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NCBC GULFPORT
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LETTER REPORT ON THE SEDIMENT SAMPLING FIELD PROGRAM AND ANALYTICAL
RESULTS FOR 11TH STREET OUTFALL 3 NORTH NCBC GULFPORT MS
3/10/1995
ABB ENVIRONMENTAL SERVICES



13.0.1

March 10, 1995

Southern Division
Naval Facilities Engineering Command
ATTN: Mr. Art Conrad
2155 Eagle Drive
North Charleston, SC 29419-9010

SUBJECT: Letter Report, Sediment Sampling Field Program and Analytical Results for 11th Street, Outfall 3 North, Naval Construction Battalion Center (NCBC) Gulfport, Mississippi, Contract No. N62467-89-D-0317/096

INTRODUCTION

ABB Environmental Services, Inc. (ABB-ES), under contract to Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), conducted site investigation activities adjacent to 11th Street at the Naval Construction Battalion Center (NCBC) in Gulfport, Mississippi. The field program consisted of collecting seven sediment samples, including one duplicate sample, in the surface water channel that runs under 11th Street, Outfall 3 North, and 28th Street. The field program and preparation of this letter were completed under the Comprehensive Long-Term Environmental Action, Navy contract (Contract Number N62467-89-D-0317, Contract Task Order Number 096) between SOUTHNAVFACENGCOM and ABB-ES.

PURPOSE

The sediment sampling activities are to confirm whether dioxins and/or furans are present in sediment in the surface water channel that runs under 11th Street and 28th Street. A sediment sample, which was collected on the south side of 11th Street in December 1994 had a 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) toxicity equivalence concentration of 150 parts per trillion (ppt).

FIELD AND ANALYTICAL PROGRAM

Sediment sampling was performed on March 2, 1995. Sample locations were on the north and south sides of 28th Street. Samples were collected from the sides and middle of the surface water channel. All samples were collected in accordance with procedures outlined in the base-wide groundwater, surface water, and sediment sampling workplan (ABB-ES, 1994). Samples were submitted to Quanterra Environmental Services for chemical analyses. Samples were analyzed for dioxins and furans in

accordance with U.S. Environmental Protection Agency (USEPA) SW-846 Method 8290 (USEPA, 1992) and NEESA level C documentation (Naval Energy and Environmental Support Activity [NEESA], 1988).

Review of the field notebook and chain-of-custody forms did not indicate any nonconformance 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 Plans and the June 1988 NEESA *Sampling and Chemical Analyses Quality Assurance Requirements for the Navy Installation Restoration Program* (NEESA, 1988) (Document 20.2-047B). Field quality control QC samples included an equipment rinsate blank.

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

The analytical results for environmental samples were evaluated and validated according to NEESA Level C QC criteria to determine quality and useability. The validated analytical forms in Attachment A reflect validation according to Level C criteria.

INVESTIGATIVE RESULTS

All seven samples indicated dioxin contamination. Table 1 lists each sample, the compounds that were detected, and their associated values. Sample G2D006 and the duplicate sample G2D006D had the highest levels of 2,3,7,8-TCDD of 92 and 87 ppt, respectively. These samples were collected in the channel on the southwest side of 28th Street as shown in Figure 1. Field observations noted that these two samples were collected from fine-grained organic material. Sample G2D001 and G2D002 had the lowest levels of 2,3,7,8-TCDD of 10 and 11, respectively. These samples were located on the north side of 28th Street from the middle and the west side of the channel.

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 2,3,7,8 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 the TEF factor for that compound. The total toxicity value for each sample is reported in Table 1. The highest TEF concentrations was detected in sample G2D006 at 115.20 ppt.

SUMMARY

The sediment sampling indicated positive results for dioxins and furans for all seven samples. The fine-grained physical properties and organic nature of samples G2D006 and G2D006D may indicate media preference for the dioxins and furans to attach. The higher values for these two samples may also be

Table 1
Dioxins and Furans Detected in Sediment

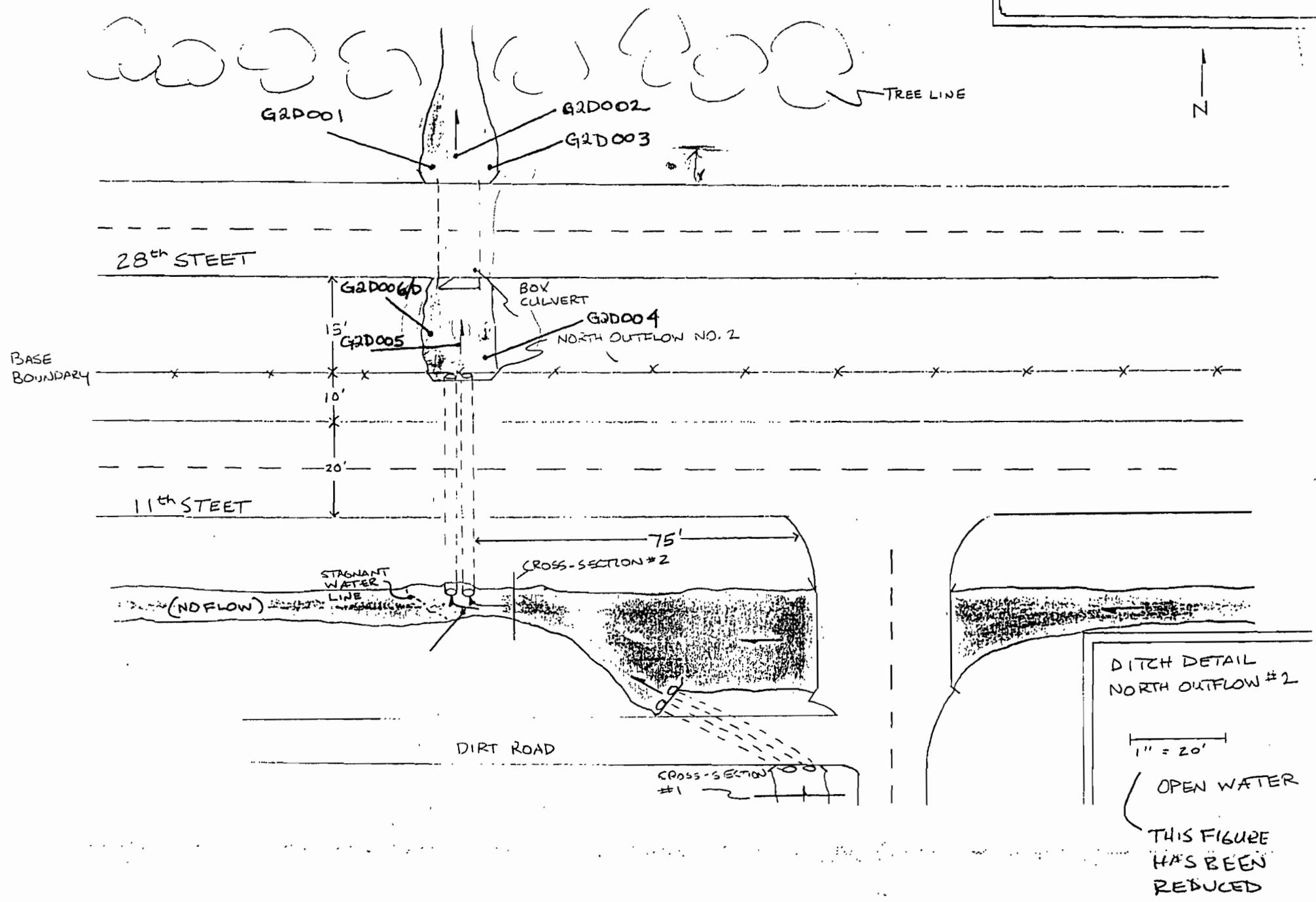
Letter Report
Base-wide Sampling Program
Naval Construction Battalion Center
Gulfport, Mississippi

Analyte	G2D001	G2D002	G2D003	G2D004	G2D005	G2D006	G2D006D
2,3,7,8-TCDD	10	11	14	16	43	92	87
1,2,3,6,7,8-HxCDD	ND	ND	ND	ND	23	26	22
1,2,3,7,8,9-HxCDD	ND	ND	ND	ND	30	31	26
1,2,3,4,7,8-HxCDD	ND	ND	ND	ND	ND	9.3	ND
1,2,3,4,6,7,8-HpCDD	81	61	95	110	620	660	540
OCDD	800	700	960	1200	6600	6700	5100
2,3,7,8-TCDF	1.8	3.1	3.0	2.9	5.3	14	14
1,2,3,6,7,8-HxCDF	ND	ND	ND	ND	ND	ND	10
1,2,3,4,6,7,8-HpCDF	23	16	25	28	130	130	110
1,2,3,4,7,8,9-HpCDF	ND	ND	ND	ND	ND	11	9.8
OCDF	73	47	76	130	450	460	350
Total TEF Concentration	12.093	12.827	16.536	19	63.38	115.20	106.248

Notes: Concentration results represent actual polychlorinated dibenzodioxins and polychlorinated dibenzofurans (PCDD/PCDF) concentrations. Toxicity equivalence factor (TEF) concentrations are based on the TEFs developed by the U.S. Environmental Protection Agency (1992).

TCDD = tetrachlorodibenzo-p-dioxin.
HxCDD = hexachlorodibenzo-p-dioxin.
HpCDD = heptachlorodibenzo-p-dioxin.
OCDD = octachlorodibenzo-p-dioxin.
TCDF = tetrachlorodibenzofuran.
HxCDF = hexachlorodibenzofuran.
HpCDF = heptachlorodibenzofuran.
OCDF = octachlorodibenzofuran.
TEF = toxicity equivalence factor.

SAMPLE LOCATION /
AREA LAYOUT
OUTFLOW NORTH #2



indicative of stream flow characteristics. A focused field investigation that includes hydrologic measurements, sampling, and evaluation is needed.

Very truly yours,

ABB Environmental Services, Inc.



Penny Baxter
Project Manager



Kate Kelly
Engineer

Attachments

[8505.052]

ATTACHMENT A
VALIDATED ANALYTICAL FORMS

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS
Method 8290

Client Name: ABB Environmental Services
 Client ID: G2D001
 Lab ID: 080641-0002-SA
 Matrix: SOIL
 Authorized: 03 MAR 95
 Sampled: 02 MAR 95
 Prepared: 03 MAR 95
 Received: 03 MAR 95
 Analyzed: 06 MAR 95

Sample Amount 5.0 G
 Column Type DB-5

Parameter	Result	Dry Weight Units	Detection Limit	Data Qualifiers
Furans				
TCDFs (total)	5.1	pg/g	--	
2,3,7,8-TCDF	1.8	pg/g	--	@g
PeCDFs (total)	21	pg/g	--	
1,2,3,7,8-PeCDF	ND	pg/g	0.96	
2,3,4,7,8-PeCDF	ND	pg/g	0.80	
HxCDFs (total)	22	pg/g	--	
1,2,3,4,7,8-HxCDF	ND	pg/g	1.3	
1,2,3,6,7,8-HxCDF	ND	pg/g	1.7	
2,3,4,6,7,8-HxCDF	ND	pg/g	1.9	
1,2,3,7,8,9-HxCDF	ND	pg/g	2.6	
HpCDFs (total)	64	pg/g	--	
1,2,3,4,6,7,8-HpCDF	23	pg/g	--	
1,2,3,4,7,8,9-HpCDF	ND	pg/g	1.5	
OCDF	73	pg/g	--	
Dioxins				
TCDDs (total)	10	pg/g	--	
2,3,7,8-TCDD	10	pg/g	--	
PeCDDs (total)	ND	pg/g	2.3	
1,2,3,7,8-PeCDD	ND	pg/g	2.0	
HxCDDs (total)	24	pg/g	--	
1,2,3,4,7,8-HxCDD	ND	pg/g	0.93	
1,2,3,6,7,8-HxCDD	ND	pg/g	3.7	
1,2,3,7,8,9-HxCDD	ND	pg/g	3.5	
HpCDDs (total)	170	pg/g	--	
1,2,3,4,6,7,8-HpCDD	81	pg/g	--	
OCDD	800	pg/g	--	

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Jill Kellmann

Approved By: Maricon Estrada

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G2D001

TOXICITY EQUIVALENCE

ANALYTE	CONC/DL		TEF	TEF CONCENTRATION
2,3,7,8-TCDD	<u>10</u>	X	1.00	<u>10</u>
1,2,3,7,8-PeCDD	<u>—</u>	X	0.50	<u> </u>
1,2,3,6,7,8-HxCDD	<u>—</u>	X	0.10	<u> </u>
1,2,3,7,8,9-HxCDD	<u>—</u>	X	0.10	<u> </u>
1,2,3,4,7,8-HxCDD	<u>—</u>	X	0.10	<u> </u>
1,2,3,4,6,7,8-HpCDD	<u>.81</u>	X	0.01	<u>.81</u>
OCDD	<u>800</u>	X	0.001	<u>.8</u>
2,3,7,8-TCDF	<u>1.8</u>	X	0.10	<u>.18</u>
1,2,3,7,8-PeCDF	<u>—</u>	X	0.05	<u> </u>
2,3,4,7,8-PeCDF	<u>—</u>	X	0.50	<u> </u>
1,2,3,6,7,8-HxCDF	<u>—</u>	X	0.10	<u> </u>
1,2,3,7,8,9-HxCDF	<u>—</u>	X	0.10	<u> </u>
1,2,3,4,7,8-HxCDF	<u>—</u>	X	0.10	<u> </u>
2,3,4,6,7,8-HxCDF	<u>—</u>	X	0.10	<u> </u>
1,2,3,4,6,7,8-HpCDF	<u>23</u>	X	0.01	<u>.23</u>
1,2,3,4,7,8,9-HpCDF	<u>—</u>	X	0.01	<u> </u>
OCDF	<u>73</u>	X	0.001	<u>.073</u>

TOTAL 12.093 = TEQ

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Co. ABB	Co. QUANTERRA
Dept.	Phone # 916 374-4408
Fax # 615 531-8226	Fax # 916 372 7768

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS
Method 8290

Client Name: ABB Environmental Services
 Client ID: G2D002
 Lab ID: 080641-0003-SA
 Matrix: SOIL
 Authorized: 03 MAR 95
 Sampled: 02 MAR 95
 Prepared: 03 MAR 95
 Received: 03 MAR 95
 Analyzed: 06 MAR 95

Sample Amount 5.0 G
 Column Type DB-5

Parameter	Result	Dry Weight Units	Detection Limit	Data Qualifiers
Furans				
TCDFs (total)	8.8	pg/g	--	
2,3,7,8-TCDF	3.1	pg/g	--	@g
PeCDFs (total)	16	pg/g	--	
1,2,3,7,8-PeCDF	ND	pg/g	2.7	
2,3,4,7,8-PeCDF	ND	pg/g	2.2	
HxCDFs (total)	18	pg/g	--	
1,2,3,4,7,8-HxCDF	ND	pg/g	1.2	
1,2,3,6,7,8-HxCDF	ND	pg/g	1.5	
2,3,4,6,7,8-HxCDF	ND	pg/g	1.8	
1,2,3,7,8,9-HxCDF	ND	pg/g	2.5	
HpCDFs (total)	51	pg/g	--	
1,2,3,4,6,7,8-HpCDF	16	pg/g	--	
1,2,3,4,7,8,9-HpCDF	ND	pg/g	1.5	
OCDF	47	pg/g	--	
Dioxins				
TCDDs (total)	11	pg/g	--	
2,3,7,8-TCDD	11	pg/g	--	
PeCDDs (total)	ND	pg/g	2.6	
1,2,3,7,8-PeCDD	ND	pg/g	1.6	
HxCDDs (total)	25	pg/g	--	
1,2,3,4,7,8-HxCDD	ND	pg/g	1.3	
1,2,3,6,7,8-HxCDD	ND	pg/g	3.5	
1,2,3,7,8,9-HxCDD	ND	pg/g	5.0	
HpCDDs (total)	130	pg/g	--	
1,2,3,4,6,7,8-HpCDD	61	pg/g	--	
OCDD	700	pg/g	--	

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ND = Not detected
 NA = Not applicable

Reported By: Jill Kellmann

Approved By: Maricon Estrada

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G2D002
TOXICITY EQUIVALENCE

ANALYTE	CONC/DL		TEF	TEF CONCENTRATION
2,3,7,8-TCDD	<u>11</u>	X	1.00	<u>11</u>
1,2,3,7,8-PeCDD	<u> </u>	X	0.50	<u> </u>
1,2,3,6,7,8-HxCDD	<u> </u>	X	0.10	<u> </u>
1,2,3,7,8,9-HxCDD	<u> </u>	X	0.10	<u> </u>
1,2,3,4,7,8-HxCDD	<u> </u>	X	0.10	<u> </u>
1,2,3,4,6,7,8-HpCDD	<u>61</u>	X	0.01	<u>.61</u>
OCDD	<u>700</u>	X	0.001	<u>.7</u>
2,3,7,8-TCDF	<u>3.1</u>	X	0.10	<u>.31</u>
1,2,3,7,8-PeCDF	<u> </u>	X	0.05	<u> </u>
2,3,4,7,8-PeCDF	<u> </u>	X	0.50	<u> </u>
1,2,3,6,7,8-HxCDF	<u> </u>	X	0.10	<u> </u>
1,2,3,7,8,9-HxCDF	<u> </u>	X	0.10	<u> </u>
1,2,3,4,7,8-HxCDF	<u> </u>	X	0.10	<u> </u>
2,3,4,6,7,8-HxCDF	<u> </u>	X	0.10	<u> </u>
1,2,3,4,6,7,8-HpCDF	<u>16</u>	X	0.01	<u>.16</u>
1,2,3,4,7,8,9-HpCDF	<u> </u>	X	0.01	<u> </u>
OCDF	<u>47</u>	X	0.001	<u>.047</u>

TOTAL 12.827 = TEQ

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Co. ABB	Co. QUANTERRA
Dept.	Phone # 916 374-4408
Fax # 615 531-8226	Fax # 916 372 7768

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS
Method 8290

Client Name: ABB Environmental Services
Client ID: G2D003
Lab ID: 080641-0004-SA
Matrix: SOIL
Authorized: 03 MAR 95

Sampled: 02 MAR 95
Prepared: 03 MAR 95

Received: 03 MAR 95
Analyzed: 06 MAR 95

Sample Amount 5.0 G
Column Type DB-5

Parameter	Result	Dry Weight Units	Detection Limit	Data Qualifiers
Furans				
TCDFs (total)	11	pg/g	--	
2,3,7,8-TCDF	3.0	pg/g	--	@g
PeCDFs (total)	39	pg/g	--	
1,2,3,7,8-PeCDF	ND	pg/g	2.8	
2,3,4,7,8-PeCDF	ND	pg/g	2.3	
HxCDFs (total)	33	pg/g	--	
1,2,3,4,7,8-HxCDF	ND	pg/g	1.3	
1,2,3,6,7,8-HxCDF	ND	pg/g	1.6	
2,3,4,6,7,8-HxCDF	ND	pg/g	1.8	
1,2,3,7,8,9-HxCDF	ND	pg/g	2.6	
HpCDFs (total)	85	pg/g	--	
1,2,3,4,6,7,8-HpCDF	25	pg/g	--	
1,2,3,4,7,8,9-HpCDF	ND	pg/g	3.4	
OCDF	76	pg/g	--	
Dioxins				
TCDDs (total)	21	pg/g	--	
2,3,7,8-TCDD	14	pg/g	--	
PeCDDs (total)	ND	pg/g	3.6	
1,2,3,7,8-PeCDD	ND	pg/g	1.2	
HxCDDs (total)	45	pg/g	--	
1,2,3,4,7,8-HxCDD	ND	pg/g	1.9	
1,2,3,6,7,8-HxCDD	ND	pg/g	5.2	
1,2,3,7,8,9-HxCDD	ND	pg/g	6.6	
HpCDDs (total)	210	pg/g	--	
1,2,3,4,6,7,8-HpCDD	95	pg/g	--	
OCDD	960	pg/g	--	

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ND = Not detected
NA = Not applicable

Reported By: Mike Flournoy

Approved By: Maricon Estrada

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G2D003
TOXICITY EQUIVALENCE

ANALYTE	CONC/DL		TEF	TEF CONCENTRATION
2,3,7,8-TCDD	<u>14</u>	X	1.00	<u>14</u>
1,2,3,7,8-PeCDD	<u> </u>	X	0.50	<u> </u>
1,2,3,6,7,8-HxCDD	<u> </u>	X	0.10	<u> </u>
1,2,3,7,8,9-HxCDD	<u> </u>	X	0.10	<u> </u>
1,2,3,4,7,8-HxCDD	<u> </u>	X	0.10	<u> </u>
1,2,3,4,6,7,8-HpCDD	<u>95</u>	X	0.01	<u>.95</u>
OCDD	<u>960</u>	X	0.001	<u>960</u>
2,3,7,8-TCDF	<u>3.0</u>	X	0.10	<u>.3</u>
1,2,3,7,8-PeCDF	<u> </u>	X	0.05	<u> </u>
2,3,4,7,8-PeCDF	<u> </u>	X	0.50	<u> </u>
1,2,3,6,7,8-HxCDF	<u> </u>	X	0.10	<u> </u>
1,2,3,7,8,9-HxCDF	<u> </u>	X	0.10	<u> </u>
1,2,3,4,7,8-HxCDF	<u> </u>	X	0.10	<u> </u>
2,3,4,6,7,8-HxCDF	<u> </u>	X	0.10	<u> </u>
1,2,3,4,6,7,8-HpCDF	<u>25</u>	X	0.01	<u>.25</u>
1,2,3,4,7,8,9-HpCDF	<u> </u>	X	0.01	<u> </u>
OCDF	<u>76</u>	X	0.001	<u>.076</u>

TOTAL 16.536 = TEQ

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Co. ABB	Co. QUANTERRA
Dept.	Phone # 916 374-4408
Fax # 615 531-8226	Fax # 916 372 7768

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS
Method 8290

Client Name: ABB Environmental Services
 Client ID: G2D004
 Lab ID: 080641-0005-SA
 Matrix: SOIL
 Authorized: 03 MAR 95
 Sampled: 02 MAR 95
 Prepared: 03 MAR 95
 Received: 03 MAR 95
 Analyzed: 06 MAR 95

Sample Amount 5.0 G
 Column Type DB-5

Parameter	Result	Dry Weight Units	Detection Limit	Data Qualifiers
Furans				
TCDFs (total)	23	pg/g	--	
2,3,7,8-TCDF	2.9	pg/g	--	@g
PeCDFs (total)	50	pg/g	--	
1,2,3,7,8-PeCDF	ND	pg/g	4.1	
2,3,4,7,8-PeCDF	ND	pg/g	3.4	
HxCDFs (total)	38	pg/g	--	
1,2,3,4,7,8-HxCDF	ND	pg/g	2.6	
1,2,3,6,7,8-HxCDF	ND	pg/g	3.3	
2,3,4,6,7,8-HxCDF	ND	pg/g	3.8	
1,2,3,7,8,9-HxCDF	ND	pg/g	5.3	
HpCDFs (total)	97	pg/g	--	
1,2,3,4,6,7,8-HpCDF	28	pg/g	--	
1,2,3,4,7,8,9-HpCDF	ND	pg/g	2.7	
OCDF	130	pg/g	--	
Dioxins				
TCDDs (total)	19	pg/g	--	
2,3,7,8-TCDD	16	pg/g	--	
PeCDDs (total)	ND	pg/g	2.3	
1,2,3,7,8-PeCDD	ND	pg/g	2.3	
HxCDDs (total)	30	pg/g	--	
1,2,3,4,7,8-HxCDD	ND	pg/g	1.5	
1,2,3,6,7,8-HxCDD	ND	pg/g	4.7	
1,2,3,7,8,9-HxCDD	ND	pg/g	5.4	
HpCDDs (total)	230	pg/g	--	
1,2,3,4,6,7,8-HpCDD	110	pg/g	--	
OCDD	1200	pg/g	--	

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ND = Not detected
 NA = Not applicable

Reported By: Jill Kellmann

Approved By: Maricon Estrada

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G2D004
TOXICITY EQUIVALENCE

ANALYTE	CONC/DL		TEF	TEF CONCENTRATION
2,3,7,8-TCDD	<u>16</u>	X	1.00	<u>16</u>
1,2,3,7,8-PeCDD	_____	X	0.50	_____
1,2,3,6,7,8-HxCDD	_____	X	0.10	_____
1,2,3,7,8,9-HxCDD	_____	X	0.10	_____
1,2,3,4,7,8-HxCDD	_____	X	0.10	_____
1,2,3,4,6,7,8-HpCDD	<u>110</u>	X	0.01	<u>1.1</u>
OCDD	<u>1200</u>	X	0.001	<u>1.2</u>
2,3,7,8-TCDF	<u>2.9</u>	X	0.10	<u>.29</u>
1,2,3,7,8-PeCDF	_____	X	0.05	_____
2,3,4,7,8-PeCDF	_____	X	0.50	_____
1,2,3,6,7,8-HxCDF	_____	X	0.10	_____
1,2,3,7,8,9-HxCDF	_____	X	0.10	_____
1,2,3,4,7,8-HxCDF	_____	X	0.10	_____
2,3,4,6,7,8-HxCDF	_____	X	0.10	_____
1,2,3,4,6,7,8-HpCDF	<u>28</u>	X	0.01	<u>.28</u>
1,2,3,4,7,8,9-HpCDF	_____	X	0.01	_____
OCDF	<u>130</u>	X	0.001	<u>.130</u>

TOTAL 19 = TEQ

Post-It™ brand fax transmittal memo 7671 # of pages > 1

To: KATE KELLY	From: KATHY GILL
Co. ABB	Co. QUANTERRA
Dept.	Phone # 916 374-4408
Fax # 615 531-8226	Fax # 916 372 7768

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS
Method 8290

Client Name: ABB Environmental Services
Client ID: G2D005
Lab ID: 080641-0006-SA
Matrix: SOIL
Authorized: 03 MAR 95

Sampled: 02 MAR 95
Prepared: 03 MAR 95

Received: 03 MAR 95
Analyzed: 06 MAR 95

Sample Amount 5.0 G
Column Type DB-5

Parameter	Result	Dry Weight Units	Detection Limit	Data Qualifiers
Furans				
TCDFs (total)	24	pg/g	--	
2,3,7,8-TCDF	5.3	pg/g	--	@g
PeCDFs (total)	21	pg/g	--	
1,2,3,7,8-PeCDF	ND	pg/g	4.2	
2,3,4,7,8-PeCDF	ND	pg/g	3.5	
HxCDFs (total)	140	pg/g	--	
1,2,3,4,7,8-HxCDF	ND	pg/g	5.7	
1,2,3,6,7,8-HxCDF	ND	pg/g	7.9	
2,3,4,6,7,8-HxCDF	ND	pg/g	4.8	
1,2,3,7,8,9-HxCDF	ND	pg/g	2.0	
HpCDFs (total)	400	pg/g	--	
1,2,3,4,6,7,8-HpCDF	130	pg/g	--	
1,2,3,4,7,8,9-HpCDF	ND	pg/g	8.4	
OCDF	450	pg/g	--	
Dioxins				
TCDDs (total)	43	pg/g	--	
2,3,7,8-TCDD	43	pg/g	--	
PeCDDs (total)	ND	pg/g	8.5	
1,2,3,7,8-PeCDD	ND	pg/g	3.5	
HxCDDs (total)	190	pg/g	--	
1,2,3,4,7,8-HxCDD	ND	pg/g	7.5	
1,2,3,6,7,8-HxCDD	23	pg/g	--	
1,2,3,7,8,9-HxCDD	30	pg/g	--	
HpCDDs (total)	1300	pg/g	--	
1,2,3,4,6,7,8-HpCDD	620	pg/g	--	
OCDD	6600	pg/g	--	

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Jill Kellmann

Approved By: Maricon Estrada

0022

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Rev 230787

G2D005

TOXICITY EQUIVALENCE

ANALYTE	CONC/DL		TEF	TEF CONCENTRATION
2,3,7,8-TCDD	<u>43</u>	X	1.00	<u>43</u>
1,2,3,7,8-PeCDD	<u> </u>	X	0.50	<u> </u>
1,2,3,6,7,8-HxCDD	<u>23</u>	X	0.10	<u>2.3</u>
1,2,3,7,8,9-HxCDD	<u>30</u>	X	0.10	<u>3.0</u>
1,2,3,4,7,8-HxCDD	<u> </u>	X	0.10	<u> </u>
1,2,3,4,6,7,8-HpCDD	<u>620</u>	X	0.01	<u>6.2</u>
OCDD	<u>6600</u>	X	0.001	<u>6.6</u>
2,3,7,8-TCDF	<u>5.3</u>	X	0.10	<u>.53</u>
1,2,3,7,8-PeCDF	<u> </u>	X	0.05	<u> </u>
2,3,4,7,8-PeCDF	<u> </u>	X	0.50	<u> </u>
1,2,3,6,7,8-HxCDF	<u> </u>	X	0.10	<u> </u>
1,2,3,7,8,9-HxCDF	<u> </u>	X	0.10	<u> </u>
1,2,3,4,7,8-HxCDF	<u> </u>	X	0.10	<u> </u>
2,3,4,6,7,8-HxCDF	<u> </u>	X	0.10	<u> </u>
1,2,3,4,6,7,8-HpCDF	<u>130</u>	X	0.01	<u>1.3</u>
1,2,3,4,7,8,9-HpCDF	<u> </u>	X	0.01	<u> </u>
OCDF	<u>450</u>	X	0.001	<u>.45</u>
TOTAL				<u>63.38</u> = TEQ

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To: KATE KELLY	From: KATHY GILG
Co. ABB	Co. QUANTERRA
Dept.	Phone # 916 374-4408
Fax # 615 531-8226	Fax # 916 372 7768

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS
Method 8290

Client Name: ABB Environmental Services

Client ID: G2D006

Lab ID: 080641-0007-SA

Matrix: SOIL

Authorized: 03 MAR 95

Sampled: 02 MAR 95

Prepared: 03 MAR 95

Received: 03 MAR 95

Analyzed: 06 MAR 95

Sample Amount 5.0 G

Column Type DB-5

Parameter	Result	Dry Weight Units	Detection Limit	Data Qualifiers
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Furans

TCDFs (total)	48	pg/g	--	
2,3,7,8-TCDF	14	pg/g	--	g
PeCDFs (total)	86	pg/g	--	
1,2,3,7,8-PeCDF	ND	pg/g	8.7	
2,3,4,7,8-PeCDF	ND	pg/g	7.2	
HxCDFs (total)	170	pg/g	--	
1,2,3,4,7,8-HxCDF	ND	pg/g	6.2	
1,2,3,6,7,8-HxCDF	ND	pg/g	7.9	
2,3,4,6,7,8-HxCDF	ND	pg/g	6.0	
1,2,3,7,8,9-HxCDF	ND	pg/g	8.3	
HpCDFs (total)	460	pg/g	--	
1,2,3,4,6,7,8-HpCDF	130	pg/g	--	
1,2,3,4,7,8,9-HpCDF	11	pg/g	--	@
JCDF	460	pg/g	--	

Dioxins

TCDDs (total)	100	pg/g	--	
2,3,7,8-TCDD	92	pg/g	--	
PeCDDs (total)	ND	pg/g	7.4	
1,2,3,7,8-PeCDD	ND	pg/g	6.0	
HxCDDs (total)	220	pg/g	--	
1,2,3,4,7,8-HxCDD	9.3	pg/g	--	@
1,2,3,6,7,8-HxCDD	26	pg/g	--	
1,2,3,7,8,9-HxCDD	31	pg/g	--	
HpCDDs (total)	1400	pg/g	--	
1,2,3,4,6,7,8-HpCDD	660	pg/g	--	
OCDD	6700	pg/g	--	

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Clark Pickell

Approved By: Maricon Estrada

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Rev 230787

0024
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G2D006

TOXICITY EQUIVALENCE

ANALYTE	CONC/DL		TEF	TEF CONCENTRATION
2,3,7,8-TCDD	<u>92</u>	X	1.00	<u>92</u>
1,2,3,7,8-PeCDD	<u>200</u>	X	0.50	<u> </u>
1,2,3,6,7,8-HxCDD	<u>26</u>	X	0.10	<u>2.6</u>
1,2,3,7,8,9-HxCDD	<u>31</u>	X	0.10	<u>3.1</u>
1,2,3,4,7,8-HxCDD	<u>9.3</u>	X	0.10	<u>.93</u>
1,2,3,4,6,7,8-HpCDD	<u>660</u>	X	0.01	<u>6.6</u>
OCDD	<u>6700</u>	X	0.001	<u>6.7</u>
2,3,7,8-TCDF	<u>14</u>	X	0.10	<u>1.4</u>
1,2,3,7,8-PeCDF	<u> </u>	X	0.05	<u> </u>
2,3,4,7,8-PeCDF	<u> </u>	X	0.50	<u> </u>
1,2,3,6,7,8-HxCDF	<u> </u>	X	0.10	<u> </u>
1,2,3,7,8,9-HxCDF	<u> </u>	X	0.10	<u> </u>
1,2,3,4,7,8-HxCDF	<u> </u>	X	0.10	<u> </u>
2,3,4,6,7,8-HxCDF	<u> </u>	X	0.10	<u> </u>
1,2,3,4,6,7,8-HpCDF	<u>130</u>	X	0.01	<u>1.3</u>
1,2,3,4,7,8,9-HpCDF	<u>11</u>	X	0.01	<u>.11</u>
OCDF	<u>460</u>	X	0.001	<u>.460</u>
TOTAL				<u>115.20</u> = TEF

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To: KATE KELLY	From: KATHY GILL
Co. ABB	Co. QUANTERRA
Dept.	Phone # 916 374-4408
Fax # 615 531-8226	Fax # 916 372 7768

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS
Method 8290

Client Name: ABB Environmental Services
Client ID: G2D006D
Lab ID: 080641-0008-SA
Matrix: SOIL
Authorized: 03 MAR 95
Sampled: 02 MAR 95
Prepared: 03 MAR 95
Received: 03 MAR 95
Analyzed: 06 MAR 95

Sample Amount 5.0 G
Column Type DB-5

Parameter	Result	Dry Weight Units	Detection Limit	Data Qualifiers
Furans				
TCDFs (total)	46	pg/g	--	
2,3,7,8-TCDF	14	pg/g	--	g
PeCDFs (total)	72	pg/g	--	
1,2,3,7,8-PeCDF	ND	pg/g	3.4	
2,3,4,7,8-PeCDF	ND	pg/g	2.9	
HxCDFs (total)	150	pg/g	--	
1,2,3,4,7,8-HxCDF	ND	pg/g	4.7	
1,2,3,6,7,8-HxCDF	10	pg/g	--	e
2,3,4,6,7,8-HxCDF	ND	pg/g	4.2	
1,2,3,7,8,9-HxCDF	ND	pg/g	1.7	
HpCDFs (total)	360	pg/g	--	
1,2,3,4,6,7,8-HpCDF	110	pg/g	--	
1,2,3,4,7,8,9-HpCDF	9.8	pg/g	--	e
OCDF	350	pg/g	--	
Dioxins				
TCDDs (total)	95	pg/g	--	
2,3,7,8-TCDD	87	pg/g	--	
PeCDDs (total)	ND	pg/g	7.0	
1,2,3,7,8-PeCDD	ND	pg/g	3.9	
HxCDDs (total)	180	pg/g	--	
1,2,3,4,7,8-HxCDD	ND	pg/g	7.0	
1,2,3,6,7,8-HxCDD	22	pg/g	--	
1,2,3,7,8,9-HxCDD	26	pg/g	--	
HpCDDs (total)	1100	pg/g	--	
1,2,3,4,6,7,8-HpCDD	540	pg/g	--	
OCDD	5100	pg/g	--	

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ND = Not detected
NA = Not applicable

Reported By: Jill Kellmann
Approved By: Maricon Estrada

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Rev 230787

Handwritten signature and date: 3/9/95 024

G2D006D
TOXICITY EQUIVALENCE

ANALYTE	CONC/DL		TEF	TEF CONCENTRATION
2,3,7,8-TCDD	<u>87</u>	X	1.00	<u>87</u>
1,2,3,7,8-PeCDD	<u> </u>	X	0.50	<u> </u>
1,2,3,6,7,8-HxCDD	<u>22</u>	X	0.10	<u>2.2</u>
1,2,3,7,8,9-HxCDD	<u>26</u>	X	0.10	<u>2.6</u>
1,2,3,4,7,8-HxCDD	<u> </u>	X	0.10	<u> </u>
1,2,3,4,6,7,8-HpCDD	<u>540</u>	X	0.01	<u>5.4</u>
OCDD	<u>5100</u>	X	0.001	<u>5.1</u>
2,3,7,8-TCDF	<u>14</u>	X	0.10	<u>1.4</u>
1,2,3,7,8-PeCDF	<u> </u>	X	0.05	<u> </u>
2,3,4,7,8-PeCDF	<u> </u>	X	0.50	<u> </u>
1,2,3,6,7,8-HxCDF	<u>10</u>	X	0.10	<u>1.0</u>
1,2,3,7,8,9-HxCDF	<u> </u>	X	0.10	<u> </u>
1,2,3,4,7,8-HxCDF	<u> </u>	X	0.10	<u> </u>
2,3,4,6,7,8-HxCDF	<u> </u>	X	0.10	<u> </u>
1,2,3,4,6,7,8-HpCDF	<u>110</u>	X	0.01	<u>1.1</u>
1,2,3,4,7,8,9-HpCDF	<u>9.8</u>	X	0.01	<u>0.098</u>
OCDF	<u>350</u>	X	0.001	<u>0.350</u>
TOTAL				<u>106.248</u> = TEQ

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To: KATE KELLY	From: KATHY GILL
Co. ABB	Co. QUANTERRA
Dept.	Phone # 916 374-4408
Fax # 615 531-8226	Fax # 916 372 7768

ATTACHMENT B

GLOSSARY

GLOSSARY

2,3,7,8-TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
ABB-ES	ABB Environmental Services, Inc.
HpCDD	heptachlorodibenzo-p-dioxin
HpCDF	heptachlorodibenzofuran
HxCDD	hexachlorodibenzo-p-dioxin
HxCDF	hexachlorodibenzofuran
NCBC	Naval Construction Battalion Center
NEESA	Naval Energy and Environmental Support Activity
OCDD	octachlorodibenzo-p-dioxin
OCDF	octachlorodibenzofuran
PCDD/PCDF ppt	polychlorinated dibenzodioxin and polychlorinated dibenzofuran parts per trillion
QC	quality control
SOUTHNAVFACENGCOM	Southern Division, Naval Facilities Engineering Command
TCDD	tetrachlorodibenzo-p-dioxin
TCDF	tetrachlorodibenzofuran
TEF	toxicity equivalency factor
USEPA	U.S. Environmental Protection Agency