0.72	4.76	18.5	12SS210002
SODIUM	3/4	78.2 J	370 J	51	193	249	12SS220002
THALLIUM	1/4	6.4 J	6.4 J	0.18 - 0.29	1.69	6.40	12SS210002
TIN	4/4	12.4 J	838 J	0	247	247	12SS210002
VANADIUM	4/4	16.8 J	42.7 J	0	28.6	28.6	12SS240002
ZINC	4/4	156 J	2490 J	0	1226	1226	12SS220002

TABLE 3

ANALYTICAL DATA
SURFACE SOIL CONFIRMATION SAMPLES
SWMU 12 - MFA BATTERY SITE
NSWC CRANE, CRANE, INDIANA

SITE	MINE FILL A	MINE FILL A	MINE FILL A	MINE FILL A
SWMU	12	12	12	12
LOCATION	12SB21	12SB22	12SB23	12SB24
NSAMPLE	12SS210002	12SS220002	12SS230002	12SS240002
SAMPLE	12SS210002	12SS220002	12SS230002	12SS240002
MATRIX	SS	SS	SS	SS
SACODE	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2
QC TYPE	NM	NM	NM	NM
SAMPLE DATE	9/21/2004	9/21/2004	9/21/2004	9/21/2004
VALIDATED	Y	Y	Y	Y
COLLECTION METHOD	GRAB	GRAB	GRAB	GRAB
Volatile Organics (ug/kg)				
1,1,1,2-TETRACHLOROETHANE	1.6 U	1.04 U	1.3 U	0.918 U
1,1,1-TRICHLOROETHANE	1.6 U	1.04 U	1.3 U	0.918 U
1,1,2,2-TETRACHLOROETHANE	1.6 U	1.04 U	1.3 U	0.918 U
1,1,2-TRICHLOROETHANE	1.6 U	1.04 U	1.3 U	0.918 U
1,1-DICHLOROETHANE	1.6 U	1.04 U	1.3 U	0.918 U
1,1-DICHLOROETHENE	1.6 U	1.04 U	1.3 U	0.918 U
1,2,3-TRICHLOROPROPANE	1.6 U	1.04 U	1.3 U	0.918 U
1,2-DIBROMO-3-CHLOROPROPANE	1.6 U	1.04 U	1.3 U	0.918 U
1,2-DIBROMOETHANE	1.6 U	1.04 U	1.3 U	0.918 U
1,2-DICHLOROETHANE	1.6 U	1.04 U	1.3 U	0.918 U
1,2-DICHLOROPROPANE	1.6 U	1.04 U	1.3 U	0.918 U
1,4-DIOXANE	76.7 UJ	94.9 U	151 U	135 U
2-BUTANONE	1.6 U	1.04 U	1.3 U	0.918 U
2-HEXANONE	1.6 U	1.04 U	1.3 U	0.918 U
3-CHLOROPROPENE	1.6 U	1.04 U	1.3 U	0.918 U
4-METHYL-2-PENTANONE	1.6 U	1.04 U	1.3 U	0.918 U
ACETONE	1.6 U	1.04 U	1.3 U	2 U
ACETONITRILE	30.7 UJ	38 U	60.2 U	54 U
ACROLEIN	1.6 U	1.04 U	1.3 U	0.918 U
ACRYLONITRILE	1.6 U	1.04 U	1.3 U	0.918 U
BENZENE	1.6 U	1.04 U	1.3 U	0.918 U
BROMODICHLOROMETHANE	1.6 U	1.04 U	1.3 U	0.918 U
BROMOFORM	1.6 U	1.04 U	1.3 U	0.918 U
BROMOMETHANE	1.6 U	1.04 U	1.3 U	0.918 U
CARBON DISULFIDE	1.6 U	1.04 U	1.3 U	0.918 U
CARBON TETRACHLORIDE	1.6 U	1.04 U	1.3 U	0.918 U
CHLOROBENZENE	1.6 U	1.04 U	1.3 U	0.918 U
CHLORODIBROMOMETHANE	1.6 U	1.04 U	1.3 U	0.918 U
CHLOROETHANE	1.6 U	1.04 U	1.3 U	0.918 U
CHLOROFORM	1.6 U	1.04 U	1.3 U	0.918 U
CHLOROMETHANE	1.6 U	1.04 U	1.3 U	0.918 U
CHLOROPRENE	1.6 U	1.04 U	1.3 U	0.918 U
CIS-1,2-DICHLOROETHENE	1.6 U	1.04 U	1.3 U	0.918 U
CIS-1,3-DICHLOROPROPENE	1.6 U	1.04 U	1.3 U	0.918 U
DIBROMOMETHANE	1.6 U	1.04 U	1.3 U	0.918 U
DICHLORODIFLUOROMETHANE	15	10	14	5

TABLE 3

ANALYTICAL DATA
SURFACE SOIL CONFIRMATION SAMPLES
SWMU 12 - MFA BATTERY SITE
NSWC CRANE, CRANE, INDIANA

SITE	MINE FILL A	MINE FILL A	MINE FILL A	MINE FILL A
SWMU	12	12	12	12
LOCATION	12SB21	12SB22	12SB23	12SB24
NSAMPLE	12SS210002	12SS220002	12SS230002	12SS240002
SAMPLE	12SS210002	12SS220002	12SS230002	12SS240002
MATRIX	SS	SS	SS	SS
SACODE	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2
QC TYPE	NM	NM	NM	NM
SAMPLE DATE	9/21/2004	9/21/2004	9/21/2004	9/21/2004
VALIDATED	Y	Y	Y	Y
COLLECTION METHOD	GRAB	GRAB	GRAB	GRAB
ETHYL METHACRYLATE	1.6 U	1.04 U	1.3 U	0.918 U
ETHYLBENZENE	1.6 U	1.04 U	1.3 U	0.918 U
ISOBUTANOL	30.7 UJ	38 U	60.2 U	54 U
METHACRYLONITRILE	1.6 U	1.04 U	1.3 U	0.918 U
METHYL IODIDE	1.6 U	1.04 U	1.3 U	0.918 U
METHYL METHACRYLATE	1.6 U	1.04 U	1.3 U	0.918 U
METHYLENE CHLORIDE	1.6 UJ	2 J	2 J	1 J
PROPIONITRILE	30.7 UJ	38 U	60.2 U	54 U
STYRENE	1.6 U	1.04 U	1.3 U	0.918 U
TETRACHLOROETHENE	1.6 U	1.04 U	1.3 U	0.918 U
TOLUENE	1.6 U	1.04 U	1.3 U	0.918 U
TOTAL XYLENES	1.6 U	1.04 U	1.3 U	0.918 U
TRANS-1,2-DICHLOROETHENE	1.6 U	1.04 U	1.3 U	0.918 U
TRANS-1,3-DICHLOROPROPENE	1.6 U	1.04 U	1.3 U	0.918 U
TRANS-1,4-DICHLORO-2-BUTENE	1.6 U	1.04 U	1.3 U	0.918 U
TRICHLOROETHENE	1.6 U	1.04 U	1.3 U	0.918 U
TRICHLOROFLUOROMETHANE	1.6 U	1.04 U	1.3 U	0.918 U
VINYL ACETATE	1.6 U	1.04 U	1.3 U	0.918 U
VINYL CHLORIDE	1.6 U	1.04 U	1.3 U	0.918 U
Semivolatile Organics (ug/kg)				
1,2,4,5-TETRACHLOROBENZENE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
1,2,4-TRICHLOROBENZENE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
1,2-DICHLOROBENZENE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
1,3-DICHLOROBENZENE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
1,4-DICHLOROBENZENE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
1,4-NAPHTHOQUINONE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
1,4-PHENYLENEDIAMINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
1-NAPHTHYLAMINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
2,2'-OXYBIS(1-CHLOROPROPANE)	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
2,3,4,6-TETRACHLOROPHENOL	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
2,4,5-TRICHLOROPHENOL	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
2,4,6-TRICHLOROPHENOL	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
2,4-DICHLOROPHENOL	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
2,4-DIMETHYLPHENOL	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
2,4-DINITROPHENOL	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
2,6-DICHLOROPHENOL	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
2-ACETYLAMINOFLUORENE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ

TABLE 3

ANALYTICAL DATA
SURFACE SOIL CONFIRMATION SAMPLES
SWMU 12 - MFA BATTERY SITE
NSWC CRANE, CRANE, INDIANA

SITE	MINE FILL A	MINE FILL A	MINE FILL A	MINE FILL A
SWMU	12	12	12	12
LOCATION	12SB21	12SB22	12SB23	12SB24
NSAMPLE	12SS210002	12SS220002	12SS230002	12SS240002
SAMPLE	12SS210002	12SS220002	12SS230002	12SS240002
MATRIX	SS	SS	SS	SS
SACODE	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2
QC TYPE	NM	NM	NM	NM
SAMPLE DATE	9/21/2004	9/21/2004	9/21/2004	9/21/2004
VALIDATED	Y	Y	Y	Y
COLLECTION METHOD	GRAB	GRAB	GRAB	GRAB
2-CHLORONAPHTHALENE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
2-CHLOROPHENOL	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
2-METHYLNAPHTHALENE	3.47 U	3.73 U	3.76 U	3.65 U
2-METHYLPHENOL	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
2-NAPHTHYLAMINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
2-NITROANILINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
2-NITROPHENOL	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
2-PICOLINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
3&4-METHYLPHENOL	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
3,3'-DICHLOROBENZIDINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
3,3'-DIMETHYLBENZIDINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
3-METHYLCHOLANTHRENE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
3-NITROANILINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
4,6-DINITRO-2-METHYLPHENOL	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
4-AMINOBIPHENYL	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
4-BROMOPHENYL PHENYL ETHER	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
4-CHLORO-3-METHYLPHENOL	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
4-CHLOROANILINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
4-CHLOROPHENYL PHENYL ETHER	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
4-NITROANILINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
4-NITROPHENOL	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
4-NITROQUINOLINE-1-OXIDE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
5-NITRO-O-TOLUIDINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
7,12-DIMETHYLBENZ(A)ANTHRACENE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
A,A-DIMETHYLPHENETHYLAMINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
ACENAPHTHENE	3.47 U	3.73 U	3.76 U	3.65 U
ACENAPHTHYLENE	3.47 U	3.73 U	3.76 U	3.65 U
ACETOPHENONE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
ANILINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
ANTHRACENE	3.47 U	3.73 U	3.76 U	3.65 U
ARAMITE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
BENZO(A)ANTHRACENE	5 J	14	16	8
BENZO(A)PYRENE	3.47 U	14	17	12
BENZO(B)FLUORANTHENE	54	13	17	19
BENZO(G,H,I)PERYLENE	13	14	13	25
BENZO(K)FLUORANTHENE	6 J	11	10	4 J
BENZYL ALCOHOL	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ

TABLE 3

ANALYTICAL DATA
SURFACE SOIL CONFIRMATION SAMPLES
SWMU 12 - MFA BATTERY SITE
NSWC CRANE, CRANE, INDIANA

SITE	MINE FILL A	MINE FILL A	MINE FILL A	MINE FILL A
SWMU	12	12	12	12
LOCATION	12SB21	12SB22	12SB23	12SB24
NSAMPLE	12SS210002	12SS220002	12SS230002	12SS240002
SAMPLE	12SS210002	12SS220002	12SS230002	12SS240002
MATRIX	SS	SS	SS	SS
SACODE	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2
QC TYPE	NM	NM	NM	NM
SAMPLE DATE	9/21/2004	9/21/2004	9/21/2004	9/21/2004
VALIDATED	Y	Y	Y	Y
COLLECTION METHOD	GRAB	GRAB	GRAB	GRAB
BIS(2-CHLOROETHOXY)METHANE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
BIS(2-CHLOROETHYL)ETHER	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
BIS(2-ETHYLHEXYL)PHTHALATE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
BUTYL BENZYL PHTHALATE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
CHLOROBENZILATE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
CHRYSENE	110	14	16	12
DI-N-BUTYL PHTHALATE	170 J	75.7 UJ	76.4 UJ	74.1 UJ
DI-N-OCTYL PHTHALATE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
DIALLATE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
DIBENZO(A,H)ANTHRACENE	3.47 U	3.73 U	3.76 U	3.65 U
DIBENZOFURAN	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
DIETHYL PHTHALATE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
DIMETHYL PHTHALATE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
DIPHENYLAMINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
ETHYL METHANE SULFONATE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
FLUORANTHENE	45	13	23	11
FLUORENE	3.47 U	3.73 U	3.76 U	3.65 U
HEXACHLOROBENZENE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
HEXACHLOROBUTADIENE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
HEXACHLOROCYCLOPENTADIENE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
HEXACHLOROETHANE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
HEXACHLOROPROPENE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
INDENO(1,2,3-CD)PYRENE	11	11	11	17
ISODRIN	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
ISOPHORONE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
ISOSAFROLE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
KEPONE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
METHAPYRILENE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
METHYL METHANE SULFONATE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
N-NITROSO-DI-N-BUTYLAMINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
N-NITROSO-DI-N-PROPYLAMINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
N-NITROSODIETHYLAMINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
N-NITROSODIMETHYLAMINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
N-NITROSODIPHENYLAMINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
N-NITROSOMETHYLETHYLAMINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
N-NITROSOMORPHOLINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
N-NITROSOPIPERIDINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ

TABLE 3

ANALYTICAL DATA
SURFACE SOIL CONFIRMATION SAMPLES
SWMU 12 - MFA BATTERY SITE
NSWC CRANE, CRANE, INDIANA

SITE	MINE FILL A	MINE FILL A	MINE FILL A	MINE FILL A
SWMU	12	12	12	12
LOCATION	12SB21	12SB22	12SB23	12SB24
NSAMPLE	12SS210002	12SS220002	12SS230002	12SS240002
SAMPLE	12SS210002	12SS220002	12SS230002	12SS240002
MATRIX	SS	SS	SS	SS
SACODE	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2
QC TYPE	NM	NM	NM	NM
SAMPLE DATE	9/21/2004	9/21/2004	9/21/2004	9/21/2004
VALIDATED	Y	Y	Y	Y
COLLECTION METHOD	GRAB	GRAB	GRAB	GRAB
N-NITROSOPYRROLIDINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
NAPHTHALENE	38	7 J	3.76 U	3.65 U
O,O,O-TRIETHYL PHOSPHOROTHIOATE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
O-TOLUIDINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
P-(DIMETHYLAMINO)AZOBENZENE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
PENTACHLOROBENZENE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
PENTACHLOROETHANE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
PENTACHLORONITROBENZENE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
PHENACETIN	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
PHENANTHRENE	140 J	9 J	15 J	11 J
PHENOL	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
PRONAMIDE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
PYRENE	22	22	36	19
PYRIDINE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
SAFROLE	70.4 UJ	75.7 UJ	76.4 UJ	74.1 UJ
Explosives (mg/kg)				
1,3,5-TRINITROBENZENE	0.84	0.25 U	0.25 U	0.25 U
1,3-DINITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U
2,4,6-TRINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U
2,4-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U
2,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U
2-AMINO-4,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U
2-NITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U
3-NITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U
4-AMINO-2,6-DINITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U
4-NITROTOLUENE	0.25 U	0.25 U	0.25 U	0.25 U
HMX	1.7	0.25 U	0.25 U	0.25 U
NITROBENZENE	0.25 U	0.25 U	0.25 U	0.25 U
RDX	6.1	0.25 U	0.25 U	0.25 U
TETRYL	0.25 UJ	0.25 UJ	0.25 UJ	0.25 UJ
Herbicides (ug/kg)				
HEXACHLOROPHENE	0.893 U	0.96 U	0.969 U	0.94 U
PENTACHLOROPHENOL	0.473 U	0.508 U	0.513 U	0.498 U
Inorganics (mg/kg)				
ALUMINUM	8780 J	13200 J	18700 J	19600 J
ANTIMONY	3610 J	11.4 J	34.1 J	213 J
ARSENIC	94.2 J	5.4 J	7.6 J	158 J

TABLE 3

ANALYTICAL DATA
SURFACE SOIL CONFIRMATION SAMPLES
SWMU 12 - MFA BATTERY SITE
NSWC CRANE, CRANE, INDIANA

SITE	MINE FILL A	MINE FILL A	MINE FILL A	MINE FILL A
SWMU	12	12	12	12
LOCATION	12SB21	12SB22	12SB23	12SB24
NSAMPLE	12SS210002	12SS220002	12SS230002	12SS240002
SAMPLE	12SS210002	12SS220002	12SS230002	12SS240002
MATRIX	SS	SS	SS	SS
SACODE	NORMAL	NORMAL	NORMAL	NORMAL
DEPTH RANGE	0 - 2	0 - 2	0 - 2	0 - 2
QC TYPE	NM	NM	NM	NM
SAMPLE DATE	9/21/2004	9/21/2004	9/21/2004	9/21/2004
VALIDATED	Y	Y	Y	Y
COLLECTION METHOD	GRAB	GRAB	GRAB	GRAB
BARIUM	505 J	313 J	147 J	97.3 J
BERYLLIUM	0.35 U	0.96 U	0.96 U	1 U
CADMIUM	5.8 J	6.3 J	0.81 U	0.75 U
CALCIUM	5400 J	9150 J	2550 J	7590 J
CHROMIUM	48.5 J	50.2 J	18.3 J	51.7 J
COBALT	6.2 J	13.6 J	12.9 J	12 J
COPPER	345 J	292 J	26.2 J	27.9 J
IRON	29500 J	32200 J	18700 J	51200 J
LEAD	429000 J	506 J	3230 J	366 J
MAGNESIUM	1720 J	2750 J	1580 J	1710 J
MANGANESE	516	1340	1400	451
MERCURY	0.31	0.069 J	0.042 J	0.034 J
NICKEL	17.3 J	30.5 J	15.9 J	23.9 J
POTASSIUM	558 J	2000 J	1160 J	1980 J
SELENIUM	0.29 U	0.37 U	0.49 J	0.61 J
SILVER	18.5 J	0.72 U	0.24 U	0.08 U
SODIUM	298 J	370 J	51 U	78.2 J
THALLIUM	6.4 J	0.18 U	0.29 U	0.23 U
TIN	838 J	90.7 J	12.4 J	45.2 J
VANADIUM	16.8 J	23.5 J	31.4 J	42.7 J
ZINC	2050 J	2490 J	156 J	206 J

TABLE 4

SURVEY DATA
SURFACE SOIL CONFIRMATION SAMPLES
SWMU 12 - MFA BATTERY SITE
NSWC CRANE, CRANE, INDIANA

Sample ID	Northing (feet)	Easting (feet)	Ground Surface Elevation (feet amsl)
SWMU 12			
12SB210002	1310543.08	3027414.43	724.66
12SB220002	1310555.02	3027432.94	719.64
12SB230002	1310565.07	3027424.00	723.85
12SB240002	1310565.59	3027436.25	719.49

P:\GIS\CRANE_NWSC\MAPDOCS\APR\SWMU12.APR PROPOSED LOCATIONS LAYOUT 11/23/04 CF

DRAWN BY	DATE
C. FOSTER	11/23/04
CHECKED BY	DATE
J. GIOBBOT	11/22/04

COST/SCHEDULE-AREA

SCALE
AS NOTED

SOIL BORING LOCATIONS
SWMU 12 - MFA BATTERY SITE
NWSC CRANE
CRANE, INDIANA

CONTRACT NUMBER
5676

APPROVED BY — DATE —

APPROVED BY — DATE —

DRAWING NO FIGURE 1 REV 0

APPENDIX A-F
QUALITY CONTROL EXCEEDENCES TABLE

MINE FILL A BATTERY SITE
INTERIM MEASURE REPORT ADDENDUM 1
ANALYTICAL QUALITY CONTROL EXCEEDENCES

Sample ID	Method	QC Parameter	Actual Measured Value	Units	Applicable QA/QC Limits	Units	Corrective Action	Reasoning
S060204GPXSLG	8081	LCS %R	Methoxychlor: 119	%	61-118	%	none	high bias
0405353-01MS/MSD	8081	MS/MSD RPD	Endrin Aldehyde:73	%	30	%	none	MS/MSD %R within limits
0405353-01MS/MSD	8082	MS/MSD RPD	Arochlor 1016: 26	%	16	%	none	MS/MSD %R within limits
0405353-01MS	8260	MS %R	1,2-dibromo-3-chloropropane: 42	%	60-140	%	none	matrix interference
0405353-01MS	8260	MS %R	1,2,4-trichlorobenzene: 38	%	60-140	%	none	matrix interference
0405353-01MSD	8260	MSD %R	1,2-Dibromoethane: 58	%	60-140	%	none	matrix interference
0405353-01MSD	8260	MSD %R	Chlorobenzene:42	%	45-108	%	none	matrix interference
0405353-01MSD	8260	MSD %R	1,2-dibromo-3-chloropropane: 43	%	60-140	%	none	matrix interference
0405353-01MSD	8260	MSD %R	1,1,1,2-tetrachloroethane:53	%	60-140	%	none	matrix interference
0405353-01MSD	8260	MSD %R	1,2,4-trichlorobenzene: 28	%	60-140	%	none	matrix interference
0405353-01MS/MSD	8260	MS/MSD RPD	carbon tetrachloride: 23	%	21	%	none	matrix interference
0405353-01MS/MSD	8260	MS/MSD RPD	1,2-dibromoethane: 31	%	20	%	none	matrix interference
0405353-01MS	8260	MS/MSD RPD	1,2,4-trichlorobenzene:30	%	20	%	none	matrix interference
0405353-01MS/MSD	8260	internal standard	fluorobenzene: 536248	RA	559325-2237298	RA	none	matrix interference
S060204MSVSLG	8270	LCS %R	bis(2-chloroethoxy)methane: 62	%	63-111	%	none	MS/MSD %R within limits
S060204MSVSLG	8270	LCS %R	2-chloronaphthalene: 60	%	68-112	%	none	MS/MSD %R within limits
S060204MSVSLG	8270	LCS %R	benzidine: 0	%	10-123	%	none	not an analyte of concern *
0405353-01MS	8270	MS %R	3,3'-dichlorobenzidine: 6	%	20-160	%	none	LCS %R acceptable
0405353-01MS	8270	MS %R	benzidine: 0	%	20-160	%	none	not an analyte of concern *
0405353-01MSD	8270	MSD %R	benzidine: 0	%	20-160	%	none	not an analyte of concern *
0405353-01MSD	8270	MSD %R	3,3'-dichlorobenzidine: 10	%	20-160	%	none	LCS %R acceptable
0405353-01MS/MSD	8270	MS/MSD RPD	4-chloroaniline: 53	%	30	%	none	MS/MSD %R within limits
0405353-01MS/MSD	8270	MS/MSD RPD	pentachlorophenol: 61	%	50	%	none	MS/MSD %R within limits
0405353-01MS/MSD	8270	MS/MSD RPD	3,3'dichlorobenzidine: 50	%	30	%	none	LCS %R acceptable
B060204MSVSLG	8270	method blank	Di-n-butlphthalate: 320J		<RL		none	present but <RL acceptable
0405353-01MS	6010	MS %R	cadmium: -56	%	75-125	%	none	LCS %R acceptable **
0405353-01MS	6010	MS %R	copper: -88	%	75-125	%	none	LCS %R acceptable **
0405353-01MS	6010	MS %R	lead: -1737	%	75-125	%	none	LCS %R acceptable **
0405353-01MS	6010	MS %R	zinc: -488	%	75-125	%	none	LCS %R acceptable **
0405353-01MS	6010	MS %R	antimony: 25.3	%	75-125	%	post digestive spike	post digestive spike within limits
0405353-01MS	6010	MS %R	tin: 52	%	75-126	%	post digestive spike	post digestive spike within limits
0405353-01MS/MSD	6010	MS/MSD RPD	lead:68.3	%	<20	%	none	LCS %R acceptable
0405353-01MS/MSD	6010	MS/MSD RPD	nickel:148.9	%	<20	%	none	LCS %R acceptable
0405353-01MS/MSD	6010	MS/MSD RPD	tin:86.3	%	<20	%	none	post digestive spike within limits
0405353-01	8015	surrogate %R	bromofluorobenzene: 41	%	50-150	%	none	matrix interference
0405353-01MSD	8015	surrogate %R	bromofluorobenzene: 28	%	50-150	%	none	matrix interference

MINE FILL A BATTERY SITE
INTERIM MEASURE REPORT ADDENDUM 1
ANALYTICAL QUALITY CONTROL EXCEEDENCES

Sample ID	Method	QC Parameter	Actual Measured Value	Units	Applicable QA/QC Limits	Units	Corrective Action	Reasoning
0405353-01MS	7471	MS %R	mercury: 83.6	%	85-115	%	none	LCS %R acceptable
0405353-01MSD	7471	MSD %R	mercury: 5.9	%	85-116	%	none	LCS %R acceptable
0405353-01MS/MSD	7471	MS/MSD RPD	mercury: 78.6	%	<20	%	none	LCS %R acceptable
0405353-01MS	9034	MS %R	sulfide:-1	%	75-125	%	none	LCS %R acceptable
0405353-01MSD	9034	MSD %R	sulfide:-1	%	75-126	%	none	LCS %R acceptable
S060304_CNS03	9012	LCS low level %R	cyanide:80	%	90-110	%	reanalyzed samples	high level LCS %R acceptable
0405353-01MS	9012	MS %R	cyanide:5	%	50-150	%	reanalyzed samples	high level LCS %R acceptable
0405353-01MSD	9012	MSD %R	cyanide: 5	%	50-150	%	reanalyzed samples	high level LCS %R acceptable

RA - response area
MS/MSD - matrix spike/matrix spike duplicate
LCS - laboratory contol spike
%R - percent recovery
RL - reporting limit
RPD - relative percent difference
* not an analyte of concern and is not a recommended spiked analyte in the DOD Quality Assurance Manual
** MS/MSD recoveries are often high when parent sample has a high concentration of the target analyte. Sample concentration exceeded the spike amount by a factor of four or more.