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NCBC GULFPORT
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LETTER REPORT REGARDING INTERIM REMOVAL ACTION 28TH STREET ROAD
CONSTRUCTION NCBC GULFPORT MS
9/28/1995
ABB ENVIRONMENTAL



39501 - ASSOCIATED AO
02.02.00.0004

September 28, 1995

Southern Division
Naval Facilities Engineering Command
ATTN: Art Conrad
P.O. Box 10068
2155 Eagle Drive
North Charleston, South Carolina 29418

Dear Mr. Conrad:

SUBJECT: Letter Report, Interim Removal Action - 28th Street Road Construction, NCBC Gulfport, Mississippi.

INTRODUCTION

ABB Environmental Services, Inc. (ABB-ES), was contracted by Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) to perform an interim removal action (IRA) on sediments located in three ditches along 28th Street, Gulfport, Mississippi.

Between July 10 and July 20, 1995, dioxin-contaminated sediment was removed from the ditches along the northern boundary of the base between Outfall 1 and Outfall 4. The sediment was removed to ensure that personnel performing work in these ditches, in advance of road widening and improvement work along 28th Street, would not be exposed to dioxin levels above the action level of 4.7 parts per trillion (ppt), as determined by Mississippi State Department of Environmental Quality (MSDEQ). Confirmation samples were collected to ensure that these levels were met. Measures were taken to ensure that workers and individuals living in the vicinity were not exposed to any potential dioxin contamination as a result of these activities. These measures included keeping the sediment moist during excavation and transport to prevent the creation and mobilization of dust particles, creating exclusion zones around the areas of excavation to prevent entry of non-(OSHA)-trained personnel, and air monitoring sampling specifically for dioxin. The methods of removal and storage of the dioxin-contaminated sediment and the results of the confirmation samples will be presented in this report.

BACKGROUND

The presence of low-level dioxin contamination was discovered in sediments in the ditches at three outfalls on the north side of the Naval Construction Battalion Center (NCBC), Gulfport in samples collected in December 1994. These samples indicated that dioxin was present at levels up to 116 ppt. These levels were confirmed by the results of additional samples collected in February 1995.

ABB Environmental Services, Inc.

The presence of dioxin was investigated further in April 1995 as part of the interim removal action process. At this point, the full horizontal and vertical extent of dioxin contamination was assessed to guide the removal of the contaminated sediment to MSDEQ levels. MSDEQ determined that the cleanup level would be 4.7 ppt at that time.

Also completed in April 1995 was the installation of sediment recovery traps (SRTs) in the ditches leading off from NCBC Gulfport to prevent the further migration of contaminants off-base through the suspended and base loads of the ditches.

The sampling results from the April 1995 effort identified three areas where workers could potentially be exposed to levels above 4.7 ppt. These areas were Outfall 1 (Canal 1), Outfall 3, and Outfall 4 (Attachment A, Figure 1). In these areas, the extent of sediment contaminated above 4.7 ppt was identified both vertically and horizontally. Additionally, information regarding the nature of the dioxin contamination was determined. Specifically, it was discovered that the natural affinity that dioxins have for organic carbon could be used as a predictive tool in the field for determining its presence or absence. It was observed that sediment that contained high organic content and was fine grained in nature generally contained the highest levels of dioxin, while sands and gravels, with little or no organic material, often had levels of dioxin below the MSDEQ level of 4.7 ppt. This observational tool would later be employed during the actual removal process.

INTERIM REMOVAL ACTION

The interim removal action consisted of dewatering of the ditches prior to excavation, excavation of sediments down to 4.7 ppt toxicity equivalence quotient (TEQ) dioxin, excavating and storing sediments at the sediment-handling area, and collecting confirmation samples in the areas of excavation to ensure that the cleanup levels had been reached.

Surface Water Diversion and Dewatering of the Ditches. Before any sediments could be removed, the baseline flow of the surface water in the ditches needed to be stopped or diverted before it reached the proposed excavation area. This was required to minimize the amount of excavation from the ditches and to allow for observation and inspection of the sediment as it was removed. Again, the predictive tools learned during the interim removal sampling process would be applied during the excavation to minimize "overexcavation."

To prepare each area for excavation, surface water flow was diverted beyond the outfall by placing impermeable barriers in the culverts on the upgradient side. This prevented surface water from exiting the base at that outfall and allowed the remaining surface water downgradient from that outfall to be pumped back to the base and discharged between sediment recovery traps along 11th Street. The sediment recovery traps immobilized any potential dioxin contamination present in the dewatering fluids.

The Sediment-Handling Area. The sediment-handling area was constructed to temporarily store the sediment excavated from the outfalls located on 28th Street. The sediment-handling area is located on the southern boundary of Site 8, roughly in the middle of the base (Attachment A). The sediment-handling area was constructed by first excavating a V-shaped trench that sloped to one end. The bottom of the trench was lined with 40-mil high density polyethylene (HDPE). Perforated piping was installed along the bottom of the trench to allow dewatering of the sediments.

The dimensions of the trench were 60 feet wide by 85 feet long. The edge was bermed 3 feet above grade to allow for extra storage capacity and to keep the trench as far above groundwater as possible. A single piece of HDPE was used to cover the entire trench to keep rainwater or surfacewater from entering the trench, and to prevent the sediment from migrating off the site. The nearly saturated sediment was dewatered, and the fluids were containerized in a 21,000-gallon-capacity tank on Site 8.

EXCAVATION OF CONTAMINATED SEDIMENT

Outfall 1 (Canal No. 1). The sampling efforts at Outfall 1 revealed that contamination above 4.7 ppt was limited to the sediment north of 28th Street. Samples collected as far north from the outfall as the easement (75 feet) indicated sediment contamination above 4.7 ppt. The depths of contamination ranged from as shallow as 1 foot on the western side of the ditch to a depth of 2 feet on the east side. The depth of excavation was determined based on previous sampling and geologic observations, such as organic content and lithologic character. Outfall 1 was much larger than the other two outfalls outlined in this report. The ditch is nearly 75 feet long by 25 feet wide and 12 feet deep in the area of investigation.

The final limits of excavation were determined in the field by noting the last occurrence of organic-rich silt and sand. The excavation revealed a gray fine sand with little silt in the ditch profile. In total, 114 cubic yards of sediment were removed from the ditch at this location and transferred to the handling area. Confirmation samples were collected from three locations (Figure 2) and analyzed for dioxins (U.S. Environmental Protection Agency [USEPA] Method 8290).

Outfall 3. Excavation at Outfall 3 commenced on July 14 on the north side of 28th Street. This outfall had consistently exhibited the highest levels and the deepest extent of dioxin contamination as determined by confirmation samples collected in April 1995. Surface water was a particularly difficult issue at this location because Outfall 3 is the confluence of three drainage ditches. Sheet piling was erected to cut off flow from two ditches north of 28th Street and the drainage ditch along 11th Street was cut off using expanding plugs in the culvert piping leading to this outfall. The remaining flow was directed along 11th Street through two SRTs before it joined Canal No. 1 to the west.

The size of the area of investigation at this outfall was 80 feet long by 30 feet wide. Excavation began on the north side of 28th Street (Figure 3). At this location, the distinction between the organic-rich sediments that have accumulated in the ditch and the white and gray sands of the Pleistocene was readily apparent. Delineation and characterization samples indicated that dioxin contamination at levels above 4.7 ppt extended approximately 1.5 feet below grade. Excavation confirmed this level, as gray silty sand was encountered nearly uniformly at 1.5 feet below grade. The dark gray and brown silt and sand that constituted the deposited load were removed as well as the top one-half to one foot of gray silty sand that was in direct contact with the contaminated sediment. Total excavation at Outfall 3 north of 28th Street was estimated at 47 cubic yards.

South of 28th Street, the sediment was excavated 2.0 to 3.0 feet below grade. This was necessary because the entire area was originally excavated lower than other areas of the ditch. This created a point of accumulation, or sump, where the contaminated sediment collected more readily. Again, the excavation continued until the gray silty sand was encountered and the soil with high organic content had been removed. Forty-nine cubic yards of sediment were excavated and transported to the sediment-handling area from the south side of Outfall 3. Two confirmation samples were collected from each side of the outfall and analyzed for dioxins (USEPA Method 8290).

Surface soil samples collected in April 1995 indicated the presence of dioxin contamination in surface soil adjacent to Outfall 3 on the south side of 28th Street. Conceptually, this soil was contaminated during periods of heavy rainfall when the ditch would overflow its banks onto the surface soil, carrying with it contaminated dioxin sediment. The contamination was limited to the surface soil (less than 1 foot). This soil was excavated and transported to the handling area on July 17 and July 18, 1995. A total of 60 cubic yards of surface soil was excavated and transported to the handling area. Two confirmation surface soil samples were collected (Figure 3) and analyzed for dioxins.

Outfall 4. Excavation of the contaminated sediment commenced on July 13 at Outfall 4 (Figure 4). The depth of excavation was determined based on previous sampling and geologic observations, such as organic content and lithologic character. The size of this ditch, including the culvert in the area of excavation, was 75 feet long by 22 feet wide. At Outfall 4, there was not a clear lithologic distinction between material that had filled the ditch in and the native Pleistocene sand. Here, the final depth of excavation was determined by noting the last occurrence of organic-rich materials that had been previously identified as generally having the highest concentrations of dioxin. This occurred at between 1.5 and 2.0 feet below the existing grade of the ditch. The excavation was continued somewhat deeper south of 28th Street in an area that was identified during previous sampling as having contamination above 4.7 ppt to nearly 2.0 feet below grade. At this location, the excavation was completed to 3.0 feet below grade. A total of 17 cubic yards of sediment were excavated from the north and south sides of 28th Street at this outfall. Three confirmation samples were collected at Outfall 4 and sent to an offsite laboratory for analysis for dioxins (USEPA Method 8290) (Figure 4). Excavation was completed on July 13.

This sediment, as all of the others, was transported to the sediment-handling area by roll-off trucks with plastic-lined beds to prevent the accidental spillage of sediment or the fluids associated with the saturated sediment.

CONFIRMATION SAMPLING RESULTS

Confirmation samples results all indicated that sediment and surface soil contaminated with dioxin above 4.7 ppt TEQ were removed by excavation. This meets the level set by MSDEQ. The highest dioxin result from the confirmation samples was determined at Outfall 3, where G5D006 was reported at 4.0 ppt. The lowest reported dioxin result occurred at Outfall 3 (G5D004) at 0.023 ppt. The confirmation sample results are summarized in the table below.

These confirmation samples were collected from 0 to 0.5 foot below grade in the bottoms of the ditches and excavated surface soil areas. The raw analytical data are presented in Attachment B.

The results for samples G5D004, G5D004D, and G5D005 were initially rejected by the data validator because end resolution checks were not performed by the laboratory within the 12-hour time frame that the method (8290) specifies. The samples were reanalyzed and the results were nearly identical to the first run. The results for these samples are flagged with a "J," for estimated value, in Table 1 because the analyses were performed 5 days after the holding time had expired for dioxins.

Table 1
Confirmation Sample Results

Letter Report
Interim Removal Action - 28th Street Road Construction
Naval Construction Battalion Center
Gulfport, Mississippi

| Sample Number | Outfall | TCDD (ppt) | TEQ Dioxin (ppt) |
|---------------|---------|------------|------------------|
| G5D001 | 4 | 2.6 | 3.3 |
| G5D002 | 4 | ND | 0.41 |
| G5D003 | 4 | ND | 0.14 |
| G5D004 | 3 | ND | 0.23 J |
| G5D004D | 3 | 2.2 | 2.2 J |
| G5D005 | 3 | ND | 0.43 J |
| G5D006 | 3 | 3.4 | 4.0 |
| G5D007 | 3 | ND | 1.4 |
| G5D008 | 1 | ND | 0.91 |
| G5D009 | 1 | ND | 1.1 |
| G5D010 | 1 | ND | 2.4 |
| G5S001 | 3 | ND | 0.071 |
| G5S001D | 3 | ND | 0.14 |
| G5S002 | 3 | ND | 0.65 |

Notes: All concentrations are reported in parts per trillion (ppt).

TCDD = 2,3,7,8-tetrachlorodibenzo-p-dioxin.

TEQ = toxicity equivalent.

J = value is estimated due to sample analysis after holding time had expired.

AIR SAMPLING

Air samples were collected from upwind and downwind locations before and during excavation. These samples were analyzed for dioxins (USEPA Method 8290). As of this writing, the sample results were not yet available for presentation. The sample results will enable determination of the amount, if any, of dioxin-contaminated particles that were mobilized during the excavation and transportation. The sample results and analysis will be presented in a future letter report.

SUMMARY

This interim removal action was initiated to remove contaminated sediment and surface soil above 4.7 ppt dioxin in and near the ditches north of the Base along 28th Street. This action was required because of the road widening and construction work that was to be performed. Additionally, by removing the contaminated sediment and surface soil, the source for continued migration and contamination of other sediment is removed. To accomplish this goal, 287 cubic yards of contaminated sediment and surface soil were removed and transported to a temporary holding area constructed on the base. The goal of 4.7 ppt dioxin was confirmed through sediment and surface soil sampling results in the excavated areas. All of these samples were analyzed for dioxin using the high resolution USEPA Method 8290, and the results were all below 4.7 ppt.

The excavation of the sediment was done with great care, so that potentially dioxin-contaminated dust particles were not mobilized. To ensure that dioxin-contaminated particles were not mobilized, air samples were collected continuously before and during excavation. These results are not yet available, but will be presented in the next letter report.

Great care was also taken to ensure that workers and local inhabitants were not directly exposed to the dioxin-contaminated sediment and surface soil. At each excavation area, exclusion zones were established, where only OSHA 40-hour-trained employees were allowed access. The workers that did enter the exclusion zone were required to wear personal protective clothing.

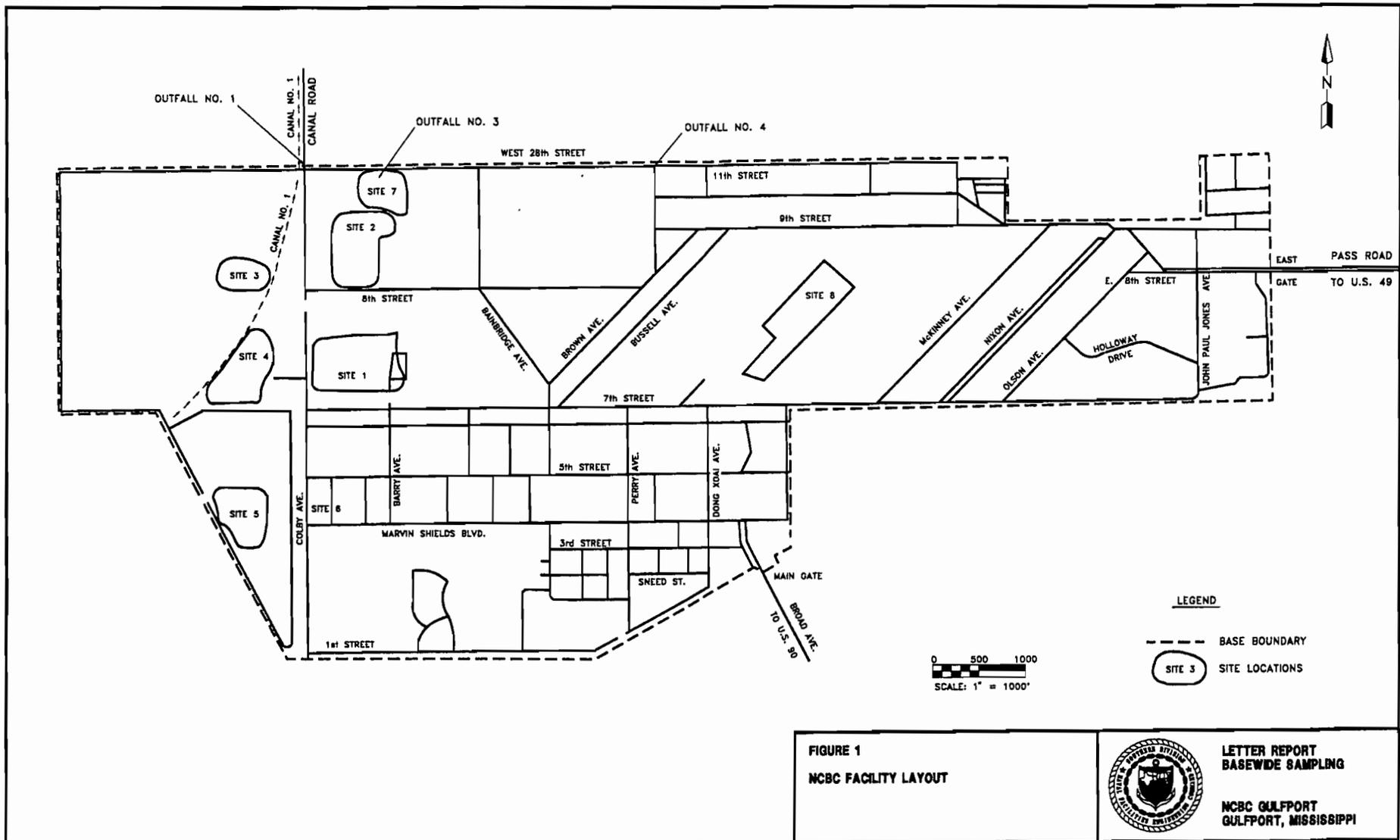


FIGURE 1
NCBC FACILITY LAYOUT

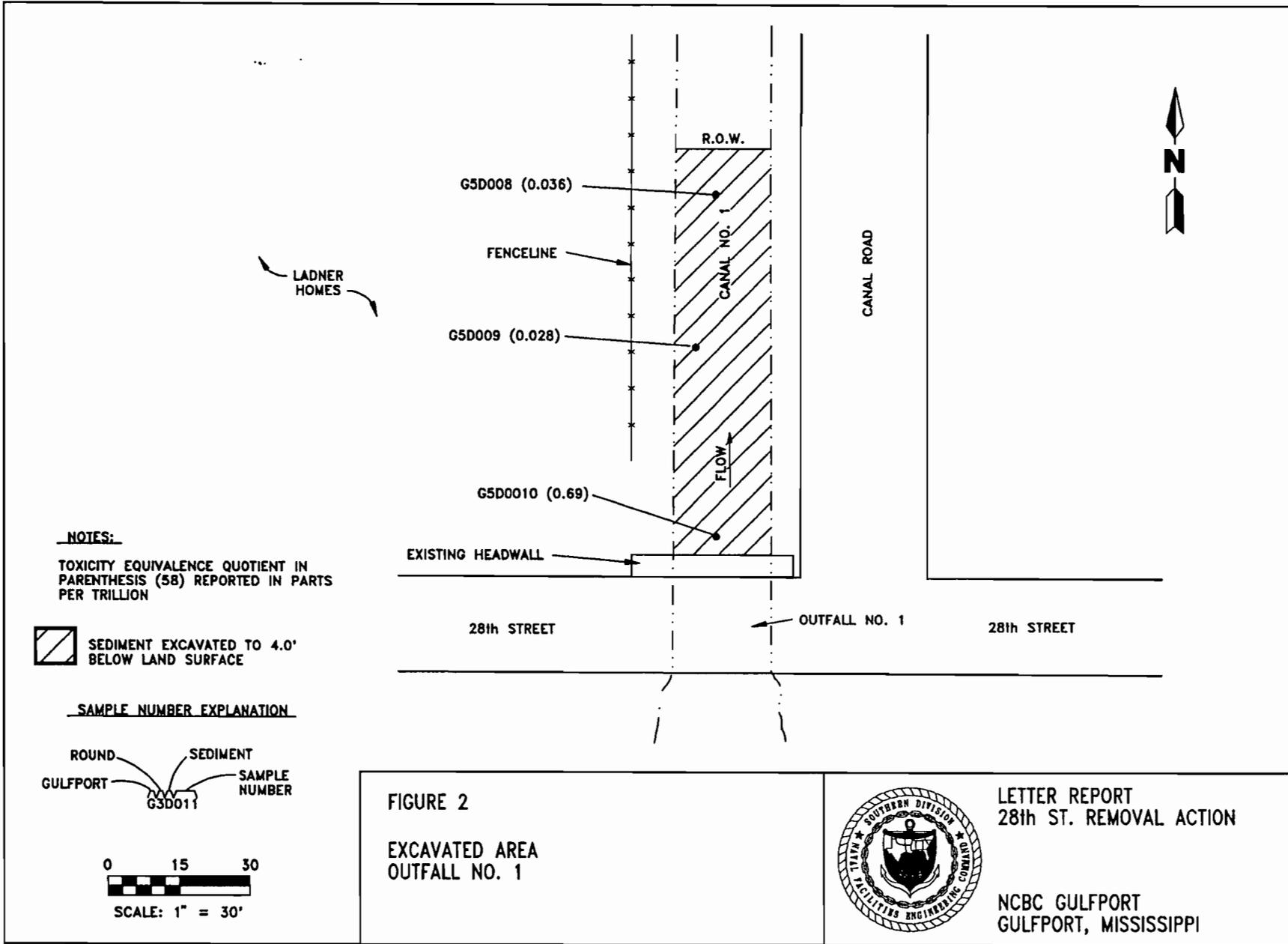
LETTER REPORT
BASEWIDE SAMPLING

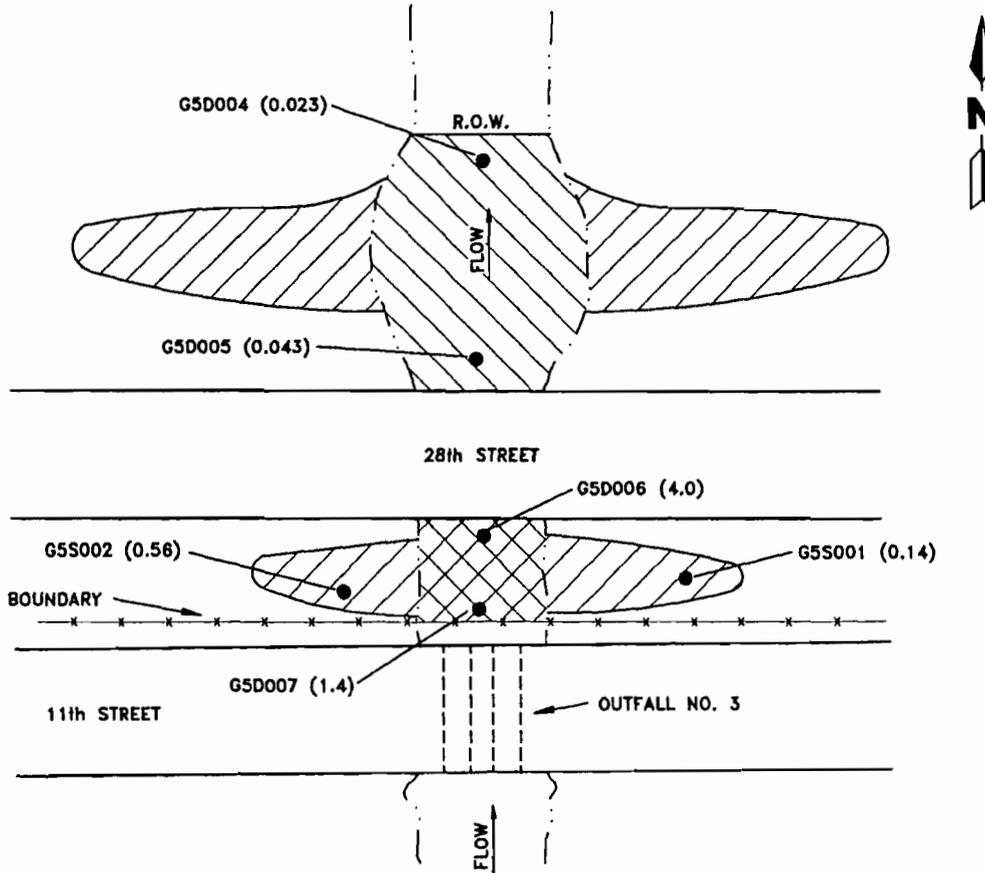


NCBC GULFPORT
GULFPORT, MISSISSIPPI

ATTACHMENT A

FIGURES





NOTES:

TOXICITY EQUIVALECE QUOTIENT IN PARENTHESIS (7.2) REPORTED IN PARTS PER TRILLION

-  SEDIMENT EXCAVATED TO 3.0' BELOW LAND SURFACE (BLS)
-  SEDIMENT EXCAVATED TO 2.5' BLS
-  SURFACE SOIL EXCAVATED TO 2.0' BLS

SAMPLE NUMBER EXPLANATION

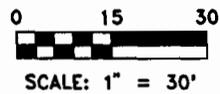


FIGURE 3

**EXCAVATED AREA
OUTFALL NO. 3**



**LETTER REPORT
28th ST. REMOVAL ACTION**

**NCBC GULFPORT
GULFPORT, MISSISSIPPI**



PRIVATE PROPERTY

FLOW

53rd AVE.

G5D001 (3.3)

EXISTING HEADWALL

OUTFALL NO. 4 28th STREET

SMALL BASIN

G5D002 (0.41)

CEMENT BLOCKS

G5D003 (0.14)

NOTES:

TOXICITY EQUIVALENT QUOTIENT IN PARENTHESIS (3.3) REPORTED IN PARTS PER TRILLION

 SEDIMENT EXCAVATED TO 2.0' BELOW LAND SURFACE

SAMPLE NUMBER EXPLANATION

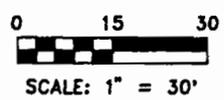
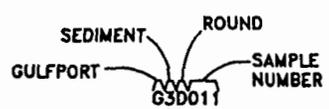


FIGURE 4
EXCAVATED AREA
OUTFALL NO. 4



LETTER REPORT
28th ST. REMOVAL ACTION

NCBC GULFPORT
GULFPORT, MISSISSIPPI

ATTACHMENT B
ANALYTICAL DATA

Toxicity Equivalents

The following results are based on EPA Toxicity Equivalence Factors (Method 8290 Table 10). For the first column of data (TEQ) zero is used for all ND results in calculating the toxicity equivalence. The second column of data (Maximum TEQ) is a maximum possible toxicity equivalent. The sample specific detection limits for ND results are used to calculate Maximum TEQs.

| CAL ID: | CLIENT ID: | TEQ: | MAXIMUM TEQ: |
|-------------|------------|------|--------------|
| 082903-0001 | G5D001 | 3.3 | 5.5 |
| 082903-0002 | G5D002 | 0.41 | 4.5 |
| 082903-0003 | G5D003 | 0.14 | 3.5 |

Toxicity Equivalents

The following results are based on EPA Toxicity Equivalence Factors (Method 8290 Table 10). For the first column of data (TEQ) zero is used for all ND results in calculating the toxicity equivalence. The second column of data (Maximum TEQ) is a maximum possible toxicity equivalent. The sample specific detection limits for ND results are used to calculate Maximum TEQs.

| CAL ID: | CLIENT ID: | TEQ:(pg/g) | MAXIMUM TEQ:(pg/g) |
|-------------|------------|------------|--------------------|
| 083808-0001 | G5D004 | 0.023 | 2.1 |
| 083808-0002 | G5D004D | 2.2 | 3.2 |
| 083808-0003 | G5D005 | 0.043 | 1.4 |

Toxicity Equivalents

The following results are based on EPA Toxicity Equivalence Factors (Method 8290 Table 10). For the first column of data (TEQ) zero is used for all ND results in calculating the toxicity equivalence. The second column of data (Maximum TEQ) is a maximum possible toxicity equivalent. The sample specific detection limits for ND results are used to calculate Maximum TEQs.

| CAL ID: | CLIENT ID: | TEQ: (pg/g) | MAXIMUM TEQ: (pg/g) |
|-------------|------------|-------------|---------------------|
| 082956-0001 | G5D006 / | 4.0 | 4.8 |
| 082956-0002 | G5D007 | 1.4 | 3.3 |
| 082956-0003 | G5S001 | 0.071 | 0.91 |
| 082956-0004 | G5S001D | 0.14 | 0.97 |
| 082956-0005 | G5S002 | 0.56 | 2.1 |

Toxicity Equivalents

The following results are based on EPA Toxicity Equivalence Factors (Method 8290 Table 10). For the first column of data (TEQ) zero is used for all ND results in calculating the toxicity equivalence. The second column of data (Maximum TEQ) is a maximum possible toxicity equivalent. The sample specific detection limits for ND results are used to calculate Maximum TEQs.

| CAL ID: | CLIENT ID: | TEQ: (pg/g) | MAXIMUM TEQ: (pg/g) |
|-------------|------------|-------------|---------------------|
| 083014-0001 | G5D008 | 0.036 | 0.91 |
| 083014-0002 | G5D009 | 0.028 | 1.1 |
| 083014-0003 | G5S010 | 0.69 | 2.4 |

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS (CONT.)
Method 8290

Client Name: ABB Environmental Services
Client ID: G5S001
Lab ID: 082956-0003-SA
Matrix: SOIL
Authorized: 18 JUL 95

Sampled: 17 JUL 95
Prepared: 18 JUL 95

Received: 18 JUL 95
Analyzed: 20 JUL 95

Sample Amount 5.0 G
Column Type DB-5

% Recovery

| | |
|-------------------------|----|
| 13C-2,3,7,8-TCDF | 93 |
| 13C-2,3,7,8-TCDD | 84 |
| 13C-1,2,3,7,8-PeCDF | 90 |
| 13C-1,2,3,7,8-PeCDD | 99 |
| 13C-1,2,3,4,7,8-HxCDF | 83 |
| 13C-1,2,3,6,7,8-HxCDD | 90 |
| 13C-1,2,3,4,6,7,8-HpCDF | 78 |
| 13C-1,2,3,4,6,7,8-HpCDD | 82 |
| 13C-OCDD | 73 |

Percent Moisture is 18%. All results and limits are reported on a dry weight basis.

ND = Not detected
NA = Not applicable

Reported By: Clark Pickell

Approved By: Andre Algazi

The cover letter is an integral part of this report.
Rev 230787

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS (CONT.)
Method 8290

Client Name: ABB Environmental Services

Client ID: G5S001D

Lab ID: 082956-0004-SA

Matrix: SOIL

Authorized: 18 JUL 95

Sampled: 17 JUL 95

Prepared: 18 JUL 95

Received: 18 JUL 95

Analyzed: 20 JUL 95

Sample Amount 5.0 G
Column Type DB-5

| | % Recovery |
|-------------------------|------------|
| 13C-2,3,7,8-TCDF | 91 |
| 13C-2,3,7,8-TCDD | 82 |
| 13C-1,2,3,7,8-PeCDF | 86 |
| 13C-1,2,3,7,8-PeCDD | 86 |
| 13C-1,2,3,4,7,8-HxCDF | 85 |
| 13C-1,2,3,6,7,8-HxCDD | 87 |
| 13C-1,2,3,4,6,7,8-HpCDF | 71 |
| 13C-1,2,3,4,6,7,8-HpCDD | 72 |
| 13C-OCDD | 62 |

Percent Moisture is 17%. All results and limits are reported on a dry weight basis.

ND = Not detected

NA = Not applicable

Reported By: Clark Pickell

Approved By: Andre Algazi

The cover letter is an integral part of this report.
Rev 230787

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS
Method 8290

Client Name: ABB Environmental Services
 Client ID: G5S002
 Lab ID: 082956-0005-SA
 Matrix: SOIL
 Authorized: 18 JUL 95
 Sampled: 17 JUL 95
 Prepared: 18 JUL 95
 Received: 18 JUL 95
 Analyzed: 20 JUL 95

Sample Amount 5.0
 Column Type DB-5

| Parameter | Result | Dry Weight Units | Detection Limit | Data Qualifiers |
|---------------------|--------|------------------|-----------------|-----------------|
| Furans | | | | |
| TCDFs (total) | 32 | pg/g | -- | |
| 2,3,7,8-TCDF | ND | pg/g | 0.83 | |
| PeCDFs (total) | 7.2 | pg/g | -- | |
| 1,2,3,7,8-PeCDF | ND | pg/g | 0.39 | |
| 2,3,4,7,8-PeCDF | ND | pg/g | 0.26 | |
| HxCDFs (total) | ND | pg/g | 2.4 | |
| 1,2,3,4,7,8-HxCDF | ND | pg/g | 0.32 | |
| 1,2,3,6,7,8-HxCDF | ND | pg/g | 0.66 | |
| 2,3,4,6,7,8-HxCDF | ND | pg/g | 0.36 | |
| 1,2,3,7,8,9-HxCDF | ND | pg/g | 0.14 | |
| HpCDFs (total) | ND | pg/g | 3.8 | |
| 1,2,3,4,6,7,8-HpCDF | ND | pg/g | 2.4 | |
| 1,2,3,4,7,8,9-HpCDF | ND | pg/g | 0.16 | |
| OCDF | ND | pg/g | 5.0 | |
| Dioxins | | | | |
| TCDDs (total) | 13 | pg/g | -- | |
| 2,3,7,8-TCDD | ND | pg/g | 0.71 | |
| PeCDDs (total) | ND | pg/g | 3.5 | |
| 1,2,3,7,8-PeCDD | ND | pg/g | 0.44 | |
| HxCDDs (total) | ND | pg/g | 2.5 | |
| 1,2,3,4,7,8-HxCDD | ND | pg/g | 0.34 | |
| 1,2,3,6,7,8-HxCDD | ND | pg/g | 0.79 | |
| 1,2,3,7,8,9-HxCDD | ND | pg/g | 1.3 | |
| HpCDDs (total) | 33 | pg/g | -- | |
| 1,2,3,4,6,7,8-HpCDD | 12 | pg/g | -- | @ |
| OCDD | 440 | pg/g | -- | |

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Clark Pickell

Approved By: Andre Algazi

The cover letter is an integral part of this report.
 Rev 230787

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS
Method 8290

Client Name: ABB Environmental Services

Client ID: G5D001

Lab ID: 082903-0001-SA

Matrix: SOIL

Authorized: 14 JUL 95

Sampled: 13 JUL 95

Prepared: 14 JUL 95

Received: 14 JUL 95

Analyzed: 16 JUL 95

Sample Amount 5.0 G
Column Type DB-5

| Parameter | Result | Dry Weight Units | Detection Limit | Data Qualifiers |
|---------------------|--------|------------------|-----------------|-----------------|
| Furans | | | | |
| TCDFs (total) | ND | pg/g | 0.51 | |
| 2,3,7,8-TCDF | ND | pg/g | 0.51 | |
| PeCDFs (total) | ND | pg/g | 2.1 | |
| 1,2,3,7,8-PeCDF | ND | pg/g | 1.5 | |
| 2,3,4,7,8-PeCDF | ND | pg/g | 1.3 | |
| HxCDFs (total) | ND | pg/g | 5.2 | |
| 1,2,3,4,7,8-HxCDF | ND | pg/g | 0.81 | |
| 1,2,3,6,7,8-HxCDF | ND | pg/g | 0.98 | |
| 2,3,4,6,7,8-HxCDF | ND | pg/g | 1.0 | |
| 1,2,3,7,8,9-HxCDF | ND | pg/g | 1.2 | |
| HpCDFs (total) | 23 | pg/g | -- | |
| 1,2,3,4,6,7,8-HpCDF | 9.6 | pg/g | -- | @ |
| 1,2,3,4,7,8,9-HpCDF | ND | pg/g | 0.79 | |
| OCDF | 21 | pg/g | -- | @ |
| Dioxins | | | | |
| TCDDs (total) | 2.6 | pg/g | -- | |
| 2,3,7,8-TCDD | 2.6 | pg/g | -- | @ |
| PeCDDs (total) | ND | pg/g | 3.4 | |
| 1,2,3,7,8-PeCDD | ND | pg/g | 1.3 | |
| HxCDDs (total) | ND | pg/g | 5.3 | |
| 1,2,3,4,7,8-HxCDD | ND | pg/g | 0.73 | |
| 1,2,3,6,7,8-HxCDD | ND | pg/g | 1.5 | |
| 1,2,3,7,8,9-HxCDD | ND | pg/g | 2.0 | |
| HpCDDs (total) | 74 | pg/g | -- | |
| 1,2,3,4,6,7,8-HpCDD | 34 | pg/g | -- | |
| OCDD | 350 | pg/g | -- | |

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Teri Vergara

Approved By: Maricon Estrada

The cover letter is an integral part of this report.

Rev 230787

POLYCHLORINATED DIOXINS/FURANS
 ISOMER SPECIFIC ANALYSIS
 Method 8290

Client Name: ABB Environmental Services
 Client ID: G5D002
 Lab ID: 082903-0002-SA
 Matrix: SOIL
 Authorized: 14 JUL 95

Sampled: 13 JUL 95
 Prepared: 14 JUL 95

Received: 14 JUL 95
 Analyzed: 16 JUL 95

Sample Amount 5.0 G
 Column Type DB-5

| Parameter | Result | Dry Weight Units | Detection Limit | Data Qualifiers |
|---------------------|--------|---------------------|--------------------|--------------------|
| Furans | | | | |
| TCDFs (total) | ND | pg/g | 0.76 | |
| 2,3,7,8-TCDF | ND | pg/g | 0.76 | |
| PeCDFs (total) | ND | pg/g | 2.0 | |
| 1,2,3,7,8-PeCDF | ND | pg/g | 2.0 | |
| 2,3,4,7,8-PeCDF | ND | pg/g | 1.7 | |
| HxCDFs (total) | ND | pg/g | 1.0 | |
| 1,2,3,4,7,8-HxCDF | ND | pg/g | 0.70 | |
| 1,2,3,6,7,8-HxCDF | ND | pg/g | 0.85 | |
| 2,3,4,6,7,8-HxCDF | ND | pg/g | 0.88 | |
| 1,2,3,7,8,9-HxCDF | ND | pg/g | 1.0 | |
| HpCDFs (total) | 7.9 | pg/g | -- | |
| 1,2,3,4,6,7,8-HpCDF | ND | pg/g | 3.7 | |
| 1,2,3,4,7,8,9-HpCDF | ND | pg/g | 2.5 | |
| OCDF | ND | pg/g | 12 | |
| Dioxins | | | | |
| TCDDs (total) | ND | pg/g | 1.6 | |
| 2,3,7,8-TCDD | ND | pg/g | 1.6 | |
| PeCDDs (total) | ND | pg/g | 3.4 | |
| 1,2,3,7,8-PeCDD | ND | pg/g | 1.0 | |
| HxCDDs (total) | ND | pg/g | 4.9 | |
| 1,2,3,4,7,8-HxCDD | ND | pg/g | 1.4 | |
| 1,2,3,6,7,8-HxCDD | ND | pg/g | 1.3 | |
| 1,2,3,7,8,9-HxCDD | ND | pg/g | 1.8 | |
| HpCDDs (total) | 42 | pg/g | -- | |
| 1,2,3,4,6,7,8-HpCDD | 21 | pg/g | -- | |
| OCDD | 200 | pg/g | -- | |

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Teri Vergara

Approved By: Maricon Estrada

The cover letter is an integral part of this report.
 Rev 230787



Environmental Services

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS
Method 8290

Client Name: ABB Environmental Services

Client ID: G5D003

Lab ID: 082903-0003-SA

Matrix: SOIL

Authorized: 14 JUL 95

Sampled: 13 JUL 95

Prepared: 14 JUL 95

Received: 14 JUL 95

Analyzed: 16 JUL 95

Sample Amount 5.0 G
Column Type DB-5

| Parameter | Result | Dry Weight Units | Detection Limit | Data Qualifiers |
|-----------|--------|------------------|-----------------|-----------------|
|-----------|--------|------------------|-----------------|-----------------|

Furans

| | | | | |
|---------------------|----|------|------|--|
| TCDFs (total) | ND | pg/g | 0.71 | |
| 2,3,7,8-TCDF | ND | pg/g | 0.71 | |
| PeCDFs (total) | ND | pg/g | 2.1 | |
| 1,2,3,7,8-PeCDF | ND | pg/g | 2.1 | |
| 2,3,4,7,8-PeCDF | ND | pg/g | 1.7 | |
| HxCDFs (total) | ND | pg/g | 0.65 | |
| 1,2,3,4,7,8-HxCDF | ND | pg/g | 0.44 | |
| 1,2,3,6,7,8-HxCDF | ND | pg/g | 0.53 | |
| 2,3,4,6,7,8-HxCDF | ND | pg/g | 0.55 | |
| 1,2,3,7,8,9-HxCDF | ND | pg/g | 0.65 | |
| HpCDFs (total) | ND | pg/g | 0.65 | |
| 1,2,3,4,6,7,8-HpCDF | ND | pg/g | 0.51 | |
| 1,2,3,4,7,8,9-HpCDF | ND | pg/g | 0.65 | |
| OCDF | ND | pg/g | 2.0 | |

Dioxins

| | | | | |
|---------------------|-----|------|------|---|
| TCDDs (total) | 2.6 | pg/g | -- | |
| 2,3,7,8-TCDD | ND | pg/g | 0.95 | |
| PeCDDs (total) | ND | pg/g | 3.1 | |
| 1,2,3,7,8-PeCDD | ND | pg/g | 1.5 | |
| HxCDDs (total) | ND | pg/g | 3.6 | |
| 1,2,3,4,7,8-HxCDD | ND | pg/g | 1.1 | |
| 1,2,3,6,7,8-HxCDD | ND | pg/g | 1.0 | |
| 1,2,3,7,8,9-HxCDD | ND | pg/g | 2.3 | |
| HpCDDs (total) | 8.6 | pg/g | -- | |
| 1,2,3,4,6,7,8-HpCDD | 8.6 | pg/g | -- | @ |
| OCDD | 51 | pg/g | -- | |

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Teri Vergara

Approved By: Maricon Estrada

The cover letter is an integral part of this report.

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POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS
Method 8290

Client Name: ABB Environmental Services
Client ID: G5D004
Lab ID: 083808-0001-SA
Matrix: SEDIMENT
Authorized: 07 SEP 95

Sampled: 14 JUL 95
Prepared: 15 JUL 95

Received: 15 JUL 95
Analyzed: 06 SEP 95

Sample Amount 5.0 G
Column Type DB-5

| Parameter | Result | Dry Weight Units | Detection Limit | Data Qualifiers |
|---------------------|--------|------------------|-----------------|-----------------|
| Furans | | | | |
| TCDFs (total) | ND | pg/g | 0.48 | |
| 2,3,7,8-TCDF | ND | pg/g | 0.48 | |
| PeCDFs (total) | ND | pg/g | 1.1 | |
| 1,2,3,7,8-PeCDF | ND | pg/g | 1.1 | |
| 2,3,4,7,8-PeCDF | ND | pg/g | 0.94 | |
| HxCDFs (total) | ND | pg/g | 0.40 | |
| 1,2,3,4,7,8-HxCDF | ND | pg/g | 0.26 | |
| 1,2,3,6,7,8-HxCDF | ND | pg/g | 0.33 | |
| 2,3,4,6,7,8-HxCDF | ND | pg/g | 0.34 | |
| 1,2,3,7,8,9-HxCDF | ND | pg/g | 0.40 | |
| HpCDFs (total) | ND | pg/g | 1.2 | |
| 1,2,3,4,6,7,8-HpCDF | ND | pg/g | 0.49 | |
| 1,2,3,4,7,8,9-HpCDF | ND | pg/g | 0.18 | |
| OCDF | ND | pg/g | 2.1 | |
| Dioxins | | | | |
| TCDDs (total) | ND | pg/g | 0.95 | |
| 2,3,7,8-TCDD | ND | pg/g | 0.95 | |
| PeCDDs (total) | ND | pg/g | 3.0 | |
| 1,2,3,7,8-PeCDD | ND | pg/g | 0.36 | |
| HxCDDs (total) | ND | pg/g | 0.75 | |
| 1,2,3,4,7,8-HxCDD | ND | pg/g | 0.75 | |
| 1,2,3,6,7,8-HxCDD | ND | pg/g | 0.75 | |
| 1,2,3,7,8,9-HxCDD | ND | pg/g | 0.68 | |
| HpCDDs (total) | ND | pg/g | 2.2 | |
| 1,2,3,4,6,7,8-HpCDD | ND | pg/g | 2.0 | |
| OCDD | 23 | pg/g | -- | @ |

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Teri Vergara

Approved By: Mark Bechthold

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Environmental Services

POLYCHLORINATED DIOXINS/FURANS ISOMER SPECIFIC ANALYSIS Method 8290

Client Name: ABB Environmental Services
Client ID: G5D004D
Lab ID: 083808-0002-SA
Matrix: SEDIMENT
Authorized: 07 SEP 95

Sampled: 14 JUL 95
Prepared: 15 JUL 95

Received: 15 JUL 95
Analyzed: 06 SEP 95

Sample Amount 5.0 G
Column Type DB-5

Table with 5 columns: Parameter, Result, Dry Weight Units, Detection Limit, Data Qualifiers. Rows include Furans (TCDFs, PeCDFs, HxCDFs, HpCDFs, OCDF) and Dioxins (TCDDs, PeCDDs, HxCDDs, HpCDDs, OCDD).

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Teri Vergara

Approved By: Mark Bechthold

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POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS
Method 8290

Client Name: ABB Environmental Services
Client ID: G5D005
Lab ID: 083808-0003-SA
Matrix: SEDIMENT
Authorized: 07 SEP 95

Sampled: 14 JUL 95
Prepared: 15 JUL 95

Received: 15 JUL 95
Analyzed: 06 SEP 95

Sample Amount 5.0 G
Column Type DB-5

| Parameter | Result | Dry Weight Units | Detection Limit | Data Qualifiers |
|---------------------|--------|---------------------|--------------------|--------------------|
| Furans | | | | |
| TCDFs (total) | ND | pg/g | 0.37 | |
| 2,3,7,8-TCDF | ND | pg/g | 0.22 | |
| PeCDFs (total) | ND | pg/g | 0.84 | |
| 1,2,3,7,8-PeCDF | ND | pg/g | 0.84 | |
| 2,3,4,7,8-PeCDF | ND | pg/g | 0.74 | |
| HxCDFs (total) | ND | pg/g | 0.32 | |
| 1,2,3,4,7,8-HxCDF | ND | pg/g | 0.22 | |
| 1,2,3,6,7,8-HxCDF | ND | pg/g | 0.25 | |
| 2,3,4,6,7,8-HxCDF | ND | pg/g | 0.27 | |
| 1,2,3,7,8,9-HxCDF | ND | pg/g | 0.32 | |
| HpCDFs (total) | ND | pg/g | 0.24 | |
| 1,2,3,4,6,7,8-HpCDF | ND | pg/g | 0.17 | |
| 1,2,3,4,7,8,9-HpCDF | ND | pg/g | 0.24 | |
| OCDF | ND | pg/g | 0.78 | |
| Dioxins | | | | |
| TCDDs (total) | ND | pg/g | 0.60 | |
| 2,3,7,8-TCDD | ND | pg/g | 0.36 | |
| PeCDDs (total) | ND | pg/g | 2.6 | |
| 1,2,3,7,8-PeCDD | ND | pg/g | 0.60 | |
| HxCDDs (total) | ND | pg/g | 1.9 | |
| 1,2,3,4,7,8-HxCDD | ND | pg/g | 0.51 | |
| 1,2,3,6,7,8-HxCDD | ND | pg/g | 0.51 | |
| 1,2,3,7,8,9-HxCDD | ND | pg/g | 0.46 | |
| HpCDDs (total) | ND | pg/g | 3.8 | |
| 1,2,3,4,6,7,8-HpCDD | ND | pg/g | 2.0 | |
| OCDD | 43 | pg/g | -- | |

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Teri Vergara

Approved By: Mark Bechthold

The cover letter is an integral part of this report.

Rev 230787

POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS (CONT.)
Method 8290

Client Name: ABB Environmental Services
Client ID: G5D006
Lab ID: 082956-0001-SA
Matrix: SEDIMENT
Authorized: 18 JUL 95
Sampled: 17 JUL 95
Prepared: 18 JUL 95
Received: 18 JUL 95
Analyzed: 20 JUL 95

Sample Amount 5.0 G
Column Type DB-5

| | % Recovery |
|-------------------------|------------|
| 13C-2,3,7,8-TCDF | 91 |
| 13C-2,3,7,8-TCDD | 85 |
| 13C-1,2,3,7,8-PeCDF | 95 |
| 13C-1,2,3,7,8-PeCDD | 106 |
| 13C-1,2,3,4,7,8-HxCDF | 89 |
| 13C-1,2,3,6,7,8-HxCDD | 90 |
| 13C-1,2,3,4,6,7,8-HpCDF | 64 |
| 13C-1,2,3,4,6,7,8-HpCDD | 68 |
| 13C-OCDD | 57 |

Percent Moisture is 22%. All results and limits are reported on a dry weight basis.

Note @ : Result is an estimated value that is below the lower calibration limit but above the target detection limit.

Note g : 2,3,7,8-TCDF results have been confirmed on a DB-225 column.

ND = Not detected
NA = Not applicable

Reported By: Clark Pickell

Approved By: Andre Algazi

The cover letter is an integral part of this report.
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POLYCHLORINATED DIOXINS/FURANS
ISOMER SPECIFIC ANALYSIS (CONT.)
Method 8290

Client Name: ABB Environmental Services

Client ID: G5D007

Lab ID: 082956-0002-SA

Matrix: SEDIMENT

Authorized: 18 JUL 95

Sampled: 17 JUL 95

Prepared: 18 JUL 95

Received: 18 JUL 95

Analyzed: 20 JUL 95

Sample Amount 5.0 G
Column Type DB-5

% Recovery

| | |
|-------------------------|-----|
| 13C-2,3,7,8-TCDF | 114 |
| 13C-2,3,7,8-TCDD | 111 |
| 13C-1,2,3,7,8-PeCDF | 107 |
| 13C-1,2,3,7,8-PeCDD | 124 |
| 13C-1,2,3,4,7,8-HxCDF | 113 |
| 13C-1,2,3,6,7,8-HxCDD | 114 |
| 13C-1,2,3,4,6,7,8-HpCDF | 80 |
| 13C-1,2,3,4,6,7,8-HpCDD | 91 |
| 13C-OCDD | 77 |

Percent Moisture is 29%. All results and limits are reported on a dry weight basis.

Note @ : Result is an estimated value that is below the lower calibration limit but above the target detection limit.

ND = Not detected
NA = Not applicable

Reported By: Clark Pickell

Approved By: Andre Algazi

The cover letter is an integral part of this report.
Rev 230787

CC. 10

ATTACHMENT C

GLOSSARY

| | |
|------------------------|--|
| ABB-ES | ABB Environmental Services, Inc. |
| CTO | Contract Task Order |
| HDPE | high density polyethylene |
| IRA | interim removal action |
| J | value is estimated due to sample analysis after holding time had expired |
| MSDEQ | Mississippi State Department of Environmental Quality |
| NCBC | Naval Construction Battalion Center |
| OSHA | Occupaitonal Safety and Health Administration |
| ppt | parts per trillion |
| SOUTHNAVFAC- ENGCOM | Southern Division, Naval Facilities Engineering Command |
| SRTs | sediment recovery traps |
| TCDD | 2,3,7,8-tetrachlorodibenzo-p-dioxin |
| TEQ | toxicity equivalence quotient |
| USEPA | U.S. Environmental Protection Agency |



September 28, 1995

Commanding Officer
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, SC 29418

Attention: Mr. Art Conrad

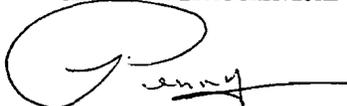
Subject: Letter report for 28th Street removal effort
N62467-89-D-0317/CTO 096

Dear Art:

The letter report detailing the complete activities associated with the 28th Street removal is enclosed. If you have any questions, please call me at (615) 531-1922.

Sincerely,

ABB ENVIRONMENTAL SERVICES, INC.



Penny M. Baxter
Senior Project Manager

cc: G. Crane/NCBC
file
[8505.071]

ABB Environmental Services, Inc.