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NCBC GULFPORT
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TECHNICAL MEMORANDUM NUMBER 5 AT SITE 8A GROUNDWATER SAMPLING TO DETERMINE EXTENT OF CONTAMINATION FROM ASH STORAGE IN GROUNDWATER

NCBC GULFPORT MS

9/1/1995

ABB ENVIRONMENTAL

TECHNICAL MEMORANDUM NO. 5
SITE A, FORMER HERBICIDE ORANGE STORAGE AREA, GROUNDWATER SAMPLING EVENT NO. 5

NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI

Unit Identification No. N62604

Contract No. N62467-89-D-0317/092

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September 1995

CERTIFICATION OF TECHNICAL
DATA CONFORMITY (MAY 1987)

The Contractor, ABB Environmental Services, Inc., hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-89-D-0317/092 is complete, accurate, and complies with all requirements of this contract.

DATE: September 18, 1995

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FOREWORD

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

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

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

Investigations at this site focus on characterizing groundwater quality and are in support of a petition to delist the ash located at the site under the RCRA program. This report discusses the findings of the fourth round of groundwater sampling at Site A, Former Herbicide Orange Storage Area, Naval Construction Battalion Center, Gulfport, Mississippi.

Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), has the responsibility for implementation of the Navy and Marine Corps RCRA program in the southeastern and midwestern United States. Questions regarding this report should be addressed to the SOUTHNAVFACENGCOM Remedial Project Manager, Mr. Dan Owens, at (803) 743-0331.

EXECUTIVE SUMMARY

ABB Environmental Services, Inc. (ABB-ES), under contract to Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), conducted site investigative activities at Site A, Former Herbicide Orange Storage Area, located at Naval Construction Battalion Center (NCBC), Gulfport, Mississippi. This technical memorandum was prepared under the Comprehensive Long-Term Environmental Action, Navy (CLEAN) Contract No. N62467-89-D-0317 as Contract Task Order No. 092.

Groundwater sampling event No. 5 is the fifth in a series of quarterly sampling events that are part of the ongoing delisting process for the ash located at Site A. The sampling event at Site A included collection of five groundwater samples, including one duplicate sample. Groundwater samples were analyzed and validated for dioxin and furans (USEPA Method 8290). Samples were collected following the procedures outlined in the addendum to the Versar sampling and analysis plan (ABB-ES, 1993).

Groundwater samples collected from the four groundwater monitoring wells were split and sent to two laboratories, Quanterra and QAL-Canviro, for confirmational analyses. Laboratory results from Quanterra indicate the 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) toxicity equivalent (TEQ) of groundwater sample GPTH05-2 to be above the maximum contaminant level (MCL) of 30 picograms per liter (pg/ℓ). All other samples had TEQs below the MCL. Results from QAL-Canviro indicate that sample GPTH05-2 and its duplicate sample, GPTH05-2D, had TEQs above the MCL. Soil remaining at the site may contain 2,3,7,8 tetrachlorodibenzo-p-dioxin at concentrations of up to 1 part per billion (ppb). The soil, not the ash, is thought to be the source of dioxin in the groundwater.

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Naval Construction Battalion Center
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GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action, Navy
DQO	data quality objective
FID	flame ionization detector
1,2,3,4,6,7,8-HpCDD	1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin
1,2,3,7,8,9-HxCDD	1,2,3,7,8,9-hexachlorodibenzo-p-dioxin
HO	Herbicide Orange
IR	Installation Restoration
MCL	maximum contaminant level
MS/MSDs	matrix spike and matrix spike duplicates
MSDEQ	Mississippi State Department of Environmental Quality
NCBC	Naval Construction Battalion Center
NEESA	Naval Energy and Environmental Support Activity
OCDD	Octachlorodibenzodioxin
PAHs	polynuclear aromatic hydrocarbons
PARCC	precision, accuracy, representativeness, comparability, and completeness
PCDD/PCDF	polychlorinated dibenzodioxin and polychlorinated dibenzofuran
pg/ℓ	picograms per liter
ppb	parts per billion
QA	quality assurance
QAL	QAL-Canviro Laboratory
QC	quality control
Quanterra	Quanterra Environmental Services
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
SOUTHNAVFACENGCOM	Southern Division, Naval Facilities Engineering Command
SDG	sample delivery group
2,3,7,8-TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TEF	toxicity equivalency factor
TEQ	toxicity equivalent
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compounds

1.0 INTRODUCTION

ABB Environmental Services, Inc. (ABB-ES), under contract to Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), conducted site investigative activities at Site A, Former Herbicide Orange (HO) Storage Area, at the Naval Construction Battalion Center (NCBC) in Gulfport, Mississippi. This technical memorandum is the fifth of a series of technical memoranda (ABB-ES, 1994, 1995a, 1995b, and 1995c) associated with the groundwater investigation to supplement the ongoing Resource Conservation and Recovery Act (RCRA) delisting process that is continuing into calendar year 1995. The field program and preparation of this report were completed under the Comprehensive Long-Term Environmental Action, Navy (CLEAN) contract (Contract Number N62467-89-D-0317, Contract Task Order Number 092) between SOUTHNAVFACENGCOM and ABB-ES.

Site A covers approximately 12 acres of nearly flat land and comprises Areas A, B, and C where approximately 850,000 gallons of HO were stored from 1965 to 1977. Between 1986 and 1988, soil contaminated with 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) at concentrations greater than 1 part per billion (ppb) were incinerated and returned to selected areas within Site A. The contaminated soil was classified as RCRA-listed waste F027; however, following incineration of the soil, it is now classified as F028.

Prior to disposition, the ash must be approved for delisting by the Mississippi State Department of Environmental Quality (MSDEQ). A petition for final exclusion of the incinerated residue was submitted in November 1988. Additional information was requested by the regulators to sufficiently characterize the groundwater. The objective of the quarterly groundwater sampling is to determine whether the groundwater is contaminated with dioxins or other inorganic contaminants at levels higher than background. Results from groundwater sampling events and from the ash sampling will be incorporated into an addendum report for submittal to U.S. Environmental Protection Agency (USEPA) Region IV and the MSDEQ to support delisting the ash at Site A.

This technical memorandum summarizes the findings and results based on information and data collected from Site A as a result of groundwater sampling event No. 5, which was performed May 19, 1995.

2.0 GROUNDWATER SAMPLING FIELD PROGRAM

Groundwater sampling was performed on May 19, 1995. Groundwater samples were collected from the four wells installed at Site A during the April 1994 field effort. Groundwater samples were analyzed for dioxins and furans (USEPA Method 8290). Groundwater samples were split and sent to Quanterra Environmental Services (Quanterra) in North Canton, Ohio, and QAL-Canviro (QAL) in Redmond, California. Naval Energy and Environmental Support Activity (NEESA) Level D data quality objectives and deliverables were specified for the analytical program (NEESA, 1988). Results of groundwater sample analyses are discussed in Chapters 3.0 and 4.0.

Upon opening each monitoring well, the headspace was screened for volatile organic compounds (VOCs) using a flame ionization detector (FID). Prior to sample collection, each well was purged of at least three well volumes. Samples were collected within 24 hours following purging. Decontaminated Teflon™ bailers were used to purge the monitoring wells and to collect samples. ABB-ES personnel placed the filled containers on ice in ice chests immediately after collection. Chain-of-custody procedures were initiated in the field at the time of sample collection. Samples were shipped via overnight courier service to the laboratory on the date of collection.

Field parameter measurements for groundwater samples included pH, conductivity, and temperature. Appropriate preservatives were added to the sample containers by ABB-ES personnel immediately after collecting the samples.

3.0 ANALYTICAL PROGRAM

This chapter summarizes the analytical program for groundwater samples collected from monitoring wells at Site A during groundwater sampling event No. 5 at NCBC Gulfport. In addition, it presents an assessment of data quality and useability.

3.1 CHEMICAL ANALYSES. Sampling activities during the fifth groundwater sampling event at NCBC Gulfport included collection of five groundwater samples, including one duplicate sample. All samples were collected in accordance with procedures outlined in the addendum to the Versar sampling and analysis plan (ABB-ES, 1993). Samples were submitted to two laboratories, Quanterra and QAL, for chemical analyses. Samples were analyzed in accordance with USEPA SW-846 methods (USEPA, 1986) and NEESA Level D documentation (NEESA, 1988) for dioxins and furans. Table 3-1 is a list of dioxin and furan congeners.

3.2 DATA QUALITY ASSESSMENT. All groundwater samples collected were properly preserved, placed in coolers, and packed with bagged ice immediately after collection. All samples remained in the custody of the Field Operations Leader until delivery to the courier service providing overnight shipment to the laboratories. All samples were shipped, complete with chain-of-custody forms, to both laboratories within 24 hours for analyses. Upon arrival, laboratory personnel checked the chain of custody and preservation of the samples with the contents of each cooler, signed the chain-of-custody form, and accepted the samples for analysis.

Review of the field notebook and chain-of-custody forms did not indicate any non-conformance relative to field instrument calibration or sample handling. All required field quality control (QC) samples were collected in conformance with the requirements of the USEPA and ABB-ES quality assurance (QA) plans and the June 1988 NEESA *Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program* (NEESA, 1988) (Document 20.2-047B). These field QC samples included field duplicates, equipment rinsate blanks, and source water blanks.

The analytical results for environmental samples collected during groundwater sampling event No. 5 were evaluated and validated according to NEESA Level D QC criteria to determine data quality and useability. The data tables included in Appendix A reflect validation according to Level D criteria. These criteria are described in NEESA Document 20.2-047B (NEESA, 1988). The following subsections discuss analytical performance and the evaluation of field and laboratory QC samples for Quanterra only. A precision, accuracy, representativeness, comparability, and completeness (PARCC) report was not requested for QAL.

3.2.1 Analytical Performance The data review and validation were performed under subcontract to Heartland Environmental Services, Inc., St. Peters, Missouri. Review of analytical data indicated that the laboratory generally met applicable analytical QC criteria for all chemical analyses. Extraction and holding times for all sample lots were met.

Table 3-1
U.S. Environmental Protection Agency Dioxin and Furan Toxic Equivalency Factors

Technical Memorandum No. 5
Site A, Former Herbicide Orange Storage Area
Groundwater Sampling Event No. 5
Naval Construction Battalion Center
Gulfport, Mississippi

Congener	Toxic Equivalency Factor
Dioxins	
2,3,7,8-Tetrachloro-p-dibenzodioxins (TCDDs)	1
Other TCDDs	0
2,3,7,8-Pentachloro-p-dibenzodioxins (PeCDDs)	0.5
Other PeCDDs	0
2,3,4,7,8-Hexachloro-p-dibenzodioxins (HxCDDs)	0.1
Other HxCDDs	0
1,2,3,4,6,7,8-Heptachloro-p-dibenzodioxins (HpCDDs)	0.01
Other HpCDDs	0
Octachloro-p-dibenzodioxins (OCDDs)	0.001
Furans	
2,3,7,8-Tetrachloro-p-dibenzofurans (TCDFs)	0.1
Other TCDFs	0
2,3,7,8-Pentachloro-p-dibenzofurans (PeCDFs)	0.05
Other PeCDFs	0
2,3,7,8-Hexachloro-p-dibenzofurans (HxCDFs)	0.1
Other HxCDFs	0
2,3,7,8-Heptachloro-p-dibenzofurans (HpCDFs)	0.01
Other HpCDFs	0
Octachloro-p-dibenzofurans (OCDFs)	0.001

Source: Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of chlorinated dibenzo-p-dioxins and dibenzofurans (CDDs and CDFs) and 1989 update.

3.2.2 **Precision** Precision of the water matrix data was acceptable based on the assessment of duplicate precision criteria. Three of the congeners detected, 2,3,7,8-TCDD, OCDD, and 1,2,3,4,6,7,8-HpCDD, exhibited noncompliant relative percent difference. The congeners were detected in the original sample at concentrations above the reporting limits. However, 1,2,3,4,6,7,8-HpCDD was not detected in the field duplicate sample. The congeners OCDD and 2,3,7,8-TCDD were detected in the field duplicate sample at concentrations less than in the original sample. The noncompliance may be due to laboratory and/or field inconsistencies. Relative percent differences for the matrix spike and matrix spike duplicates (MS/MSD) fell within acceptable ranges for all congeners.

3.2.3 **Accuracy** Accuracy is evaluated by comparison of the percent recovery computed from the known concentration of analyte spikes and recovered concentrations versus the analytical method acceptance criteria. The MS/MSD pair for sample GPTH05-1 analyzed for the dioxin/furan fraction exhibited acceptable recoveries for all spiked congeners. Two samples analyzed for the dioxin/furan fraction exhibited 13C-OCDD recoveries which were below the QC limits. This indicates that reported results in the two samples for OCDD may be underestimated. Therefore, reported positive and nondetect results for OCDD in samples BS-01-R1 and GPTH05-2 were qualified as estimated. The accuracy of the groundwater matrix analytical data was acceptable for each fraction.

3.2.4 **Representativeness** Representativeness of the analytical data was assessed, and corrective action was taken when necessary. There were no dioxin/furan congeners detected in the field blank, method blank, or the equipment rinseate blank. Based on the assessment of the blanks, the analytical data were acceptable for the sample delivery group (SDG). Holding times for extraction and analysis were met for all fractions.

3.2.5 **Comparability** Comparability is the qualitative measure designed to express the confidence with which one data set may be compared to another. The analytical samples were collected and transported to the chemical analytical laboratory in accordance with standard procedures and were analyzed in conformance with acceptable USEPA procedures. All analytical data are reported in standard units (picograms per liter [pg/ℓ]). This should assure comparability of the analytical data.

3.2.6 **Completeness** The analytical data met the completeness goal of 85 percent for every fraction. Additional completeness information is contained in Appendix B which contains the complete PARCC report.

4.0 RESULTS OF INVESTIGATIONS

This chapter presents the analytical results of groundwater samples collected during the fifth groundwater sampling event at Site A, Former HO Storage Area, in May 1995. Technical Memorandum No. 1 (ABB-ES, 1994) presented discussion of the field program, including well installation, soil samples, and groundwater sampling event No. 1. Technical Memorandum No. 2 (ABB-ES, 1995a) presented the results from groundwater sampling event No. 2. Technical Memorandum No. 3 (ABB-ES, 1995b) presented the results from groundwater sampling event No. 3, and Technical Memorandum No.4 (ABB-ES, 1995c) discussed the results from the fourth groundwater sampling event.

The following sections discuss comparisons of analytical data with data associated with previous sampling events at Site A. Appendix A contains tables of validated analytical data for samples collected in May 1995 at Site A. Groundwater samples were split and sent to Quanterra and QAL laboratories, both under subcontract to ABB-ES.

4.1 SITE A, FORMER HERBICIDE ORANGE STORAGE AREA. The headspace of monitoring wells at Site A was measured for VOCs using an FID; however, no VOCs were detected. Field measurements of pH, specific conductance, and temperature were collected during purging of monitoring wells. Table 4-1 summarizes field measurements collected during purging of monitoring wells at Site A. Purging continued until at least three well volumes were removed and field parameters stabilized to within 10 percent. The final measurements of pH, specific conductance, and temperature are considered the measurements of record for the monitoring wells (USEPA, 1991).

Five groundwater samples, including a duplicate sample, were analyzed for dioxins and furans. Table 4-2 summarizes analytical data for compounds detected in groundwater samples collected from Site A from the two laboratories during sampling event No. 5.

4.1.1 Dioxin and Furan Compounds in Groundwater Samples (Quanterra) The analytical data from Quanterra indicated that OCDD was present in all groundwater samples. The highest OCDD concentrations were detected in sample GPTH05-2 at 2,900 pg/ℓ followed by sample GPTH05-4 at 2,800 pg/ℓ. 2,3,7,8-TCDD was only detected in samples GPTH05-2 and GPTH05-2D at 56 and 17 pg/ℓ, respectively. 1,2,3,4,6,7,8-HpCDD was detected in samples GPTH05-2, GPTH05-3, and GPTH05-4 at respective concentrations of 110, 47, and 130 pg/ℓ, respectively.

4.1.2 Dioxin and Furan Compounds in Groundwater Samples (QAL) The analytical results from QAL were similar to those from Quanterra. OCDD was detected in all four groundwater samples, the highest concentration in sample GPTH05-2D at 620 pg/ℓ. Again, 2,3,7,8-TCDD was detected only in samples GPTH05-2 and GPTH05-2D at 31.8 and 45.2 pg/ℓ, respectively. 1,2,3,4,6,7,8-HpCDD was detected in samples GPTH05-2, GPTH05-2D, and GPTH05-4 at concentrations of 30.1, 36.8, and 30.2 pg/ℓ, respectively.

Figure 4-1 presents the spatial variation of dioxin and furan contaminants detected as they relate to the map of Site A. The analytical data for both laboratories are provided in this figure.

Table 4-1
Summary of Field Measurements for Monitoring Wells at Site A

Technical Memorandum No. 5
Site A, Former Herbicide Orange Storage Area
Groundwater Sampling Event No. 5
Naval Construction Battalion Center
Gulfport, Mississippi

Monitoring Well No.	Field Data	Well Volume No. 1	Well Volume No. 2	Well Volume No. 3	Well Volume (gallons)	Total Purge Volume (gallons)
GPT-A-1	pH	4.72	4.80	4.81	1.4	6
	Conductivity	90	90	90		
	Temperature	21.4	21.0	21.0		
GPT-A-2	pH	6.55	6.56	6.54	1.45	4.5
	Conductivity	185	185	1.85		
	Temperature	24.1	23.8	23.6		
GPT-A-3	pH	5.9	5.85	5.83	0.94	4
	Conductivity	15,000	15,000	15,000		
	Temperature	23	22.5	22.5		
GPT-A-4	pH	5.85	5.87	5.85	1.0	4
	Conductivity	170	170	170		
	Temperature	23.0	23.0	23.0		

Note: Units are standard units (su) for pH, micromhos per centimeter (μmhos/cm) for specific conductance, and degrees Celsius (°C) for temperature.

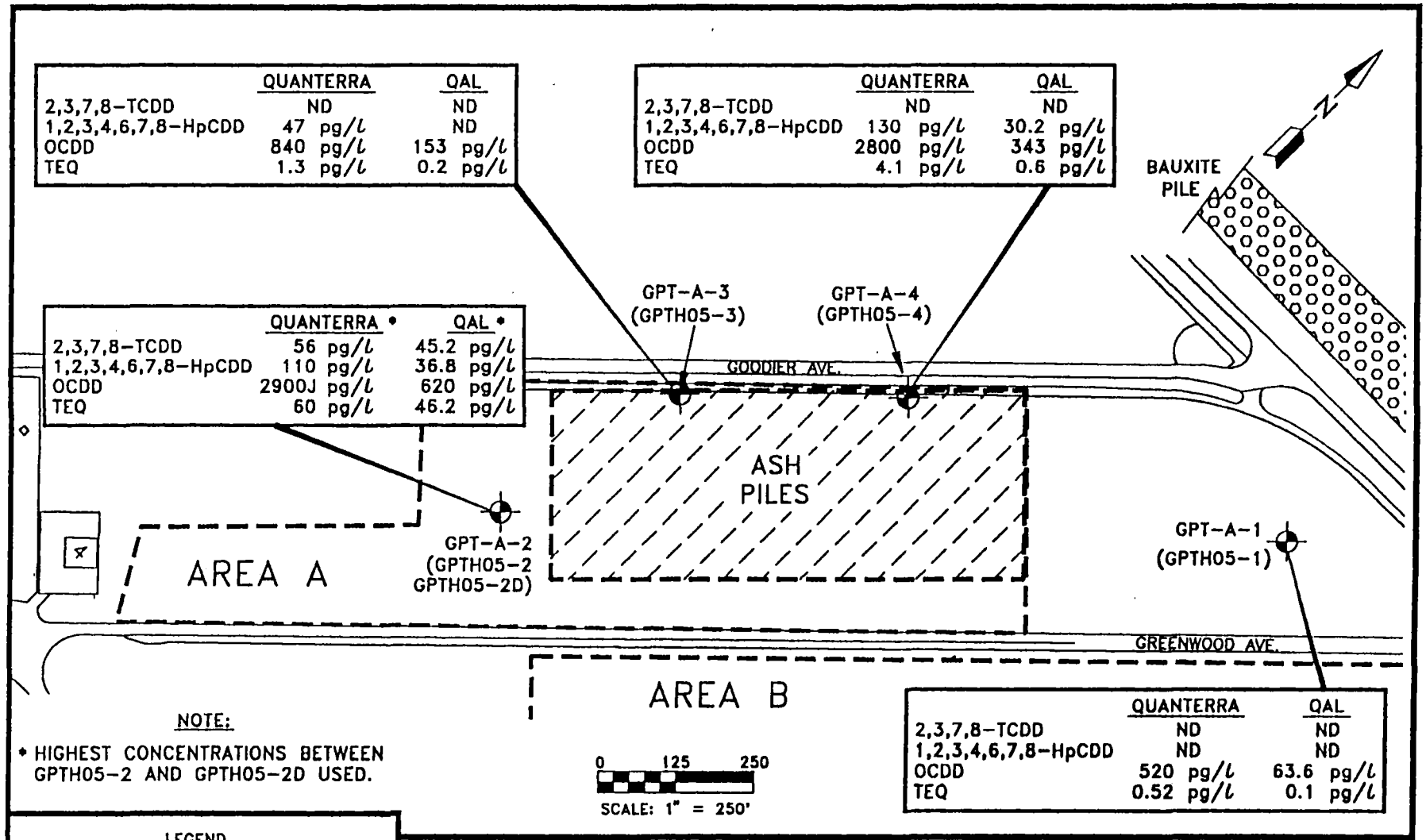
Table 4-2
Dioxins and Furans Detected in Groundwater Samples

Technical Memorandum No. 5
Site A, Former Herbicide Orange Storage Area
Groundwater Sampling Event No. 5
Naval Construction Battalion Center
Gulfport, Mississippi

Laboratory and Analyte	GPTH05-1	GPTH05-2	GPTH05-2D	GPTH05-3	GPTH05-4
Quanterra					
2,3,7,8-TCDD	ND	56	17	ND	ND
1,2,3,4,6,7,8-HpCDD	ND	110	ND	47	130
OCDD	520	2,900 J	670	840	2,800
TEQ	0.52	60	18	1.3	4.1
QAL					
2,3,7,8-TCDD	ND	31.8	45.2	ND	ND
1,2,3,4,6,7,8-HpCDD	ND	30.1	36.8	ND	30.2
OCDD	63.6	468	620	153	343
TEQ	0.1	32.6	46.2	0.2	0.6

Notes: All concentrations are reported in picograms per liter.

TCDD = tetrachlorodibenzo-p-dioxin.
HpCDD = heptachlorodibenzo-p-dioxin.
J = estimated value.
ND = not detected.
OCDD = octachlorodibenzo-p-dioxin.
TEQ = toxicity equivalent.



NOTE:

* HIGHEST CONCENTRATIONS BETWEEN GPTH05-2 AND GPTH05-2D USED.

LEGEND

- MONITORING WELL LOCATION
- ND NOT DETECTED
- pg/l PICOGRAMS PER LITER
- TEQ TOXICITY EQUIVALENCE

FIGURE 4-1

GROUNDWATER QUALITY MAP

TECHNICAL MEMORANDUM NO. 5
FORMER HERBICIDE ORANGE SITE A

NCBC GULFPORT
GULFPORT, MISSISSIPPI

C:\DWGS\GULFPORT\HOTM\TM5\NCBC\8504.50\FIG4-1/950809

Gfrpt [MS_SITEA.TM5]
mlv.08.95

4.1.3 2,3,7,8-TCDD Toxic Equivalency Approach 2,3,7,8-TCDD is considered to be the most potent carcinogen in the dioxin and furan families. Toxicologists believe that polychlorinated dibenzodioxins and polychlorinated dibenzofurans (PCDDs/PCDFs) with chlorine atoms at the 2, 3, 7, and 8 positions (2,3,7,8 substituted compounds) in their molecules can mimic the toxic properties of 2,3,7,8-TCDD. The USEPA developed toxicity equivalency factors (TEFs) to quantify the carcinogenicity of these compounds relative to 2,3,7,8-TCDD. Concentrations of PCDDs/PCDFs in a sample are multiplied by their respective TEFs to determine the 2,3,7,8-TCDD equivalent (toxicity equivalent [TEQ]) concentration. The TEQ for each sample is also shown in Table 4-2.

4.2 DISCUSSION. Maximum concentrations of PCDD/PCDF compounds detected in Site A groundwater are presented in Table 4-3. A comparison of maximum TCDD TEQs to the TCDD maximum contaminant level (MCL) is also provided. The TCDD MCL was exceeded in only one of the samples analyzed at Quanterra (GPTH05-2) while the TEQs of two samples analyzed at QAL (GPTH05-2 and GPTH05-2D) exceeded the MCL.

Table 4-3
Maximum Groundwater Dioxins and Furans Concentrations

Technical Memorandum No. 5
Site A, Former Herbicide Orange Storage Area
Groundwater Sampling Event No. 5
Naval Construction Battalion Center
Gulfport, Mississippi

Analyte	Quanterra		QAL		TCDD MCL
Dioxins and Furans (pg/ℓ)	Site ID	Concentration	Site ID	Concentration	
2,3,7,8-TCDD	GPTH05-2	56	GPTH05-2D	45.2	
1,2,3,4,6,7,8-HpCDD	GPTH05-4	130	GPTH05-2D	36.8	
OCDD	GPTH05-2	2,900 J	GPTH05-1	620	
TEQ	GPTH05-5	60	GPTH05-2D	46.2	30

Notes: MCL = maximum contaminant level.
QAL = QAL-Canviro Laboratory.
HpCDD = heptachlorodibenzo-p-dioxin.
TEQ = toxicity equivalent.
pg/ℓ = picograms per liter.
TCDD = tetrachlorodibenzo-p-dioxin.
OCDD = octachlorodibenzo-p-dioxin.
J = estimated value.

These results indicate good agreement in determining TCDD MCL exceedances provided that either sample GPTH05-2 or GPTH05-2D can be used to evaluate well GPT-A-2. However, these results also highlight some interesting differences between laboratories in the concentrations of the PCDD/PCDF compounds detected.

The PCDD/PCDF concentrations and TCDD TEQs from Quanterra tend to be higher than those reported from QAL but this pattern is not uniform. Also, the QAL data indicated a TCDD MCL exceedance in both GPTH05-2 and GPTH04-5D while the Quanterra data indicated an exceedance only in GPTH05-2. Also, there is no consistent agreement between the two laboratories in PCDD/PCDF compounds detected in the groundwater. Both of these observations are interesting since the samples sent to the two different laboratories were split samples that should have the same analytes present in similar relative proportions.

Dixoins and furans detected in the groundwater are probably due to soil contamiantion rather than the ash. Since dioxins are known to bind tightly to soil and have very low water soluabilities, it is difficult to describe the migration pathway of soil particles through the soil into the groundwater. Also, since the soil is in direct contact with the groundwater, while the ash is not, the most likely explanation of dioxin in the groundwater is from the soil rather than from the ash.

5.0 SUMMARY

Groundwater samples collected in May 1995 were analyzed for dioxin and furan (USEPA Method 8290). Groundwater samples were split in the field and sent to two laboratories, Quanterra and QAL, for chemical analyses. The samples were analyzed and validated according to NEESA Level D data quality objectives (DQOs) (NEESA, 1988). Data quality and useability were good and met the 85 percent completeness goal.

Groundwater samples from the upgradient and downgradient wells exhibited positive OCDD results. Quanterra laboratory data indicated that samples from the three downgradient wells had positive detections of 1,2,3,4,6,7,8-HpCDD, while sample data from QAL indicated positive detections in GPTH05-2 and GPTH05-4, only. Samples GPTH05-2 and GPTH05-2D collected from GPT-A-2 (primary and duplicate) indicated TEQs above the MCL for dioxins/furans in the QAL data, while only the primary sample analyzed by Quanterra indicated a concentration which exceeded the MCL of 30 pg/ℓ.

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APPENDIX A

ANALYTICAL DATA VALIDATION TABLES

Validation Groundwater Results

PROJECT: NCBC GULFPORT, MISSISSIPPI	DIOXIN/FURANS AQUEOUS ANALYSES (pg/l): QUANTERRA				
SAMPLE LOCATION:	GPTH05-1	GPTH05-2	GPTH05-2D	GPTH05-3	GPTH05-4
LAB NUMBER:	082031-0001-SA	082031-0002-SA	082031-0003-SA	082031-0004-SA	082031-0005-SA
DATE SAMPLED:	5/19/95	5/19/95	5/19/95	5/19/95	5/19/95
DATE ANALYZED:	6/1/95	6/1/95	6/1/95	6/1/95	6/1/95
2,3,7,8-TCDD	1.3 U	56	17	2.6 U	5.0 U
2,3,7,8-TCDF	1.2 U	4.3 U	4.0 U	1.7 U	3.2 U
1,2,3,7,8-PeCDD	1.8 U	11 U	7.2 U	4.5 U	8.0 U
1,2,3,7,8-PeCDF	1.9 U	4.2 U	8.6 U	3.2 U	9.6 U
2,3,4,7,8-PeCDF	1.7 U	3.7 U	7.7 U	2.8 U	8.6 U
1,2,3,4,7,8-HxCDD	1.4 U	2.8 U	12 U	3.4 U	9.9 U
1,2,3,6,7,8-HxCDD	1.1 U	3.3 U	9.6 U	2.6 U	8.2 U
1,2,3,7,8,9-HxCDD	3.8 U	18 U	10 U	5.9 U	33 U
1,2,3,4,7,8-HxCDF	0.47 U	1.0 U	7.0 U	0.48 U	3.8 U
1,2,3,6,7,8-HxCDF	0.50 U	1.1 U	9.6 U	0.51 U	5.3 U
2,3,4,6,7,8-HxCDF	0.61 U	1.4 U	10 U	0.62 U	5.8 U
1,2,3,7,8,9-HxCDF	0.77 U	1.7 U	12 U	0.79 U	6.9 U
1,2,3,4,6,7,8-HpCDD	25 U	110	29 U	47	130
1,2,3,4,6,7,8-HpCDF	1.4 U	8.7 U	3.6 U	0.53 U	4.0 U
1,2,3,4,7,8,9-HpCDF	0.65 U	0.90 U	1.4 U	0.79 U	1.9 U
OCDD	520	2900 J	670	840	2800
OCDF	7.0 U	18 U	7.0 U	3.0 U	6.8 U

PROJECT: NCBC GULFPORT, MISSISSIPPI	DIOXIN/FURANS AQUEOUS ANALYSES (pg/l): QAL				
SAMPLE LOCATION:	GPTH05-1	GPTH05-2	GPTH05-2D	GPTH05-3	GPTH05-4
LAB NUMBER:	9505320-01	9505320-04	9505320-05	9505320-06	9505320-07
DATE SAMPLED:	5/19/95	5/19/95	5/19/95	5/19/95	5/19/95
DATE ANALYZED:	6/6/95	6/6/95	6/6/95	6/6/95	6/6/95
2,3,7,8-TCDD	1.45 U	31.8	45.2	1.63 U	1.70 U
2,3,7,8-TCDF	0.89 U	1.24 U	0.22 U	0.76 U	0.83 U
1,2,3,7,8-PeCDD	1.62 U	2.0 U	1.49 U	1.53 U	1.49 U
1,2,3,7,8-PeCDF	1.25 U	1.71 U	1.16 U	1.37 U	1.23 U
2,3,4,7,8-PeCDF	1.22 U	1.66 U	1.14 U	1.34 U	1.20 U
1,2,3,4,7,8-HxCDD	0.79 U	0.88 U	0.93 U	0.79 U	0.58 U
1,2,3,6,7,8-HxCDD	0.73 U	0.82 U	0.87 U	0.73 U	0.54 U
1,2,3,7,8,9-HxCDD	0.77 U	0.27 U	0.28 U	0.77 U	0.17 U
1,2,3,4,7,8-HxCDF	0.43 U	0.63 U	0.48 U	0.55 U	0.38 U
1,2,3,6,7,8-HxCDF	0.39 U	0.57 U	0.43 U	0.49 U	0.34 U
2,3,4,6,7,8-HxCDF	0.46 U	0.67 U	0.51 U	0.58 U	0.41 U
1,2,3,7,8,9-HxCDF	0.19 U	0.26 U	0.20 U	0.22 U	0.16 U
1,2,3,4,6,7,8-HpCDD	0.21 U	30.1	36.8	0.23 U	30.2
1,2,3,4,6,7,8-HpCDF	0.54 U	0.20 U	0.24 U	0.73 U	0.67 U
1,2,3,4,7,8,9-HpCDF	0.85 U	1.10 U	1.36 U	1.17 U	1.06 U
OCDD	63.6	468	620	153	343
OCDF	3.48 U	5.11 U	4.24 U	3.98 U	3.79 U

Validated Quality Assurance and Quality Control Results

PROJECT: NCBC GULFPORT, MISSISSIPPI	DIOXIN/FURANS AQUEOUS ANALYSES (pg/l): QUANTERRA	
SAMPLE LOCATION:	BS-01-DI5	BS-01-RI5
LAB NUMBER:	082031-0006-SA	082031-0007-SA
DATE SAMPLED:	5/19/95	5/19/95
DATE ANALYZED:	6/7/95	6/1/95
2,3,7,8-TCDD	3.9 U	2.0 U
2,3,7,8-TCDF	2.9 U	0.63 U
1,2,3,7,8-PeCDD	7.8 U	4.0 U
1,2,3,7,8-PeCDF	6.8 U	4.9 U
2,3,4,7,8-PeCDF	6.1 U	4.2 U
1,2,3,4,7,8-HxCDD	7.0 U	3.8 U
1,2,3,6,7,8-HxCDD	5.8 U	2.9 U
1,2,3,7,8,9-HxCDD	6.2 U	3.3 U
1,2,3,4,7,8-HxCDF	3.3 U	0.83 U
1,2,3,6,7,8-HxCDF	4.5 U	0.88 U
2,3,4,6,7,8-HxCDF	4.9 U	1.1 U
1,2,3,7,8,9-HxCDF	5.8 U	1.4 U
1,2,3,4,6,7,8-HpCDD	4.8 U	6.8 U
1,2,3,4,6,7,8-HpCDF	2.3 U	1.2 U
1,2,3,4,7,8,9-HpCDF	1.3 U	1.7 U
OCDD	15 U	12 UJ
OCDF	5.2 U	22 U

PROJECT: NCBC GULFPORT, MISSISSIPPI	DIOXIN/FURANS AQUEOUS ANALYSES (pg/l): QAL		
SAMPLE LOCATION:	BS-01-DI5	BS-01-RI5	TRVLBLK
LAB NUMBER:	9505320-08	9505320-09	95095320-10
DATE SAMPLED:	5/19/95	5/19/95	5/19/95
DATE ANALYZED:	6/6/95	1/5/00	6/6/96
2,3,7,8-TCDD	1.35 U	1.39 U	1.41 U
2,3,7,8-TCDF	0.59 U	0.69 U	0.67 U
1,2,3,7,8-PeCDD	1.14 U	0.84 U	1.07 U
1,2,3,7,8-PeCDF	1.07 U	1.08 U	0.99 U
2,3,4,7,8-PeCDF	1.04 U	1.05 U	0.96 U
1,2,3,4,7,8-HxCDD	0.64 U	0.50 U	0.51 U
1,2,3,6,7,8-HxCDD	0.60 U	0.46 U	0.47 U
1,2,3,7,8,9-HxCDD	0.63 U	0.49 U	0.50 U
1,2,3,4,7,8-HxCDF	0.31 U	0.33 U	0.26 U
1,2,3,6,7,8-HxCDF	0.23 U	0.30 U	0.23 U
2,3,4,6,7,8-HxCDF	0.33 U	0.13 U	0.28 U
1,2,3,7,8,9-HxCDF	0.13 U	0.15 U	0.11 U
1,2,3,4,6,7,8-HpCDD	0.76 U	0.20 U	0.59 U
1,2,3,4,6,7,8-HpCDF	0.55 U	0.16 U	0.51 U
1,2,3,4,7,8,9-HpCDF	0.87 U	0.96 U	0.80 U
OCDD	1.42 U	0.55 U	1.84 U
OCDF	2.15 U	3.77 U	3.04 U

APPENDIX B

PRECISION, ACCURACY, REPRESENTATIVENESS, COMPARABILITY, AND COMPLETENESS REPORT

PRECISION, ACCURACY, REPRESENTATIVENESS, COMPARABILITY, AND COMPLETENESS FOR NCBC GULFPORT HO

NAVAL CONSTRUCTION BATTALION CENTER GULFPORT, MISSISSIPPI

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August 1995

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NCBC Gulfport HO

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Appendix A
Calibration Criteria Summary

NCBC Gulfport HO

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NO TABLES REQUIRED		

Appendix B
Serial Dilution Summary

NCBC Gulfport HO

Tables	Title	Page No.
NO TABLES REQUIRED		

Appendix C
Rejected Data Summary

NCBC Gulfport HO

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1.0 INTRODUCTION

Prior to evaluating the data for precision, accuracy, representativeness, comparability, and completeness (PARCC) criteria the laboratory reviewed the data package and the data also were independently reviewed and validated using the Naval Energy and Environmental and Support Activity (NEESA) guidance document 20.2-047B (1988) entitled, *Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Program*. Before the laboratory released the chemical analytical results, both the sample and laboratory QC data were carefully reviewed in order to verify sample identity, instrument calibration, detection limits, dilution factors, numerical computations, accuracy of transcriptions, and chemical interpretations. Additionally, the QC data were reduced and spike recoveries were included in control charts, and the resulting data were reviewed to ascertain whether they were within the laboratory defined limits for accuracy and precision. The data were compiled into a NEESA Level D data package and any nonconforming data were discussed in the data package cover letter and case narrative.

The Level D data packages were then reviewed and validated by Heartland Environmental Services, Inc., Missouri (Heartland). Data validation is the technical review of a data package using criteria established in the data quality objectives, the quality assurance project plan and guidance documents prepared by the United States Environmental Protection Agency (USEPA) for the validation of organic and inorganic analytical data (USEPA 1990a and 1990b) as specified by NEESA document 20.2-047B. The data review and validation process is independent of the laboratory's checks because it is impossible to repeat the review conducted by the laboratory.

Samples that did not meet the acceptance limit criteria were qualified with a flag; single letter abbreviations that indicate a problem with the data. Data qualifiers used by the validators when amending the data include the following.

U — Undetected. The analyte was not detected above the contract required quantitation limit (CRQL). The "U" designator also is used to qualify laboratory contaminants. The "U" designator is applied to an environmental sample when the laboratory contaminant is detected in an environmental sample at a concentration less than 5 times (10 X for common contaminants) the value of the concentration detected in any corresponding field QC blank, method blank or preparation blanks.

J — Estimated. The analyte was present, but the reported value may not be accurate or precise. The "J" designator is used to qualify an analyte that was present at a concentration between the CRQL and method detection limit (MDL) or the data "failed" some of the analytical validation criteria but did not require rejections of the data. When combined with the U designator, the quantitation limit is estimated.

R — Rejected. Data was rejected by the data validator during comparison of the NEESA Level D data package with the analytical functional guideline criteria. The "R" designator indicates a significant variance in acceptable laboratory performance. Either re-analysis or re-sampling and analysis would be necessary to determine the presence or absence of the target analyte(s).

Once the data were reviewed and validated according to the guidance presented in NEESA document 20.2-047B, the data were evaluated by Heartland using the PARCCs criteria included in the Data Quality Objectives (DQOs) of the Work Plan for Naval Construction Battalion Center (NCBC) Gulfport, Mississippi, dated October 1993. The following sections present a brief description of PARCCs criteria.

Precision. Precision is a measure of the agreement or repeatability of a set of replicate results obtained from duplicate laboratory analyses of samples collected from the same location/depth interval. Precision was calculated from laboratory analytical data and cannot be measured directly. Precision is expressed as the Relative Percent Difference (RPD) between analytical values for two samples divided by the average of their analytical values. Precision is calculated using the expression:

$$RPD = (D1-D2) / (\tfrac{1}{2}(D1+D2)) \times 100$$

D1 and D2 are the reported values for the duplicate sample pair. Precision was evaluated using field duplicate samples and laboratory split samples (for example, MS/MSD samples).

Precision for environmental samples and their duplicates was assessed using a maximum RPD of 20 Percent for water matrices. Precision for MS/MSD/MD samples was assessed by using the target analyte specific RPD criteria for the spiked compounds and the sample duplicates.

Accuracy. Accuracy is a measure of the agreement between an experimental determination and the true value of the parameter being measured. Accuracy can be calculated from the analytical data and was not measured directly. Accuracy is used to identify the bias in a given measurement system (i.e. laboratory conditions, sample matrix, and sampling conditions). Accuracy is assessed by reviewing the Percent Recovery (%R) between the true value of the spike analyte and the actual analytical value. Accuracy is calculated using the equation:

$$\%R = ((A-B)/C) \times 100$$

A = Measured concentration of the spiked analyte.
B = Measured concentration of the spiked compound in the unspiked sample.
C = True concentration of the spiked analyte.

For the dioxin/furan analysis, each of the samples was spiked with internal standard compounds, and each chosen matrix spike and matrix duplicate pair was spiked with a known reference material before digestion. Each of these approaches provides a measure of the matrix effects on the analytical accuracy.

Representativeness. Representativeness is a qualitative measure of the degree to which sample data accurately and precisely represent a characteristic environmental condition. Representativeness is a subjective parameter and is used to evaluate the efficacy of the sampling plan design. Representativeness was evaluated using the field and laboratory QC blank sample results. QC blank samples are equipment rinseate blanks, field blanks, trip blanks, laboratory method blanks for organic analysis and laboratory preparation blanks for inorganic analysis. Positive detection of target analytes in the QC blank samples identify contaminants that possibly were introduced to the associated environmental sample during sample collection, transport or laboratory analysis. Representativeness was also evaluated used the defined extraction and analytical holding time requirements set forth in the Work Plan for NCBC Gulfport or the analytical methodology.

Comparability. Comparability is qualitative measure designed to express the confidence with which one data set may be compared to another. Factors that affect comparability are: sample collection and handling techniques, sample matrix type, and analytical method. Comparability is limited by the other PARCC parameters because only when precision and accuracy are known can data sets be compared with confidence.

Completeness. Completeness is defined as the percentage of measurements that are judged to be valid compared to the total number of measurements made. Valid usable data are values that were not qualified as rejected (R qualifier) during data validation. A goal of 85 percent usable data was established in the Work Plan for NCBC, Gulfport, Mississippi. Completeness equals the total number of analytes for each matrix minus the total number of rejected analytes divided by the total number of analytes multiplied by 100.

2.0 PRECISION

The following section describes the evaluation of precision for volatile organic compounds, semivolatile organic compounds, polynuclear aromatic hydrocarbons, pesticides and polychlorinated biphenyls (PCBs), organophosphorus pesticides, herbicides, metals and cyanide, and the wet chemistry parameter sulfide. Duplicate samples are evaluated for precision only when contaminants are detected in both the environmental sample and the sample's duplicate. A ND in the RPD column of the spreadsheet indicates that a RPD calculation was not required because one result was a non-detect and the other result was less than the compound/analyte CRQL/CRDL. Environmental samples and their respective duplicates may not exhibit positive results for all compounds found at or near the contract required quantitation limit (CRQL) or detection limit (CRDL) because of low levels of contamination found at a site. Duplicates with Relative Percent Differences (RPDs) within control limits indicate adequate sampling practices and/or good analytical precision. Duplicates with RPDs outside the control limits may result from inappropriate sampling procedures, matrix interferences, or non-homogeneity of the sample matrix. In addition, poor precision can be attributed to deviation(s) from the analytical methodology or to poor reproducibility of target analyte concentrations at or near the required quantitation or detection limits (CRQLs or CRDLs). The acceptance criteria for evaluating precision of field duplicates analytical results is a RPD of 20 for water matrices.

The percent of duplicate samples collected for the analytical parameters and sample matrices was greater than ten percent (10%) for the water matrix as specified in the Work Plan for NCBC Gulfport, Mississippi. The following Sections summarize the evaluation of analytical precision for the water matrix for the following analytical groups:

- Dioxin/Furan congeners

Duplicate precision was assessed using both environmental sample and associated duplicates and matrix spike (MS)/matrix spike duplicates (MSDs) pairs for the dioxin/furan fraction.

Tabulation of the results of assessing duplicate precision and duplicate frequency are presented in Table 2-1. The results of the evaluation of precision for MS/MSD samples is provided in Table 2-2.

In addition, to assess whether instrument calibration for dioxin/furan analytical method resulted in non-compliant duplicate precision, tables were made of initial and continuing calibration outliers for each sample delivery group (SDG) and are included in Appendix A. Calibration criteria was met in the dioxin/furan fraction. Therefore, tables of calibration criteria were not required.

TABLE 2 - 1
DIOXIN/FURAN FRACTION
WATER SAMPLE AND DUPLICATE PRECISION
NCBC GULFPORT HO

DIOXIN/FURANS

SDG	SAMPLE ID	MATRIX	NO. ASSC. SAMPLES	COMPOUND	SAMPLE CONC.	DUP CONC	MAX RPD	RPD
082031	GPTH05-2	WATER	4	TCDFs (TOTAL)	38	0	20%	200%
				PeCDFs (TOTAL)	39	0	20%	200%
				TCDDs (TOTAL)	68	17	20%	120%
				2,3,7,8-TCDD	56	17	20%	107%
				HxCDDs (TOTAL)	82	0	20%	200%
				HpCDDs (TOTAL)	250	0	20%	200%
				1,2,3,4,6,7,8-HpCDD	110	0	20%	200%
				OCDD	2900	670	20%	125%
	TOTAL SAMPLES		4					

DIOXIN FURANS

% OF DUPLICATES COLLECTED	RPD IN	RPD OUT	% WITHIN RPD LIMIT
25.0%	0	8	0.0%

ND - INDICATES RPD CALCULATION NOT REQUIRED BECAUSE ONE (1) RESULT IS NON-DETECT AND THE OTHER RESULT IS BELOW THE CRQL.

TABLE 2 - 2
DIOXIN/FURAN FRACTION
WATER SAMPLE MATRIX SPIKE/ DUPLICATES
NCBC GULFPORT HO

MS = MATRIX SPIKE *SAMPLE GPTH05-1*		SDG 082031		
MSD = MATRIX SPIKE DUPLICATE		MS	MSD	
RPD = RELATIVE PERCENT DIFFERENCE		%R	%R	RPD
DIOXIN/FURAN CONGENERS	UNITS			
2378-TCDF	ug/L	97	91	5.8
12378-PeCDF	ug/L	83	96	14
23478-PeCDF	ug/L	91	93	2.4
123478-HxCDF	ug/L	87	96	9.3
123678-HxCDF	ug/L	94	83	12
234678-HxCDF	ug/L	86	76	13
123789-HxCDF	ug/L	85	76	11
1234678-HpCDF	ug/L	91	90	1.1
1234789-HpCDF	ug/L	94	86	8.0
OCDF	ug/L	97	112	14
2378-TCDD	ug/L	85	100	16
12378-PeCDD	ug/L	97	96	0.41
123478-HxCDD	ug/L	104	106	1.7
123678-HxCDD	ug/L	95	90	6.0
123789-HxCDD	ug/L	92	78	16
1234678-HpCDD	ug/L	103	98	4.9
OCDD	ug/L	79	73	8.5

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

CORRESPONDING SDG'S AND ASSOCIATED SAMPLES

082031: GPTH05-1, GPTH05-2, GPTH05-2D, GPTH05-3D, GPTH05-4

QC LIMITS WERE NOT PROVIDED BY THE LABORATORY.
%R AND RPDS WERE DEEMED IN CONTROL BY THE DATA REVIEWER.

2.1 Water Matrix

The dioxin/furan analysis of the field duplicate pair of sample GPTH05-2 exhibited non-compliant RPDs for the eight (8) congeners detected (Table 2-1). The non-compliant congeners were TCDF (total), PeCDF (total), TCDD (total), 2,3,7,8-TCDD, HxCDD (total), HpCDD (total), 1,2,3,4,6,7,8-HpCDD, and OCDD. The congeners were detected in the original sample at concentration above the reporting limits. The congeners TCDF (total), PeCDF (total), HxCDD (total), HpCDD (total), and 1,2,3,4,6,7,8-HpCDD were not detected in the field duplicate sample. The congeners TCDD (total), 2,3,7,8-TCDD, and OCDD were detected in the field duplicate sample at concentrations significantly less than in the original sample. The disparity in the results may be due to laboratory inconsistencies or field sampling techniques.

The dioxin/furan analysis of the MS/MSD pair of sample GPTH05-2 exhibited acceptable RPDs for all congeners.

Based on assessment of duplicate precision evaluation criteria, the water matrix analytical data was acceptable for each SDG.

3.0 ACCURACY

The assessment of accuracy is evaluated by comparison of the percent recovery (%R) computed from the known concentration of analyte spikes and their recovered concentration versus the analytical method acceptance criteria. Spike recoveries provide an indication of bias, where the reported data may either overestimate or underestimate the actual concentration of detected compounds and/or the detection limits. Recoveries outside acceptable criteria may be caused by factors such as matrix interference, poor analytical precision, or instrument calibration.

The following Sections summarize the evaluation of analytical accuracy for the water matrix for the following analytical groups:

- Dioxin/Furan Fraction

Accuracy was assessed using MS and MSD samples as well as internal standard recoveries for the dioxin/furan fraction. The results of the evaluation of accuracy for the MS/MSD samples is provided in Table 2-2 for water matrix. The results of the evaluation of accuracy for the internal standard recoveries in the samples are provided in Table 3-1for the water matrix.

3.1 Water Matrix

The MS/MSD pair of sample GPTH05-1 analyzed for the dioxin/furan fraction exhibited acceptable recoveries for all spiked congeners (Table 2-2).

Two (2) samples analyzed for the dioxin/furan fraction exhibited 13C-OCDD recoveries which were below the QC limits (Table 3-1). This indicates that reported results in the two (2) samples for the congener OCDD may be underestimated. Therefore, reported positive and non-detect results for the congener OCDD in samples BS-01-RI5 and GPTH05-2 were appropriately qualified as estimated, J/UJ.

Based on assessment of MS/MSD and internal standard accuracy evaluation criteria, the water matrix analytical data was acceptable for the SDG.

TABLE 3 - 1
WATER SAMPLE INTERNAL STANDARDS % RECOVERIES
DIOXIN/FURAN
NCBC GULFPORT HO

	BS-01-DI5	BS-01-RI5	GPTHO5-1	GPTHO5-2	GPTHO5-2D	GPTHO5-3	GPTHO5-4	GPTHO5-1MS	GPTHO5-1MSD
I.S. COMPOUND									
13C-2378-TCDF	71	61	83	68	69	79	69	73	80
13C-2378-TCDD	80	54	76	62	76	74	79	78	73
13C-12378-PeCDF	85	51	83	59	78	73	74	81	77
13C-12378-PeCDD	84	49	81	62	78	68	73	80	76
13C-123478-HxCDF	81	124	76	84	79	95	75	88	99
13C-123678-HxCDD	100	113	77	85	89	91	85	92	100
13C-1234678-HpCDF	87	87	71	72	91	85	81	74	88
13C-1234678-HpCDD	80	63	73	66	77	76	75	70	81
13C-OCDD	68	*23	65	*39	72	52	63	66	50
TOTAL OUT	0	1	0	1	0	0	0	0	0

QC LIMITS 40% - 135%
* - VALUE OUTSIDE OF QC LIMITS

# SAMPLES	% REC IN	% REC OUT	% TOTAL IN
9	79	2	97.5%

4.0 REPRESENTATIVENESS

Representativeness of the environmental sample analytical data was assessed using trip blanks, field blanks, equipment rinseate blanks, and laboratory method blanks. The environmental samples and associated blanks were analyzed for the following target analyte groups:

- Dioxin/Furan Fraction

Field blanks, equipment rinseate blanks, and laboratory method blanks were analyzed for target analytes in each listed category. The assessment of representativeness is summarized in tabular form for each type of blank, field blank results are summarized in Table 4-1, equipment rinseate blank results are summarized in Table 4-2, and method blank results are summarized in Table 4-3.

If contaminants were detected in a blank, corrective actions were made for the chemical analytical data during data validation by Heartland. The corrective action consisted of amending the laboratory reported results for organic and inorganic target analytes by the criteria. The following describes the Validation Qualifier code in the blank summary tables.

Organic Target Analytes

- CRDL Validation Qualifier. If a sample result for the blank contaminant was less than the CRQL and less than 5 times the blank value (10 times for common laboratory contaminants), the sample result was rejected and amended as estimated non-detected at the CRQL for the target compound.

- U Validation Qualifier. If a sample result for the blank contaminant was greater than the sample CRQL and less than 5 times the blank value (10 times for common laboratory contaminants), the sample result for the blank contaminant was amended as non detect at the concentration reported in the sample results.

- No Action (NA). If a sample result for the blank contaminant was greater than the CRQL and 5 time the blank value (10 times for common laboratory contaminants), the result was not amended.

Inorganic Target Analytes

- U Validation Qualifier. If a sample result for the blank contaminant was less than the IDL and less than 5 times the blank value, the sample result was amended as non-detected.

- UJ Validation Qualifier. If a sample result for the blank contaminant was less than the sample IDL when the absolute value of the negative blank value was greater than the IDL, the sample result for the blank contaminant was amended as estimated non-detected.

- J Validation Qualifier. If a sample result for the blank contaminant was greater than the IDL and less than 10 times the blank value, when the absolute of the negative blank value id greater than the IDL the result was amended as estimated at the laboratory value.

TABLE 4 - 1
DIOXIN FURAN COMPOUNDS DETECTED IN FIELD BLANKS
NCBC GULFPORT HO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	FB CONC.	UNITS	VALIDATION QUALIFIER
082031	BS-01-DI5	GPTH05-1, GPTH05-1MS, GPTH05-1MSD, GPTH05-2, GPTH05-2D, GPTH05-3, GPTH05-4	NO CONTAMINATION FOUND			

TABLE 4 - 2
DIOXIN FURAN COMPOUNDS DETECTED IN RINSEATE BLANKS
NCBC GULFPORT HO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	RB CONC.	UNITS	VALIDATION QUALIFIER
082031	BS-01-RI5	GPTH05-1, GPTH05-1MS, GPTH05-1MSD, GPTH05-2, GPTH05-2D, GPTH05-3, GPTH05-4	NO CONTAMINATION FOUND			

TABLE 4 - 3
DIOXIN FURAN COMPOUNDS DETECTED IN METHOD BLANKS
NCBC GULFPORT HO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	MB CONC.	UNITS	VALIDATION QUALIFIER
082031	METHOD BLANK	GPTH05-1, GPTH05-2, GPTH05-3, BS-01-RI5, GPTH05-1MS, GPTH05-1MSD	NO CONTAMINATION FOUND			
	METHOD BLANK	GPTH05-2D, GPTH05-4, BS-01-DI5	NO CONTAMINATION FOUND			

4.1 Field Blanks

The field blank, BS-01-DI5, was a sample of DI water. It was prepared from the source potable water. The field blank was prepared at the site and placed in containers that were similar to those used for the environmental samples. Dioxin/Furan target congeners were not detected in the field blank samples (Table 4-1).

No target congeners were detected in the field blank. None of the analytical data required qualification. Based on assessment of field blanks for representativeness the analytical data was acceptable for the SDG.

4.2 Equipment Rinseate Blanks

The equipment rinseate blank was prepared by rinsing a piece of decontaminated sampling equipment with deionized water from a field DI unit. A sample of this water was collected and placed in sample containers similar to those used for the environmental samples. Dioxin/Furan target congeners were not detected in the rinseate blank sample (Table 4-2).

No target congeners were detected in the rinseate blank. None of the analytical data required qualification. Based on assessment of rinseate blanks for representativeness the analytical data was acceptable for the SDG.

4.3 Method Blanks

The method blanks were samples of deionized water prepared by the laboratory at the time of analysis. Method blanks undergo the same analytical process as the corresponding environmental samples and associated field blanks. The purpose of the method blank is to assess the potential for target compounds and analytes to "contaminate" the sample during analysis. Dioxin/Furan congeners were not detected in method blank samples (Tables 4-3).

No target congeners were detected in the method blanks. None of the analytical data required qualification. Based on assessment of method blanks for representativeness the analytical data was acceptable for the SDG.

4.4 Holding Times

Holding times requirements are utilized in an effort to minimize the degradation or concentration of constituents in a particular matrix over time. The stability of the constituents is determined to the best extent and then a reasonable time limit is imposed under which the samples must be extracted or prepared and then analyzed. The holding times regulations assume that the samples have been properly preserved according to the guidelines, either at the laboratory or in the field. Analytical results from samples with holding time violations are qualified as estimated, J/UJ, due to the potential for compromising the integrity of the samples.

All holding times requirements, extraction and analytical, were met for all samples, for the analytical fractions.

5.0 COMPARABILITY

Comparability is qualitative measure designed to express the confidence with which one data set may be compared to another. The analytical samples were collected and transported to the chemical analytical laboratory in accordance with standard procedures and were analyzed in conformance with acceptable USEPA procedures (Refer to Table 5-1 below). The analytical data are reported in standard units (micrograms per liter, micrograms per kilogram, etc.).

The methods used to collect the environmental samples and the methods used to analyze the samples should assure comparability of the analytical data.

TABLE 5-1
USEPA Procedures (CLP or SW-846 Methodologies)

U.S. EPA Method	Description
SW-846, Method 8290	Dioxin/Furan Fraction

6.0 COMPLETENESS

Completeness is the quantitative measure of the amount of data obtained from a measurement process compared with the amount expected to be obtained under the conditions of measurement. The completeness goal for laboratory analysis for this project was 85 percent useable data. Unusable analytical data are those results reported by the laboratory but rejected during the data validation process. A summary of the completeness goal for NCBC Gulfport is provided in Table 6-1. For more detailed completeness goal tables, please refer to Appendix C.

TABLE 6-1
COMPLETION GOAL (>85%)

	QC	GW	OVERALL
Dioxin/Furans	100.0	100.0	100.0

MATRIX KEY

QC = QC Samples
GW = Ground Water Samples

The analytical data met the 85 percent completeness goal for the fraction.

7.0 PARCC SUMMARY

The purpose of evaluating the quality of the analytical data using the PARCC criteria was to address the qualification of the data in regards to evaluation of the presence, magnitude and characteristics of hazardous substances at NCBC Gulfport. Overall, the chemical analytical data are acceptable and exceeded the completion goal of 85 percent for the dioxin/furan fraction. Tables 7-1 and 7-2 provides a tabulation of the assessment of PARCC criteria for the SDG for water samples and quality control samples, respectively.

7.1 Water Samples

No data points were rejected. The completion goal was met.

7.2 QC Samples

No data points were rejected. The completion goal was met.

TABLE C - 1
DIOXIN/FURANS - REJECTED DATA
NCBC GULFPORT HO

SDG	# SAMPLES/MATRIX			# OF COMPOUNDS REJECTED PER MATIX	
	QC	GW		QC	GW
082031	3	4		0	0
GRAND TOTAL	3	4		0	0
COMPLETION GOAL (>85%)				100.0%	100.0%

OVERALL COMPLETENESS
100.0%

MATRIX KEY

QC = QC SAMPLES
GW = GROUND WATER SAMPLES

*** 24 TARGET CONGENERS/ISOMERS PER SAMPLE**