



**US Army Corps  
of Engineers®  
Memphis District**

---

## **SECTION IX**

# **Northwest Tennessee Regional Harbor**

## **SEDIMENT ANALYSIS**

**April 2004**

## **Introduction**

Concerns were expressed early in the planning stages of the study over the possibility of contaminated sediments that may be present in the proposed harbor area. The Tennessee Valley Authority (TVA) conducted sediment analysis in the area in 1992 (Attachment 1). Analysis from the Mississippi River locations revealed that concentrations of barium and manganese were in the “heavily polluted” range and arsenic and nickel were in the “moderately polluted” range. Sediment tests from Slab Fill Chute revealed that concentrations of copper, iron, manganese, zinc, barium, arsenic, chromium, and nickel were in the “moderately polluted range” or “heavily polluted” range.

Sediment testing was conducted as part of the present study to determine the level of contamination present at the site. Sediment testing was contracted to HESS Environmental Services, Inc. A copy of the draft report is found in Attachment 2. Concentrations of pollutants were compared to EPA Ecological Screening Values, Sediment Quality Guidelines (Effects Range - Low and Effects Range – High), and Preliminary Remediation Goals (residential and industrial soil).

### EPA Ecological Screening Values (EPA 2001)

Ecological screening values are based on contaminant levels associated with a low probability of unacceptable risks to ecological receptors. The numbers are based on conservative endpoints and sensitive ecological effects data. Ecological screening values should not be used as remediation levels.

### Sediment Quality Guidelines (USACE, 1998; (EPA, 1997)

Sediment quality guidelines (SQG) are used to determine sediment contaminant concentrations that differentiate sediments of little concern from those predicted to have adverse biological effects. The effects range low (ERL) and effects range medium (ERM) were developed from correlating sediment chemical concentrations. Data was arranged in increasing concentrations that had an effect on benthic organisms. Concentrations of a specific chemical that did not have an effect were excluded. ERL was calculated as the lower 10<sup>th</sup> percentile of concentrations that had an effect. ERM was calculated as the 50<sup>th</sup> percentile of concentrations that had an effect. SQGs are limited to Tier 1 or Tier 2 evaluations.

### Preliminary Remediation Goals

The State of Tennessee utilizes EPA Region 9 Preliminary Remediation Goals (PRGs) to establish no further action levels for media contaminated with hazardous constituents. They are broken into residential and industrial soils.

## Summary of Results

Table 1 provides the results of sediment testing. Results were screened against Ecological Effects Values, ERL concentrations, ERM concentrations, and PRG values to determine the level of pollution present and if further testing is warranted.

It is important to note that sediment testing conducted for this analysis was limited. Results were used to determine if further testing and modeling would be necessary. A more detailed analysis and modeling would be necessary for definitive determinations of adverse impacts of sediment to the aquatic environment. However, results obtained from this sampling suggest that the concentration of pollutants in the bottom sediments located at the proposed Northwest Tennessee Harbor sight do not warrant further testing.

### Polynuclear Hydrocarbons (PAHs)

All of the PAHs sampled were above the ecological screening values (for those with published values) with the exception of fluoranthene. Five of the PAHs tested had concentrations higher than ERL levels. They are acenaphthene, fluorene (lab detection limit was above ER-L level), anthracene, phenanthrene, and dibenz(a,h)anthracene (lab detection limit was above ER-L level). Two PAHs were above the PRG values for residential soils. They are benzo(a)pyrene and dibenz(a,h)anthracene. These are listed because the lab detection limit was above the PRG value. No concentrations exceeded the PRG values for industrial soil.

### Pesticides

Pesticide results detected traces of dieldrin, 4',4'-DDD, and 4',4'-DDE.

The dieldrin concentrations detected were above the ecological screening values but below PRG levels. No ERL or ERM values are published. The maximum concentration of dieldrin found was 0.007 mg/Kg. The PRG value for residential soils is 0.03 mg/Kg.

Detected concentrations of DDD were above the ecological risk values and three of the eight samples had concentrations above the ERL levels (0.005 mg/Kg). None of the samples exceeded the ERM or PRG values.

Lab detection limits for DDE were above the ERL level. None of the samples exceeded the ERM or PRG values.

### Chlorinated Herbicides

All chlorinated herbicides samples were below PRG levels (no published ecological effects, ERL, or ERM values).

## Metals

With the exception of zinc all concentrations of metals were above, or lab detection limits were above, ecological risk values (for published values).

Lab detection limits for cadmium were above ERL levels but below ERM and PRG values.

One sample detected concentrations of mercury at 0.15 mg/KG that is equal to the ERL level. All other samples were below the ERL level.

Two samples detected concentrations of nickel above ERL levels (20.9 mg/Kg). None of the samples detected concentrations of nickel over ERM or PRG values.

No ecological risk values, ERL, or ERM levels are published for iron. Six samples detected concentrations of iron that exceeded the PRG values for residential soils. All levels were below PRG values for industrial soil.

## Polychlorinated Biphenyls (PCBs)

PCBs were tested as aroclors and specific congeners. Lab detection limits were above ERL values for all aroclors tested. All aroclor samples were below ERM and PRG values. Congener specific PCBs were summed to obtain a total PCB concentration. All samples exceeded ERL values. However, it is important to note that the lab detection values was 1.0 ug/Kg. None of the samples exceeded the ERM or PRG values.

## **Discussion**

Concerns were expressed over the likelihood of resuspending contaminants into the water column during construction. Elevated levels of some contaminants were detected. None of the levels exceeded ERM or PRG levels for industrial soil. However, concentrations did exceed ERL levels. It is important to note that SQGs have limitations. The limitations are as follows (USACE, 1998):

- Not every chemical of concern have an SQG value
- Unanticipated chemicals are not addressed
- Chemical interactions are not addressed
- They do not adequately consider the exposure component of environmental risk
- SQGs developed for one environment have no relevance for other environments

It is also important to note that SQGs are limited to Tier 1 and Tier 2 screening of sediments. SQGs by themselves are technically unacceptable for making definitive determinations of adverse impacts of sediment to the aquatic environment.

Proposed construction would utilize a hydraulic dredge to excavate a navigation channel. A hydraulic dredge uses a cutter head and suction device to loosen sediments and remove them from the channel bottom. Disposal would take place on land. Utilizing a cutter head dredge and

placing the material on land would decrease the likelihood of resuspending contaminants into the water column. However, an increase in total suspended solids is expected in the return water. Best management practices would be used during construction to ensure that resuspension of contaminants would not take place. Best management practices that would be used during construction are as follows:

- A drop structure would be utilized to allow return water to exit the disposal area. A drop structure would allow for an increase in time for sediments to settle to the bottom of the water column (below the level of the drop structure). Sediment screens would be placed over each drop structure to further reduce the level of total suspended solids in the return water.
- The return water would be periodically monitored to ensure that state water quality standards are not violated during construction. Sampling protocols would be established prior to construction during detailed plans and specifications.
- Construction is scheduled to take place during low water stages on the Mississippi River. Therefore, the proposed harbor area would have little to no current. Sediments suspended in the construction zone should be contained in the backwater area.

## **Conclusion**

Sediment testing revealed that there is a moderate level of pollution present in the proposed harbor area. It is highly unlikely that construction would resuspend contaminated sediments into the water column because of the low level of contaminants detected and the upland disposal construction methods. No further testing is warranted at this time. Mississippi River background levels and return water would be monitored during construction to ensure that applicable state water quality standards are not violated. Construction would be suspended and modified if testing reveals that state water quality standards are violated.

## **Literature Cited**

- U.S. Army Corps of Engineers. 1998. Use of sediment quality guidelines (SQGs) in dredged material management. U.S. Army Corps of Engineers, Long-Term Effects of Dredging Operations Program, ERDC, Dredging Research Technical Note EEDP-04-29, Vicksburg, MS. 14 pp.
- EPA, 1997. The incidence and severity of sediment contamination in surface waters of the United States: Volume 1: National Sediment Quality Survey. U.S. Environmental Protection Agency, Office of Science and Technology, Washington, D.C.
- EPA. 2001. Supplemental Guidance to RAGS: Region 4 Bulletins, Ecological Risk Assessment. Originally published November 1995. Website version last updated November 30, 2001: <http://www.epa.gov/region4/waste/ots/ecolbul.htm>









**Attachment 1**

**TVA Sediment Results**













---

## STORET LDC - Detailed Data Report

---

Organization Code: **131TVAC** Organization Name: **TENN VALLEY AUTHORITY**  
Station ID: **477505** Station Alias:  
Station Name: **SLAB FILL CHUTE**  
**MISSISSIPPI RIVER BASIN**  
**MISSISSIPPI RIVER 900.4**  
State: **Tennessee** County: **Lake**  
Latitude: **36deg. 26min. 54sec. N** Longitude: **89deg. 28min. 42sec. W**  
Hydrologic Unit Code (HUC): **08010100**  
Station Type Indicator Description: **Surface Water**  
Legacy STORET Station Type: **/TYPA/AMBNT/STREAM**

---

Start Date: **12-17-1992** Start Time: **1118**  
End Date: End Time: **0**  
Sample Depth: **6.56 feet** Effluent Monitoring Code:  
UMK: Replicate Number:  
Composite Method Code: Pipe ID:  
Composite/Grab Number:  
Primary/Secondary Activity Category:

---

Parameter Code	Parameter Long Name	Result Value	Remark Code	Composite Statistic Code
<b>00002</b>	<b>X-SEC. LOC., HORIZ (% FROM R BANK LOOK UPSTR.)</b>	<b>10.00</b>		<b>A</b>
<b>00010</b>	<b>TEMPERATURE, WATER (DEGREES CENTIGRADE)</b>	<b>6.39</b>		<b>A</b>
<b>00090</b>	<b>OXIDATION REDUCTION POTENTIAL (MILLIVOLTS)</b>	<b>619.00</b>		<b>A</b>
<b>00094</b>	<b>SPECIFIC CONDUCTANCE, FIELD (UMHOS/CM @ 25C)</b>	<b>443.00</b>		<b>A</b>
<b>00300</b>	<b>OXYGEN, DISSOLVED MG/L</b>	<b>9.78</b>		<b>A</b>
<b>00301</b>	<b>OXYGEN, DISSOLVED, PERCENT OF SATURATION</b>	<b>78.24</b>	<b>\$</b>	<b>A</b>
<b>00400</b>	<b>PH (STANDARD UNITS)</b>	<b>7.77</b>		<b>A</b>

---



---

## STORET LDC - Detailed Data Report

---

Organization Code: **131TVAC** Organization Name: **TENN VALLEY AUTHORITY**  
Station ID: **477505** Station Alias:  
Station Name: **SLAB FILL CHUTE**  
**MISSISSIPPI RIVER BASIN**  
**MISSISSIPPI RIVER 900.4**  
State: **Tennessee** County: **Lake**  
Latitude: **36deg. 26min. 54sec. N** Longitude: **89deg. 28min. 42sec. W**  
Hydrologic Unit Code (HUC): **08010100**  
Station Type Indicator Description: **Surface Water**  
Legacy STORET Station Type: **/TYPA/AMBNT/STREAM**

---

Start Date: **12-17-1992** Start Time: **1121**  
End Date: End Time: **0**  
Sample Depth: **11.81 feet** Effluent Monitoring Code:  
UMK: Replicate Number:  
Composite Method Code: Pipe ID:  
Composite/Grab Number:  
Primary/Secondary Activity Category:

---

Parameter Code	Parameter Long Name	Result Value	Remark Code	Composite Statistic Code
<b>00002</b>	<b>X-SEC. LOC., HORIZ (% FROM R BANK LOOK UPSTR.)</b>	<b>10.00</b>		<b>A</b>
<b>00010</b>	<b>TEMPERATURE, WATER (DEGREES CENTIGRADE)</b>	<b>6.53</b>		<b>A</b>
<b>00090</b>	<b>OXIDATION REDUCTION POTENTIAL (MILLIVOLTS)</b>	<b>608.00</b>		<b>A</b>
<b>00094</b>	<b>SPECIFIC CONDUCTANCE, FIELD (UMHOS/CM @ 25C)</b>	<b>456.00</b>		<b>A</b>
<b>00300</b>	<b>OXYGEN, DISSOLVED MG/L</b>	<b>9.04</b>		<b>A</b>
<b>00301</b>	<b>OXYGEN, DISSOLVED, PERCENT OF SATURATION</b>	<b>74.0983</b>	<b>\$</b>	<b>A</b>
<b>00400</b>	<b>PH (STANDARD UNITS)</b>	<b>7.68</b>		<b>A</b>

---



















**Attachment 2**

**Reconnaissance Phase Sediment Study**

**DRAFT  
RECONNAISSANCE PHASE  
SEDIMENT STUDY FOR THE  
PROPOSED NORTHWESTERN  
TENNESSEE HARBOR PROJECT  
CATES LANDING, LAKE COUNTY, TENNESSEE  
USACE DELIVERY ORDER NO. W912EQ-F-0020**

**PREPARED FOR:  
U.S. ARMY CORPS OF ENGINEERS  
MEMPHIS DISTRICT  
MEMPHIS, TENNESSEE**

**PREPARED BY:  
HESS ENVIRONMENTAL SERVICES, INC.  
MEMPHIS, TENNESSEE  
HES PROJECT NO. 0610.T5**

**APRIL 7, 2004**

## TABLE OF CONTENTS

<b>Section</b>	<b>Page</b>
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
<b>2.0 SITE BACKGROUND INFORMATION.....</b>	<b>1</b>
<b>3.0 INITIAL SITE INSPECTION.....</b>	<b>1</b>
<b>4.0 SITE ACCESS MONITORING.....</b>	<b>2</b>
<b>5.0 FIELD INVESTIGATION.....</b>	<b>2</b>
<b>5.1 Subsurface Soil Investigation.....</b>	<b>2</b>
<b>5.1.1 Hollow Stem Auger Subsurface Soil Investigation.....</b>	<b>2</b>
<b>5.1.2 Field Subsurface Soil Investigation Soil Analyses</b>	
<b>Sample Collection .....</b>	<b>3</b>
<b>5.2 Soil Analytical Results.....</b>	<b>4</b>
<b>6.0 LABORATORY INFORMATION.....</b>	<b>4</b>
<b>6.1 Additional Analytical Information.....</b>	<b>5</b>
<b>7.0 HEALTH AND SAFETY.....</b>	<b>5</b>

## LIST OF APPENDICES

### APPENDIX

---

**APPENDIX A      CORRESPONDENCES**

**APPENDIX B      FIGURES**

**FIGURE 1      SUBJECT PROPERTY LOCATED ON A SELECTION OF  
                         DELORME 3-D TOPOQUADS TENNESSEE REGION 1**

**FIGURE 2      SITE MAP SHOWING APPROXIMATE LOCATION  
                         OF SOIL BORINGS**

**TABLE OF CONTENTS  
(CONTINUED)**

**LIST OF APPENDICES**

**APPENDIX**

---

<b>APPENDIX C</b>	<b>TABLE</b>
<b>APPENDIX D</b>	<b>COPY OF FIELD NOTEBOOK</b>
<b>APPENDIX E</b>	<b>SELECTED DIGITAL PHOTOGRAPHS</b>
<b>APPENDIX F</b>	<b>SOIL BORING LOGS</b>
<b>APPENDIX G</b>	<b>SOIL PHYSICAL PROPERTY REPORTS AND CHAIN OF CUSTODY DOCUMENTATION</b>
<b>APPENDIX H</b>	<b>SOIL ANALYTICAL REPORTS AND CHAIN OF CUSTODY DOCUMENTATION</b>
<b>APPENDIX I</b>	<b>SITE-SPECIFIC HEALTH AND SAFETY PLAN WITH SIGNATURE SHEET</b>

## **1.0 INTRODUCTION**

Hess Environmental Services, Inc. (HES), under a General Services Administration (GSA) Contractor (GSA Contract #GS 10F-0473N) agreement was contracted by the U.S. Army Corps of Engineers (USACE), Memphis District; to conduct a Sediment Study at the proposed site designated by the USACE as the Northwestern Tennessee Harbor Project (the Site) located at Cates Landing, Lake County, Tennessee. A copy of USACE Delivery Order No. W912EQ-04-F-0020 is presented in Appendix A. Figure 1 in Appendix B shows the location of the Site.

Upon the performance of the work proposed, it was understood that the objectives of the Sediment Study were to:

- Gather site specific data to be used to evaluate the project soils for potential environmental contamination;
- Gather site specific data to be used to evaluate the project soils for future USACE project planning; and
- Present work and analytical finding to the USACE.

Soil boring placements were originally selected in the field by USACE prior to the start of work. Later, after the start of work, these locations were offset due to access difficulties and unanticipated refusal and/or underground obstructions. The senior geologist from HES along with the consent of the onsite USACE representative made the appropriate changes to the soil boring locations in the field in an effort to achieve the investigation results.

The field investigation was conducted in general accordance with *United States Environmental Protection Agency, Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, May 1996, Revised in 1997 (US EPA SOP) and the previously submitted *Work, Quality Assurance, and Quality Control Plans for the Sediment Study for the Proposed Northwestern Tennessee Harbor Project* (Work Plan), created by HES dated January 9, 2004. Please see the Sampling and Analysis Plan (SAP) and the Quality Assurance Project Plan (QAPP) provided in the Work Plan Section.

## **2.0 SITE BACKGROUND INFORMATION**

Based on historical information provided by the USACE, the Site was previously used as an access barge channel connecting the former USACE Casting Facility (the Facility) located to the east of the Site to the Mississippi River. Over time and non-use, silting has occurred due to the work shutdown at the Facility. Currently, the Site is bordered on the north by wooded sand bars, on the west by the Mississippi River, to the south by farmland, and on the east by the remnants of the silted barge channel. Figure 2 shows the Site in some detail and is presented in Appendix B.

## **3.0 INITIAL SITE INSPECTION**

On December 2, 2003, a USACE Representative, Mr. Danny Ward, and HES' senior team members conducted a preliminary inspection of the Site. Site access, layout, logistics, and

potential safety hazards were identified. Based upon this initial site visit, the Work Plan by HES was prepared and submitted to the USACE on January 9, 2004.

Based on the initial site visit, the USACE representative at the site, using GPS instrumentation, located the proposed locations of the soil borings. The coordinates of each soil boring were as follows:

<u>Boring Designation</u>	<u>X-Coordinates</u>	<u>Y-Coordinates</u>
SB-01	-89.47935528950	36.44761853170
SB-02	-89.48230658020	36.44989318500
SB-03	-89.48514269860	36.45265732070
SB-04	No coordinates selected during this event.	

#### **4.0 SITE ACCESS MONITORING**

After receiving the USACE Delivery Order in January 2004, HES began monitoring the Mississippi River Stages to monitor site accessibility. High water in the Mississippi River would require barge access; low water height would require a standard truck mounted drill rig. After a month of monitoring and contractor delays in obtaining a serviceable drilling barge, it became clear that site access by barge was not feasible in January. However, a dry land window of opportunity in the Mississippi River Stages developed at the site in late February. With the consent of the USACE representative, the drilling operation was changed from drilling from barge access to land drilling with a truck rig. The field operation was then scheduled to begin on February 3, 2004.

#### **5.0 FIELD INVESTIGATION**

##### **5.1 Subsurface Soil Investigation**

To perform the operation of obtaining soil samples at the site, Tri-State Testing Services, Inc. (Tri-State) (a USACE approved and listed contractor) of Memphis, Tennessee was utilized as the drilling subcontractor.

Between February 2 and 5, 2004, the Site subsurface soil investigation at the site was conducted.

##### **5.1.1 Hollow Stem Auger Subsurface Soil Investigation**

For this investigation, a total of four (4) hollow stem auger soil borings (see Figure 2, SB-01 through SB-04) were advanced within the proposed harbor area. Soil Borings SB-01 and SB-04 were each advanced to an approximate depth of 20 feet below the Ground Surface (BGS). Soil boring SB-02 was advanced to an approximate depth of nine (9) feet BGS at which point the soil boring bottomed out on a hard surface such as rock or concrete. Soil boring SB-03 was advanced to an approximate depth of six (6) feet BGS at which point this soil boring bottomed out on either rock or a concrete surface.

Due to major obstacles, trees, slopes, and soft surface soil conditions, the soil borings were

repositioned and were re-located by the USACE representative using GPS instrumentation on February 3, 2004. The coordinates of each soil boring are as follows:

<u>Boring Designation</u>	<u>X-Coordinates</u>	<u>Y-Coordinates</u>
SB-01	-89.47946	36.44737
SB-02	-89.48150	36.44864
SB-03	-89.48322	36.45031
SB-04	-89.47946	36.44737 (50 feet southwest SB-01)
Surface Sample	-89.47946	36.44737 (in the vicinity of SB-04)

Continuous core samples were collected, while advancing the hollow stem augers, utilizing a two (2) inch nominal diameter stainless steel split spoon sampler. During this collection process, each of the soil borings was characterized, logged based on the visual interpretation of soil properties and correspondingly each soil sample collected in the process was screened in the field for environmental and geotechnical considerations.

The continuous core soil samples were screened utilizing a HNU® Photo-Ionization Detector (PID) to select field headspace test samples and to determine the potential presence of Volatile Organic Compounds (VOCs). All of the field headspace test readings were less than one part per million by volume (< 1.0 ppmv). The PID was calibrated upwind of the work area using a 100 parts per million by volume (ppmv) toluene standard calibration gas.

Soil data was recorded in the field notebook that included soil classification descriptions (utilizing the ASTM's Unified Soil Classification System), headspace PID readings, and equipment calibration data, a digital photographic record was kept for representative samples, and a set of standard TDEC boring logs were later prepared for each soil boring. Tabulated data is presented in Appendix C. A copy of the field notebook is presented in Appendix D, selected digital photographs are presented in Appendix E, and a copy set of the soil boring logs is presented in Appendix F.

### **5.1.2 Field Subsurface Soil Investigation Soil Analyses Sample Collection**

HES composited three (3) separate soil samples from the continuous soil samples collected from soil borings SB-01, SB-02, and SB-03. A surface sample was also collected in the vicinity of a fourth soil boring, SB-04. The continuous core samples from the fourth soil boring were divided into three (3) equidistant composited soil samples. Due to the low volume of the soil collected for the composite sample at soil boring SB-04, a duplicate sample was collected with the surface soil sample. A total of eight (8) geotechnical and environmental composite soil samples were collected during this process.

The geotechnical composite soil samples were collected for physical property analyses for particle size analyses by ASTM D-422 and D-1140 Methods. Each of these soil samples were placed in to a one (1) quart Ziploc® bag, sealed, labeled, then placed in a sample cooler on wet-ice at less than four (4) degrees Celsius for preservation. The samples were then transported to Tri-State Testing of Memphis, Tennessee (geotech laboratory), under chain of custody protocols. The soil physical

property chain of custody documentation is presented in Appendix G.

The environmental composite soil samples were collected for analyses for Total Organic Content (TOC) by EPA Method 9060, Poly-Aromatic Hydrocarbons (PAHs) by EPA Method 8270C, Pesticides by EPA Method 8081, Herbicides by EPA Method 8151A, PCBs by EPA Method 8082 (by Aroclor Method), 22 Metals TAL, and Total Petroleum Hydrocarbons (TPH) by EPA Method 8015B. Each sample was placed into a nine (9)-ounce glass container, sealed, labeled, and placed in a sample cooler on wet-ice at less than four (4) degrees Celsius for preservation. The samples were transported to A&L Laboratories, Inc. (A&L) (NELAC Certificate No. 03033) in Memphis, Tennessee under chain of custody protocols. The A&L soil analytical chain of custody documentation is presented in Appendix H.

## **5.2 Soil Analytical Results**

The soil physical property reports and chain of custody documentation are presented in Appendix G.

The environmental composite soil samples analytical reports and chain of custody documentation are presented in Appendix H. The environmental composite soil samples analytical results are summarized in Table 1 and are presented in Appendix C.

As a part of the Scope of Work, the USACE requested soil analysis for PCBs by EPA Method 8082 (Congeners Specific). Due to a misunderstanding by HES, a different PCB analysis method was performed on these soil samples.

To correct this misunderstanding, a complete set of the reserve composite soil samples from the site was submitted and analyzed by Seven Trent Laboratories, Inc. (STL) in Knoxville, Tennessee, a USACE approved and listed environmental laboratory. At STL, reserve amounts of the original samples were analyzed for PCBs by EPA Method 8082 (Congeners Specific). Prior to sending samples to STL, HES, STL, and the USACE representative agreed upon the extent of the Congers Analyte List.

The reserve composite soil samples were kept at A&L at less than four (4) degrees Celsius for preservation in their sample temperature controlled refrigerator under chain of custody protocols. After HES received the samples from A&L, they were repackaged, placed in a cooler on wet-ice, and sealed for shipment to STL. A HES chain of custody was prepared for this sample set.

These environmental composite soil samples analytical reports and chain of custody documentation are also presented in Appendix H. The environmental composite soil samples analytical results are also summarized in Table 1 and are presented in Appendix C.

## **6.0 LABORATORY INFORMATION**

HES submitted physical property composite soil samples for soil particle size analyses to:

Tri-State Testing Services, Inc. (USACE Approved and Listed)  
6756 Buckles Cove  
Memphis, Tennessee 38133  
Telephone No. – (901) 385-1199  
Fax No. – (901) 386-6614

HES submitted environmental composite soil samples for chemical analyses to:

A&L Analytical Laboratories, Inc. (A&L) (NELAC Certificate No. 03033)  
2790 Whitten Road  
Memphis, Tennessee 38133  
Telephone No. - (800) 264-4522 or (901) 213-2400  
Fax No. - (901) 213-2440

HES submitted PCB environmental composite soil samples for chemical analysis to:

Seven Trent Laboratories, Inc. (STL Knoxville) (USACE Approved and Listed)  
5815 Middlebrook Pike  
Knoxville, Tennessee 37921  
Telephone No. - (865) 291-3000  
Fax No. - (865) 584-4315

## **6.1 Additional Analytical Information**

In the discussions with the various laboratories concerning PCBs holding times, it was conveyed to HES that the holding time for the PCB samples was one (1) year. STL reports that the holding time the PCB soil samples analyzed by US EPA Method 8082 (Congeners Specific) was two (2) weeks and has flagged their analytical results accordingly. In later telephone discussions, STL stated that the one (1) year holding time was for the US EPA Method 1668A.

In discussions with the USACE representative, it was determined that at some point in the near future the USACE might need to evaluate the TAL Metals concentrations in the soil as a waste disposal issue rather than as a Total Metals issue. Sufficient reserve composite soil samples remain stored at A&L to perform a full analysis of Toxicity Characteristic Leaching Procedure (TCLP) (as per US EPA Method 1311). Afterward, TAL Metals analyses may be completed. The holding time for the reserve samples is six (6) months from the time of sampling. Holding time for the reserve composite soil samples will expire first week of August 2004.

No additional information is available at this time.

## **7.0 HEALTH AND SAFETY**

Site health and safety was conducted and documented in general accordance with the Site-Specific Health and Safety Plan (HASP) for the project as per OSHA 29 CFR 1910.120 requirement. A site health and safety meeting was conducted at the beginning of each days work. A copy of the

HASP and signature sheet is presented in Appendix I.

## **APPENDICES**

**APPENDIX A**

**CORRESPONDENCES**

**Robert Langford**

---

**From:** Joyner, Verneda B MVM [Verneda.B.Joyner@mvm02.usace.army.mil]  
**Sent:** Thursday, December 18, 2003 12:02 PM  
**To:** 'garys@hessenv.com'; 'robertl@hessenv.com'  
**Cc:** Ward, Daniel D MVM; Lloyd, James W MVM  
**Subject:** W912-04-F-0020;NW TN Harbor Sediment Study  
**Importance:** High

Good Afternoon Gentlemen,

Attached is subject delivery order. If there are questions, please do not hesitate to contact the undersigned.

Mr. Siebenschah, all work is to be in strict accordance with the Scope of Work (previously provided). For you convenience, I am including another copy of the Scope of Work. The points of contact are as stated in the Scope of Work.

Thank you for all of your help.

VERNEDA B. JOYNER  
(901)544-3616  
FAX (901)544-3710

<<04-F-0020;NW TN Harbor Sediment Study.pdf>>

<<Sediment Samples Scope of Work.doc>>



Section B - Supplies or Services and Prices

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0001		1	Lump Sum	\$21,258.60	\$21,258.60

NW TN HARBOR SEDIMENT STUDY:

THE CONTRACTOR SHALL PROVIDE ALL LABOR AND MATERIAL REQUIRED TO PERFORM THE WORK IN STRICT ACCORDANCE WITH THE ATTACHED "SCOPE OF WORK".

---

				NET AMT	\$21,258.60
	ACRN AB Funded Amount				\$21,258.60

Section F - Deliveries or Performance

DELIVERY INFORMATION

CLIN	DELIVERY DATE	QUANTITY	SHIP TO ADDRESS	UIC
0001	SEE "SCOPE OF WORK"	1	N/A	

## Section G - Contract Administration Data

## ACCOUNTING AND APPROPRIATION DATA

AB: 96X88620000 082411 3230J52LFC150101 NA 96401  
COST 000000000000  
CODE:  
AMOUNT: \$21,258.60

## CLAUSES INCORPORATED BY FULL TEXT

## 252.232-7003 ELECTRONIC SUBMISSION OF PAYMENT REQUESTS (MAR 2003)

(a) Definitions. As used in this clause--

(1) Contract financing payment and invoice payment have the meanings given in section 32.001 of the Federal Acquisition Regulation.

(2) Electronic form means any automated system that transmits information electronically from the initiating system to all affected systems. Facsimile, e-mail, and scanned documents are not acceptable electronic forms.

(3) Payment request means any request for contract financing payment or invoice payment submitted by the Contractor under this contract.

(b) Except as provided in paragraph (c) of this clause, the Contractor shall submit payment requests using one of the following electronic forms:

(1) Wide Area WorkFlow-Receipt and Acceptance (WAWF-RA). Information regarding WAWF-RA is available on the Internet at <https://rmb.ogden.disa.mil>.

(2) Web Invoicing System (WInS). Information regarding WInS is available on the Internet at <https://ecweb.dfas.mil>.

(3) American National Standards Institute (ANSI) X.12 electronic data interchange (EDI) formats.

(i) Information regarding EDI formats is available on the Internet at <http://www.X12.org>.

(ii) EDI implementation guides are available on the Internet at <http://www.dfas.mil/ecedi>.

(4) Another electronic form authorized by the Contracting Officer.

(c) If the Contractor is unable to submit a payment request in electronic form, or DoD is unable to receive a payment request in electronic form, the Contractor shall submit the payment request using a method mutually agreed to by the Contractor, the Contracting Officer, and the payment office.

(d) In addition to the requirements of this clause, the Contractor shall meet the requirements of the appropriate payment clauses in this contract when submitting payments requests.

(End of clause)



**Scope of Work Sediment Analysis  
Northwest Tennessee Harbor, Lake County, Tennessee**

1. **General Statement of Services:** The Contractor shall provide all personnel required to perform work as described below. The contractor shall conduct sediment samples from the proposed harbor site located behind the lateral dike at Mississippi River Mile 900. All tests conducted will be recorded and results furnished to the Memphis District. Equipment will most likely include core samplers mounted on a boat/vessel for samples taken in open water and core samplers mounted on a suitable vehicle for any shallow water/terrestrial samples. Borings will be made in such a way as to ensure that contamination will not be introduced into the sample.
2. **Background and Location:** The U.S. Army Corps of Engineers, Memphis District is conducting a study to determine if it is feasible to construct a harbor at Cates Landing, Mississippi River Mile 900, Lake County, Tennessee. Sediment analysis is required to determine the likelihood of encountering contaminated sediments during construction.
3. **Staffing Requirements:** A qualified individual is required to act as principal investigator and/or supervise the sampling effort. Appropriate academic, scientific, and working knowledge specific to contaminated sediments and sediment sampling is required.
4. **Field Methodology:** Sediment samples will be taken by obtaining a core sample, below the water, to the maximum proposed excavation depth within the proposed navigation channel. This would most likely require the use of a barge and or pontoon. At a minimum, three core samples will be taken in the last 3000 feet (area of highest amount of proposed dredging) of the proposed navigation channel. Samples will be taken in such a way as to ensure that contaminants would not be introduced into the sample. Sample locations will be determined at the site with Corps environmental staff. Sample locations will be recorded by a Global Positioning System (GPS). A composite of each individual core sample will be made by mixing the entire core and obtaining a sample. The composite sample will be preserved accordingly. At a minimum, one additional core will be made and a sample shall be collected at the surface, over dredged depth (20 – foot maximum proposed depth), and three equidistant lengths between the surface and over dredged depth. Each sample shall be preserved accordingly. Therefore, at a minimum, a total of eight samples shall be taken. **Appropriate techniques shall be followed throughout sampling to ensure that contamination is not introduced.**
5. **Lab Analysis:** At a minimum, each sample will be analyzed for grain size, total organic carbon (TOC), polynuclear aromatic hydrocarbons (PAH), PCB (congener-specific method), Pesticides/Herbicides, metals (TAL), and total petroleum hydrocarbons by an approved EPA method. Analysis will be conducted at an accredited lab. At a minimum, accreditation will include the National Environmental Laboratory Accreditation (NELAP/NELAC).

6. **Reporting Requirements:** Refer also to “schedule and deliverables” section below. A field journal of daily activities shall be maintained by the principal investigator. Results of the lab analysis will be furnished to the Memphis District as soon as possible. A report (Microsoft Word format) will be furnished that describe the sampling protocol, lab analysis, and lab results. Photographs of sediment sampling should be included.

7. **Schedule and Deliverables:**

<u>Activity/Deliverable</u>	<u>Schedule</u>
QA/QC Plan	5 days after Notice to Proceed
Start Field Work	10 days after Notice to Proceed
Initial draft report 3 hard copies 1 electronic copy on CD (Adobe Acrobat Format)	10 days after completion of lab analysis
Corps review of draft report	estimated 5 days duration
Final draft report	10 days after receipt of Corps comments
Corps review of final report	5 days duration upon receipt
Final report 6 hard copies 3 electronic copies on CD	15 days after Corps comments
All field notes, photos, etc.	Concurrent with final report.

8. **Meetings:** To the extent possible, coordination will be done by telephone as needed. Site visits may be arranged for environmental staff and interagency team members while sampling is being conducted. The contractor may have to attend a pre-sampling meeting and present findings with Corps and or interagency personnel. Meeting locations could be at the harbor site, Dyersburg, Tennessee; Jackson, Tennessee; Memphis, Tennessee; or Nashville, Tennessee.

9. **Technical Point of Contact:** Please contact Danny Ward at (901) 544-0709 or [daniel.d.ward@mvm02.usace.army.mil](mailto:daniel.d.ward@mvm02.usace.army.mil) for any additional information including site maps, aerial photographs, and conducting site visits to the location.

## **APPENDIX B**

### **FIGURES**

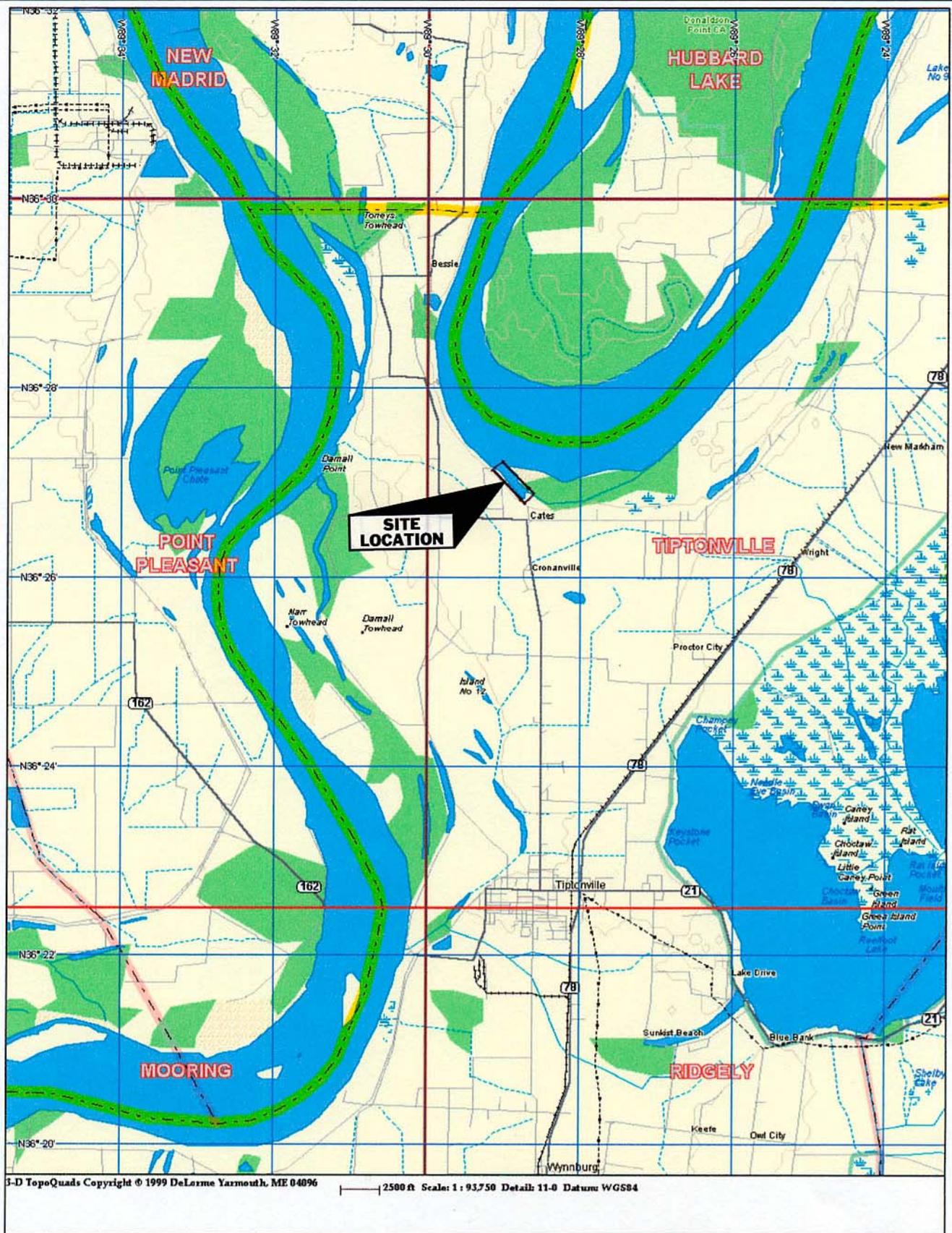
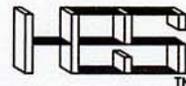


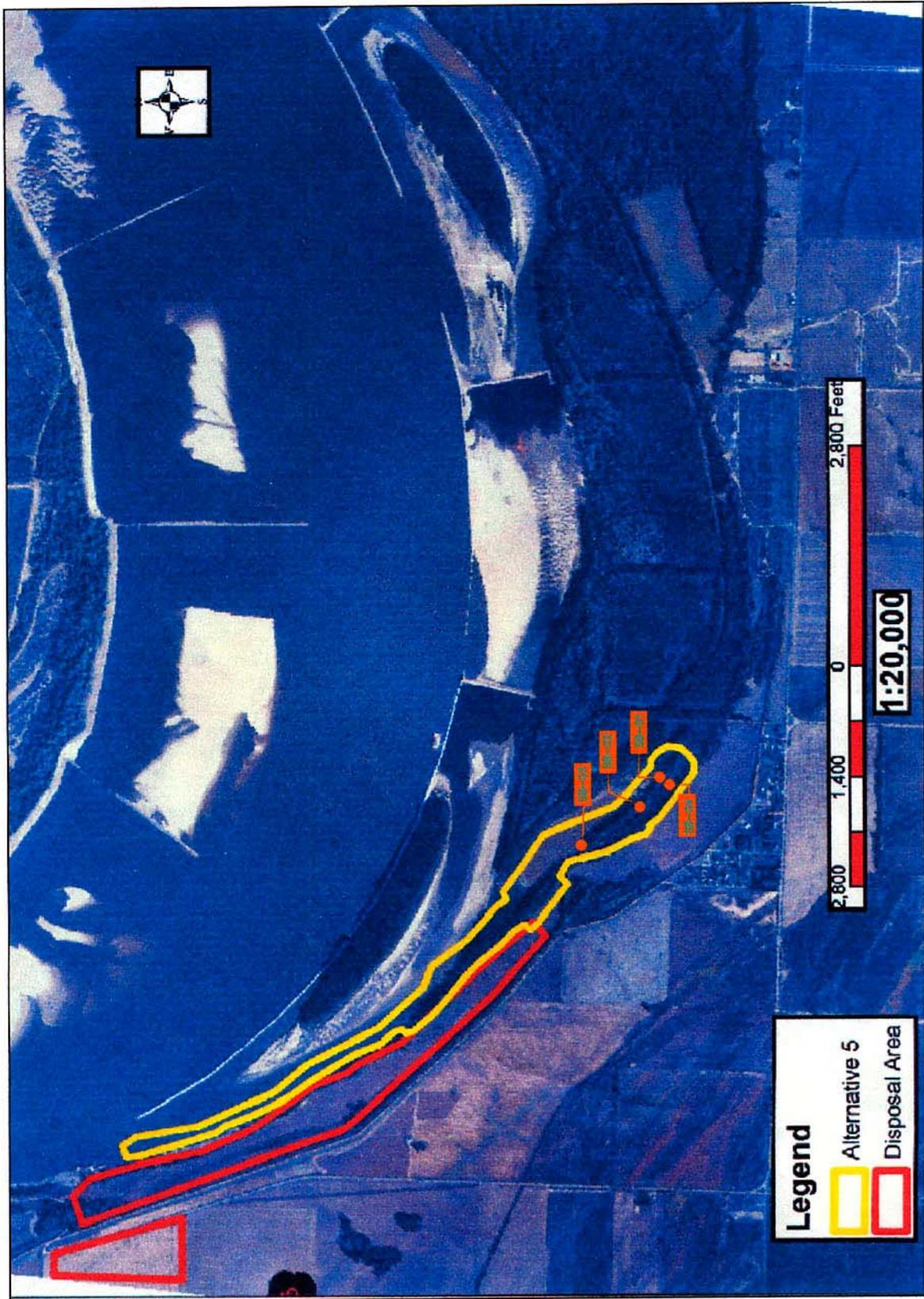
FIGURE: 1  
 TITLE: SUBJECT PROPERTY LOCATED ON A SELECTION  
 OF DELORME 3-D TOPOQUADS  
 TENNESSEE REGION 1

SUBJECT: PROPOSED NORTHWESTERN TENNESSEE HARBOR PROJECT  
 CATES LANDING, LAKE COUNTY, TENNESSEE  
 USACE P.R. #W38XGR-3276-0640



HESS ENVIRONMENTAL SERVICES, INC.  
 MEMPHIS, TENNESSEE

SCALE: SEE ABOVE	CHECKED BY <i>[Signature]</i>	DRAWN BY: DS
DATE: 1/5/05		NUMBER: 0610-40
PROJECT NO. 0610.T5		TRACKING NO. 2840-04



● = Soil Boring Locations

FIGURE: 2  
 TITLE: SITE MAP SHOWING APPROXIMATE LOCATION OF SOIL BORINGS  
 SUBJECT: PROPOSED NORTHWESTERN TENNESSEE HARBOR PROJECT  
 CATES LANDING, LAKE COUNTY, TENNESSEE  
 USACE P.R. #W38XGR-3276-0640

 HESS ENVIRONMENTAL SERVICES, INC. MEMPHIS, TENNESSEE		
SCALE: SEE ABOVE	CHECKED BY <i>[Signature]</i>	DRAWN BY: DS
DATE: 1/5/04	PROJECT NUMBER: 0610.T5	LOG NUMBER: 2891-04
		DRAWING NUMBER: 0610-047

**APPENDIX C**

**TABLE**

**TABLE 1  
SOIL ANALYTICAL DATA SUMMARY**

NORTHWESTERN TENNESSEE HARBOR PROJECT  
CATES LANDING, LAKE COUNTY, TENNESSEE  
USACE DELIVERY ORDER #W912EQ-04-F-0020

Parameters, Units	Borehole Designation		SB-01 0 to 20 feet	SB-02 0 to 9 feet	SB-03 0 to 6 feet	SB-04 9 to 10.5 feet	SB-04 14 to 16 feet	SB-04 18 to 20 feet	Surface Sample 0 to 0.5 feet	Surface Sample 020304-RL-S001	Surface Sample (QA/QC DUPLICATE)
	Sample Interval	Sample Designation									
PID Reading, ppmv	SW 846 Method	020404-RL-S002	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
<b>Total Organic Carbon (TOC)</b>											
Carbon (TOC), %	Walkley-Black		2.4	2.3	2.1	1.6	2.1	1.6	1.9	2.0	2.0
<b>Metals</b>											
Total Aluminum, mg/Kg	SW-6010B		12,879.430	13,193.321	12,300.717	14,102.810	12,753.252	11,443.907	10,215.766	13,351.184	
Total Antimony, mg/Kg	SW-6010B		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	
Total Arsenic, mg/Kg	SW-6010B		5.328	< 5	5.549	5.740	6.168	5.960	5.058	5.884	
Total Barium, mg/Kg	SW-6010B		125.576	134.413	144.791	140.003	145.925	155.582	134.636	122.376	
Total Beryllium, mg/Kg	SW-6010B		0.619	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.569	
Total Cadmium, mg/Kg	SW-6010B		< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	
Total Calcium, mg/Kg	SW-6010B		3,843.370	4,705.147	7,329.056	4,619.809	3,138.128	2,840.392	5,115.396	3,529.560	
Total Chromium, mg/Kg	SW-6010B		15.413	16.915	19.527	18.319	19.117	21.826	17.642	14.656	
Total Cobalt, mg/Kg	SW-6010B		9.748	8.109	8.427	8.304	9.509	10.362	8.376	9.085	
Total Copper, mg/Kg	SW-6010B		15.624	15.549	18.994	17.013	17.378	20.017	17.969	15.319	
Total Iron, mg/Kg	SW-6010B		23,341.625	26,482.698	25,239.388	26,711.877	26,090.854	23,566.696	22,963.657	22,580.609	
Total Lead, mg/Kg	SW-6010B		16.163	17.439	20.567	21.822	21.375	24.133	21.976	15.539	
Total Magnesium, mg/Kg	SW-6010B		3,084.9	3,127.6	4,451.0	3,201.1	2,821.0	2,620.2	3,284.8	2,890.6	
Total Manganese, mg/Kg	SW-6010B		859.073	1,329.662	903.213	766.733	796.591	864.041	664.753	905.155	
Total Mercury, mg/Kg	SW-7471		0.0550	0.1210	0.1390	0.0880	0.1200	0.1500	0.1300	0.0540	
Total Nickel, mg/Kg	SW-6010B		20.412	17.909	19.688	17.816	21.010	23.504	18.652	18.637	
Total Potassium, mg/Kg	SW-6010B		1,340.4	1,321.4	1,317.6	1,221.2	1,229.8	1,186.1	1,043.9	1,271.0	
Total Selenium, mg/Kg	SW-6010B		< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	
Total Silver, mg/Kg	SW-6010B		< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	
Total Sodium, mg/Kg	SW-6010B		176.285	183.319	184.580	192.062	199.000	181.729	186.323	168.865	
Total Thallium, mg/Kg	SW-6010B		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	
Total Vanadium, mg/Kg	SW-6010B		24.860	27.433	26.439	28.003	27.569	24.546	22.177	25.485	
Total Zinc, mg/Kg	SW-6010B		79.204	74.077	92.400	85.561	92.071	108.740	88.670	75.922	

**NOTES:**

< = Less Than  
SB-01 = Soil Boring Number 1  
ppmv = Parts per million by volume  
mg/Kg = Milligrams per Kilogram or parts per million(ppm)

HNU = Brand Name  
PID = Photo-ionization Detector  
QA = Quality Assurance  
QC = Quality Control

**TABLE 1 - CONTINUED -  
SOIL ANALYTICAL DATA SUMMARY**

NORTHWESTERN TENNESSEE HARBOR PROJECT  
CATES LANDING, LAKE COUNTY, TENNESSEE  
USACE DELIVERY ORDER #W912EQ-04-F-0020

Parameters, Units	Borehole Designation Sample Interval	SB-01 0 to 20 feet	SB-02 0 to 9 feet	SB-03 0 to 6 feet	SB-04 9 to 10.5 feet	SB-04 14 to 16 feet	SB-04 18 to 20 feet	Surface Sample 0 to 0.5 feet	Surface Sample (QA/QC DUPLICATE)
	Sample Designation SW 846 Method	020404-RL-S002	020404-RL-S003	020404-RL-S004	020404-RL-S005	020404-RL-S006	020404-RL-S007	020304-RL-S001	020304-RL-S009
<b>Total Petroleum Hydrocarbons (TPH)</b>									
TN-GRO, mg/Kg	SW-8015B (GRO)	< 15.4	< 14.7	< 14.3	< 13.9	< 14.1	< 13.0	< 14.7	< 15.2
TN-EPH, mg/Kg	SW-8015B (EPH)	56	100	86	101	62	43	128	22
TPH, mg/Kg	Sum (TN-GRO + EPH)	56	100	86	101	62	43	128	22
<b>Poly-Aromatic Hydrocarbons (PAHs)</b>									
Naphthalene, mg/Kg	SW 8270C	< 0.103	< 0.099	< 0.099	< 0.093	< 0.095	< 0.087	< 0.099	< 0.102
Acenaphthene, mg/Kg	SW 8270C	< 0.103	< 0.099	< 0.099	< 0.093	< 0.095	< 0.087	0.094	< 0.102
Fluorene, mg/Kg	SW 8270C	< 0.103	< 0.099	< 0.099	< 0.093	< 0.095	< 0.087	< 0.099	< 0.102
Fluoranthene, mg/Kg	SW 8270C	0.314	0.315	0.351	0.527	0.326	0.280	0.402	0.307
Anthracene, mg/Kg	SW 8270C	< 0.103	< 0.099	0.348	0.400	< 0.095	< 0.087	0.356	< 0.102
Phenanthrene, mg/Kg	SW 8270C	< 0.103	< 0.099	< 0.099	0.251	< 0.095	< 0.087	0.126	< 0.102
Pyrene, mg/Kg	SW 8270C	< 0.103	< 0.099	0.157	0.357	< 0.095	0.092	0.221	< 0.102
Chrysene, mg/Kg	SW 8270C	< 0.103	< 0.099	< 0.099	0.239	< 0.095	< 0.087	0.122	< 0.102
Benz(a)anthracene, mg/Kg	SW 8270C	< 0.103	< 0.099	< 0.099	0.207	< 0.095	< 0.087	0.154	< 0.102
Benzo(e)pyrene, mg/Kg	SW 8270C	< 0.103	< 0.099	< 0.099	< 0.093	< 0.095	< 0.087	< 0.099	< 0.102
Benzo(k)fluoranthene, mg/Kg	SW 8270C	< 0.103	< 0.099	< 0.099	0.139	< 0.095	< 0.087	< 0.099	< 0.102
Benzo(b)fluoranthene, mg/Kg	SW 8270C	< 0.103	< 0.099	< 0.099	0.225	< 0.095	< 0.087	< 0.099	< 0.102
Indeno(1,2,3-cd)pyrene, mg/Kg	SW 8270C	< 0.103	< 0.099	< 0.099	< 0.093	< 0.095	< 0.087	< 0.099	< 0.102
Dibenz(a,h)anthracene, mg/Kg	SW 8270C	< 0.103	< 0.099	< 0.099	< 0.093	< 0.095	< 0.087	< 0.099	< 0.102

NOTES:

< = Less Than  
 SB-01 = Soil Boring Number 1  
 mg/Kg = Milligrams per Kilogram or parts per million (ppm)

TN-GRO = Tennessee-Gasoline Range Organics  
 TN-EPH = Tennessee-Extractable Range Hydrocarbons  
 QA = Quality Assurance  
 QC = Quality Control

**TABLE 1 - CONTINUED -  
SOIL ANALYTICAL DATA SUMMARY**  
NORTHWESTERN TENNESSEE HARBOR PROJECT  
CATES LANDING, LAKE COUNTY, TENNESSEE  
USACE DELIVERY ORDER #W912EQ-04-F-0020

Parameters, Units	Borehole Designation	SB-01	SB-02	SB-03	SB-04	SB-04	SB-04	SB-04	SB-04	SB-04	Surface Sample	Surface Sample
	Sample Interval	0 to 20 feet	0 to 9 feet	0 to 6 feet	9 to 10.5 feet	14 to 16 feet	18 to 20 feet	0 to 0.5 feet	(QA/QC DUPLICATE)			
	Sample Designation	020404-RL-S002	020404-RL-S003	020404-RL-S004	020404-RL-S005	020404-RL-S006	020404-RL-S007	020304-RL-S001	020304-RL-S001	020304-RL-S001	020304-RL-S009	020304-RL-S009
	SW 846 Method											
<b>Organochlorine Pesticides</b>												
Aldrin, mg/Kg	8081A	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.002	< 0.003	< 0.003	< 0.003	< 0.003
Dieldrin, mg/Kg	8081A	< 0.003	< 0.003	< 0.003	0.004	0.007	0.003	0.005	0.003	0.003	0.003	< 0.003
Total Chlordane, mg/Kg	8081A	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.002	< 0.003	< 0.003	< 0.003	< 0.003
4',4'-DDT, mg/Kg	8081A	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.002	< 0.003	< 0.003	< 0.003	< 0.003
4',4'-DDD, mg/Kg	8081A	< 0.003	< 0.003	0.008	0.007	0.004	0.003	0.007	0.003	0.004	0.007	< 0.003
4',4'-DDE, mg/Kg	8081A	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	0.004	< 0.003	< 0.003	0.004	< 0.003
Endosulfan I, mg/Kg	8081A	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.002	< 0.003	< 0.003	< 0.002	< 0.003
Endosulfan II, mg/Kg	8081A	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.002	< 0.003	< 0.003	< 0.002	< 0.003
Alpha-BHC, mg/Kg	8081A	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.002	< 0.003	< 0.003	< 0.002	< 0.003
Beta-BHC, mg/Kg	8081A	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.002	< 0.003	< 0.003	< 0.002	< 0.003
Gamma-BHC, mg/Kg	8081A	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.002	< 0.003	< 0.003	< 0.002	< 0.003
Delta-BHC, mg/Kg	8081A	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.002	< 0.003	< 0.003	< 0.002	< 0.003
Toxaphene, mg/Kg	8081A	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.002	< 0.003	< 0.003	< 0.002	< 0.003
Endosulfan Sulfate, mg/Kg	8081A	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.002	< 0.003	< 0.003	< 0.002	< 0.003
Endrin, mg/Kg	8081A	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.002	< 0.003	< 0.003	< 0.002	< 0.003
Endrin Aldehyde, mg/Kg	8081A	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.002	< 0.003	< 0.003	< 0.002	< 0.003
Heptachlor, mg/Kg	8081A	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.002	< 0.003	< 0.003	< 0.002	< 0.003
Heptachlor Epoxide, mg/Kg	8081A	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.002	< 0.003	< 0.003	< 0.002	< 0.003

NOTES:  
 < = Less Than  
 SB-01 = Soil Boring Number 1  
 mg/Kg = Milligrams per Kilogram or parts per million(ppm)

QA = Quality Assurance  
 QC = Quality Control

**TABLE 1 - CONTINUED -  
SOIL ANALYTICAL DATA SUMMARY**

NORTHWESTERN TENNESSEE HARBOR PROJECT  
CATES LANDING, LAKE COUNTY, TENNESSEE  
USACE DELIVERY ORDER #W912EQ-04-F-0020

Parameters, Units	Borehole Designation	SB-01	SB-02	SB-03	SB-04	SB-04	SB-04	SB-04	SB-04	Surface Sample	Surface Sample
	Sample Interval	0 to 20 feet	0 to 9 feet	0 to 6 feet	9 to 10.5 feet	14 to 16 feet	18 to 20 feet	0 to 0.5 feet	0 to 0.5 feet	(QA/QC DUPLICATE)	
Sample Designation		020404-RL-S002	020404-RL-S003	020404-RL-S004	020404-RL-S005	020404-RL-S006	020404-RL-S007	020304-RL-S001	020304-RL-S009		
SW 846 Method											
<b>Chlorinated Herbicides by GC/ECD</b>											
2,4-D, mg/Kg	8151A	< 0.046	< 0.044	< 0.043	< 0.042	< 0.042	< 0.039	< 0.044	< 0.046		
2,4-DB, mg/Kg	8151A	< 0.031	< 0.029	< 0.029	< 0.028	< 0.028	< 0.026	< 0.029	< 0.03		
2,4,5-TP (Silvex), mg/Kg	8151A	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002		
2,4,5-T, mg/Kg	8151A	< 0.008	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.008		
Dalapon, mg/Kg	8151A	< 0.092	< 0.088	< 0.086	< 0.083	< 0.085	< 0.078	< 0.088	< 0.091		
Dicamba, mg/Kg	8151A	< 0.031	< 0.029	< 0.029	< 0.028	< 0.028	< 0.026	< 0.029	< 0.03		
Dichlorprop, mg/Kg	8151A	< 0.015	< 0.015	< 0.014	< 0.014	< 0.014	< 0.013	< 0.015	< 0.015		
Dinoseb, mg/Kg	8151A	< 0.023	< 0.022	< 0.022	< 0.021	< 0.021	< 0.02	< 0.022	< 0.023		
MCPA, mg/Kg	8151A	< 0.785	< 0.75	< 0.729	< 0.709	< 0.719	< 0.663	< 0.75	< 0.775		
MCPP, mg/Kg	8151A	< 1.54	< 1.47	< 1.43	< 1.39	< 1.41	< 1.30	< 1.47	< 1.52		
<b>Polychlorinated Biphenyls (PCBs) by Gas Chromatography</b>											
Aroclor 1016, mg/Kg	8082	< 0.054	< 0.052	< 0.050	< 0.048	< 0.049	< 0.053	< 0.052	< 0.053		
Aroclor 1221, mg/Kg	8082	< 0.054	< 0.052	< 0.050	< 0.048	< 0.049	< 0.053	< 0.052	< 0.053		
Aroclor 1232, mg/Kg	8082	< 0.054	< 0.052	< 0.050	< 0.048	< 0.049	< 0.053	< 0.052	< 0.053		
Aroclor 1242, mg/Kg	8082	< 0.054	< 0.052	< 0.050	< 0.048	< 0.049	< 0.053	< 0.052	< 0.053		
Aroclor 1248, mg/Kg	8082	< 0.054	< 0.052	< 0.050	< 0.048	< 0.049	< 0.053	< 0.052	< 0.053		
Aroclor 1254, mg/Kg	8082	< 0.054	< 0.052	< 0.050	0.073	0.083	0.078	< 0.052	0.078		
Aroclor 1260, mg/Kg	8082	< 0.054	< 0.052	< 0.050	< 0.048	< 0.049	< 0.053	< 0.052	< 0.053		

**NOTES:**

< = Less Than

SB-01 = Soil Boring Number 1

mg/Kg = Milligrams per Kilogram or parts per million(ppm)

QA = Quality Assurance

QC = Quality Control

**TABLE 1 - CONTINUED -  
SOIL ANALYTICAL DATA SUMMARY**  
NORTHWESTERN TENNESSEE HARBOR PROJECT  
CATES LANDING, LAKE COUNTY, TENNESSEE  
USACE DELIVERY ORDER #W912EQ-04-F-0020

Parameters, Units	Borehole Designation Sample Interval	SB-01 0 to 20 feet	SB-02 0 to 9 feet	SB-03 0 to 6 feet	SB-04 9 to 10.5 feet	SB-04 14 to 16 feet	SB-04 18 to 20 feet	Surface Sample 0 to 0.5 feet	Surface Sample (QA/QC DUPLICATE)
<b>Congeners Specific Polychlorinated Biphenyls (PCBs)</b>									
PCB 8 (BZ), ug/Kg	8082	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB 18 (BZ), ug/Kg	8082	5.6	<1.0	2.8	3.0	3.6	1.2	<1.0	<1.0
PCB 28 (BZ), ug/Kg	8082	12	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB 44 (BZ), ug/Kg	8082	9.6	<1.0	6.9	5.5	5.9	2.3	2.0	<1.0
PCB 49 (BZ), ug/Kg	8082	7.1	<1.0	5.1	4.1	4.6	1.9	1.7	<1.0
PCB 52 (BZ), ug/Kg	8082	11	<1.0	8.4	6.8	7.0	2.8	2.7	<1.0
PCB 66 (BZ), ug/Kg	8082	9.8	<1.0	8.1	6.3	6.6	3.7	5.4	<1.0
PCB 77 (BZ), ug/Kg	8082	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	<1.0
PCB 87 (BZ), ug/Kg	8082	4.0	<1.0	3.4	3.0	2.8	1.6	2.1	<1.0
PCB 101 (BZ), ug/Kg	8082	12	1.0	12	8.8	9.5	4.6	5.9	<1.0
PCB 105 (BZ), ug/Kg	8082	3.4	<1.0	3.0	2.6	2.5	1.5	2.7	<1.0
PCB 118 (BZ), ug/Kg	8082	8.0	<1.0	6.8	5.9	5.9	3.5	5.0	<1.0
PCB 126 (BZ), ug/Kg	8082	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB 128 (BZ), ug/Kg	8082	2.1	<1.0	1.9	1.7	1.8	1.2	2.2	<1.0
PCB 138 (BZ), ug/Kg	8082	11	1.1	9.1	8.5	7.8	5.1	9.9	<1.0
PCB 153 (BZ), ug/Kg	8082	11	1.3	8.7	8.7	8.0	5.2	8.0	<1.0
PCB 156 (BZ), ug/Kg	8082	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB 169 (BZ), ug/Kg	8082	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB 170 (BZ), ug/Kg	8082	4.0	<1.0	3.2	3.4	2.9	1.8	3.4	<1.0
PCB 180 (BZ), ug/Kg	8082	8.0	<1.0	6.4	7.0	5.6	3.6	6.4	<1.0
PCB 183 (BZ), ug/Kg	8082	2.2	<1.0	1.7	1.9	1.5	<1.0	1.7	<1.0
PCB 184 (BZ), ug/Kg	8082	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB 187 (BZ), ug/Kg	8082	4.1	<1.0	3.3	3.6	3.0	1.6	2.9	<1.0
PCB 195 (BZ), ug/Kg	8082	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB 206 (BZ), ug/Kg	8082	1.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
PCB 209 (BZ), ug/Kg	8082	1.2	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0

NOTES:  
 < = Less Than  
 SB-01 = Soil Boring Number 1  
 ug/Kg = Micrograms per Kilogram or parts per billion(ppb)

QA = Quality Assurance  
 QC = Quality Control

**APPENDIX D**

**COPY OF  
FIELD NOTEBOOK**

"Rite in the Rain"<sup>®</sup>  
ALL-WEATHER WRITING PAPER



**FIELD**

All-Weather Notebook  
No. 351

0610

USACE
NORTHWESTERN TN Harbor Project
CATES Landing Lake County
TENNESSEE

4 5/8" x 7" - 48 Numbered Pages

5





0610.75 - START - 02-03-04

RR #W38VGR-3276-0640

Site: Proposed NW TN Harbor Project  
CATER LAUNDRY, Lake Co., TN  
USACE Delivery Order #W912EQ-04-0020

- Task:
- 1) Supervisor Drill Area
  - 2) Document Site Activities
  - 3) Collect Required Sample

Count # I HES

- A. Robert A. Langford (TR. Log #4320)  
Sample Signature: Robert A. Langford  
B. HES Vehicle Clou. Van  
TR Log # 14212  
C. HNU-AIA S#A01146  
D. Soil Sample Kit  
E. Digital Camera

- II TRI-STATE  
A. Driller: GLENN PAKER  
B. Helper: MARK CHEVALIER  
C. Helper: KARY PARMENTER  
D. Core Drill Bit  
E. Support Truck + TOWER  
TR Log # 163329

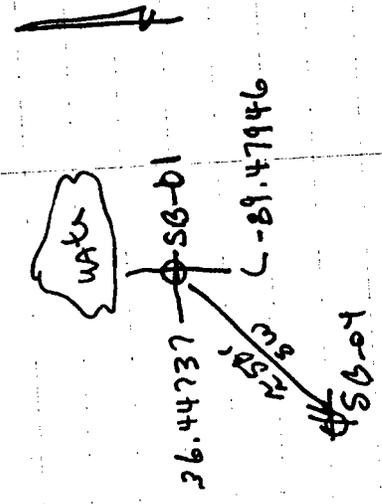
RM

0610.75 CWS 02-03-04

III USACE

- A. Kevin Pigott  
B. Vehicles (1010 NOT SEET)

Sketch Site Map:-



Coordinates provided by Mr. Pigott w/USACE



RM

0610.75

Cub

02-03-04

Weather conditions + HSTE note  
Time (hr)  
07:30

Moody Clear + ~~Geo~~ rising w/ W. SE wind 08:00  
HSTE note - Calibrated HNU PID to  
100 PMV TOBENS GAS Vok 08:15 -  
V/wind of maintenance  
same 08:30

08:30

08:35

09:00

~~(BWP)~~  
(BWP)

same -

0610.75

Cub

02-03-04

Roll notes:  
- Arrive north  
unload Drill rig.  
near Lpstone to get additional fuel.  
(IN MUD LIC #769)

TRI-STATE - Hollow STEAM Agon 658 00  
- Sample 2' Length - 1.8" ID  
- Conduct BRIS of TRI-STATE SAFETY MEETING  
- Signed in with SAFETY MAN SB-01

~~35202.9544~~ 36:44757 N  
~~890 55.8544~~ ~~2.00~~ 09.47946 W

2047 on 55'

0'-2' REC = 1' on 50'  
0.5' < 1.0

0'-2' ~~sample~~ (CL)  
Cup 3.144 clay moist soft

2.4' REC = 1' on 50'  
2.5' < 1.0

Lim same

- A Kasten 12.77 meter @ soil 6.25' location  
BWP

0610.75

Out

02-03-04

Time

(hr)

Weather Conditions + H2O Sat

09:00

09:05

09:10

09:15

AWP

02-03-04

Out

0610.75

56-D1 Cont.

Field notes cont.

Rec: 2' or 100%

4-6'

4.5' < 1.0

5.5' 1.0

4-6' - Same

6-8'

Rec.

2' or 100%

6.5' < 1.0

7.5' 1.0

6-8' - ~~Same~~ Greenish Grey Silty Clay  
with Fe

8-10'

Rec: 2' or 100%

8.5' < 1.0

9.5' 1.0

8-10' Same

10-12'

Rec: 2' or 100%

10.5' < 1.0

11.5' 1.0

10-12' Same

AWP

0610.75

Cut

02-03-04

Time

Weather Conditions & HSE Note

(hour)

09:20

09:25

Partly clear & cold w/ <sup>SE</sup> wind (100%)

- 09:30

09:40

09:48

02-03-04

Cut

0610.75

Field Meter Counts

56-01 Gnt.

12'-14' REC 1.0' (at 50%)

12.5' < 1.0

12'-14' Same Moist soft

14'-16'

REC 1.2"

14.5' < 1.0

14'-14.5'

- Same

14.5'-15'

Grav Sol (fine) moist soft

15'-15.5' Grav silty clay (co) w/ soft

particles moist soft

15.5'-16' Same

16'-18' REC = 2' (at 100%)

16.5' < 1.0

17.5' < 1.0

16'-18' Same

18'-20' REC = 2' (at 100%)

18.5' < 1

19.5' < 1

18'-20' Same

09:48

0610.75

cut

02-03-04

Weather Conditions + HSD in 10th

7mm

(HMS)

09:45

mostly clear + cold w/sw breeze - 10:00

10:15 -

called Bob to update him regarding  
stack drill logs. Agreed that  
he contact TRISTAC to get bills  
for Change Order.

-5Ame -

12:00

-5Ame -

13:00

Clear + cold w/v. lth sw breeze

14:30

PR

0610.75

cut

02-03-04

Fall note cuts

SB-01 cut

Component the Collected Samples

8 020304-AL-5001

- Drill log stack Driller number system

~~SB-04~~ PR

Surface Sample:

Plus Duplicate

10-6" 020304-AL-5002 + 020304-AL-5009

~~36.477437~~ N

~~89.479846~~ W

Brownish gray silty clay (CL), MIT SFT

walked down to SB-2 + 3 location.

w/Driller + USAEC Rep. To scope out

Trail for the Drill Rig. Reformed

SB-3 to 36.45031 Ad

-89.48322 W

+SB-2 to 36.44864 N

-89.48150 W

- Break for lunch

- Return from lunch

- Start by AUSTRIA Tow Equipment.

89.48150 N on site to AUSEN

Eq. Meets

PR

0610.TS

Out

02-03-04

Time

Went to Cond. y. 1125 + Miss's notes

16:45

17:15

Very cold w/ no wind = 17:30

17:45

CRP

0610.TS CUX 02-03-04

Field Notes Cont 5-

~~38~~

Track hole Arrived

- Pulled mud by force of the mud  
- Part of it on Dig ground

- WAD OUT Track hole

- LEFT Site

END Paper  
Parker

CRP

0610 TS - START - 02-0404

WACE P.R. #W3BXGR-3276-0640

Site: Proposed North Western TN Harbor Project

CATES Landing, LAKE COUNTY TN.

WACE Delivery Order #WPRZEQ-04-F-0020

Task: 1) Advance Soil borings + collect

Schedule Samples

2) Monitor HOTS for site

3) Supervise Drill Crew.

Geology: I. HES

A. Robert Longford (TN 01684320)  
Sample Syntinal/initials: Robert Longford RLP

B. HES Vehicle: Chev Waco

TN TAG # 64212

C. AND-PID s#AD1146

D. DIGITAL Camera (S-Eyed Lens)

E. Soil Sample Kist

II. Tai-STATE

A. Driller: Glenn Baker

B. Helper #1: Mark Chavaler

C. Helper #2: Gary PARMENTER

D. Support Truck w/Tools + Case running

TN TAG # 63329

END

02-0404

0610.75

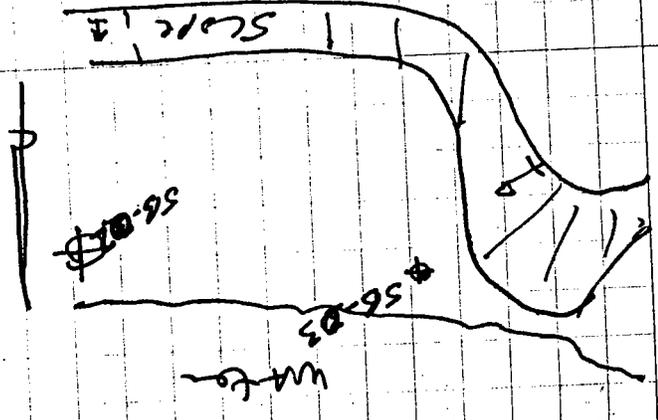
Geol

III. WACE

A. No. 1 & 2 combined

Sketches

SA-02: -89.48150, 36.44864  
SA-03: -89.48322, 36.45031



END

0610.75

Cut

020404

Weather Conditions & HSSE

Partly Cloudy and below freezing (around 20°F) 07:30

w/ light NW breeze

HSSE note - Cal: KHALA HNU-11A  
to happen tomorrow -  
upwind of work area

07:47

07:50

07:55

Partly Cloudy + below freezing  
w/ light NE breeze

08:00

08:05

(ANT)

0610.75

Cut

020404

Field Notes:

- Arrive onsite

Begin Drilling

50' SW of  
this point -

SA-04  
36.44734 N  
89.47964 W

08:11

Brownish gray silty clay  
MOIST FIRM

08:5' 2.10

09:06

REC = 0 (u.o.l.)

NO LOGGING

09:11

REC. 18" (u. 75%)

09:5' c.l.o

10:0' c.l.o

9-10.5' Brownish gray silty clay  
MOIST FIRM

10.5-11' No NE coverage

Stop 10.1 - 020404-11-S003

(ANT)

0610.75

Cut

020404

Time

Weather Conditions & HSGE Notes (hr)

08:07

08:10

08:10

08:15

BM

0610.75

Cut

020404

Field Notes Cont'd

50-04 Cont.

14'-16'

rec = 2' (at 100ft)

14.5' < 1.0

15.5' < 1.0

14'-16' Stone

020404 - 11-5004 = 34ypl 10

18'-20'

rec = 2' (at 100ft)

18.5' < 1.0

19.5' < 1.0

18'-20' - Gray silty clay w/ silt pieces  
MISS FIRM

020404 - 11-5005 = 34ypl 10

- hard & rocky -

BM

0610.75

Cuts

02-04-04

Time

(Ch)

Weather Conditions + HSE Notes

- 08:30

Partly Cloudy + below freezing w/ snow breeze 08:30

08:40

08:50

AMB

0610.75

Cuts

02-04-04

Field to the Cuts:-

50-02

- begin drilling -

0-2'

Rec = 0" (ca 0X)

21-4'

Rec = 2" (ca 50X)

2.5' < 0.0

21-3' Brownish gray silty clay (cc)

Finest

3-4' NA

41-6'

Rec = 0" (ca 0X)

- concrete observation will try to

Drill through it.

- Too tough

- Hard 2 8' exactly + drilled to 6' f

Not ground again

- mixed 15 N of 50-2 loc.

+ drilled to 6' oil

6-8'

Rec = 1.5'

5.5' < 1.0

7.0 < 1.5

61-7.5' SAND

AMB

0610.75 Curb 02-04-04

Time

Weather Conditions & HSE No. (hr)

Partly cloudy & below freezing. - 09:00  
w/ light SW breeze

09:15

09:15 -

Partly Cloud & below freezing w/ light SW breeze - 09:30

09:35

09:40

DPD

0610.75 Curb 02-04-04

Field Notes Curb: -

5A Dept.

8-10' REC = 1' (on 50-5)

8.5' < 1.0

8-9' Gray Silty Clay w/ silt  
matrix soft moist

9-10' NO recovery

40% Curc. MATAL 9'

020404-AL-S 006

End Survey Approx. 5:46  
020404-AL-S 006

- Setback to Start Drilling 5B-03

0-2' REC = 18" (on 75%)

0.5' < 1.0

1.0' < 1.0

0-1.5' Brownish Gray Silty Clay  
Firm moist

1.5-2' NR

2-4' REC = 2' (on 100%)

8.5' < 1.0

3.5' < 1.0

DPD

0610.75

Cut

02-04-04

Time

Weather Conditions + ASSE Notes (hrs)

09:45

09:55

Parity (wind) + Behaviour of LWS average 10:00

At 10:10 -

CRP

0610.75

Cut

02-04-04

Fell Notes Cut :-

50-03 Cut

2' to 4' Same

4'-6' SEE = 1' (250%)

4:5' ch0

4'-5' Same

5'-5.11 Cut 44-5 SAND (SP)

34 UNATED

5'-6' NO RECOVERY

6'-8' REPAIR @ 6" Concrete speed

- END - Copied 14 Sept 10  
020404-01-5007

I called Jimmy Ward w/ VACE

+ discussed Stephen Collett

+ the report @ 50.2+3.

He said good effort and that

what we have collected is ok for

their purpose for this phase.

CRP

**APPENDIX E**

**SELECTED  
DIGITAL PHOTOGRAPHS**



## **PHOTO GRAPH 001**

**SUBJECT:** Initial Phase of Drilling  
(This photo shows the drilling of initial soil interval,  
0 to 2 feet BGS, of Soil Boring SB-01.)

**SITE:** Proposed Northwestern Tennessee Harbor Project  
Cades Landing, Lake County, Tennessee

**DATE:** February 3, 2004

**Orientation:** Northerly

**PHOTOGRAPHER:** Robert A. Langford



**PHOTO GRAPH 002**

**SUBJECT:** Typical Split Spoon Soil Sample  
(This photo shows the continuous soil sample from the drilling interval,  
0 to 2 feet BGS, of Soil Boring SB-01.)

**SITE:** Proposed Northwestern Tennessee Harbor Project  
Cades Landing, Lake County, Tennessee

**DATE:** February 3, 2004 **Orientation:** Westerly

**PHOTOGRAPHER:** Robert A. Langford



### PHOTO GRAPH 003

**SUBJECT:** Typical Composited Soil Sample  
(This photo shows composited soil sample (ID #020304-RL-S001)  
that was prepared from the continuous soil interval, 0 to 20 feet BGS,  
of Soil Boring SB-01.)

**SITE:** Proposed Northwestern Tennessee Harbor Project  
Cades Landing, Lake County, Tennessee

**DATE:** February 3, 2004 **Orientation:** Easterly

**PHOTOGRAPHER:** Robert A. Langford



## **PHOTO GRAPH 004**

**SUBJECT:** View of Stuck Drill Rig  
(This photo shows the drill rig after it had broken through  
the soft surface soil just after completing Soil Boring SB-01.)

**SITE:** Proposed Northwestern Tennessee Harbor Project  
Cades Landing, Lake County, Tennessee

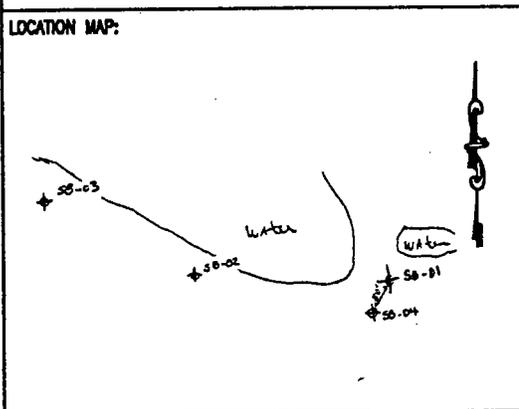
**DATE:** February 3, 2004

**Orientation:** Northerly

**PHOTOGRAPHER:** Robert A. Langford

**APPENDIX F**

**SOIL BORING LOGS**

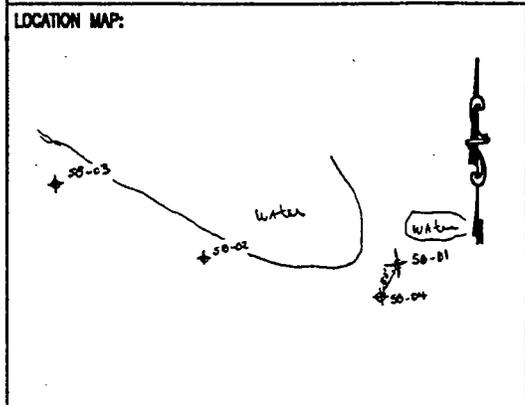


START DATE & TIME: 02/03/04 @ 08:45 Hours  
 COMP. DATE & TIME: 02/03/04 @ 09:45 Hours  
 LOGGED BY: Robert A. Langford TN RPC LIC #4320  
 DRILLER: Tri-State Testing Services, Inc. TN MWD LIC #789  
 DRILLING METHOD: HOLLOW STEM AUGER  
 TOC ELV.: ' AMSL, Unknown T.D.: ' AMSL, Unknown

PROJECT No.: 0610.75  
 FIGURE No.: 0810-042  
 LOG No.: 2885-04  
 Reviewed By: *[Signature]*  
 HESS ENVIRONMENTAL SERVICES, INC. MEMPHIS, TENNESSEE

COMMENTS: 1) SPLIT Spoon (SS) Samples were Composites (Sample ID # 020304-RL-S001)  
 2) GPS Locations: 36.44737 N MWJ-89.47946 W

AMSL (Feet)	WELL COMPLETION DIAGRAM		PENETRATION RATE	DEPTH (Feet)	GRAPHIC LITHOLOGY	PID HEADSPACE READING (ppmv)	SAMPLES & CORES			DESCRIPTION (Color, Texture, Structure, etc..)
	BOREHOLE DIAMETER: 6 5/8"						WATER LEVEL	TYPE	IN/FEET	
0	FILLED WITH DRILL CUTTINGS			0						0'-6', Soft, Moist, Brownish Gray Silty CLAY (CL)
5				5						6'-14.5', Firm, Moist, Greenish Gray Silty CLAY (CL)
10				10						14.5'-15', Soft, Moist, Gray SILT (ML)
15				15						15'-20', Soft, Moist, Gray Silty CLAY (CL) with Silt PARTINGS
20				20						END OF BORING TOTAL Depth 20'
25				25						3) ANALYSES - SEE COC

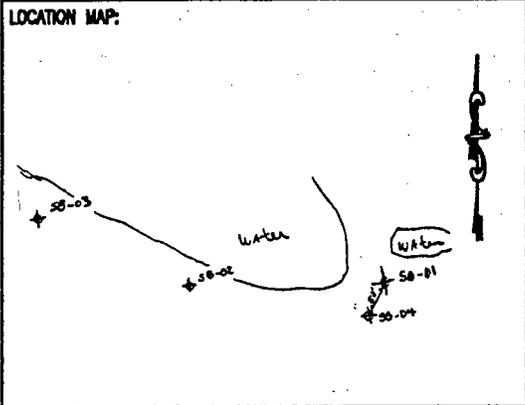


START DATE & TIME: 02/04/04 @ 08:30 Hours  
 COMP. DATE & TIME: 02/04/04 @ 09:15 Hours  
 LOGGED BY: Robert A. Langford TN RPG LIC #4320  
 DRILLER: Tri-State Testing Services, Inc. TN MWD LIC #769  
 DRILLING METHOD: HOLLOW STEM AUGER  
 TDC ELV.: ' AMSL, Unknown T.D.: ' AMSL, Unknown

PROJECT No.: 0610.75  
 FIGURE No.: 0610-043  
 LOG No.: 2886-04  
 Reviewed By: *RA*  
 HESS ENVIRONMENTAL SERVICES, INC. MEMPHIS, TENNESSEE

COMMENTS: 1) GPS LOCATION: 36.44864 N 89.48150 W  
 2) No Ground Water Encountered.  
 3) The Split Spoon (SS) Samples were Composite (10#020404-AL-006)

AMSL (Feet)	WELL COMPLETION DIAGRAM		WATER LEVEL	PENETRATION RATE	DEPTH (Feet)	GRAPHIC LITHOLOGY	PID HEADSPACE READING (ppmv)	SAMPLES & CORES			DESCRIPTION (Color, Texture, Structure, etc.)
	BOREHOLE DIAMETER: 6 5/8"							TYPE	HT/FE	ANAL	
0					0		<1.0 SS			5	0'-7.5', Firm, Moist, Brownish Gray Silty CLAY (CL)
5											
10					10						
15					15						
20					20						
25					25						

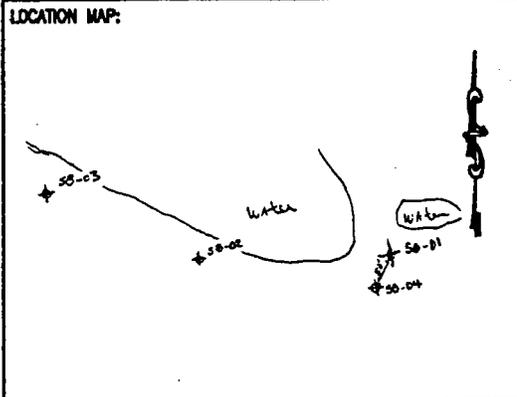


START DATE & TIME: 02/04/04 @ 09:30 Hours  
 COMP. DATE & TIME: 02/04/04 @ 10:00 Hours  
 LOGGED BY: Robert A. Langford TN RPC LIC #4320  
 DRILLER: Tri-State Testing Services, Inc. TN MWD LIC #769  
 DRILLING METHOD: HOLLOW STEM AUGER  
 TOC ELV.: \* AMSL, Unknown T.D.: \* AMSL, Unknown

PROJECT No.: 0610.75  
 FIGURE No.: 0810-04 4  
 LOG No.: 2887-04  
 Reviewed By: *[Signature]*  
 HESS ENVIRONMENTAL SERVICES, INC. MEMPHIS, TENNESSEE

COMMENTS: 1) GPS LOCATION: 36.45031 N S-89.48322 W  
 2) Round water table was NOT ENCOUNTERED  
 3) Split Spoon (SS) sampler were Composite (10 #20404-RL -5007)

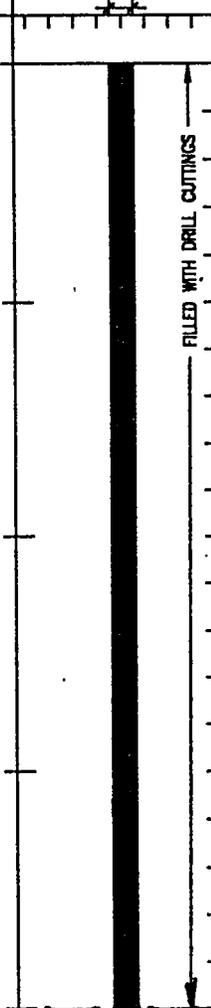
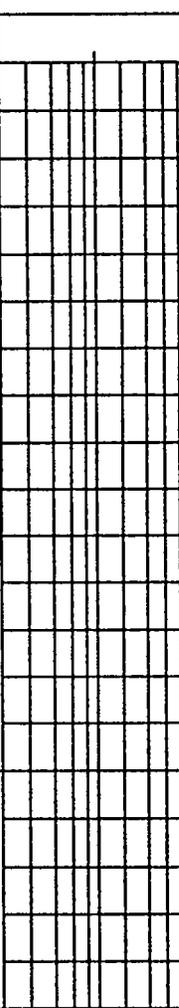
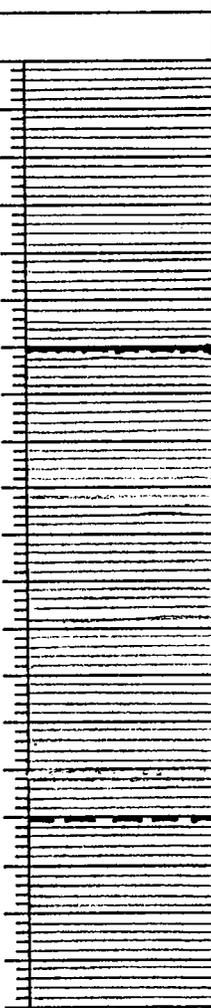
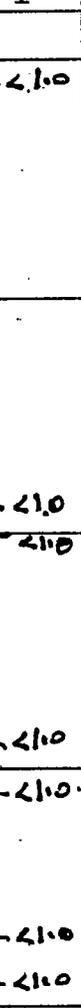
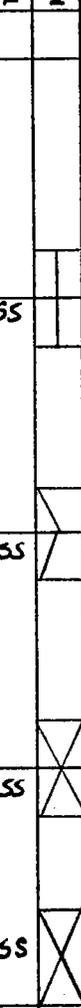
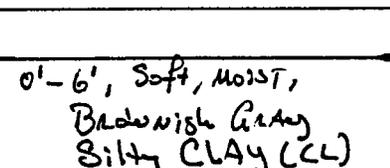
AMSL (Feet)	WELL COMPLETION DIAGRAM BOREHOLE DIAMETER: 6 5/8"	WATER LEVEL	PENETRATION RATE	DEPTH (Feet)	GRAPHIC LITHOLOGY	PID HEADSPACE READING (ppmv)	SAMPLES & CORES			DESCRIPTION (Color, Texture, Structure, etc.)
							TYPE	NO./FEET	ANAL	
				0						5)
				0 - 5'		<1.0 <1.0 <1.0 <1.0	SS			0'-5', Firm, moist, brownish gray silty clay (CL)
				5 - 6'			SS			5'-6' gray medium to fine grained sand (SP) SATURATED
				6'						END OF BORING TOTAL Depth 6'
				10'						4) BORING BOTTOMED OUT ON ROCK AND/OR CONCRETE
				15'						5) ANALYSES - SEE COC
				20'						
				25'						



START DATE & TIME: 02/04/04 @ 07:45 Hours  
 COMP. DATE & TIME: 02/04/04 @ 08:15 Hours  
 LOGGED BY: Robert A. Langford TN RPC LIC #4320  
 DRILLER: Tri-State Testing Services, Inc. TN MWD LIC #789  
 DRILLING METHOD: HOLLOW STEM AUGER  
 TOC ELV.: \* AMSL, Unknown T.D.: \* AMSL, Unknown

PROJECT No.: 0610.15  
 FIGURE No.: 0610-045  
 LOG No.: 288B-04  
 Reviewed By: *RAJ*  
  
 HESS ENVIRONMENTAL SERVICES, INC.  
 MEMPHIS, TENNESSEE

COMMENTS: 1) 50' SW OF GPS LOCATION 36.447378 - 89.47946 W  
 2) SURFACE Soil Sample 020404-RL-S002 (Duplicate 020404-RL-S009)  
 3) 020404-RL-S003 4) 020404-RL-S004 5) 020404-RL-S005

AMSL (Feet)	WELL COMPLETION DIAGRAM BOREHOLE DIAMETER: 6 5/8"	WATER LEVEL	PENETRATION RATE	DEPTH (Feet)	GRAPHIC LITHOLOGY	PID HEADSPACE READING (ppm)	SAMPLES & CORES			DESCRIPTION (Color, Texture, Structure, etc..)
							TYPE	NO./FE	ANAL	
0				0						
5				6'-16', Firm, moist, Greenish Gray Silty CLAY (CL)						
10				16'-20', Soft, moist, Gray Silty CLAY (CL) with silt partings						
15				END OF BORING TOTAL Depth 20'						
20				6) ANALYSES - SEE COC						

**APPENDIX G**

**SOIL PHYSICAL PROPERTY REPORTS**

**AND**

**CHAIN OF CUSTODY**

**DOCUMENTATION**



RECEIVED FEB 13 2004

Letter of Transmittal

To: Hess Environmental Services, Inc.  
6057 Executive Center Dr., # 6  
Memphis, TN 38134  
Robert Langford

Date:	February 12, 2004
Project No.:	E-6-880
Attention:	Robert Langford
RE:	Proposed Harbor Lake County Tiptonville

WE ARE SENDING YOU:  Attached  Under separate cover  via \_\_\_ the following items

Shop drawings  Prints  Test Results  Samples

Reports  Plans  Copy of letter  Other

ORIGINALS	DATE	DESCRIPTION
8	2/11/04	8- Gradation Curves: Sample ID #'s (1)020304-RL-S001 (2)020304-RL-S002 (3)020404-RL-S003 (4)020404-RL-S004 (5)020404-RL-S005 (6)020404-RL-S006 (7)020404-RL-S007 (8)020304-RL-S009
1	2/12/04	Sample Identification and Custody Tag (Chain of Custody)

THESE ARE TRANSMITTED as checked below:

For Approval  No exceptions taken  Resubmit \_\_\_\_\_ copies for approval

For your use  Make corrections noted  Submit \_\_\_\_\_ copies for distribution

As requested  Amend and resubmit  Return \_\_\_\_\_ corrected prints

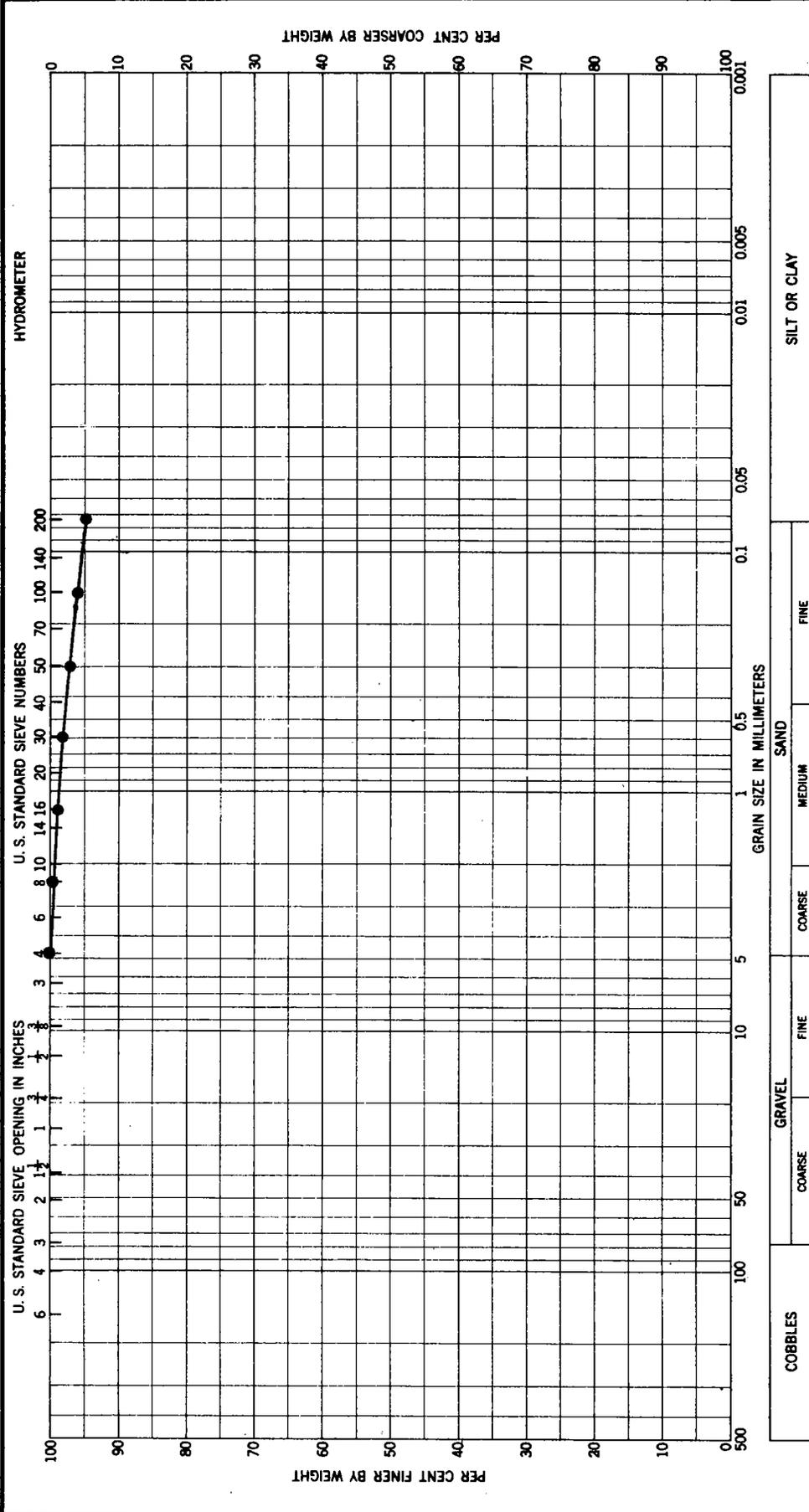
REMARKS:

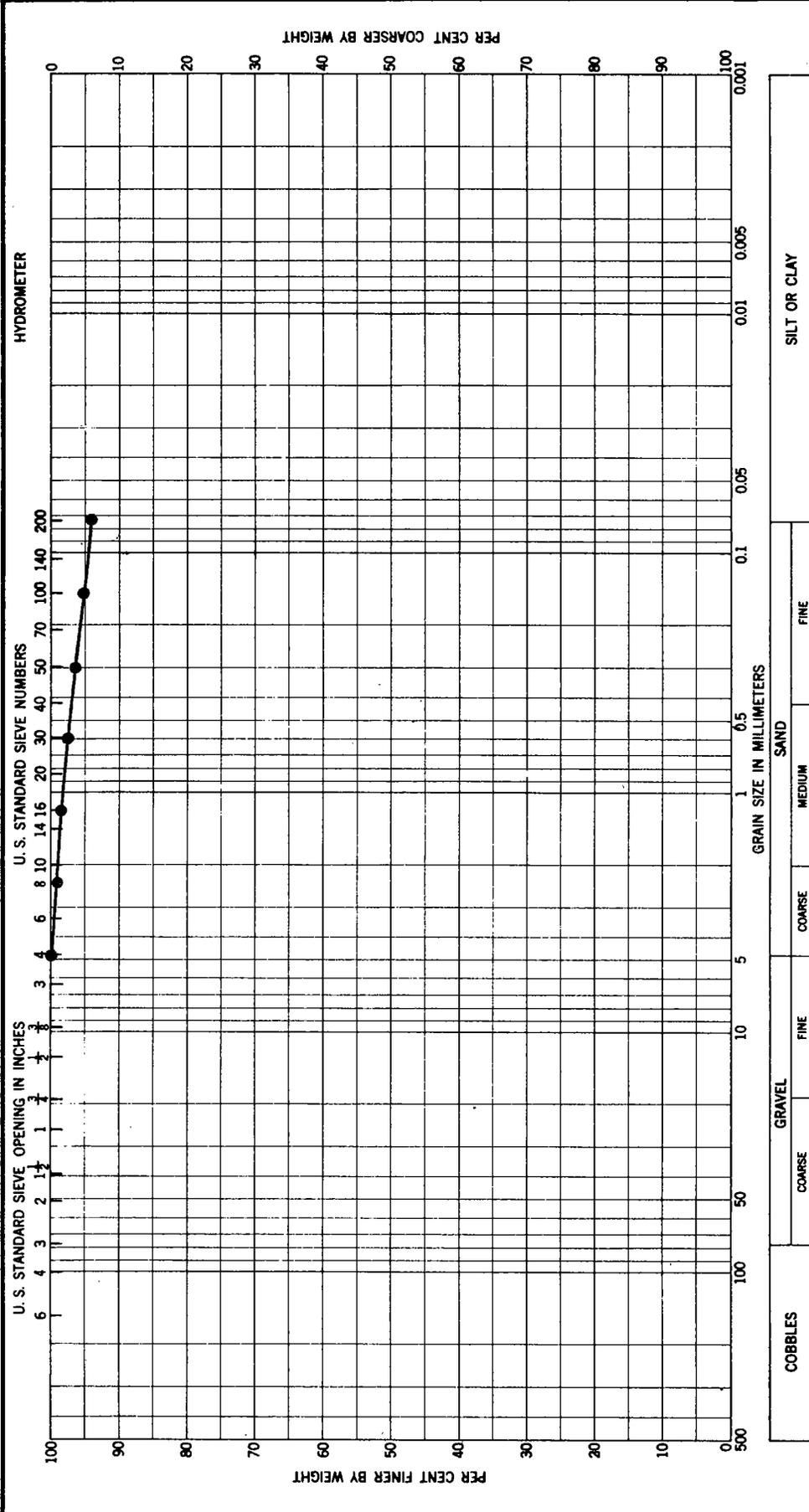
Please call if you need additional information or have any questions.

SIGNED: \_\_\_\_\_

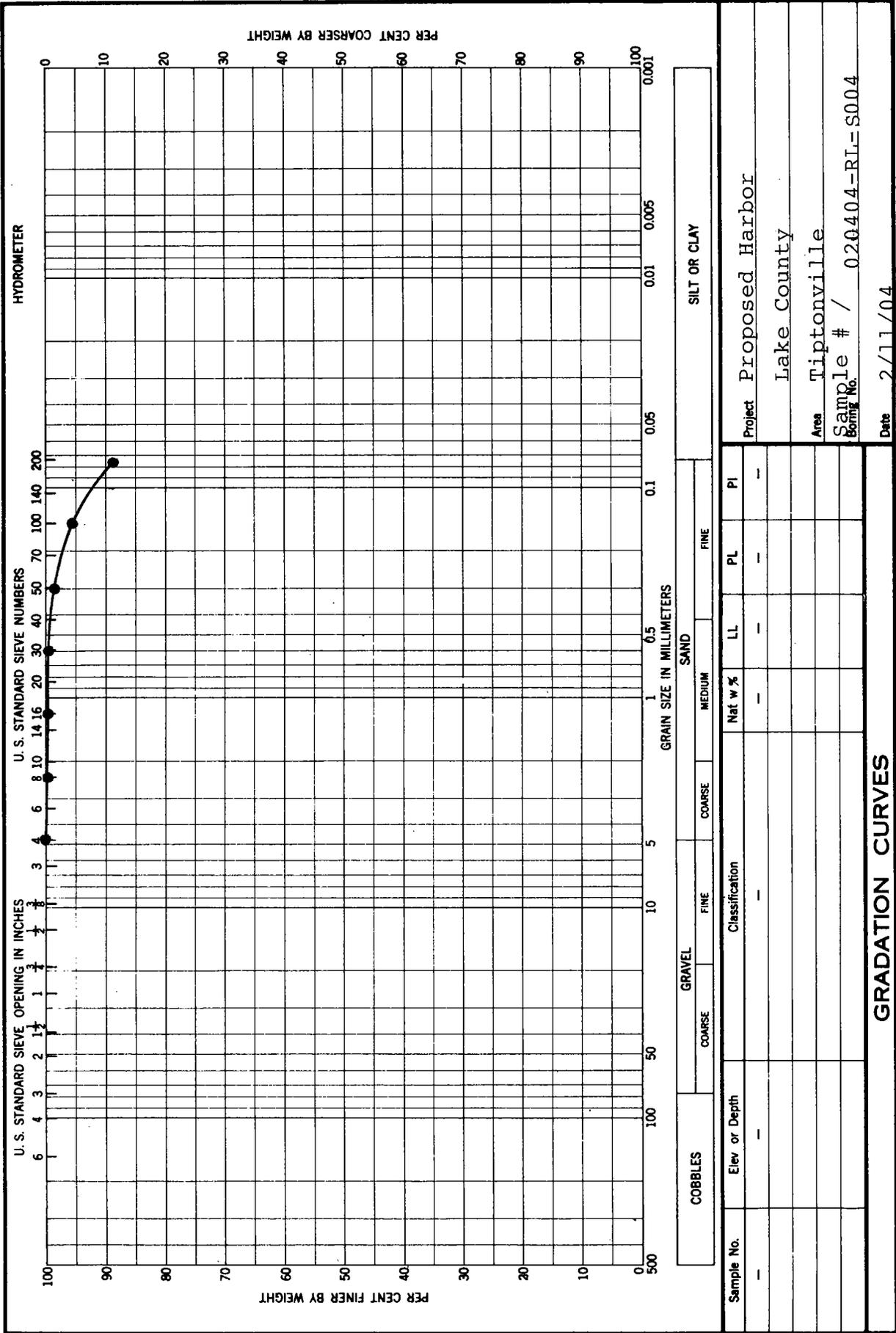
*[Handwritten Signature]*  
If enclosures are not as noted, kindly notify us at once.

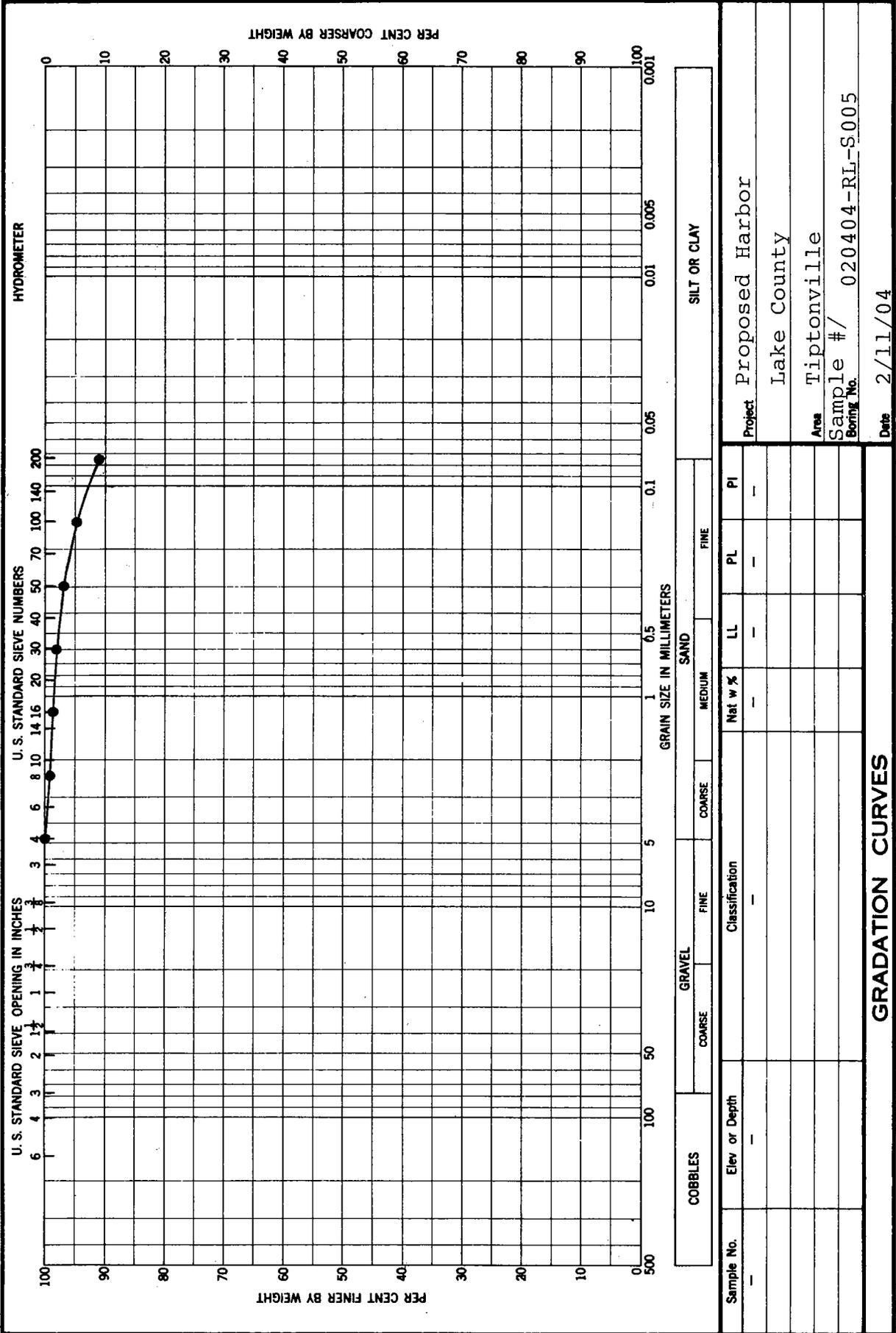






COBBLES		GRAVEL		SAND		SILT OR CLAY	
COARSE		FINE		MEDIUM		FINE	
Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI	
Project				Proposed Harbor			
Area				Lake County			
Sample #/ Boring No.				020404-RL-S003			
Date				2/11/04			
<b>GRADATION CURVES</b>							

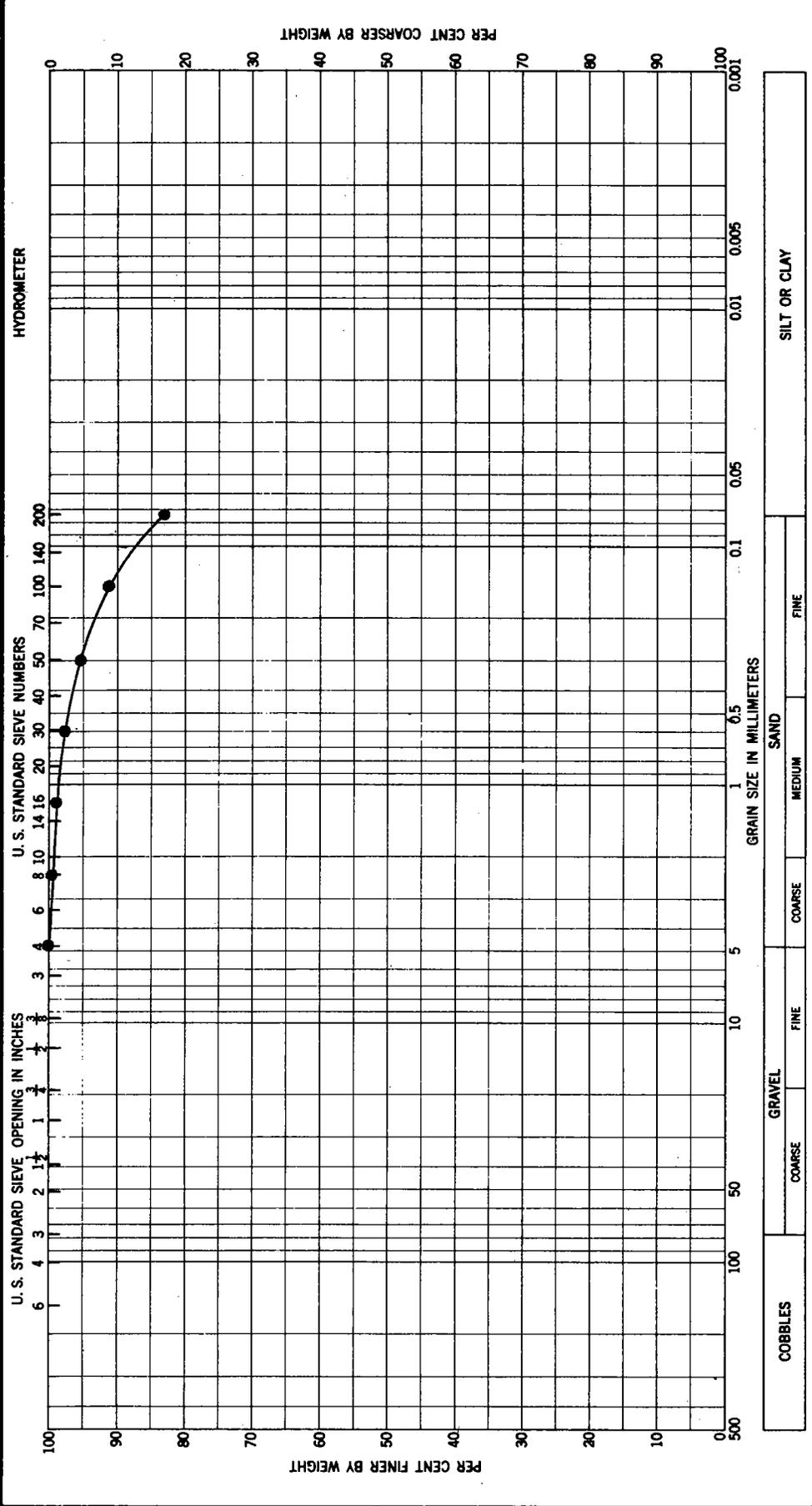




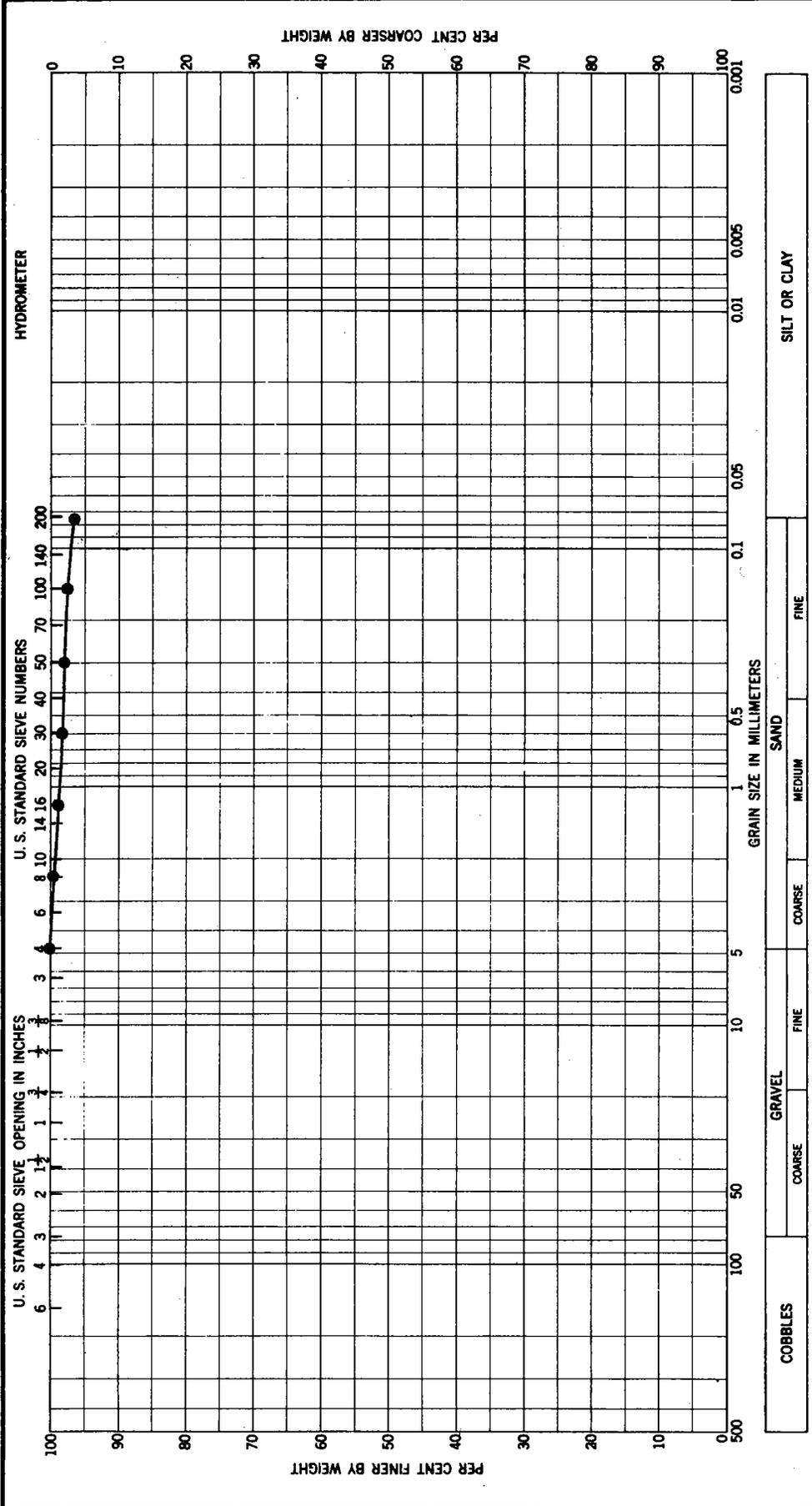
**GRADATION CURVES**

Project Proposed Harbor  
 Area Lake County  
 Tiptonville  
 Sample #/ Boring No. 020404-RL-S005  
 Date 2/11/04





COBBLES		GRAVEL		SAND		SILT OR CLAY	
COARSE		FINE		MEDIUM		FINE	
Sample No.	Elev or Depth	Classification		Nat w %	LL	PL	PI
-	-	-		-	-	-	-
Project				Proposed Harbor			
Area				Lake County			
Sample #/ Boring No.				020404-RL-S007			
Date				2/11/04			
<b>GRADATION CURVES</b>							



**HESS ENVIRONMENTAL SERVICES, INC.**  
**6057 Executive Centre Drive, Suite 6**  
**MEMPHIS, TENNESSEE 38134**

**SAMPLE IDENTIFICATION AND CUSTODY TAG**

SOURCE OF SAMPLE: \$ 0610.T5 / W38XER-3276-0640

TYPE SAMPLE: SOIL

**SAMPLE IDENTIFICATION**

NUMBERS: 020304-RL-5001, 020304-RL-5002, 020404-RL-5003, 020404-RL-5004,  
020404-RL-5005, 020404-RL-5006, 020404-RL-5007, & 020304-RL-5009

NUMBER OF SAMPLE CONTAINERS: 8  
 COLLECTED, DATE: FEB 3+4, 2003 TIME: VARIOUS

FIELD PROCEDURES/PRESERVATION: PLACED IN ZIP LOCK® PLASTIC BAGS

TRANSPORTATION MODE: By Her Vehicle

SAMPLE SEALED BY: Robert A. Langley DATE: FEB 3+4, 2004

ANALYSIS REQUESTED: Soil Sieve Analysis & Wash over #200 sieve  
ASTM D.422 and D-1140 Methods, Respectively.

**CUSTODY OF SAMPLE**

(a) Collected by	<u>Robert A. Langley</u>	(date)	<u>02-03-04</u>	(time)	<u>VARIOUS</u>
Delivered to	<u>Diane Wilka</u>	(date)	<u>02-04-04</u>	(time)	<u>1430</u>
(b) Received by	<u>(Tri-State Testing)</u>	(date)		(time)	
Delivered to		(date)		(time)	
(c) Received by		(date)		(time)	
Delivered to		(date)		(time)	
(d) Received by		(date)		(time)	
Delivered to		(date)		(time)	
(e) Received in		(date)		(time)	
laboratory by	<u>D. D. Maly</u>	(date)	<u>1/4/04</u>	(time)	<u>1638</u>
From		(date)		(time)	
(f) Logged in by		(date)		(time)	

**FIELD ANALYSES AND RESULTS AT SAMPLING POINT:**

ANALYSIS	RESULT	DATE	TIME	ANALYST

REMARKS \_\_\_\_\_

**APPENDIX H**

**SOIL ANALYTICAL REPORTS**

**AND**

**CHAIN OF CUSTODY**

**DOCUMENTATION**



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



Report Number

04-035-0219

Page : 1

Account Number

04808

Send To :

HESS ENVIRONMENTAL  
6057 EXECUTIVE CENTRE DR.  
SUITE 6  
MEMPHIS, TN 38134

Client : W38XGR-3276-0640

Lab Number : 55282

Sample Id : 020304-RL-S001

Purchase Order :

Report Date : 02/19/2004

Date received : 2/4/2004

Sample Date : 02/03/2004 09:45

## REPORT OF ANALYSIS

Analysis	Result	Quantitation Limit	Method	Date and Time Test Started	Analyst
Total Antimony,mg/Kg	< 5	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Thallium,mg/Kg	< 5	5.00	SW-6010B	Feb 9 2004 10:00AM	GBT
Carbon (TOC),%	1.9	0.1	WALKLEY-BLACK	Feb 13 2004 9:00AM	HBR
Total Vanadium,mg/Kg	22.177	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Aluminum,mg/Kg	10215.766	50.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Arsenic,mg/Kg	5.058	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Barium,mg/Kg	134.636	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Beryllium,mg/Kg	< 0.5	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Cadmium,mg/Kg	< 2.5	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Calcium,mg/Kg	5115.396	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Cobalt,mg/Kg	8.376	1.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Chromium,mg/Kg	17.642	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Copper,mg/Kg	17.969	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Iron,mg/Kg	22963.657	50.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Mercury,mg/Kg	0.1300	0.050	SW-7471	Feb 12 2004 9:00AM	GBT
Total Magnesium,mg/Kg	3284.8	5.0	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Manganese,mg/Kg	664.753	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT

M. Scott McKee, Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



Report Number

04-035-0219

Page : 2

Account Number

04808

Send To :

HESS ENVIRONMENTAL  
6057 EXECUTIVE CENTRE DR.  
SUITE 6  
MEMPHIS, TN 38134

Client : W38XGR-3276-0640

Lab Number : 55282

Sample Id : 020304-RL-S001

Purchase Order :

Report Date : 02/19/2004

Date received : 2/4/2004

Sample Date : 02/03/2004 09:45

## REPORT OF ANALYSIS

Analysis	Result	Quantitation Limit	Method	Date and Time	
				Test Started	Analyst
Total Nickel,mg/Kg	18.652	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Lead,mg/Kg	21.976	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Potassium,mg/Kg	1043.9	5.0	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Selenium,mg/Kg	< 2.5	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Silver,mg/Kg	< 0.25	0.250	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Sodium,mg/Kg	186.323	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Zinc,mg/Kg	88.670	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Gasoline Range Organics,mg/Kg	< 14.7	14.7	SW-8015B(GRO)	Feb 10 2004 12:00PM	MK

Comments:

SSSA : Methods of Soil Analysis, Part 3 - Chemical Methods, 2nd Ed. Rev. Soil Science Society of America, Black, C  
C.A et al. 1982, pages 995-996.

SW : USEPA, SW-846, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, 3rd Ed. Current Revision

M. Scott McKee, Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



Report Number

04-035-0219

Page : 3

Account Number

04808

Send To :

HESS ENVIRONMENTAL  
6057 EXECUTIVE CENTRE DR.  
SUITE 6  
MEMPHIS, TN 38134

Client : W38XGR-3276-0640

Lab Number : 55283

Sample Id : 020304-RL-S002

Purchase Order :

Report Date : 02/19/2004

Date received : 2/4/2004

Sample Date : 02/03/2004 10:15

## REPORT OF ANALYSIS

Analysis	Result	Quantitation Limit	Method	Date and Time Test Started	Analyst
Total Antimony,mg/Kg	< 5	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Thallium,mg/Kg	< 5	5.00	SW-6010B	Feb 9 2004 10:00AM	GBT
Carbon (TOC), %	2.4	0.1	WALKLEY-BLACK	Feb 13 2004 9:00AM	HBR
Total Vanadium,mg/Kg	24.860	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Aluminum,mg/Kg	12879.430	50.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Arsenic,mg/Kg	5.328	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Barium,mg/Kg	125.576	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Beryllium,mg/Kg	0.619	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Cadmium,mg/Kg	< 2.5	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Calcium,mg/Kg	3843.370	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Cobalt,mg/Kg	9.748	1.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Chromium,mg/Kg	15.413	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Copper,mg/Kg	15.624	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Iron,mg/Kg	23341.625	500.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Mercury,mg/Kg	0.0550	0.050	SW-7471	Feb 12 2004 9:00AM	GBT
Total Magnesium,mg/Kg	3084.9	5.0	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Manganese,mg/Kg	859.073	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT

M. Scott McKee, Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



The One Source.

Report Number

04-035-0219

Page : 4

Account Number

04808

Send To :

HESS ENVIRONMENTAL  
6057 EXECUTIVE CENTRE DR.  
SUITE 6  
MEMPHIS, TN 38134

Client : W38XGR-3276-0640

Lab Number : 55283

Sample Id : 020304-RL-S002

Purchase Order :

Report Date : 02/19/2004

Date received : 2/4/2004

Sample Date : 02/03/2004 10:15

## REPORT OF ANALYSIS

Analysis	Result	Quantitation Limit	Method	Date and Time Test Started	Analyst
Total Nickel,mg/Kg	20.412	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Lead,mg/Kg	16.163	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Potassium,mg/Kg	1340.4	5.0	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Selenium,mg/Kg	< 2.5	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Silver,mg/Kg	< 0.25	0.250	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Sodium,mg/Kg	176.285	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Zinc,mg/Kg	79.204	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Gasoline Range Organics,mg/Kg	< 15.4	15.4	SW-8015B(GRO)	Feb 10 2004 12:00PM	MK

Comments:

SSSA : Methods of Soil Analysis, Part 3 - Chemical Methods, 2nd Ed. Rev. Soil Science Society of America, Black, C  
C.A et al. 1982, pages 995-996.

SW : USEPA, SW-846, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, 3rd Ed. Current Revision

M. Scott McKee, Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



Page : 5

Report Number

04-035-0219

Account Number

04808

Send To :

HESS ENVIRONMENTAL  
6057 EXECUTIVE CENTRE DR.  
SUITE 6  
MEMPHIS, TN 38134

Client : W38XGR-3276-0640

Lab Number : 55284

Sample Id : 020404-RL-S003

Purchase Order :

Report Date : 02/19/2004

Date received : 2/4/2004

Sample Date : 02/04/2004 08:05

## REPORT OF ANALYSIS

Analysis	Result	Quantitation Limit	Method	Date and Time		Analyst
				Test Started		
Total Antimony,mg/Kg	< 5	5.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Thallium,mg/Kg	< 5	5.00	SW-6010B	Feb 9 2004 10:00AM		GBT
Carbon (TOC),%	2.3	0.1	WALKLEY-BLACK	Feb 13 2004 9:00AM		HBR
Total Vanadium,mg/Kg	27.433	0.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Aluminum,mg/Kg	13193.321	50.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Arsenic,mg/Kg	< 5	5.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Barium,mg/Kg	134.413	0.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Beryllium,mg/Kg	< 0.5	0.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Cadmium,mg/Kg	< 2.5	2.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Calcium,mg/Kg	4705.147	5.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Cobalt,mg/Kg	8.109	1.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Chromium,mg/Kg	16.915	2.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Copper,mg/Kg	15.549	0.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Iron,mg/Kg	26482.698	50.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Mercury,mg/Kg	0.1210	0.050	SW-7471	Feb 12 2004 9:00AM		GBT
Total Magnesium,mg/Kg	3127.6	5.0	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Manganese,mg/Kg	1329.662	0.500	SW-6010B	Feb 9 2004 10:00AM		GBT

M. Scott McKee, Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



Report Number  
04-035-0219

Page : 6

Account Number  
04808

Send To :

HESS ENVIRONMENTAL  
6057 EXECUTIVE CENTRE DR.  
SUITE 6  
MEMPHIS, TN 38134

Client : W38XGR-3276-0640

Purchase Order :  
Report Date : 02/19/2004  
Date received : 2/4/2004

Lab Number : 55284

Sample Id : 020404-RL-S003

Sample Date : 02/04/2004 08:05

## REPORT OF ANALYSIS

Analysis	Result	Quantitation Limit	Method	Date and Time Test Started	Analyst
Total Nickel,mg/Kg	17.909	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Lead,mg/Kg	17.439	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Potassium,mg/Kg	1321.4	5.0	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Selenium,mg/Kg	< 2.5	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Silver,mg/Kg	< 0.25	0.250	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Sodium,mg/Kg	183.319	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Zinc,mg/Kg	74.077	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Gasoline Range Organics,mg/Kg	< 14.7	14.7	SW-8015B(GRO)	Feb 10 2004 12:00PM	MK

Comments:

SSSA : Methods of Soil Analysis, Part 3 - Chemical Methods, 2nd Ed. Rev. Soil Science Society of America, Black, C  
C.A et al. 1982, pages 995-996.

SW : USEPA, SW-846, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, 3rd Ed. Current Revision

M. Scott McKee, Technical Director



**A&L Analytical Laboratories, Inc.**  
 2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



**Report Number**  
04-035-9219

**Account Number**  
04808

Page : 7

**Send To :**

HESS ENVIRONMENTAL  
 6057 EXECUTIVE CENTRE DR.  
 SUITE 6  
 MEMPHIS, TN 38134

RECEIVED FEB 26 2004

**Purchase Order :**  
**Report Date :** 02/24/2004  
**Date received :** 2/4/2004

**Client :** W38XGR-3276-0640

**Lab Number :** 55285  
**Sample Id :** 020404-RL-S004

**Sample Date :** 02/04/2004 08:10

**REPORT OF ANALYSIS**

Analysis	Result	Quantitation Limit	Method	Date and Time Test Started	Analyst
Total Antimony,mg/Kg	< 5	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Thallium,mg/Kg	< 5	5.00	SW-6010B	Feb 9 2004 10:00AM	GBT
Carbon (TOC),%	2.1	0.1	WALKLEY-BLACK	Feb 13 2004 9:00AM	HBR
Total Vanadium,mg/Kg	26.439	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Aluminum,mg/Kg	12300.717	50.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Arsenic,mg/Kg	5.549	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Barium,mg/Kg	144.791	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Beryllium,mg/Kg	< 0.5	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Cadmium,mg/Kg	< 2.5	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Calcium,mg/Kg	7329.056	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Cobalt,mg/Kg	8.427	1.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Chromium,mg/Kg	19.527	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Copper,mg/Kg	18.994	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Iron,mg/Kg	25239.388	50.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Mercury,mg/Kg	0.1390	0.050	SW-7471	Feb 12 2004 9:00AM	GBT
Total Magnesium,mg/Kg	4451.0	5.0	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Manganese,mg/Kg	903.213	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT

M. Scott McKee, Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



The One Source.

Report Number  
04-035-9219

Page : 8

Account Number  
04808

RECEIVED FEB 20 2004

Send To :

HESS ENVIRONMENTAL  
6057 EXECUTIVE CENTRE DR.  
SUITE 6  
MEMPHIS, TN 38134

Purchase Order :

Client : W38XGR-3276-0640

Report Date : 02/24/2004

Date received : 2/4/2004

## REPORT OF ANALYSIS

Lab Number : 55285

Sample Date : 02/04/2004 08:10

Sample Id : 020404-RL-S004

Analysis	Result	Quantitation Limit	Method	Date and Time		Analyst
				Test Started		
Total Nickel,mg/Kg	19.688	2.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Lead,mg/Kg	20.567	5.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Potassium,mg/Kg	1317.6	5.0	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Selenium,mg/Kg	< 2.5	2.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Silver,mg/Kg	< 0.25	0.250	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Sodium,mg/Kg	184.580	5.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Zinc,mg/Kg	92.400	2.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Gasoline Range Organics,mg/Kg	< 14.3	14.3	SW-8015B(GRO)	Feb 10 2004 12:00PM		MK

### Comments:

SSSA : Methods of Soil Analysis, Part 3 - Chemical Methods, 2nd Ed. Rev. Soil Science Society of America, Black, C  
C.A et al. 1982, pages 995-996.  
SW : USEPA, SW-846, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, 3rd Ed. Current Revision

M. Scott McKee, Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



Report Number

04-035-0219

Page : 9

Account Number

04808

Send To :

HESS ENVIRONMENTAL  
6057 EXECUTIVE CENTRE DR.  
SUITE 6  
MEMPHIS, TN 38134

Client : W38XGR-3276-0640

Lab Number : 55286

Sample Id : 020404-RL-S005

Purchase Order :

Report Date : 02/19/2004

Date received : 2/4/2004

Sample Date : 02/04/2004 08:15

## REPORT OF ANALYSIS

Analysis	Result	Quantitation Limit	Method	Date and Time		Analyst
				Test Started		
Total Antimony,mg/Kg	< 5	5.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Thallium,mg/Kg	< 5	5.00	SW-6010B	Feb 9 2004 10:00AM		GBT
Carbon (TOC),%	1.6	0.1	WALKLEY-BLACK	Feb 13 2004 9:00AM		HBR
Total Vanadium,mg/Kg	28.003	0.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Aluminum,mg/Kg	14102.810	50.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Arsenic,mg/Kg	5.740	5.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Barium,mg/Kg	140.003	0.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Beryllium,mg/Kg	< 0.5	0.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Cadmium,mg/Kg	< 2.5	2.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Calcium,mg/Kg	4619.809	5.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Cobalt,mg/Kg	8.304	1.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Chromium,mg/Kg	18.319	2.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Copper,mg/Kg	17.013	0.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Iron,mg/Kg	26711.877	50.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Mercury,mg/Kg	0.0880	0.050	SW-7471	Feb 12 2004 9:00AM		GBT
Total Magnesium,mg/Kg	3201.1	5.0	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Manganese,mg/Kg	766.733	0.500	SW-6010B	Feb 9 2004 10:00AM		GBT

M. Scott McKee, Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



Report Number

04-035-0219

Page : 10

Account Number

04808

Send To :

HESS ENVIRONMENTAL  
6057 EXECUTIVE CENTRE DR.  
SUITE 6  
MEMPHIS, TN 38134

Client : W38XGR-3276-0640

Lab Number : 55286

Sample Id : 020404-RL-S005

Purchase Order :

Report Date : 02/19/2004

Date received : 2/4/2004

Sample Date : 02/04/2004 08:15

## REPORT OF ANALYSIS

Analysis	Result	Quantitation		Date and Time Test Started	Analyst
		Limit	Method		
Total Nickel,mg/Kg	17.816	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Lead,mg/Kg	21.822	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Potassium,mg/Kg	1221.2	5.0	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Selenium,mg/Kg	< 2.5	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Silver,mg/Kg	< 0.25	0.250	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Sodium,mg/Kg	192.062	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Zinc,mg/Kg	85.561	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Gasoline Range Organics,mg/Kg	< 13.9	13.9	SW-8015B(GRO)	Feb 10 2004 12:00PM	MK

Comments:

SSSA : Methods of Soil Analysis, Part 3 - Chemical Methods, 2nd Ed. Rev. Soil Science Society of America, Black, C  
C.A et al. 1982, pages 995-996.

SW : USEPA, SW-846, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, 3rd Ed. Current Revision

M. Scott McKee, Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



Report Number

04-035-0219

Page : 11

Account Number

04808

Send To :

HESS ENVIRONMENTAL  
6057 EXECUTIVE CENTRE DR.  
SUITE 6  
MEMPHIS, TN 38134

Client : W38XGR-3276-0640

Lab Number : 55287

Sample Id : 020404-RL-S006

Purchase Order :

Report Date : 02/19/2004

Date received : 2/4/2004

Sample Date : 02/04/2004 09:15

## REPORT OF ANALYSIS

Analysis	Result	Quantitation		Method	Date and Time Test Started	Analyst
		Limit				
Total Antimony,mg/Kg	< 5	5.000		SW-6010B	Feb 9 2004 10:00AM	GBT
Total Thallium,mg/Kg	< 5	5.00		SW-6010B	Feb 9 2004 10:00AM	GBT
Carbon (TOC),%	2.1	0.1		WALKLEY-BLACK	Feb 13 2004 9:00AM	HBR
Total Vanadium,mg/Kg	27.569	0.500		SW-6010B	Feb 9 2004 10:00AM	GBT
Total Aluminum,mg/Kg	12753.252	50.000		SW-6010B	Feb 9 2004 10:00AM	GBT
Total Arsenic,mg/Kg	6.168	5.000		SW-6010B	Feb 9 2004 10:00AM	GBT
Total Barium,mg/Kg	145.925	0.500		SW-6010B	Feb 9 2004 10:00AM	GBT
Total Beryllium,mg/Kg	< 0.5	0.500		SW-6010B	Feb 9 2004 10:00AM	GBT
Total Cadmium,mg/Kg	< 2.5	2.500		SW-6010B	Feb 9 2004 10:00AM	GBT
Total Calcium,mg/Kg	3138.128	5.000		SW-6010B	Feb 9 2004 10:00AM	GBT
Total Cobalt,mg/Kg	9.509	1.000		SW-6010B	Feb 9 2004 10:00AM	GBT
Total Chromium,mg/Kg	19.117	2.500		SW-6010B	Feb 9 2004 10:00AM	GBT
Total Copper,mg/Kg	17.378	0.500		SW-6010B	Feb 9 2004 10:00AM	GBT
Total Iron,mg/Kg	26090.854	50.000		SW-6010B	Feb 9 2004 10:00AM	GBT
Total Mercury,mg/Kg	0.1200	0.050		SW-7471	Feb 12 2004 9:00AM	GBT
Total Magnesium,mg/Kg	2821.0	5.0		SW-6010B	Feb 9 2004 10:00AM	GBT
Total Manganese,mg/Kg	796.591	0.500		SW-6010B	Feb 9 2004 10:00AM	GBT

M. Scott McKee, Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



Report Number

04-035-0219

Page : 12

Account Number

04808

Send To :

HESS ENVIRONMENTAL  
6057 EXECUTIVE CENTRE DR.  
SUITE 6  
MEMPHIS, TN 38134

Citent : W38XGR-3276-0640

Lab Number : 55287

Sample Id : 020404-RL-S006

Purchase Order :

Report Date : 02/19/2004

Date received : 2/4/2004

Sample Date : 02/04/2004 09:15

## REPORT OF ANALYSIS

Analysis	Result	Quantitation Limit	Method	Date and Time		Analyst
				Test Started	Test Ended	
Total Nickel,mg/Kg	21.010	2.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Lead,mg/Kg	21.375	5.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Potassium,mg/Kg	1229.8	5.0	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Selenium,mg/Kg	< 2.5	2.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Silver,mg/Kg	< 0.25	0.250	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Sodium,mg/Kg	199.000	5.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Zinc,mg/Kg	92.071	2.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Gasoline Range Organics,mg/Kg	< 14.1	14.1	SW-8015B(GRO)	Feb 10 2004 12:00PM		MK

Comments:

SSSA : Methods of Soil Analysis, Part 3 - Chemical Methods, 2nd Ed. Rev. Soil Science Society of America, Black, C  
C.A et al. 1982, pages 995-996.

SW : USEPA, SW-846, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, 3rd Ed. Current Revision

M. Scott McKee, Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



Report Number

04-035-0219

Page : 13

Account Number

04808

Send To :

HESS ENVIRONMENTAL  
6057 EXECUTIVE CENTRE DR.  
SUITE 6  
MEMPHIS, TN 38134

Client : W38XGR-3276-0640

Lab Number : 55288

Sample Id : 020404-RL-S007

Purchase Order :

Report Date : 02/19/2004

Date received : 2/4/2004

Sample Date : 02/04/2004 10:00

## REPORT OF ANALYSIS

Analysis	Result	Quantitation Limit	Method	Date and Time Test Started	Analyst
Total Antimony,mg/Kg	< 5	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Thallium,mg/Kg	< 5	5.00	SW-6010B	Feb 9 2004 10:00AM	GBT
Carbon (TOC),%	1.6	0.1	WALKLEY-BLACK	Feb 13 2004 9:00AM	HBR
Total Vanadium,mg/Kg	24.546	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Aluminum,mg/Kg	11443.907	50.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Arsenic,mg/Kg	5.960	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Barium,mg/Kg	155.582	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Beryllium,mg/Kg	< 0.5	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Cadmium,mg/Kg	< 2.5	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Calcium,mg/Kg	2840.392	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Cobalt,mg/Kg	10.362	1.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Chromium,mg/Kg	21.826	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Copper,mg/Kg	20.017	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Iron,mg/Kg	23566.696	500.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Mercury,mg/Kg	0.1500	0.050	SW-7471	Feb 12 2004 9:00AM	GBT
Total Magnesium,mg/Kg	2620.2	5.0	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Manganese,mg/Kg	864.041	0.500	SW-6010B	Feb 9 2004 10:00AM	GBT

M. Scott McKee, Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



Report Number  
04-035-0219

Page : 14

Account Number  
04808

Send To :

HESS ENVIRONMENTAL  
6057 EXECUTIVE CENTRE DR.  
SUITE 6  
MEMPHIS, TN 38134

Client : W38XGR-3276-0640

Lab Number : 55288

Sample Id : 020404-RL-S007

Purchase Order :

Report Date : 02/19/2004

Date received : 2/4/2004

Sample Date : 02/04/2004 10:00

## REPORT OF ANALYSIS

Analysis	Result	Quantitation Limit	Method	Date and Time	
				Test Started	Analyst
Total Nickel,mg/Kg	23.504	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Lead,mg/Kg	24.133	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Potassium,mg/Kg	1186.1	5.0	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Selenium,mg/Kg	< 2.5	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Silver,mg/Kg	< 0.25	0.250	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Sodium,mg/Kg	181.729	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Zinc,mg/Kg	108.740	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Gasoline Range Organics,mg/Kg	< 13.0	13.0	SW-8015B(GRO)	Feb 10 2004 12:00PM	MK

Comments:

SSSA : Methods of Soil Analysis, Part 3 - Chemical Methods, 2nd Ed. Rev. Soil Science Society of America, Black, C  
C.A et al. 1982, pages 995-996.

SW : USEPA, SW-846, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, 3rd Ed. Current Revision

M. Scott McKee, Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



Report Number  
04-035-0219

Account Number  
04808

Send To :

HESS ENVIRONMENTAL  
6057 EXECUTIVE CENTRE DR.  
SUITE 6  
MEMPHIS, TN 38134

Client : W38XGR-3276-0640

Lab Number : 55289  
Sample Id : 020304-RL-S009

Purchase Order :  
Report Date : 02/19/2004  
Date received : 2/4/2004

Sample Date : 02/03/2004 10:15

## REPORT OF ANALYSIS

Analysis	Result	Quantitation Limit	Method	Date and Time		Analyst
				Test Started	Test Ended	
Total Antimony, mg/Kg	< 5	5.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Thallium, mg/Kg	< 5	5.00	SW-6010B	Feb 9 2004 10:00AM		GBT
Carbon (TOC), %	2.0	0.1	WALKLEY-BLACK	Feb 13 2004 9:00AM		HBR
Total Vanadium, mg/Kg	25.485	0.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Aluminum, mg/Kg	13351.184	50.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Arsenic, mg/Kg	5.884	5.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Barium, mg/Kg	122.376	0.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Beryllium, mg/Kg	0.569	0.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Cadmium, mg/Kg	< 2.5	2.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Calcium, mg/Kg	3529.560	5.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Cobalt, mg/Kg	9.085	1.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Chromium, mg/Kg	14.656	2.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Copper, mg/Kg	15.319	0.500	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Iron, mg/Kg	22580.609	500.000	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Mercury, mg/Kg	0.0540	0.050	SW-7471	Feb 12 2004 9:00AM		GBT
Total Magnesium, mg/Kg	2890.6	5.0	SW-6010B	Feb 9 2004 10:00AM		GBT
Total Manganese, mg/Kg	905.155	0.500	SW-6010B	Feb 9 2004 10:00AM		GBT

M. Scott McKee, Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



Report Number

04-035-0219

Page : 16

Account Number

04808

Send To :

HESS ENVIRONMENTAL  
6057 EXECUTIVE CENTRE DR.  
SUITE 6  
MEMPHIS, TN 38134

Client : W38XGR-3276-0640

Purchase Order :

Report Date : 02/19/2004

Date received : 2/4/2004

Lab Number : 55289

Sample Id : 020304-RL-S009

Sample Date : 02/03/2004 10:15

## REPORT OF ANALYSIS

Analysis	Result	Quantitation Limit	Method	Date and Time Test Started	Analyst
Total Nickel,mg/Kg	18.637	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Lead,mg/Kg	15.539	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Potassium,mg/Kg	1271.0	5.0	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Selenium,mg/Kg	< 2.5	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Silver,mg/Kg	< 0.25	0.250	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Sodium,mg/Kg	168.865	5.000	SW-6010B	Feb 9 2004 10:00AM	GBT
Total Zinc,mg/Kg	73.922	2.500	SW-6010B	Feb 9 2004 10:00AM	GBT
Gasoline Range Organics,mg/Kg	< 15.2	15.2	SW-8015B(GRO)	Feb 10 2004 12:00PM	MK

Comments:

SSSA : Methods of Soil Analysis, Part 3 - Chemical Methods, 2nd Ed. Rev. Soil Science Society of America, Black, C  
C.A et al. 1982, pages 995-996.

SW : USEPA, SW-846, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, 3rd Ed. Current Revision

M. Scott McKee, Technical Director



HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report #: 04-035-0219

Page 1 of 8

Account # 4808

## Report of Analyses

Lab Number: 55282  
Units: mg/Kg

Sample ID: 020304-RL-S001

<u>Analysis</u>	<u>Result</u>	<u>QL</u>	<u>Date/Time Analyzed</u>	<u>Analyst</u>
Naphthalene	BQL	0.099	10-Feb-04 12:00	ES
Acenaphthene	0.094	0.099	10-Feb-04 12:00	ES
Fluorene	BQL	0.099	10-Feb-04 12:00	ES
Fluoranthene	0.402	0.099	10-Feb-04 12:00	ES
Anthracene	0.356	0.099	10-Feb-04 12:00	ES
Phenanthrene	0.126	0.099	10-Feb-04 12:00	ES
Pyrene	0.221	0.099	10-Feb-04 12:00	ES
Chrysene	0.122	0.099	10-Feb-04 12:00	ES
Benz(a)anthracene	0.154	0.099	10-Feb-04 12:00	ES
Benzo(a)pyrene	BQL	0.099	10-Feb-04 12:00	ES
Benzo(k)fluoranthene	BQL	0.099	10-Feb-04 12:00	ES
Benzo(b)fluoranthene	BQL	0.099	10-Feb-04 12:00	ES
Indeno(1,2,3-cd)pyrene	BQL	0.099	10-Feb-04 12:00	ES
Dibenz(a,h)anthracene	BQL	0.099	10-Feb-04 12:00	ES

### Surrogate Recovery %

Nitrobenzene-d5	53
2-Fluorobiphenyl	71
p-Terphenyl-d14	105

**QL - QUANTITATION LIMIT.**

**BQL - BELOW QUANTITATION LIMIT.**

### **Method Reference:**

**PAH PERFORMED ACCORDING TO USEPA, SW846, METHOD 8270C..**

Scott McKee  
Technical Director

February 18, 2004

Date



**HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134**

**Report #: 04-035-0219**

**Page 2 of 8**

**Account # 4808**

## Report of Analyses

**Lab Number: 55283  
Units: mg/Kg**

**Sample ID: 020304-RL-S002**

<u>Analysis</u>	<u>Result</u>	<u>QL</u>	<u>Date/Time Analyzed</u>	<u>Analyst</u>
Naphthalene	BQL	0.103	10-Feb-04 12:00	ES
Acenaphthene	BQL	0.103	10-Feb-04 12:00	ES
Fluorene	BQL	0.103	10-Feb-04 12:00	ES
Fluoranthene	0.314	0.103	10-Feb-04 12:00	ES
Anthracene	BQL	0.103	10-Feb-04 12:00	ES
Phenanthrene	BQL	0.103	10-Feb-04 12:00	ES
Pyrene	BQL	0.103	10-Feb-04 12:00	ES
Chrysene	BQL	0.103	10-Feb-04 12:00	ES
Benz(a)anthracene	BQL	0.103	10-Feb-04 12:00	ES
Benzo(a)pyrene	BQL	0.103	10-Feb-04 12:00	ES
Benzo(k)fluoranthene	BQL	0.103	10-Feb-04 12:00	ES
Benzo(b)fluoranthene	BQL	0.103	10-Feb-04 12:00	ES
Indeno(1,2,3-cd)pyrene	BQL	0.103	10-Feb-04 12:00	ES
Dibenz(a,h)anthracene	BQL	0.103	10-Feb-04 12:00	ES

### Surrogate Recovery %

Nitrobenzene-d5	48
2-Fluorobiphenyl	69
p-Terphenyl-d14	69

**QL - QUANTITATION LIMIT.**

**BQL - BELOW QUANTITATION LIMIT.**

### **Method Reference:**

**PAH PERFORMED ACCORDING TO USEPA, SW846, METHOD 8270C..**

Scott McKee  
Technical Director

**February 18, 2004**

Date



**HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134**

**Report #: 04-035-0219**

**Page 3 of 8**

**Account # 4808**

## Report of Analyses

**Lab Number: 55284  
Units: mg/Kg**

**Sample ID: 020404-RL-S003**

<u>Analysis</u>	<u>Result</u>	<u>QL</u>	<u>Date/Time Analyzed</u>	<u>Analyst</u>
Naphthalene	BQL	0.099	10-Feb-04 12:00	ES
Acenaphthene	BQL	0.099	10-Feb-04 12:00	ES
Fluorene	BQL	0.099	10-Feb-04 12:00	ES
Fluoranthene	0.315	0.099	10-Feb-04 12:00	ES
Anthracene	BQL	0.099	10-Feb-04 12:00	ES
Phenanthrene	BQL	0.099	10-Feb-04 12:00	ES
Pyrene	BQL	0.099	10-Feb-04 12:00	ES
Chrysene	BQL	0.099	10-Feb-04 12:00	ES
Benz(a)anthracene	BQL	0.099	10-Feb-04 12:00	ES
Benzo(a)pyrene	BQL	0.099	10-Feb-04 12:00	ES
Benzo(k)fluoranthene	BQL	0.099	10-Feb-04 12:00	ES
Benzo(b)fluoranthene	BQL	0.099	10-Feb-04 12:00	ES
Indeno(1,2,3-cd)pyrene	BQL	0.099	10-Feb-04 12:00	ES
Dibenz(a,h)anthracene	BQL	0.099	10-Feb-04 12:00	ES

### Surrogate Recovery %

Nitrobenzene-d5	56
2-Fluorobiphenyl	73
p-Terphenyl-d14	113

**QL - QUANTITATION LIMIT.**

**BQL - BELOW QUANTITATION LIMIT.**

### **Method Reference:**

**PAH PERFORMED ACCORDING TO USEPA, SW846, METHOD 8270C..**

Scott McKee  
Technical Director

**February 18, 2004**

Date



**HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134**

**Report #: 04-035-0219**

**Page 4 of 8**

**Account # 4808**

## Report of Analyses

**Lab Number: 55285  
Units: mg/Kg**

**Sample ID: 020404-RL-S004**

<u>Analysis</u>	<u>Result</u>	<u>QL</u>	<u>Date/Time Analyzed</u>	<u>Analyst</u>
Naphthalene	BQL	0.099	10-Feb-04 12:00	ES
Acenaphthene	BQL	0.099	10-Feb-04 12:00	ES
Fluorene	BQL	0.099	10-Feb-04 12:00	ES
Fluoranthene	0.351	0.099	10-Feb-04 12:00	ES
Anthracene	0.348	0.099	10-Feb-04 12:00	ES
Phenanthrene	BQL	0.099	10-Feb-04 12:00	ES
Pyrene	0.157	0.099	10-Feb-04 12:00	ES
Chrysene	BQL	0.099	10-Feb-04 12:00	ES
Benz(a)anthracene	BQL	0.099	10-Feb-04 12:00	ES
Benzo(a)pyrene	BQL	0.099	10-Feb-04 12:00	ES
Benzo(k)fluoranthene	BQL	0.099	10-Feb-04 12:00	ES
Benzo(b)fluoranthene	BQL	0.099	10-Feb-04 12:00	ES
Indeno(1,2,3-cd)pyrene	BQL	0.099	10-Feb-04 12:00	ES
Dibenz(a,h)anthracene	BQL	0.099	10-Feb-04 12:00	ES

### Surrogate Recovery %

Nitrobenzene-d5	53
2-Fluorobiphenyl	72
p-Terphenyl-d14	96

**QL - QUANTITATION LIMIT.**

**BQL - BELOW QUANTITATION LIMIT.**

### **Method Reference:**

**PAH PERFORMED ACCORDING TO USEPA, SW846, METHOD 8270C..**

Scott McKee  
Technical Director

**February 18, 2004**

Date



**HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134**

**Report #: 04-035-0219**

**Page 5 of 8**

**Account # 4808**

### Report of Analyses

**Lab Number: 55286  
Units: mg/Kg**

**Sample ID: 020404-RL-S005**

<u>Analysis</u>	<u>Result</u>	<u>QL</u>	<u>Date/Time Analyzed</u>	<u>Analyst</u>
Naphthalene	BQL	0.093	10-Feb-04 12:00	ES
Acenaphthene	BQL	0.093	10-Feb-04 12:00	ES
Fluorene	BQL	0.093	10-Feb-04 12:00	ES
Fluoranthene	0.527	0.093	10-Feb-04 12:00	ES
Anthracene	0.400	0.093	10-Feb-04 12:00	ES
Phenanthrene	0.251	0.093	10-Feb-04 12:00	ES
Pyrene	0.357	0.093	10-Feb-04 12:00	ES
Chrysene	0.239	0.093	10-Feb-04 12:00	ES
Benz(a)anthracene	0.207	0.093	10-Feb-04 12:00	ES
Benzo(a)pyrene	BQL	0.093	10-Feb-04 12:00	ES
Benzo(k)fluoranthene	0.139	0.093	10-Feb-04 12:00	ES
Benzo(b)fluoranthene	0.225	0.093	10-Feb-04 12:00	ES
Indeno(1,2,3-cd)pyrene	BQL	0.093	10-Feb-04 12:00	ES
Dibenz(a,h)anthracene	BQL	0.093	10-Feb-04 12:00	ES

**Surrogate Recovery %**

Nitrobenzene-d5	54
2-Fluorobiphenyl	72
p-Terphenyl-d14	93

**QL - QUANTITATION LIMIT.**

**BQL - BELOW QUANTITATION LIMIT.**

**Method Reference:**

**PAH PERFORMED ACCORDING TO USEPA, SW846, METHOD 8270C..**

**February 18, 2004**

Scott McKee  
Technical Director

Date



**HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134**

**Report #: 04-035-0219**

**Page 6 of 8**

**Account # 4808**

## Report of Analyses

**Lab Number: 55287**  
**Units: mg/Kg**

**Sample ID: 020404-RL-S006**

<u>Analysis</u>	<u>Result</u>	<u>QL</u>	<u>Date/Time Analyzed</u>	<u>Analyst</u>
Naphthalene	BQL	0.095	10-Feb-04 12:00	ES
Acenaphthene	BQL	0.095	10-Feb-04 12:00	ES
Fluorene	BQL	0.095	10-Feb-04 12:00	ES
Fluoranthene	0.326	0.095	10-Feb-04 12:00	ES
Anthracene	BQL	0.095	10-Feb-04 12:00	ES
Phenanthrene	BQL	0.095	10-Feb-04 12:00	ES
Pyrene	BQL	0.095	10-Feb-04 12:00	ES
Chrysene	BQL	0.095	10-Feb-04 12:00	ES
Benz(a)anthracene	BQL	0.095	10-Feb-04 12:00	ES
Benzo(a)pyrene	BQL	0.095	10-Feb-04 12:00	ES
Benzo(k)fluoranthene	BQL	0.095	10-Feb-04 12:00	ES
Benzo(b)fluoranthene	BQL	0.095	10-Feb-04 12:00	ES
Indeno(1,2,3-cd)pyrene	BQL	0.095	10-Feb-04 12:00	ES
Dibenz(a,h)anthracene	BQL	0.095	10-Feb-04 12:00	ES

### Surrogate Recovery %

Nitrobenzene-d5	53
2-Fluorobiphenyl	72
p-Terphenyl-d14	88

**QL - QUANTITATION LIMIT.**

**BQL - BELOW QUANTITATION LIMIT.**

### **Method Reference:**

**PAH PERFORMED ACCORDING TO USEPA, SW846, METHOD 8270C..**

Scott McKee  
Technical Director

**February 18, 2004**

Date



**HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134**

**Report #: 04-035-0219**

**Page 7 of 8**

**Account # 4808**

## Report of Analyses

**Lab Number: 55288  
Units: mg/Kg**

**Sample ID: 020404-RL-S007**

<u>Analysis</u>	<u>Result</u>	<u>QL</u>	<u>Date/Time Analyzed</u>	<u>Analyst</u>
Naphthalene	BQL	0.087	10-Feb-04 12:00	ES
Acenaphthene	BQL	0.087	10-Feb-04 12:00	ES
Fluorene	BQL	0.087	10-Feb-04 12:00	ES
Fluoranthene	0.280	0.087	10-Feb-04 12:00	ES
Anthracene	BQL	0.087	10-Feb-04 12:00	ES
Phenanthrene	BQL	0.087	10-Feb-04 12:00	ES
Pyrene	0.092	0.087	10-Feb-04 12:00	ES
Chrysene	BQL	0.087	10-Feb-04 12:00	ES
Benz(a)anthracene	BQL	0.087	10-Feb-04 12:00	ES
Benzo(a)pyrene	BQL	0.087	10-Feb-04 12:00	ES
Benzo(k)fluoranthene	BQL	0.087	10-Feb-04 12:00	ES
Benzo(b)fluoranthene	BQL	0.087	10-Feb-04 12:00	ES
Indeno(1,2,3-cd)pyrene	BQL	0.087	10-Feb-04 12:00	ES
Dibenz(a,h)anthracene	BQL	0.087	10-Feb-04 12:00	ES

### Surrogate Recovery %

Nitrobenzene-d5	58
2-Fluorobiphenyl	75
p-Terphenyl-d14	106

**QL - QUANTITATION LIMIT.**

**BQL - BELOW QUANTITATION LIMIT.**

### **Method Reference:**

**PAH PERFORMED ACCORDING TO USEPA, SW846, METHOD 8270C..**

Scott McKee  
Technical Director

**February 18, 2004**

Date



**HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134**

**Report #: 04-035-0219**

**Page 8 of 8**

**Account # 4808**

## Report of Analyses

**Lab Number: 55289  
Units: mg/Kg**

**Sample ID: 020304-RL-S009**

<u>Analysis</u>	<u>Result</u>	<u>QL</u>	<u>Date/Time Analyzed</u>	<u>Analyst</u>
Naphthalene	BQL	0.102	10-Feb-04 12:00	ES
Acenaphthene	BQL	0.102	10-Feb-04 12:00	ES
Fluorene	BQL	0.102	10-Feb-04 12:00	ES
Fluoranthene	0.307	0.102	10-Feb-04 12:00	ES
Anthracene	BQL	0.102	10-Feb-04 12:00	ES
Phenanthrene	BQL	0.102	10-Feb-04 12:00	ES
Pyrene	BQL	0.102	10-Feb-04 12:00	ES
Chrysene	BQL	0.102	10-Feb-04 12:00	ES
Benz(a)anthracene	BQL	0.102	10-Feb-04 12:00	ES
Benzo(a)pyrene	BQL	0.102	10-Feb-04 12:00	ES
Benzo(k)fluoranthene	BQL	0.102	10-Feb-04 12:00	ES
Benzo(b)fluoranthene	BQL	0.102	10-Feb-04 12:00	ES
Indeno(1,2,3-cd)pyrene	BQL	0.102	10-Feb-04 12:00	ES
Dibenz(a,h)anthracene	BQL	0.102	10-Feb-04 12:00	ES

### Surrogate Recovery %

Nitrobenzene-d5	51
2-Fluorobiphenyl	70
p-Terphenyl-d14	114

**QL - QUANTITATION LIMIT.**

**BQL - BELOW QUANTITATION LIMIT.**

### **Method Reference:**

**PAH PERFORMED ACCORDING TO USEPA, SW846, METHOD 8270C..**

Scott McKee  
Technical Director

**February 18, 2004**

Date



HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Received Date: 4-Feb-04  
Page: 1 of 8

**Organochlorine Pesticides**  
SW846, Method 8081A

Lab Number: 55282  
Sample ID: 020304-RL-S001  
Units: mg/Kg

Date/Time Analyzed: 10-Feb-04 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
Aldrin	BQL	0.002	Gamma-BHC	BQL	0.002
Dieldrin	0.005	0.002	Delta-BHC	BQL	0.002
Chlordane (Total)	BQL	0.002	Toxaphene	BQL	0.002
4',4'-DDT	BQL	0.002	Endosulfan Sulfate	BQL	0.002
4',4'-DDD	0.007	0.002	Endrin	BQL	0.002
4',4'-DDE	0.004	0.002	Endrin Aldehyde	BQL	0.002
Endosulfan I	BQL	0.002	Heptachlor	BQL	0.002
Endosulfan II	BQL	0.002	Heptachlor Epoxide	BQL	0.002
Alpha-BHC	BQL	0.002			
Beta-BHC	BQL	0.002			

**Surrogate Recovery %**

Decachlorobiphenyl	132
Tetrachloro-m-xylene	62

QL - Quantitation Limit  
BQL - Below Quantitation Limit

Scott Mckee  
Technical Director



HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Received Date: 4-Feb-04  
Page: 2 of 8

**Organochlorine Pesticides**

SW846, Method 8081A

Lab Number: 55283  
Sample ID: 020304-RL-S002  
Units: mg/Kg

Date/Time Analyzed: 10-Feb-04 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
Aldrin	BQL	0.003	Gamma-BHC	BQL	0.003
Dieldrin	BQL	0.003	Delta-BHC	BQL	0.003
Chlordane (Total)	BQL	0.003	Toxaphene	BQL	0.003
4',4'-DDT	BQL	0.003	Endosulfan Sulfate	BQL	0.003
4',4'-DDD	BQL	0.003	Endrin	BQL	0.003
4',4'-DDE	BQL	0.003	Endrin Aldehyde	BQL	0.003
Endosulfan I	BQL	0.003	Heptachlor	BQL	0.003
Endosulfan II	BQL	0.003	Heptachlor Epoxide	BQL	0.003
Alpha-BHC	BQL	0.003			
Beta-BHC	BQL	0.003			

**Surrogate Recovery %**

Decachlorobiphenyl	133
Tetrachloro-m-xylene	66

QL - Quantitation Limit  
BQL - Below Quantitation Limit

---

Scott Mckee  
Technical Director



HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Received Date: 4-Feb-04  
Page: 3 of 8

**Organochlorine Pesticides**  
SW846, Method 8081A

Lab Number: 55284  
Sample ID: 020404-RL-S003  
Units: mg/Kg

Date/Time Analyzed: 10-Feb-04 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
Aldrin	BQL	0.003	Gamma-BHC	BQL	0.003
Dieldrin	BQL	0.003	Delta-BHC	BQL	0.003
Chlordane (Total)	BQL	0.003	Toxaphene	BQL	0.003
4',4'-DDT	BQL	0.003	Endosulfan Sulfate	BQL	0.003
4',4'-DDD	BQL	0.003	Endrin	BQL	0.003
4',4'-DDE	BQL	0.003	Endrin Aldehyde	BQL	0.003
Endosulfan I	BQL	0.003	Heptachlor	BQL	0.003
Endosulfan II	BQL	0.003	Heptachlor Epoxide	BQL	0.003
Alpha-BHC	BQL	0.003			
Beta-BHC	BQL	0.003			

**Surrogate Recovery %**

Decachlorobiphenyl	93
Tetrachloro-m-xylene	46

QL - Quantitation Limit  
BQL - Below Quantitation Limit

Scott Mckee  
Technical Director



HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Received Date: 4-Feb-04  
Page: 4 of 8

**Organochlorine Pesticides**  
SW846, Method 8081A

Lab Number: 55285  
Sample ID: 020404-RL-S004  
Units: mg/Kg

Date/Time Analyzed: 10-Feb-04 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
Aldrin	BQL	0.003	Gamma-BHC	BQL	0.003
Dieldrin	BQL	0.003	Delta-BHC	BQL	0.003
Chlordane (Total)	BQL	0.003	Toxaphene	BQL	0.003
4',4'-DDT	BQL	0.003	Endosulfan Sulfate	BQL	0.003
4',4'-DDD	0.008	0.003	Endrin	BQL	0.003
4',4'-DDE	BQL	0.003	Endrin Aldehyde	BQL	0.003
Endosulfan I	BQL	0.003	Heptachlor	BQL	0.003
Endosulfan II	BQL	0.003	Heptachlor Epoxide	BQL	0.003
Alpha-BHC	BQL	0.003			
Beta-BHC	BQL	0.003			

**Surrogate Recovery %**

Decachlorobiphenyl	110
Tetrachloro-m-xylene	51

QL - Quantitation Limit  
BQL - Below Quantitation Limit

---

Scott Mckee  
Technical Director



**HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134**

**Report Number:** 04-035-0219  
**Account Number:** 4808  
**Report Date:** 19-Feb-04  
**Received Date:** 4-Feb-04  
**Page:** 5 of 8

**Organochlorine Pesticides**  
SW846, Method 8081A

**Lab Number:** 55286  
**Sample ID:** 020404-RL-S005  
**Units:** mg/Kg

**Date/Time Analyzed:** 10-Feb-04 12:00  
**Analyst:** SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
Aldrin	BQL	0.003	Gamma-BHC	BQL	0.003
Dieldrin	0.004	0.003	Delta-BHC	BQL	0.003
Chlordane (Total)	BQL	0.003	Toxaphene	BQL	0.003
4',4'-DDT	BQL	0.003	Endosulfan Sulfate	BQL	0.003
4',4'-DDD	0.007	0.003	Endrin	BQL	0.003
4',4'-DDE	BQL	0.003	Endrin Aldehyde	BQL	0.003
Endosulfan I	BQL	0.003	Heptachlor	BQL	0.003
Endosulfan II	BQL	0.003	Heptachlor Epoxide	BQL	0.003
Alpha-BHC	BQL	0.003			
Beta-BHC	BQL	0.003			

**Surrogate Recovery %**

Decachlorobiphenyl	114
Tetrachloro-m-xylene	57

**QL - Quantitation Limit**  
**BQL - Below Quantitation Limit**

**Scott Mckee**  
**Technical Director**



HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Received Date: 4-Feb-04  
Page: 6 of 8

**Organochlorine Pesticides**

SW846, Method 8081A

Lab Number: 55287  
Sample ID: 020404-RL-S006  
Units: mg/Kg

Date/Time Analyzed: 10-Feb-04 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
Aldrin	BQL	0.003	Gamma-BHC	BQL	0.003
Dieldrin	0.007	0.003	Delta-BHC	BQL	0.003
Chlordane (Total)	BQL	0.003	Toxaphene	BQL	0.003
4',4'-DDT	BQL	0.003	Endosulfan Sulfate	BQL	0.003
4',4'-DDD	0.004	0.003	Endrin	BQL	0.003
4',4'-DDE	BQL	0.003	Endrin Aldehyde	BQL	0.003
Endosulfan I	BQL	0.003	Heptachlor	BQL	0.003
Endosulfan II	BQL	0.003	Heptachlor Epoxide	BQL	0.003
Alpha-BHC	BQL	0.003			
Beta-BHC	BQL	0.003			

**Surrogate Recovery %**

Decachlorobiphenyl	97
Tetrachloro-m-xylene	59

QL - Quantitation Limit  
BQL - Below Quantitation Limit

Scott Mckee  
Technical Director



HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Received Date: 4-Feb-04  
Page: 7 of 8

**Organochlorine Pesticides**  
SW846, Method 8081A

Lab Number: 55288  
Sample ID: 020404-RL-S007  
Units: mg/Kg

Date/Time Analyzed: 10-Feb-04 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
Aldrin	BQL	0.003	Gamma-BHC	BQL	0.003
Dieldrin	0.003	0.003	Delta-BHC	BQL	0.003
Chlordane (Total)	BQL	0.003	Toxaphene	BQL	0.003
4',4'-DDT	BQL	0.003	Endosulfan Sulfate	BQL	0.003
4',4'-DDD	0.003	0.003	Endrin	BQL	0.003
4',4'-DDE	BQL	0.003	Endrin Aldehyde	BQL	0.003
Endosulfan I	BQL	0.003	Heptachlor	BQL	0.003
Endosulfan II	BQL	0.003	Heptachlor Epoxide	BQL	0.003
Alpha-BHC	BQL	0.003			
Beta-BHC	BQL	0.003			

**Surrogate Recovery %**

Decachlorobiphenyl	125
Tetrachloro-m-xylene	68

QL - Quantitation Limit  
BQL - Below Quantitation Limit

Scott McKeel  
Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



The One Source.

HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Received Date: 4-Feb-04  
Page: 8 of 8

## Organochlorine Pesticides SW846, Method 8081A

Lab Number: 55289  
Sample ID: 020304-RL-S009  
Units: mg/Kg

Date/Time Analyzed: 10-Feb-04 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
Aldrin	BQL	0.003	Gamma-BHC	BQL	0.003
Dieldrin	BQL	0.003	Delta-BHC	BQL	0.003
Chlordane (Total)	BQL	0.003	Toxaphene	BQL	0.003
4',4'-DDT	BQL	0.003	Endosulfan Sulfate	BQL	0.003
4',4'-DDD	BQL	0.003	Endrin	BQL	0.003
4',4'-DDE	BQL	0.003	Endrin Aldehyde	BQL	0.003
Endosulfan I	BQL	0.003	Heptachlor	BQL	0.003
Endosulfan II	BQL	0.003	Heptachlor Epoxide	BQL	0.003
Alpha-BHC	BQL	0.003			
Beta-BHC	BQL	0.003			

### Surrogate Recovery %

Decachlorobiphenyl	124
Tetrachloro-m-xylene	84

QL - Quantitation Limit  
BQL - Below Quantitation Limit

Scott Mckee  
Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Received Date: 4-Feb-03

## Chlorinated Herbicides by GC/ECD

SW846, Method 8151A

Lab Number: 55282  
Sample ID: 020304-RL-S001  
Units: mg/Kg

Date/Time Analyzed: 10-Feb-04 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
2,4-D	BQL	0.044	Dicamba	BQL	0.029
2,4-DB	BQL	0.029	Dichlorprop	BQL	0.015
2,4,5-TP (Silvex)	BQL	0.001	Dinoseb	BQL	0.022
2,4,5-T	BQL	0.007	MCPA	BQL	0.75
Dalapon	BQL	0.088	MCPP	BQL	1.47

### Surrogate Recovery %

2,4 DCAA 98

QL - Quantitation Limit  
BQL - Below Quantitation Limit

---

Scott Mckee  
Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



The One Source.

HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Received Date: 4-Feb-03

## Chlorinated Herbicides by GC/ECD

SW846, Method 8151A

Lab Number: 55283  
Sample ID: 020304-RL-S002  
Units: mg/Kg

Date/Time Analyzed: 10-Feb-04 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
2,4-D	BQL	0.046	Dicamba	BQL	0.031
2,4-DB	BQL	0.031	Dichlorprop	BQL	0.015
2,4,5-TP (Silvex)	BQL	0.002	Dinoseb	BQL	0.023
2,4,5-T	BQL	0.008	MCPA	BQL	0.785
Dalapon	BQL	0.092	MCPP	BQL	1.54

### Surrogate Recovery %

2,4 DCAA 71

QL - Quantitation Limit  
BQL - Below Quantitation Limit

---

Scott Mckee  
Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Received Date: 4-Feb-03

## Chlorinated Herbicides by GC/ECD

SW846, Method 8151A

Lab Number: 55284  
Sample ID: 020404-RL-S003  
Units: mg/Kg

Date/Time Analyzed: 10-Feb-04 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
2,4-D	BQL	0.044	Dicamba	BQL	0.029
2,4-DB	BQL	0.029	Dichlorprop	BQL	0.015
2,4,5-TP (Silvex)	BQL	0.001	Dinoseb	BQL	0.022
2,4,5-T	BQL	0.007	MCPA	BQL	0.75
Dalapon	BQL	0.088	MCPP	BQL	1.47

### Surrogate Recovery %

2,4 DCAA 86

QL - Quantitation Limit  
BQL - Below Quantitation Limit

---

Scott Mckee  
Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



The One Source.

HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Received Date: 4-Feb-03

## Chlorinated Herbicides by GC/ECD

SW846, Method 8151A

Lab Number: 55285  
Sample ID: 020404-RL-S004  
Units: mg/Kg

Date/Time Analyzed: 10-Feb-04 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
2,4-D	BQL	0.043	Dicamba	BQL	0.029
2,4-DB	BQL	0.029	Dichlorprop	BQL	0.014
2,4,5-TP (Silvex)	BQL	0.001	Dinoseb	BQL	0.022
2,4,5-T	BQL	0.007	MCPA	BQL	0.729
Dalapon	BQL	0.086	MCPP	BQL	1.43

### Surrogate Recovery %

2,4 DCAA 68

QL - Quantitation Limit  
BQL - Below Quantitation Limit

---

Scott Mckee  
Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Received Date: 4-Feb-03

## Chlorinated Herbicides by GC/ECD

SW846, Method 8151A

Lab Number: 55286  
Sample ID: 020404-RL-S005  
Units: mg/Kg

Date/Time Analyzed: 10-Feb-04 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
2,4-D	BQL	0.042	Dicamba	BQL	0.028
2,4-DB	BQL	0.028	Dichlorprop	BQL	0.014
2,4,5-TP (Silvex)	BQL	0.001	Dinoseb	BQL	0.021
2,4,5-T	BQL	0.007	MCPA	BQL	0.709
Dalapon	BQL	0.083	MCPP	BQL	1.39

### Surrogate Recovery %

2,4 DCAA 59

QL - Quantitation Limit  
BQL - Below Quantitation Limit

---

Scott Mckee  
Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Received Date: 4-Feb-03

## Chlorinated Herbicides by GC/ECD SW846, Method 8151A

Lab Number: 55287  
Sample ID: 020404-RL-S006  
Units: mg/Kg

Date/Time Analyzed: 10-Feb-04 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
2,4-D	BQL	0.042	Dicamba	BQL	0.028
2,4-DB	BQL	0.028	Dichlorprop	BQL	0.014
2,4,5-TP (Silvex)	BQL	0.001	Dinoseb	BQL	0.021
2,4,5-T	BQL	0.007	MCPA	BQL	0.719
Dalapon	BQL	0.085	MCPP	BQL	1.41

### Surrogate Recovery %

2,4 DCAA 100

QL - Quantitation Limit  
BQL - Below Quantitation Limit

Scott Mckee  
Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Received Date: 4-Feb-03

## Chlorinated Herbicides by GC/ECD

SW846, Method 8151A

Lab Number: 55288  
Sample ID: 020404-RL-S007  
Units: mg/Kg

Date/Time Analyzed: 10-Feb-04 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
2,4-D	BQL	0.039	Dicamba	BQL	0.026
2,4-DB	BQL	0.026	Dichlorprop	BQL	0.013
2,4,5-TP (Silvex)	BQL	0.001	Dinoseb	BQL	0.02
2,4,5-T	BQL	0.007	MCPA	BQL	0.663
Dalapon	BQL	0.078	MCPP	BQL	1.3

### Surrogate Recovery %

2,4 DCAA 61

QL - Quantitation Limit  
BQL - Below Quantitation Limit

---

Scott Mckee  
Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Received Date: 4-Feb-03

RECEIVED FEB 26 2004

## Chlorinated Herbicides by GC/ECD

SW846, Method 8151A

Lab Number: 55289  
Sample ID: 020304-RL-S009  
Units: mg/Kg

Date/Time Analyzed: 10-Feb-04 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
2,4-D	BQL	0.046	Dicamba	BQL	0.03
2,4-DB	BQL	0.03	Dichlorprop	BQL	0.015
2,4,5-TP (Silvex)	BQL	0.002	Dinoseb	BQL	0.023
2,4,5-T	BQL	0.008	MCPA	BQL	0.775
Dalapon	BQL	0.091	MCPP	BQL	1.52

### Surrogate Recovery %

2,4 DCAA 78

QL - Quantitation Limit  
BQL - Below Quantitation Limit

Scott Mckee  
Technical Director



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



The One Source.

HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Page: 1 of 8

## Polychlorinated Biphenyls (PCB's) by Gas Chromatography SW846, Method 8082

Lab Number: 55282  
Sample ID: 020304-RL-S001  
Units: mg/Kg

Date/Time Analyzed: 2/10/2004 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
Aroclor 1016	BQL	0.052	Aroclor 1242	BQL	0.052
Aroclor 1221	BQL	0.052	Aroclor 1248	BQL	0.052
Aroclor 1232	BQL	0.052	Aroclor 1254	BQL	0.052
			Aroclor 1260	BQL	0.052

QL - Quantitation Limit  
BQL - Below Quantitation Limit

### Surrogate Recovery %

Tetrachloro-m-xylene 68  
Decachlorobiphenyl 81

Scott McKee  
Technical Director

February 19, 2004

Date



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Page: 2 of 8

## Polychlorinated Biphenyls (PCB's) by Gas Chromatography SW846, Method 8082

Lab Number: 55283  
Sample ID: 020304-RL-S002  
Units: mg/Kg

Date/Time Analyzed: 2/10/2004 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
Aroclor 1016	BQL	0.054	Aroclor 1242	BQL	0.054
Aroclor 1221	BQL	0.054	Aroclor 1248	BQL	0.054
Aroclor 1232	BQL	0.054	Aroclor 1254	BQL	0.054
			Aroclor 1260	BQL	0.054

QL - Quantitation Limit  
BQL - Below Quantitation Limit

### Surrogate Recovery %

Tetrachloro-m-xylene 82  
Decachlorobiphenyl 93

Scott McKee  
Technical Director

February 19, 2004

Date



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Page: 3 of 8

## Polychlorinated Biphenyls (PCB's) by Gas Chromatography SW846, Method 8082

Lab Number: 55284  
Sample ID: 020404-RL-S003  
Units: mg/Kg

Date/Time Analyzed: 2/10/2004 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
Aroclor 1016	BQL	0.052	Aroclor 1242	BQL	0.052
Aroclor 1221	BQL	0.052	Aroclor 1248	BQL	0.052
Aroclor 1232	BQL	0.052	Aroclor 1254	BQL	0.052
			Aroclor 1260	BQL	0.052

QL - Quantitation Limit  
BQL - Below Quantitation Limit

### Surrogate Recovery %

Tetrachloro-m-xylene	65
Decachlorobiphenyl	87

Scott McKee  
Technical Director

February 19, 2004

Date



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



The One Source.

HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Page: 4 of 8

## Polychlorinated Biphenyls (PCB's) by Gas Chromatography SW846, Method 8082

Lab Number: 55285  
Sample ID: 020404-RL-S004  
Units: mg/Kg

Date/Time Analyzed: 2/10/2004 12:00  
Analyst: SC

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
Aroclor 1016	BQL	0.050	Aroclor 1242	BQL	0.050
Aroclor 1221	BQL	0.050	Aroclor 1248	BQL	0.050
Aroclor 1232	BQL	0.050	Aroclor 1254	BQL	0.050
			Aroclor 1260	BQL	0.050

QL - Quantitation Limit

BQL - Below Quantitation Limit

### Surrogate Recovery %

Tetrachloro-m-xylene	62
Decachlorobiphenyl	93

Scott McKee  
Technical Director

February 19, 2004

Date



**HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134**

**Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Page: 5 of 8**

**Polychlorinated Biphenyls (PCB's) by Gas Chromatography  
SW846, Method 8082**

**Lab Number: 55286  
Sample ID: 020404-RL-S005  
Units: mg/Kg**

**Date/Time Analyzed: 2/10/2004 12:00  
Analyst: SC**

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
Aroclor 1016	BQL	0.048	Aroclor 1242	BQL	0.048
Aroclor 1221	BQL	0.048	Aroclor 1248	BQL	0.048
Aroclor 1232	BQL	0.048	Aroclor 1254	0.073	0.048
			Aroclor 1260	BQL	0.048

**QL - Quantitation Limit  
BQL - Below Quantitation Limit**

**Surrogate Recovery %**

Tetrachloro-m-xylene	57
Decachlorobiphenyl	71

**Scott McKee  
Technical Director**

**February 19, 2004**

**Date**



**A&L Analytical Laboratories, Inc.**

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



The One Source.

**HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134**

**Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Page: 6 of 8**

**Polychlorinated Biphenyls (PCB's) by Gas Chromatography  
SW846, Method 8082**

**Lab Number: 55287  
Sample ID: 020404-RL-S006  
Units: mg/Kg**

**Date/Time Analyzed: 2/10/2004 12:00  
Analyst: SC**

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
Aroclor 1016	BQL	0.049	Aroclor 1242	BQL	0.049
Aroclor 1221	BQL	0.049	Aroclor 1248	BQL	0.049
Aroclor 1232	BQL	0.049	Aroclor 1254	0.083	0.049
			Aroclor 1260	BQL	0.049

**QL - Quantitation Limit  
BQL - Below Quantitation Limit**

**Surrogate Recovery %**

Tetrachloro-m-xylene 78  
Decachlorobiphenyl 90

**Scott McKee  
Technical Director**

**February 19, 2004**

**Date**



**HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134**

**Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Page: 7 of 8**

**Polychlorinated Biphenyls (PCB's) by Gas Chromatography  
SW846, Method 8082**

**Lab Number: 55288  
Sample ID: 020404-RL-S007  
Units: mg/Kg**

**Date/Time Analyzed: 2/10/2004 12:00  
Analyst: SC**

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
Aroclor 1016	BQL	0.053	Aroclor 1242	BQL	0.053
Aroclor 1221	BQL	0.053	Aroclor 1248	BQL	0.053
Aroclor 1232	BQL	0.053	Aroclor 1254	0.078	0.053
			Aroclor 1260	BQL	0.053

**QL - Quantitation Limit  
BQL - Below Quantitation Limit**

**Surrogate Recovery %**

Tetrachloro-m-xylene 86  
Decachlorobiphenyl 107

**Scott McKee  
Technical Director**

**February 19, 2004**

**Date**



**HESS ENVIRONMENTAL SERVICE  
ATTN: ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134**

**Report Number: 04-035-0219  
Account Number: 4808  
Report Date: 19-Feb-04  
Page: 8 of 8**

**Polychlorinated Biphenyls (PCB's) by Gas Chromatography  
SW846, Method 8082**

**Lab Number: 55289  
Sample ID: 020304-RL-S009  
Units: mg/Kg**

**Date/Time Analyzed: 2/10/2004 12:00  
Analyst: SC**

<u>Compound</u>	<u>Result</u>	<u>QL</u>	<u>Compound</u>	<u>Result</u>	<u>QL</u>
Aroclor 1016	BQL	0.053	Aroclor 1242	BQL	0.053
Aroclor 1221	BQL	0.053	Aroclor 1248	BQL	0.053
Aroclor 1232	BQL	0.053	Aroclor 1254	0.078	0.053
			Aroclor 1260	BQL	0.053

**QL - Quantitation Limit  
BQL - Below Quantitation Limit**

**Surrogate Recovery %**

Tetrachloro-m-xylene 86  
Decachlorobiphenyl 107

**Scott McKee  
Technical Director**

**February 19, 2004**

**Date**



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



The One Source.

HESS ENVIRONMENTAL SERVICE  
ATTN: HANK HESS/ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

REPORT NUMBER: 04-035-0219  
ACCOUNT NO.: 4808  
REPORT DATE: 20-Feb-04  
DATE SAMPLES RECEIVED: 4-Feb-02  
MATRIX: SOIL  
PROJECT: W38XGR-3276-0640

## Report of Analyses

LAB ID: 55282

SAMPLE ID: 020304-RL-S001

<u>COMPOUND</u>	<u>RESULT, mg/Kg</u>	<u>QL, mg/Kg</u>	<u>DATE/TIME ANALYZED</u>	<u>ANALYST</u>
EPH	128	5	11-Feb-02 12:00	SC

LAB ID: 55283

SAMPLE ID: 020304-RL-S002

<u>COMPOUND</u>	<u>RESULT, mg/Kg</u>	<u>QL, mg/Kg</u>	<u>DATE/TIME ANALYZED</u>	<u>ANALYST</u>
EPH	56	5	11-Feb-02 12:00	SC

LAB ID: 55284

SAMPLE ID: 020404-RL-S003

<u>COMPOUND</u>	<u>RESULT, mg/Kg</u>	<u>QL, mg/Kg</u>	<u>DATE/TIME ANALYZED</u>	<u>ANALYST</u>
EPH	100	5	11-Feb-02 12:00	SC

LAB ID: 55285

SAMPLE ID: 020404-RL-S004

<u>COMPOUND</u>	<u>RESULT, mg/Kg</u>	<u>QL, mg/Kg</u>	<u>DATE/TIME ANALYZED</u>	<u>ANALYST</u>
EPH	86	5	11-Feb-02 12:00	SC

LAB ID: 55286

SAMPLE ID: 020404-RL-S005

<u>COMPOUND</u>	<u>RESULT, mg/Kg</u>	<u>QL, mg/Kg</u>	<u>DATE/TIME ANALYZED</u>	<u>ANALYST</u>
EPH	101	5	11-Feb-02 12:00	SC

LOW/HIGH RANGE ORGANICS PERFORMED ACCORDING TO USEPA, SW846, METHOD 8015B.

Scott Mckee  
Technical Director

February 20, 2004

Date



# A&L Analytical Laboratories, Inc.

2790 Whitten Rd. Memphis, TN 38133 • Phone (901) 213-2400 • Fax (901) 213-2440



The One Source.

HESS ENVIRONMENTAL SERVICE  
ATTN: HANK HESS/ROBERT LANGFORD  
6057 EXECUTIVE CENTER DR STE 6  
MEMPHIS, TN 38134

REPORT NUMBER: 04-035-0219  
ACCOUNT NO.: 4808  
REPORT DATE: 20-Feb-04  
DATE SAMPLES RECEIVED: 4-Feb-02  
MATRIX: SOIL  
PROJECT: W38XGR-3276-0640

## Report of Analyses

LAB ID: 55287

SAMPLE ID: 020304-RL-S006

<u>COMPOUND</u>	<u>RESULT, mg/Kg</u>	<u>QL, mg/Kg</u>	<u>DATE/TIME ANALYZED</u>	<u>ANALYST</u>
EPH	62	5	11-Feb-02 12:00	SC

LAB ID: 55288

SAMPLE ID: 020304-RL-S007

<u>COMPOUND</u>	<u>RESULT, mg/Kg</u>	<u>QL, mg/Kg</u>	<u>DATE/TIME ANALYZED</u>	<u>ANALYST</u>
EPH	43	5	11-Feb-02 12:00	SC

LAB ID: 55289

SAMPLE ID: 020304-RL-S009

<u>COMPOUND</u>	<u>RESULT, mg/Kg</u>	<u>QL, mg/Kg</u>	<u>DATE/TIME ANALYZED</u>	<u>ANALYST</u>
EPH	22	5	11-Feb-02 12:00	SC

LOW/HIGH RANGE ORGANICS PERFORMED ACCORDING TO USEPA, SW846, METHOD 8015B.

Scott Mckee  
Technical Director

February 20, 2004

Date

03 04-035-0219

RECEIVED FEB 26 2004

**A&L Tru-Testing™** - Setting the Standard for Compliance Monitoring.



A&L Analytical Laboratories, Inc  
Quality results. Quick returns.  
www.a1-labs.com

Page 1 of 2

P.O. 061075 Project W38XGR-9476-0640

Company: HESS ENVIRONMENTAL SERVICES, INC

Attention: Robert A. Langford

Address: 6057 EXECUTIVE CENTRE DR  
SO. W #6, Memphis TN 38134

Account #: 4008

Transported by: HES

Copy to (Name/Address):

Turnaround Time:  
 Normal Phone: 377-9139  
 Rush Fax Results: 377-9150 (\$1.00/page)

Sampled by (Print/Signature) Robert A. Langford  
 (Sign) Robert A. Langford

LAB# I.D. (Internal Lab Use Only)	Date & Time	Comp	Field	Sample ID/Field Location	Matrix	Total # Containers	Preservatives	Analysis/Method	Remarks
55282	2-3-04 @ 09:45	X		020304-AL-S001	Soil	2	None	TOC, PALS, PESTICIDES, HERBICIDES, PCBs, TR-ENH, T-22 METALS-TAL	SB-1, 0'-20' *
55283	2-3-04 @ 10:15	X		020304-AL-S002	"	1	"	"	Soil/Air Sample *
55284	2-4-04 @ 08:05	X		020404-AL-S003	"	1	"	"	SB-4, 9'-10.5' *
55285	2-4-04 @ 08:10	X		020404-AL-S004	"	1	"	"	SB-4, 14'-16' *
55286	2-4-04 @ 08:15	X		020404-AL-S005	"	1	"	"	SB-4, 18'-20' *
55287	2-4-04 @ 09:15	X		020404-AL-S006	"	1	"	"	SB-2, 0'-9' *
55288	2-4-04 @ 10:00	X		020404-AL-S007	"	1	"	"	SB-3, 0'-6' *

Date Samples Shipped: \_\_\_\_\_ Shipped Via: \*1/2 Airstave Sample

① Relinquished by: Robert A. Langford (Print) Robert A. Langford (Sign) Received by: Robert A. Langford (Print) Robert A. Langford (Sign) Date/Time: 3-4-04  
 (Print) Robert A. Langford (Sign) Date/Time: 08:51

② Relinquished by: J. Smith (Print) J. Smith (Sign) Received by: J. Smith (Print) J. Smith (Sign) Date/Time: 2/4/04  
 (Print) J. Smith (Sign) Date/Time: 1/20

Comments by Lab: Please fill out all RED areas.



<b>H4C050117 Analytical Report.....</b>	<b>1</b>
<b>Sample Receipt Documentation.....</b>	<b>23</b>
<b>Total Number of Pages .....</b>	<b>25</b>

H460SD117

**Ocean Programs Analytical Request Table PCB  
Congeners Target Analyte List Minimum  
Quantitation Limits Guidelines by Matrices**

PCB Congener List by #	Aroclor 1254a	Aroclor 1254g	8082 Congeners	USACE List	PCB Congener	Water	Sediment	Tissue
						ug/L (ppb)	ug/L (ppb)	ug/L (ppb)
1	1		1					
5			5					
8	8	8		8	8 /	0.02	1.0	0.0010
18	18	18	18	18	18 /	0.02	1.0	0.0010
28	28	28		28	28 /	0.02	1.0	0.0010
31	31	31	31					
44	44	44	44	44	44 /	0.02	1.0	0.0010
49	49	49		49	49 /	0.02	1.0	0.0010
52	52	52	52	52	52 /	0.02	1.0	0.0010
66	66	66	66	66	66 /	0.02	1.0	0.0010
77	77	77			77 /	0.02	1.0	0.0010
87	87	87	87	87	87 /	0.02	1.0	0.0010
101	101	101	101	101	101 /	0.02	1.0	0.0010
105	105	105			105 /	0.02	1.0	0.0010
110	110	110	110					
118	118	118		118	118 /	0.02	1.0	0.0010
126	126	126			126 /	0.02	1.0	0.0010
128	128	128			128 /	0.02	1.0	0.0010
138	138	138	138	138	138 /	0.02	1.0	0.0010
141	141	141	141					
151	151	151	151					
153	153	153	153	153	153 /	0.02	1.0	0.0010
156	156	156			156 /	0.02	1.0	0.0010
169					169 /	0.02	1.0	0.0010
170	170	170	170	170	170 /	0.02	1.0	0.0010
180	180	180	180	180	180 /	0.02	1.0	0.0010
183	183	183	183	183	183 /	0.02	1.0	0.0010
184				184	184 /	0.02	1.0	0.0010
187	187	187	187	187	187 /	0.02	1.0	0.0010
195				195	195 /	0.02	1.0	0.0010
206	206	206	206	206	206 /	0.02	1.0	0.0010
209					209 /	0.02	1.0	0.0010

19

19

26

: Total # of Congeners per List



STL Knoxville  
5815 Middlebrook Pike  
Knoxville, TN 37921

Tel: 865 291 3000 Fax: 865 584 4315  
www.stl-inc.com

RECEIVED MAR 24 2004

## ANALYTICAL REPORT

Congeners

Lot #: H4C050117

Robert Langford

Hess Environmental  
6057 Executive Center  
Suite 6  
Memphis, TN 38134

SEVERN TRENT LABORATORIES, INC.

A handwritten signature in black ink that reads "Scott A. Harris".

Scott A. Harris  
Project Manager

March 22, 2004

## ANALYTICAL METHODS SUMMARY

H4C050117

<u>PARAMETER</u>	<u>ANALYTICAL METHOD</u>
Percent Moisture	MCAWW 160.3 MOD
PCB Congeners by SW-846 8082	SW846 8082 Congeners

### References:

MCAWW "Methods for Chemical Analysis of Water and Wastes",  
EPA-600/4-79-020, March 1983 and subsequent revisions.

SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical  
Methods", Third Edition, November 1986 and its updates.

**SAMPLE SUMMARY**

H4C050117

<u>WO #</u>	<u>SAMPLE#</u>	<u>CLIENT SAMPLE ID</u>	<u>SAMPLED DATE</u>	<u>SAMP TIME</u>
GANJP	001	020304-RL-S001	02/03/04	
GANJQ	002	020304-RL-S002	02/03/04	
GANJR	003	020404-RL-S003	02/04/04	
GANJV	004	020404-RL-S004	02/04/04	
GANJW	005	020404-RL-S005	02/04/04	
GANJX	006	020404-RL-S006	02/04/04	
GANJO	007	020404-RL-S007	02/04/04	
GANJ1	008	020304-RL-S009	02/03/04	

**NOTE(S) :**

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

## PROJECT NARRATIVE H4C050117

The results reported herein are applicable to the samples submitted for analysis only.

This report shall not be reproduced except in full, without the written approval of the laboratory.

**The original chain of custody documentation is included with this report.**

### Sample Receipt

The samples were received with the recommended holding time expired.

Sample 020404-RL-5008 was listed on the chain of custody but not received.

### Quality Control

Unless otherwise noted, all QC criteria were met and the test results shown in this report meet all applicable NELAC requirements.

All solid samples are reported on a dry weight basis. The initial sample weight was adjusted for moisture content during sample prep.

Sample results with more than 40% difference between the primary and confirmation column were reported with a "COL" flag. The lower of the two results was reported.

Table 1: IUPAC and CAS Nomenclature			
IUPAC #	Compound	Chlorination Level	CAS #
1	2	Mono	2051-60-7
2	3	Mono	2051-61-8
3	4	Mono	2051-62-9
4	2,2'	Di	13029-08-8
5	2,3	Di	16605-91-7
6	2,3'	Di	25569-80-6

STL Knoxville maintains the following certifications, approvals and accreditations: Arkansas DEQ Cert. # 03-049-0, California DHS ELAP Cert. #2423, Colorado DPHE, Connecticut DPH Cert. #PH-0223, Florida DOH Cert. #E87177, Georgia DNR Cert. #906, Hawaii DOH, Illinois EPA Cert. # 000687, Indiana DOH Cert. #C-TN-02, Kansas DHE Cert. # E-10349, Kentucky DEP Lab ID #90101, Louisiana DEQ Cert. #03079, Louisiana DOHH Cert. #LA030024, Maryland DHMH Cert. #277, Massachusetts DEP Cert. #M-TN009, Michigan DEQ Lab ID #9933, New Jersey DEP Cert. #TN001, New York DOH Lab #10781, North Carolina DPH Lab ID #21705, North Carolina DEHNR Cert. #64, Oklahoma DEQ ID #9415, Pennsylvania DEP Cert. # 68-576, South Carolina DHEC Lab ID #84001001, Tennessee DOH Lab ID #02014, Utah DOH Cert. #QUAN3, Virginia DGS Lab ID #00165, Washington DOE Lab #C120, Wisconsin DNR Lab ID #998044300, US Army Corps of Engineers, Naval Facilities Engineering Service Center, US EPA Perchlorate Approval and USDA Soil Permit #S-46424. This list of approvals is subject to change and does not imply that laboratory certification is available for all parameters reported in this environmental sample data report.

**PROJECT NARRATIVE**  
**H4C050117**

Table 1: IUPAC and CAS Nomenclature			
IUPAC #	Compound	Chlorination Level	CAS #
7	2,4	Di	33284-50-3
8	2,4'	Di	34883-43-7
9	2,5	Di	34883-39-1
10	2,6	Di	33146-45-1
11	3,3'	Di	2050-67-1
12	3,4	Di	2974-92-7
13	3,4'	Di	2974-90-5
14	3,5	Di	34883-41-5
15	4,4'	Di	2050-68-2
16	2,2',3	Tri	38444-78-9
17	2,2',4	Tri	37680-66-3
18	2,2',5	Tri	37680-65-2
19	2,2',6	Tri	38444-73-4
20	2,3,3'	Tri	38444-84-7
21	2,3,4	Tri	55702-46-0
22	2,3,4'	Tri	38444-85-8
23	2,3,5	Tri	55720-44-0
24	2,3,6	Tri	58702-45-9
25	2,3',4	Tri	55712-37-3
26	2,3',5	Tri	38444-81-4
27	2,3',6	Tri	38444-76-7
28	2,4,4'	Tri	7012-37-5
29	2,4,5	Tri	15862-07-4
30	2,4,6	Tri	35693-92-6
31	2,4',5	Tri	16606-02-3
32	2,4',6	Tri	38444-77-8
33	2',3,4	Tri	38444-86-9
34	2',3,5	Tri	37680-68-5
35	3,3',4	Tri	37680-69-6
36	3,3',5	Tri	38444-87-0

STL Knoxville maintains the following certifications, approvals and accreditations: Arkansas DEQ Cert. # 03-049-0, California DHS ELAP Cert. #2423, Colorado DPHE, Connecticut DPH Cert. #PH-0223, Florida DOH Cert. #E87177, Georgia DNR Cert. #906, Hawaii DOH, Illinois EPA Cert. # 000687, Indiana DOH Cert. #C-TN-02, Kansas DHE Cert. # E-10349, Kentucky DEP Lab ID #90101, Louisiana DEQ Cert. #03079, Louisiana DOHH Cert. #LA030024, Maryland DHMH Cert. #277, Massachusetts DEP Cert. #M-TN009, Michigan DEQ Lab ID #9933, New Jersey DEP Cert. #TN001, New York DOH Lab #10781, North Carolina DPH Lab ID #21705, North Carolina DEHNR Cert. #64, Oklahoma DEQ ID #9415, Pennsylvania DEP Cert. # 68-576, South Carolina DHEC Lab ID #84001001, Tennessee DOH Lab ID #02014, Utah DOH Cert. #QUAN3, Virginia DGS Lab ID #00165, Washington DOE Lab #C120, Wisconsin DNR Lab ID #998044300, US Army Corps of Engineers, Naval Facilities Engineering Service Center, US EPA Perchlorate Approval and USDA Soil Permit #S-46424. This list of approvals is subject to change and does not imply that laboratory certification is available for all parameters reported in this environmental sample data report.

**PROJECT NARRATIVE**  
**H4C050117**

Table 1: IUPAC and CAS Nomenclature			
IUPAC #	Compound	Chlorination Level	CAS #
37	3,4,4'	Tri	38444-90-5
38	3,4,5	Tri	53555-66-1
39	3,4',5	Tri	38444-88-1
40	2,2',3,3'	Tetra	38444-93-8
41	2,2',3,4	Tetra	52663-59-9
42	2,2',3,4'	Tetra	36559-22-5
43	2,2',3,5	Tetra	70362-46-8
44	2,2',3,5'	Tetra	41464-39-5
45	2,2',3,6	Tetra	70362-45-7
46	2,2',3,6'	Tetra	41464-47-5
47	2,2',4,4'	Tetra	2437-79-8
48	2,2',4,5	Tetra	70362-47-9
49	2,2',4,5'	Tetra	41464-40-8
50	2,2',4,6	Tetra	62796-65-8
51	2,2',4,6'	Tetra	65194-04-7
52	2,2',5,5'	Tetra	35693-99-3
53	2,2',5,6'	Tetra	41464-41-9
54	2,2',6,6'	Tetra	15968-05-5
55	2,3,3',4	Tetra	74338-24-2
56	2,3,3',4'	Tetra	41464-43-1
57	2,3,3',5	Tetra	70424-67-8
58	2,3,3',5'	Tetra	41464-49-7
59	2,3,3',6	Tetra	74472-33-6
60	2,3,4,4'	Tetra	33025-41-1
61	2,3,4,5	Tetra	33284-53-6
62	2,3,4,6	Tetra	54230-23-7
63	2,3,4',5	Tetra	74472-35-8
64	2,3,4',6	Tetra	52663-58-8
65	2,3,5,6	Tetra	33284-54-7
66	2,3',4,4'	Tetra	32598-10-0

STL Knoxville maintains the following certifications, approvals and accreditations: Arkansas DEQ Cert. # 03-049-0, California DHS ELAP Cert. #2423, Colorado DPHE, Connecticut DPH Cert. #PH-0223, Florida DOH Cert. #E87177, Georgia DNR Cert. #906, Hawaii DOH, Illinois EPA Cert. # 000687, Indiana DOH Cert. #C-TN-02, Kansas DHE Cert. # E-10349, Kentucky DEP Lab ID #90101, Louisiana DEQ Cert. #03079, Louisiana DOHH Cert. #LA030024, Maryland DHMH Cert. #277, Massachusetts DEP Cert. #M-TN009, Michigan DEQ Lab ID #9933, New Jersey DEP Cert. #TN001, New York DOH Lab #10781, North Carolina DPH Lab ID #21705, North Carolina DEHNR Cert. #64, Oklahoma DEQ ID #9415, Pennsylvania DEP Cert. # 68-576, South Carolina DHEC Lab ID #84001001, Tennessee DOH Lab ID #02014, Utah DOH Cert. #QUAN3, Virginia DGS Lab ID #00165, Washington DOE Lab #C120, Wisconsin DNR Lab ID #998044300, US Army Corps of Engineers, Naval Facilities Engineering Service Center, US EPA Perchlorate Approval and USDA Soil Permit #S-46424. This list of approvals is subject to change and does not imply that laboratory certification is available for all parameters reported in this environmental sample data report.

**PROJECT NARRATIVE**  
**H4C050117**

Table 1: IUPAC and CAS Nomenclature			
IUPAC #	Compound	Chlorination Level	CAS #
67	2,3',4,5	Tetra	73575-53-8
68	2,3',4,5'	Tetra	73575-52-7
69	2,3',4,6	Tetra	60233-24-1
70	2,3',4',5	Tetra	32598-11-1
71	2,3',4',6	Tetra	41464-46-4
72	2,3',5,5'	Tetra	41464-42-0
73	2,3',5',6	Tetra	74338-23-1
74	2,4,4',5	Tetra	32690-93-0
75	2,4,4',6	Tetra	32598-12-2
76	2',3,4,5	Tetra	70362-48-0
77	3,3',4,4'	Tetra	32598-13-3
78	3,3',4,5	Tetra	70362-49-1
79	3,3',4,5'	Tetra	41464-48-6
80	3,3',5,5'	Tetra	33284-52-5
81	3,4,4',5	Tetra	70362-50-4
82	2,2',3,3',4	Penta	52663-62-4
83	2,2',3,3',5	Penta	60145-20-2
84	2,2',3,3',6	Penta	52663-60-2
85	2,2',3,4,4'	Penta	65510-45-4
86	2,2',3,4,5	Penta	55312-69-1
87	2,2',3,4,5'	Penta	38380-02-8
88	2,2',3,4,6	Penta	55215-17-3
89	2,2',3,4,6'	Penta	73575-57-2
90	2,2',3,4',5	Penta	68194-07-0
91	2,2',3,4',6	Penta	58194-05-8
92	2,2',3,5,5'	Penta	52663-61-3
93	2,2',3,5,6	Penta	73575-56-1
94	2,2',3,5,6'	Penta	73575-55-0
95	2,2',3,5',6	Penta	38379-99-6
96	2,2',3,6,6'	Penta	73575-54-9

STL Knoxville maintains the following certifications, approvals and accreditations: Arkansas DEQ Cert. # 03-049-0, California DHS ELAP Cert. #2423, Colorado DPHE, Connecticut DPH Cert. #PH-0223, Florida DOH Cert. #E87177, Georgia DNR Cert. #906, Hawaii DOH, Illinois EPA Cert. # 000687, Indiana DOH Cert. #C-TN-02, Kansas DHE Cert. # E-10349, Kentucky DEP Lab ID #90101, Louisiana DEQ Cert. #03079, Louisiana DOHH Cert. #LA030024, Maryland DHMH Cert. #277, Massachusetts DEP Cert. #M-TN009, Michigan DEQ Lab ID #9933, New Jersey DEP Cert. #TN001, New York DOH Lab #10781, North Carolina DPH Lab ID #21705, North Carolina DEHNR Cert. #64, Oklahoma DEQ ID #9415, Pennsylvania DEP Cert. # 68-576, South Carolina DHEC Lab ID #84001001, Tennessee DOH Lab ID #02014, Utah DOH Cert. #QUAN3, Virginia DGS Lab ID #00165, Washington DOE Lab #C120, Wisconsin DNR Lab ID #998044300, US Army Corps of Engineers, Naval Facilities Engineering Service Center, US EPA Perchlorate Approval and USDA Soil Permit #S-46424. This list of approvals is subject to change and does not imply that laboratory certification is available for all parameters reported in this environmental sample data report.

**PROJECT NARRATIVE**  
**H4C050117**

Table 1: IUPAC and CAS Nomenclature			
IUPAC #	Compound	Chlorination Level	CAS #
97	2,2',3',4,5	Penta	41464-51-1
98	2,2',3',4,6	Penta	60233-25-2
99	2,2',4,4',5	Penta	38380-01-7
100	2,2',4,4',6	Penta	39485-83-1
101	2,2',4,5,5'	Penta	37680-73-2
102	2,2',4,5,6'	Penta	68194-06-9
103	2,2',4,5',6	Penta	60145-21-3
104	2,2',4,6,6'	Penta	56558-16-8
105	2,3,3',4,4'	Penta	32598-14-4
106	2,3,3',4,5	Penta	70424-69-0
107	2,3,3',4',5	Penta	70424-68-9
108	2,3,3',4,5'	Penta	70362-41-3
109	2,3,3',4,6	Penta	74472-35-8
110	2,3,3',4',6	Penta	38380-03-9
111	2,3,3',5,5'	Penta	39635-32-0
112	2,3,3',5,6	Penta	74472-36-9
113	2,3,3',5',6	Penta	68194-10-5
114	2,3,4,4',5	Penta	74472-37-0
115	2,3,4,4',6	Penta	74472-38-1
116	2,3,4,5,6	Penta	18259-05-7
117	2,3,4',5,6	Penta	68194-11-6
118	2,3',4,4',5	Penta	31508-00-6
119	2,3',4,4',6	Penta	56558-17-9
120	2,3',4,5,5'	Penta	68194-12-7
121	2,3',4,5',6	Penta	56558-18-0
122	2',3,3',4,5	Penta	76842-07-4
123	2',3,4,4',5	Penta	65510-44-3
124	2',3,4,5,5'	Penta	70424-70-3
125	2',3,4,5,6'	Penta	74472-39-2
126	3,3',4,4',5	Penta	57465-28-8

STL Knoxville maintains the following certifications, approvals and accreditations: Arkansas DEQ Cert. # 03-049-0, California DHS ELAP Cert. #2423, Colorado DPHE, Connecticut DPH Cert. #PH-0223, Florida DOH Cert. #E87177, Georgia DNR Cert. #906, Hawaii DOH, Illinois EPA Cert. # 000687, Indiana DOH Cert. #C-TN-02, Kansas DHE Cert. # E-10349, Kentucky DEP Lab ID #90101, Louisiana DEQ Cert. #03079, Louisiana DOHH Cert. #LA030024, Maryland DHMH Cert. #277, Massachusetts DEP Cert. #M-TN009, Michigan DEQ Lab ID #9933, New Jersey DEP Cert. #TN001, New York DOH Lab #10781, North Carolina DPH Lab ID #21705, North Carolina DEHNR Cert. #64, Oklahoma DEQ ID #9415, Pennsylvania DEP Cert. # 68-576, South Carolina DHEC Lab ID #84001001, Tennessee DOH Lab ID #02014, Utah DOH Cert. #QUAN3, Virginia DGS Lab ID #00165, Washington DOE Lab #C120, Wisconsin DNR Lab ID #998044300, US Army Corps of Engineers, Naval Facilities Engineering Service Center, US EPA Perchlorate Approval and USDA Soil Permit #S-46424. This list of approvals is subject to change and does not imply that laboratory certification is available for all parameters reported in this environmental sample data report.

**PROJECT NARRATIVE**  
**H4C050117**

Table 1: IUPAC and CAS Nomenclature			
IUPAC #	Compound	Chlorination Level	CAS #
127	3,3',4,5,5'	Penta	39635-33-1
128	2,2',3,3',4,4'	Hexa	38380-07-3
129	2,2',3,3',4,5	Hexa	55215-18-4
130	2,2',3,3',4,5'	Hexa	52663-66-8
131	2,2',3,3',4,6	Hexa	61798-70-7
132	2,2',3,3',4,6'	Hexa	38380-05-1
133	2,2',3,3',5,5'	Hexa	35694-04-3
134	2,2',3,3',5,6	Hexa	52704-70-8
135	2,2',3,3',5,6'	Hexa	52744-13-5
136	2,2',3,3',6,6'	Hexa	38411-22-2
137	2,2',3,4,4',5	Hexa	35694-06-5
138	2,2',3,4,4',5'	Hexa	35065-28-2
139	2,2',3,4,4',6	Hexa	56030-56-9
140	2,2',3,4,4',6'	Hexa	59291-64-4
141	2,2',3,4,5,5'	Hexa	52712-04-6
142	2,2',3,4,5,6	Hexa	41411-61-4
143	2,2',3,4,5,6'	Hexa	68194-15-0
144	2,2',3,4,5',6	Hexa	68194-14-9
145	2,2',3,4,6,6'	Hexa	74472-40-5
146	2,2',3,4',5,5'	Hexa	51908-16-8
147	2,2',3,4',5,6	Hexa	68194-13-8
148	2,2',3,4',5,6'	Hexa	74472-42-7
149	2,2',3,4',5',6	Hexa	38380-04-0
150	2,2',3,4',6,6'	Hexa	68194-08-1
151	2,2',3,5,5',6	Hexa	52663-63-5
152	2,2',3,5,6,6'	Hexa	68194-09-2
153	2,2',4,4',5,5'	Hexa	35065-27-1
154	2,2',4,4',5,6'	Hexa	60145-22-4
155	2,2',4,4',6,6'	Hexa	33979-03-2
156	2,3,3',4,4',5	Hexa	38380-08-4

STL Knoxville maintains the following certifications, approvals and accreditations: Arkansas DEQ Cert. # 03-049-0, California DHS ELAP Cert. #2423, Colorado DPHE, Connecticut DPH Cert. #PH-0223, Florida DOH Cert. #E87177, Georgia DNR Cert. #906, Hawaii DOH, Illinois EPA Cert. # 000687, Indiana DOH Cert. #C-TN-02, Kansas DHE Cert. # E-10349, Kentucky DEP Lab ID #90101, Louisiana DEQ Cert. #03079, Louisiana DOHH Cert. #LA030024, Maryland DHMH Cert. #277, Massachusetts DEP Cert. #M-TN009, Michigan DEQ Lab ID #9933, New Jersey DEP Cert. #TN001, New York DOH Lab #10781, North Carolina DPH Lab ID #21705, North Carolina DEHNR Cert. #64, Oklahoma DEQ ID #9415, Pennsylvania DEP Cert. # 68-576, South Carolina DHEC Lab ID #84001001, Tennessee DOH Lab ID #02014, Utah DOH Cert. #QUAN3, Virginia DGS Lab ID #00165, Washington DOE Lab #C120, Wisconsin DNR Lab ID #998044300, US Army Corps of Engineers, Naval Facilities Engineering Service Center, US EPA Perchlorate Approval and USDA Soil Permit #S-46424. This list of approvals is subject to change and does not imply that laboratory certification is available for all parameters reported in this environmental sample data report.

**PROJECT NARRATIVE**  
**H4C050117**

Table 1: IUPAC and CAS Nomenclature			
IUPAC #	Compound	Chlorination Level	CAS #
157	2,3,3',4,4',5'	Hexa	69782-90-7
158	2,3,3',4,4',6	Hexa	74472-42-7
159	2,3,3',4,5,5'	Hexa	39635-35-3
160	2,3,3',4,5,6	Hexa	41411-62-5
161	2,3,3',4,5',6	Hexa	74474-43-8
162	2,3,3',4',5,5'	Hexa	39635-34-2
163	2,3,3',4',5,6	Hexa	74472-44-9
164	2,3,3',4',5',6	Hexa	74472-45-0
165	2,3,3',5,5',6	Hexa	74472-46-1
166	2,3,4,4',5,6	Hexa	41411-63-6
167	2,3',4,4',5,5'	Hexa	52663-72-6
168	2,3',4,4',5',6	Hexa	59291-65-5
169	3,3',4,4',5,5'	Hexa	32774-16-6
170	2,2',3,3',4,4',5	Hepta	35065-30-6
171	2,2',3,3',4,4',6	Hepta	52663-71-5
172	2,2',3,3',4,5,5'	Hepta	52663-74-8
173	2,2',3,3',4,5,6	Hepta	68194-16-1
174	2,2',3,3',4,5,6'	Hepta	38411-25-5
175	2,2',3,3',4,5',6	Hepta	40186-70-7
176	2,2',3,3',4,6,6'	Hepta	52663-65-7
177	2,2',3,3',4',5,6	Hepta	52663-70-4
178	2,2',3,3',5,5',6	Hepta	52663-67-9
179	2,2',3,3',5,6,6'	Hepta	52663-64-6
180	2,2',3,4,4',5,5'	Hepta	35065-29-3
181	2,2',3,4,4',5,6	Hepta	74472-47-2
182	2,2',3,4,4',5,6'	Hepta	60145-23-5
183	2,2',3,4,4',5',6	Hepta	52663-69-1
184	2,2',3,4,4',6,6'	Hepta	74472-48-3
185	2,2',3,4,5,5',6	Hepta	52712-05-7
186	2,2',3,4,5,6,6'	Hepta	74472-49-4

STL Knoxville maintains the following certifications, approvals and accreditations: Arkansas DEQ Cert. # 03-049-0, California DHS ELAP Cert. #2423, Colorado DPHE, Connecticut DPH Cert. #PH-0223, Florida DOH Cert. #E87177, Georgia DNR Cert. #906, Hawaii DOH, Illinois EPA Cert. # 000687, Indiana DOH Cert. #C-TN-02, Kansas DHE Cert. # E-10349, Kentucky DEP Lab ID #90101, Louisiana DEQ Cert. #03079, Louisiana DOHH Cert. #LA030024, Maryland DHMH Cert. #277, Massachusetts DEP Cert. #M-TN009, Michigan DEQ Lab ID #9933, New Jersey DEP Cert. #TN001, New York DOH Lab #10781, North Carolina DPH Lab ID #21705, North Carolina DEHNR Cert. #64, Oklahoma DEQ ID #9415, Pennsylvania DEP Cert. # 68-576, South Carolina DHEC Lab ID #84001001, Tennessee DOH Lab ID #02014, Utah DOH Cert. #QUAN3, Virginia DGS Lab ID #00165, Washington DOE Lab #C120, Wisconsin DNR Lab ID #998044300, US Army Corps of Engineers, Naval Facilities Engineering Service Center, US EPA Perchlorate Approval and USDA Soil Permit #S-46424. This list of approvals is subject to change and does not imply that laboratory certification is available for all parameters reported in this environmental sample data report.

**PROJECT NARRATIVE**  
**H4C050117**

Table 1: IUPAC and CAS Nomenclature			
IUPAC #	Compound	Chlorination Level	CAS #
187	2,2',3,4',5,5',6	Hepta	52663-68-0
188	2,2',3,4',5,6,6'	Hepta	74487-85-7
189	2,3,3',4,4',5,5'	Hepta	39635-31-9
190	2,3,3',4,4',5,6	Hepta	41411-64-7
191	2,3,3',4,4',5,6	Hepta	74472-50-7
192	2,3,3',4,5,5',6	Hepta	74472-51-8
193	2,3,3',4',5,5',6	Hepta	69782-91-8
194	2,2',3,3',4,4',5,5'	Octa	35694-08-7
195	2,2',3,3',4,4',5,6	Octa	52663-78-2
196	2,2',3,3',4,4',5,6'	Octa	42740-50-1
197	2,2',3,3',4,4',6,6'	Octa	33091-17-7
198	2,2',3,3',4,5,5',6	Octa	68194-17-2
199 (BZ 201)	2,2',3,3',4,5,5',6'	Octa	52663-75-9
200 (BZ 199)	2,2',3,3',4,5,6,6'	Octa	52663-73-7
201(BZ 200)	2,2',3,3',4,5',6,6'	Octa	40186-71-8
202	2,2',3,3',5,5',6,6'	Octa	2136-99-4
203	2,2',3,4,4',5,5',6	Octa	52663-76-0
204	2,2',3,4,4',5,6,6'	Octa	74472-52-9
205	2,3,3',4,4',5,5',6	Octa	74472-53-0
206	2,2',3,3',4,4',5,5',6	Nona	40186-72-9
207	2,2',3,3',4,4',5,6,6'	Nona	52663-79-3
208	2,2',3,3',4,5,5',6,6'	Nona	52663-77-1
209	2,2',3,3',4,4',5,5',6,6'	Deca	2051-24-3

STL Knoxville maintains the following certifications, approvals and accreditations: Arkansas DEQ Cert. # 03-049-0, California DHS ELAP Cert. #2423, Colorado DPHE, Connecticut DPH Cert. #PH-0223, Florida DOH Cert. #E87177, Georgia DNR Cert. #906, Hawaii DOH, Illinois EPA Cert. # 000687, Indiana DOH Cert. #C-TN-02, Kansas DHE Cert. # E-10349, Kentucky DEP Lab ID #90101, Louisiana DEQ Cert. #03079, Louisiana DOHH Cert. #LA030024, Maryland DHMH Cert. #277, Massachusetts DEP Cert. #M-TN009, Michigan DEQ Lab ID #9933, New Jersey DEP Cert. #TN001, New York DOH Lab #10781, North Carolina DPH Lab ID #21705, North Carolina DEHNR Cert. #64, Oklahoma DEQ ID #9415, Pennsylvania DEP Cert. # 68-576, South Carolina DHEC Lab ID #84001001, Tennessee DOH Lab ID #02014, Utah DOH Cert. #QUAN3, Virginia DGS Lab ID #00165, Washington DOE Lab #C120, Wisconsin DNR Lab ID #998044300, US Army Corps of Engineers, Naval Facilities Engineering Service Center, US EPA Perchlorate Approval and USDA Soil Permit #S-46424. This list of approvals is subject to change and does not imply that laboratory certification is available for all parameters reported in this environmental sample data report.

## COD SALES

Client Sample ID: 020304-RL-S001 (0610.T5)

## GC Semivolatiles

Lot-Sample #...: H4C050117-001    Work Order #...: GANJP1AC    Matrix.....: SOLID  
 Date Sampled...: 02/03/04    Date Received...: 03/05/04  
 Prep Date.....: 03/09/04    Analysis Date...: 03/17/04  
 Prep Batch #...: 4069209  
 Dilution Factor: 1  
 % Moisture.....: 30    Method.....: SW846 8082 Congen

PARAMETER	RESULT	REPORTING LIMIT	UNITS
PCB 8 (BZ)	ND	1.0	ug/kg
PCB 18 (BZ)	5.6 COL	1.0	ug/kg
PCB 28 (BZ)	12	1.0	ug/kg
PCB 44 (BZ)	9.6	1.0	ug/kg
PCB 49 (BZ)	7.1	1.0	ug/kg
PCB 52 (BZ)	11	1.0	ug/kg
PCB 66 (BZ)	9.8 COL	1.0	ug/kg
PCB 77 (BZ)	ND	1.0	ug/kg
PCB 87 (BZ)	4.0 COL	1.0	ug/kg
PCB 101 (BZ)	12	1.0	ug/kg
PCB 105 (BZ)	3.4	1.0	ug/kg
PCB 118 (BZ)	8.0	1.0	ug/kg
PCB 126 (BZ)	ND	1.0	ug/kg
PCB 128 (BZ)	2.1	1.0	ug/kg
PCB 138 (BZ)	11	1.0	ug/kg
PCB 153 (BZ)	11	1.0	ug/kg
PCB 156 (BZ)	ND	1.0	ug/kg
PCB 169 (BZ)	ND	1.0	ug/kg
PCB 170 (BZ)	4.0	1.0	ug/kg
PCB 180 (BZ)	8.0	1.0	ug/kg
PCB 183 (BZ)	2.2	1.0	ug/kg
PCB 184 (BZ)	ND	1.0	ug/kg
PCB 187 (BZ)	4.1	1.0	ug/kg
PCB 195 (BZ)	ND	1.0	ug/kg
PCB 206 (BZ)	1.1	1.0	ug/kg
PCB 209 (BZ)	1.2	1.0	ug/kg
	PERCENT	RECOVERY	
<u>SURROGATE</u>	<u>RECOVERY</u>	<u>LIMITS</u>	
Tetrachloro-m-xylene	126	(35 - 150)	
PCB 165 (BZ)	102	(40 - 145)	

**NOTE(S) :**

COL More than 40% RPD between primary and confirmation column results. The lower of the two results is reported.

## COD SALES

Client Sample ID: 020304-RL-S002 (0610.T5)

## GC Semivolatiles

Lot-Sample #...: H4C050117-002    Work Order #...: GANJQ1AC    Matrix.....: SOLID  
 Date Sampled...: 02/03/04    Date Received...: 03/05/04  
 Prep Date.....: 03/09/04    Analysis Date...: 03/17/04  
 Prep Batch #...: 4069209  
 Dilution Factor: 1  
 % Moisture.....: 31    Method.....: SW846 8082 Congen

PARAMETER	RESULT	REPORTING LIMIT	UNITS
PCB 8 (BZ)	ND	1.0	ug/kg
PCB 18 (BZ)	ND	1.0	ug/kg
PCB 28 (BZ)	ND	10	ug/kg
PCB 44 (BZ)	ND	1.0	ug/kg
PCB 49 (BZ)	ND	1.0	ug/kg
PCB 52 (BZ)	ND	1.0	ug/kg
PCB 66 (BZ)	ND	1.0	ug/kg
PCB 77 (BZ)	ND	1.0	ug/kg
PCB 87 (BZ)	ND	1.0	ug/kg
PCB 101 (BZ)	1.0	1.0	ug/kg
PCB 105 (BZ)	ND	1.0	ug/kg
PCB 118 (BZ)	ND	1.0	ug/kg
PCB 126 (BZ)	ND	1.0	ug/kg
PCB 128 (BZ)	ND	1.0	ug/kg
PCB 138 (BZ)	1.1	1.0	ug/kg
PCB 153 (BZ)	1.3	1.0	ug/kg
PCB 156 (BZ)	ND	1.0	ug/kg
PCB 169 (BZ)	ND	1.0	ug/kg
PCB 170 (BZ)	ND	1.0	ug/kg
PCB 180 (BZ)	ND	1.0	ug/kg
PCB 183 (BZ)	ND	1.0	ug/kg
PCB 184 (BZ)	ND	1.0	ug/kg
PCB 187 (BZ)	ND	1.0	ug/kg
PCB 195 (BZ)	ND	1.0	ug/kg
PCB 206 (BZ)	ND	1.0	ug/kg
PCB 209 (BZ)	ND	1.0	ug/kg
	PERCENT	RECOVERY	
<u>SURROGATE</u>	<u>RECOVERY</u>	<u>LIMITS</u>	
Tetrachloro-m-xylene	125	(35 - 150)	
PCB 165 (BZ)	97	(40 - 145)	

**COD SALES**

**Client Sample ID: 020404-RL-S003 (0610.T5)**

**GC Semivolatiles**

Lot-Sample #....: H4C050117-003    Work Order #....: GANJR1AC    Matrix.....: SOLID  
 Date Sampled....: 02/04/04    Date Received...: 03/05/04  
 Prep Date.....: 03/09/04    Analysis Date...: 03/17/04  
 Prep Batch #....: 4069209  
 Dilution Factor: 1  
 % Moisture.....: 29    Method.....: SW846 8082 Congen

PARAMETER	RESULT	REPORTING LIMIT	UNITS
PCB 8 (BZ)	ND	1.0	ug/kg
PCB 18 (BZ)	2.8 COL	1.0	ug/kg
PCB 28 (BZ)	ND	1.0	ug/kg
PCB 44 (BZ)	6.9	1.0	ug/kg
PCB 49 (BZ)	5.1	1.0	ug/kg
PCB 52 (BZ)	8.4	1.0	ug/kg
PCB 66 (BZ)	8.1 COL	1.0	ug/kg
PCB 77 (BZ)	ND	1.0	ug/kg
PCB 87 (BZ)	3.4 COL	1.0	ug/kg
PCB 101 (BZ)	12	1.0	ug/kg
PCB 105 (BZ)	3.0	1.0	ug/kg
PCB 118 (BZ)	6.8	1.0	ug/kg
PCB 126 (BZ)	ND	1.0	ug/kg
PCB 128 (BZ)	1.9	1.0	ug/kg
PCB 138 (BZ)	9.1	1.0	ug/kg
PCB 153 (BZ)	8.7	1.0	ug/kg
PCB 156 (BZ)	ND	1.0	ug/kg
PCB 169 (BZ)	ND	1.0	ug/kg
PCB 170 (BZ)	3.2	1.0	ug/kg
PCB 180 (BZ)	6.4	1.0	ug/kg
PCB 183 (BZ)	1.7	1.0	ug/kg
PCB 184 (BZ)	ND	1.0	ug/kg
PCB 187 (BZ)	3.3	1.0	ug/kg
PCB 195 (BZ)	ND	1.0	ug/kg
PCB 206 (BZ)	ND	1.0	ug/kg
PCB 209 (BZ)	ND	1.0	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Tetrachloro-m-xylene	123	(35 - 150)
PCB 165 (BZ)	98	(40 - 145)

**NOTE(S) :**

COL More than 40% RPD between primary and confirmation column results. The lower of the two results is reported.

## COD SALES

Client Sample ID: 020404-RL-S004 (0610.T5)

## GC Semivolatiles

Lot-Sample #...: H4C050117-004    Work Order #...: GANJV1AC    Matrix.....: SOLID  
 Date Sampled...: 02/04/04    Date Received...: 03/05/04  
 Prep Date.....: 03/09/04    Analysis Date...: 03/17/04  
 Prep Batch #...: 4069209  
 Dilution Factor: 1  
 % Moisture.....: 28    Method.....: SW846 8082 Congen

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>
PCB 8 (BZ)	ND	1.0	ug/kg
PCB 18 (BZ)	3.0 COL	1.0	ug/kg
PCB 28 (BZ)	ND	1.0	ug/kg
PCB 44 (BZ)	5.5	1.0	ug/kg
PCB 49 (BZ)	4.1	1.0	ug/kg
PCB 52 (BZ)	6.8	1.0	ug/kg
PCB 66 (BZ)	6.3 COL	1.0	ug/kg
PCB 77 (BZ)	ND	1.0	ug/kg
PCB 87 (BZ)	3.0 COL	1.0	ug/kg
PCB 101 (BZ)	8.8	1.0	ug/kg
PCB 105 (BZ)	2.6	1.0	ug/kg
PCB 118 (BZ)	5.9	1.0	ug/kg
PCB 126 (BZ)	ND	1.0	ug/kg
PCB 128 (BZ)	1.7	1.0	ug/kg
PCB 138 (BZ)	8.5	1.0	ug/kg
PCB 153 (BZ)	8.7	1.0	ug/kg
PCB 156 (BZ)	ND	1.0	ug/kg
PCB 169 (BZ)	ND	1.0	ug/kg
PCB 170 (BZ)	3.4	1.0	ug/kg
PCB 180 (BZ)	7.0	1.0	ug/kg
PCB 183 (BZ)	1.9	1.0	ug/kg
PCB 184 (BZ)	ND	1.0	ug/kg
PCB 187 (BZ)	3.6	1.0	ug/kg
PCB 195 (BZ)	ND	1.0	ug/kg
PCB 206 (BZ)	ND	1.0	ug/kg
PCB 209 (BZ)	1.2	1.0	ug/kg

<u>SURROGATE</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>
Tetrachloro-m-xylene	123	(35 - 150)
PCB 165 (BZ)	99	(40 - 145)

NOTE(S) :

COL More than 40% RPD between primary and confirmation column results. The lower of the two results is reported.

COD SALES

Client Sample ID: 020404-RL-S005 (0610.T5)

GC Semivolatiles

Lot-Sample #...: H4C050117-005    Work Order #...: GANJW1AC    Matrix.....: SOLID  
 Date Sampled...: 02/04/04    Date Received...: 03/05/04  
 Prep Date.....: 03/09/04    Analysis Date...: 03/17/04  
 Prep Batch #...: 4069209  
 Dilution Factor: 1  
 % Moisture.....: 31    Method.....: SW846 8082 Congen

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>
PCB 8 (BZ)	ND	1.0	ug/kg
PCB 18 (BZ)	3.6 COL	1.0	ug/kg
PCB 28 (BZ)	ND	10	ug/kg
PCB 44 (BZ)	5.9	1.0	ug/kg
PCB 49 (BZ)	4.6	1.0	ug/kg
PCB 52 (BZ)	7.0	1.0	ug/kg
PCB 66 (BZ)	6.6 COL	1.0	ug/kg
PCB 77 (BZ)	ND	1.0	ug/kg
PCB 87 (BZ)	2.8 COL	1.0	ug/kg
PCB 101 (BZ)	9.5	1.0	ug/kg
PCB 105 (BZ)	2.5	1.0	ug/kg
PCB 118 (BZ)	5.9	1.0	ug/kg
PCB 126 (BZ)	ND	1.0	ug/kg
PCB 128 (BZ)	1.8	1.0	ug/kg
PCB 138 (BZ)	7.8	1.0	ug/kg
PCB 153 (BZ)	8.0	1.0	ug/kg
PCB 156 (BZ)	ND	1.0	ug/kg
PCB 169 (BZ)	ND	1.0	ug/kg
PCB 170 (BZ)	2.9	1.0	ug/kg
PCB 180 (BZ)	5.6	1.0	ug/kg
PCB 183 (BZ)	1.5	1.0	ug/kg
PCB 184 (BZ)	ND	1.0	ug/kg
PCB 187 (BZ)	3.0	1.0	ug/kg
PCB 195 (BZ)	ND	1.0	ug/kg
PCB 206 (BZ)	ND	1.0	ug/kg
PCB 209 (BZ)	ND	1.0	ug/kg

<u>SURROGATE</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>
Tetrachloro-m-xylene	117	(35 - 150)
PCB 165 (BZ)	92	(40 - 145)

**NOTE(S) :**

COL More than 40% RPD between primary and confirmation column results. The lower of the two results is reported.

## COD SALES

Client Sample ID: 020404-RL-S006 (0610.T5)

## GC Semivolatiles

Lot-Sample #...: H4C050117-006    Work Order #...: GANJX1AC    Matrix.....: SOLID  
 Date Sampled...: 02/04/04    Date Received...: 03/05/04  
 Prep Date.....: 03/09/04    Analysis Date...: 03/17/04  
 Prep Batch #...: 4069209  
 Dilution Factor: 1  
 % Moisture.....: 28    Method.....: SW846 8082 Congen

PARAMETER	RESULT	REPORTING	
		LIMIT	UNITS
PCB 8 (BZ)	ND	1.0	ug/kg
PCB 18 (BZ)	1.2	1.0	ug/kg
PCB 28 (BZ)	ND	10	ug/kg
PCB 44 (BZ)	2.3	1.0	ug/kg
PCB 49 (BZ)	1.9	1.0	ug/kg
PCB 52 (BZ)	2.8	1.0	ug/kg
PCB 66 (BZ)	3.7 COL	1.0	ug/kg
PCB 77 (BZ)	ND	1.0	ug/kg
PCB 87 (BZ)	1.6 COL	1.0	ug/kg
PCB 101 (BZ)	4.6	1.0	ug/kg
PCB 105 (BZ)	1.5	1.0	ug/kg
PCB 118 (BZ)	3.5	1.0	ug/kg
PCB 126 (BZ)	ND	1.0	ug/kg
PCB 128 (BZ)	1.2 COL	1.0	ug/kg
PCB 138 (BZ)	5.1	1.0	ug/kg
PCB 153 (BZ)	5.2	1.0	ug/kg
PCB 156 (BZ)	ND	1.0	ug/kg
PCB 169 (BZ)	ND	1.0	ug/kg
PCB 170 (BZ)	1.8	1.0	ug/kg
PCB 180 (BZ)	3.6	1.0	ug/kg
PCB 183 (BZ)	ND	1.0	ug/kg
PCB 184 (BZ)	ND	1.0	ug/kg
PCB 187 (BZ)	1.6	1.0	ug/kg
PCB 195 (BZ)	ND	1.0	ug/kg
PCB 206 (BZ)	ND	1.0	ug/kg
PCB 209 (BZ)	ND	1.0	ug/kg
	PERCENT	RECOVERY	
<u>SURROGATE</u>	<u>RECOVERY</u>	<u>LIMITS</u>	
Tetrachloro-m-xylene	117	(35 - 150)	
PCB 165 (BZ)	95	(40 - 145)	

## NOTE(S):

COL More than 40% RPD between primary and confirmation column results. The lower of the two results is reported.

## COD SALES

Client Sample ID: 020404-RL-S007 (0610.T5)

## GC Semivolatiles

Lot-Sample #...: H4C050117-007    Work Order #...: GANJ01AC    Matrix.....: SOLID  
 Date Sampled...: 02/04/04    Date Received...: 03/05/04  
 Prep Date.....: 03/09/04    Analysis Date...: 03/17/04  
 Prep Batch #...: 4069209  
 Dilution Factor: 1  
 % Moisture.....: 22    Method.....: SW846 8082 Congen

PARAMETER	RESULT	REPORTING LIMIT	UNITS
PCB 8 (BZ)	ND	1.0	ug/kg
PCB 18 (BZ)	ND	1.0	ug/kg
PCB 28 (BZ)	ND	10	ug/kg
PCB 44 (BZ)	2.0	1.0	ug/kg
PCB 49 (BZ)	1.7	1.0	ug/kg
PCB 52 (BZ)	2.7	1.0	ug/kg
PCB 66 (BZ)	5.4 COL	1.0	ug/kg
PCB 77 (BZ)	1.0 COL	1.0	ug/kg
PCB 87 (BZ)	2.1 COL	1.0	ug/kg
PCB 101 (BZ)	5.9	1.0	ug/kg
PCB 105 (BZ)	2.7	1.0	ug/kg
PCB 118 (BZ)	5.0	1.0	ug/kg
PCB 126 (BZ)	ND	1.0	ug/kg
PCB 128 (BZ)	2.2	1.0	ug/kg
PCB 138 (BZ)	9.9	1.0	ug/kg
PCB 153 (BZ)	8.0	1.0	ug/kg
PCB 156 (BZ)	ND	1.0	ug/kg
PCB 169 (BZ)	ND	1.0	ug/kg
PCB 170 (BZ)	3.4	1.0	ug/kg
PCB 180 (BZ)	6.4	1.0	ug/kg
PCB 183 (BZ)	1.7	1.0	ug/kg
PCB 184 (BZ)	ND	1.0	ug/kg
PCB 187 (BZ)	2.9	1.0	ug/kg
PCB 195 (BZ)	ND	1.0	ug/kg
PCB 206 (BZ)	ND	1.0	ug/kg
PCB 209 (BZ)	ND	1.0	ug/kg
	PERCENT RECOVERY	RECOVERY LIMITS	
SURROGATE	RECOVERY	LIMITS	
Tetrachloro-m-xylene	114	(35 - 150)	
PCB 165 (BZ)	93	(40 - 145)	

**NOTE(S) :**

COL More than 40% RPD between primary and confirmation column results. The lower of the two results is reported.

## COD SALES

Client Sample ID: 020304-RL-S009 (0610.T5)

## GC Semivolatiles

Lot-Sample #....: H4C050117-008    Work Order #....: GANJ11AC    Matrix.....: SOLID  
 Date Sampled....: 02/03/04    Date Received...: 03/05/04  
 Prep Date.....: 03/09/04    Analysis Date...: 03/17/04  
 Prep Batch #....: 4069209  
 Dilution Factor: 1  
 % Moisture.....: 32    Method.....: SW846 8082 Congen

PARAMETER	RESULT	REPORTING	
		LIMIT	UNITS
PCB 8 (BZ)	ND	1.0	ug/kg
PCB 18 (BZ)	ND	1.0	ug/kg
PCB 28 (BZ)	ND	10	ug/kg
PCB 44 (BZ)	ND	1.0	ug/kg
PCB 49 (BZ)	ND	1.0	ug/kg
PCB 52 (BZ)	ND	1.0	ug/kg
PCB 66 (BZ)	ND	1.0	ug/kg
PCB 77 (BZ)	ND	1.0	ug/kg
PCB 87 (BZ)	ND	1.0	ug/kg
PCB 101 (BZ)	ND	1.0	ug/kg
PCB 105 (BZ)	ND	1.0	ug/kg
PCB 118 (BZ)	ND	1.0	ug/kg
PCB 126 (BZ)	ND	1.0	ug/kg
PCB 128 (BZ)	ND	1.0	ug/kg
PCB 138 (BZ)	ND	1.0	ug/kg
PCB 153 (BZ)	ND	1.0	ug/kg
PCB 156 (BZ)	ND	1.0	ug/kg
PCB 169 (BZ)	ND	1.0	ug/kg
PCB 170 (BZ)	ND	1.0	ug/kg
PCB 180 (BZ)	ND	1.0	ug/kg
PCB 183 (BZ)	ND	1.0	ug/kg
PCB 184 (BZ)	ND	1.0	ug/kg
PCB 187 (BZ)	ND	1.0	ug/kg
PCB 195 (BZ)	ND	1.0	ug/kg
PCB 206 (BZ)	ND	1.0	ug/kg
PCB 209 (BZ)	ND	1.0	ug/kg
	PERCENT	RECOVERY	
<u>SURROGATE</u>	<u>RECOVERY</u>	<u>LIMITS</u>	
Tetrachloro-m-xylene	101	(35 - 150)	
PCB 165 (BZ)	85	(40 - 145)	

## METHOD BLANK REPORT

## GC Semivolatiles

Client Lot #...: H4C050117  
 MB Lot-Sample #: H4C090000-209

Work Order #...: GAV431AA

Matrix.....: SOLID

Prep Date.....: 03/09/04

Analysis Date...: 03/17/04

Prep Batch #...: 4069209

Dilution Factor: 1

PARAMETER	RESULT	REPORTING		
		LIMIT	UNITS	METHOD
PCB 8 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 18 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 28 (BZ)	ND	10	ug/kg	SW846 8082 Congen
PCB 44 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 49 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 52 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 66 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 77 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 87 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 101 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 105 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 118 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 126 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 128 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 138 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 153 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 156 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 169 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 170 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 180 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 183 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 184 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 187 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 195 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 206 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen
PCB 209 (BZ)	ND	1.0	ug/kg	SW846 8082 Congen

SURROGATE	PERCENT	RECOVERY
	RECOVERY	LIMITS
Tetrachloro-m-xylene	114	(35 - 150)
PCB 165 (BZ)	97	(40 - 145)

**NOTE(S) :**

Calculations are performed before rounding to avoid round-off errors in calculated results.

**LABORATORY CONTROL SAMPLE EVALUATION REPORT**

**GC Semivolatiles**

Client Lot #...: H4C050117      Work Order #...: GAV431AC      Matrix.....: SOLID  
 LCS Lot-Sample#: H4C090000-209  
 Prep Date.....: 03/09/04      Analysis Date...: 03/17/04  
 Prep Batch #...: 4069209  
 Dilution Factor: 1

<u>PARAMETER</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>	<u>METHOD</u>
PCB 3 (BZ)	89	(50 - 140)	SW846 8082 Congeners
PCB 18 (BZ)	89	(50 - 140)	SW846 8082 Congeners
PCB 15 (BZ)	86	(50 - 140)	SW846 8082 Congeners
PCB 52 (BZ)	87	(50 - 140)	SW846 8082 Congeners
PCB 66 (BZ)	88	(50 - 140)	SW846 8082 Congeners
PCB 118 (BZ)	92	(50 - 140)	SW846 8082 Congeners
PCB 128 (BZ)	92	(50 - 140)	SW846 8082 Congeners
PCB 153 (BZ)	91	(50 - 140)	SW846 8082 Congeners
PCB 180 (BZ)	91	(50 - 140)	SW846 8082 Congeners
PCB 187 (BZ)	92	(50 - 140)	SW846 8082 Congeners
PCB 195 (BZ)	91	(50 - 140)	SW846 8082 Congeners
PCB 206 (BZ)	90	(50 - 140)	SW846 8082 Congeners
PCB 209 (BZ)	81	(50 - 140)	SW846 8082 Congeners

<u>SURROGATE</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>
Tetrachloro-m-xylene	113	(35 - 150)
PCB 165 (BZ)	94	(40 - 145)

**NOTE (S) :**

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

## LABORATORY CONTROL SAMPLE DATA REPORT

## GC Semivolatiles

Client Lot #...: H4C050117      Work Order #...: GAV431AC      Matrix.....: SOLID  
 LCS Lot-Sample#: H4C090000-209  
 Prep Date.....: 03/09/04      Analysis Date...: 03/17/04  
 Prep Batch #...: 4069209  
 Dilution Factor: 1

<u>PARAMETER</u>	<u>SPIKE AMOUNT</u>	<u>MEASURED AMOUNT</u>	<u>UNITS</u>	<u>PERCENT RECOVERY</u>	<u>METHOD</u>
PCB 3 (BZ)	200	177	ug/kg	89	SW846 8082 Conge
PCB 18 (BZ)	10.0	8.85	ug/kg	89	SW846 8082 Conge
PCB 15 (BZ)	50.0	42.9	ug/kg	86	SW846 8082 Conge
PCB 52 (BZ)	10.0	8.72	ug/kg	87	SW846 8082 Conge
PCB 66 (BZ)	10.0	8.77	ug/kg	88	SW846 8082 Conge
PCB 118 (BZ)	10.0	9.19	ug/kg	92	SW846 8082 Conge
PCB 128 (BZ)	10.0	9.20	ug/kg	92	SW846 8082 Conge
PCB 153 (BZ)	10.0	9.11	ug/kg	91	SW846 8082 Conge
PCB 180 (BZ)	10.0	9.14	ug/kg	91	SW846 8082 Conge
PCB 187 (BZ)	10.0	9.19	ug/kg	92	SW846 8082 Conge
PCB 195 (BZ)	10.0	9.12	ug/kg	91	SW846 8082 Conge
PCB 206 (BZ)	10.0	8.98	ug/kg	90	SW846 8082 Conge
PCB 209 (BZ)	10.0	8.06	ug/kg	81	SW846 8082 Conge

<u>SURROGATE</u>	<u>PERCENT RECOVERY</u>	<u>RECOVERY LIMITS</u>
Tetrachloro-m-xylene	113	(35 - 150)
PCB 165 (BZ)	94	(40 - 145)

**NOTE(S) :**

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

HESS ENVIRONMENTAL SERVICES, INC.  
6057 Executive Centre Drive, Suite 6  
MEMPHIS, TENNESSEE 38134

SAMPLE IDENTIFICATION AND CUSTODY TAG

SOURCE OF SAMPLE: 0610.T5

TYPE SAMPLE: Soil

SAMPLE IDENTIFICATION <sup>2-3</sup>  
NUMBERS: 020304-RL-5001, 020304-RL-5002, 020404-RL-5003,  
020404-RL-5004, 020404-RL-5005, 020404-RL-5006,  
020404-RL-5007, 020404-RL-5008, 020304-RL-5009

NUMBER OF SAMPLE CONTAINERS: 9  
COLLECTED, DATE: Feb. 3 + 4, 2004 TIME: VARIABLE

FIELD PROCEDURES/PRESERVATION: 1) PLACED IN 4oz Sample Containers  
AND PLACED ON WET ICE FOR TRANSPORT TO LAB, 2) STORED AT  
LAB @ < 4°C, + 3) PLACED ON WET ICE IN SAMPLE COOLER FOR SHIPMENT  
TO STL.

TRANSPORTATION MODE: FedEx \*AIRBILL # 8414 5819 2388

SAMPLE SEALED BY: Robert A. Bayliff DATE: 3-4-04

ANALYSIS REQUESTED: PCBs by USEPA SW 846 Method 8082  
By Congeners - SPECIFIC Method  
see Attached Client Provided  
Congeners List Highlighted in yellow.

CUSTODY OF SAMPLE

(a) Collected by	_____	(date)	_____	(time)	_____
Delivered to	_____	(date)	_____	(time)	_____
(b) Received by	<u>Robert A. Bayliff</u>	(date)	<u>3-4-04</u>	(time)	<u>08:56 a.m.</u>
Delivered to	<u>FedEx AIR BILL *</u>	(date)	<u>3-4-04</u>	(time)	<u>10:15 a.m.</u>
(c) Received by	_____	(date)	_____	(time)	_____
Delivered to	_____	(date)	_____	(time)	_____
(d) Received by	_____	(date)	_____	(time)	_____
Delivered to	_____	(date)	_____	(time)	_____
(e) Received in	_____	(date)	_____	(time)	_____
laboratory by	<u>Andrew D. Flores</u>	(date)	<u>3-5-04</u>	(time)	<u>09:30</u>
From	<u>FEDEX</u>	(date)	<u>3-5-04</u>	(time)	<u>09:30</u>
(f) Logged in by	_____	(date)	_____	(time)	_____

FIELD ANALYSES AND RESULTS AT SAMPLING POINT: NONE

ANALYSIS	RESULT	DATE	TIME	ANALYST
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

REMARKS <sup>MOF 05-05-04</sup>  
No Custody Seals Received Temp. 2°C  
Intact  
1 COOLER / FEDEX  
TH 8414 5819 2388  
MOF 03-05-04

**Ocean Programs Analytical Request Table PCB  
Congeners Target Analyte List Minimum  
Quantitation Limits Guidelines by Matrices**

PCB Congener List by #	Aroclor 1254a	Aroclor 1254g	8082 Congeners	USACE List	PCB Congener	Water	Sediment	Tissue
						ug/L (ppb)	ug/L (ppb)	ug/L (ppb)
1	1		1					
5			5					
8	8	8		8	8 /	0.02	1.0	0.0010
18	18	18	18	18	18 /	0.02	1.0	0.0010
28	28	28		28	28 /	0.02	1.0	0.0010
31	31	31	31					
44	44	44	44	44	44 /	0.02	1.0	0.0010
49	49	49		49	49 /	0.02	1.0	0.0010
52	52	52	52	52	52 /	0.02	1.0	0.0010
66	66	66	66	66	66 /	0.02	1.0	0.0010
77	77	77			77 /	0.02	1.0	0.0010
87	87	87	87	87	87 /	0.02	1.0	0.0010
101	101	101	101	101	101 /	0.02	1.0	0.0010
105	105	105			105 /	0.02	1.0	0.0010
110	110	110	110					
118	118	118		118	118 /	0.02	1.0	0.0010
126	126	126			126 /	0.02	1.0	0.0010
128	128	128			128 /	0.02	1.0	0.0010
138	138	138	138	138	138 /	0.02	1.0	0.0010
141	141	141	141					
151	151	151	151					
153	153	153	153	153	153 /	0.02	1.0	0.0010
156	156	156			156 /	0.02	1.0	0.0010
169					169 /	0.02	1.0	0.0010
170	170	170	170	170	170 /	0.02	1.0	0.0010
180	180	180	180	180	180 /	0.02	1.0	0.0010
183	183	183	183	183	183 /	0.02	1.0	0.0010
184				184	184 /	0.02	1.0	0.0010
187	187	187	187	187	187 /	0.02	1.0	0.0010
195				195	195 /	0.02	1.0	0.0010
206	206	206	206	206	206 /	0.02	1.0	0.0010
209					209 /	0.02	1.0	0.0010

19                      19                      26                      : Total # of Congeners per List

**STL KNOXVILLE  
SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST**

CLIENT: HESS ENVIRO. PROJECT: \_\_\_\_\_ Lot No.: 146050117

**TO BE COMPLETED BY SAMPLE RECEIPT ASSOCIATE:**

- |   |                                     |                                     |                                     |
|---|-------------------------------------|-------------------------------------|-------------------------------------|
| 1. Sample Receipt:  | YES                                 | NO                                  | NA                                  |
| a. Do sample container labels match COC? (IDs, Dates, Times)  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| b. Is the cooler temperature within acceptance limits?<br>(NOTE: North Carolina, 1668, 1613B: 0-4°C; VOST: 10°C)  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| c. Were samples received with correct chemical preservative<br>(excluding Encore)?  | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| d. Were custody seals present/intact on cooler and/or containers?   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| e. Were all of the samples listed on the COC received?  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| f. Were all of the sample containers received intact?   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| g. Were containers received for VOAs received without headspace?  | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| h. Were samples received in the appropriate containers?   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| i. Did you check for residual chlorine, if necessary?   | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| j. Were samples received within 1/2 of the holding time?  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| k. Were samples screened for radioactivity?   | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| l. For aqueous samples for SOG tests (i.e., 1613B, 1668A, 8290,<br>LR PAHs), does the sample(s) have visible solids present?<br>If yes, was SOG staff notified? | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| m. Were client's sample documents (RFA/COC) received?   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| n. Has the RFA/COC been relinquished? (Signed, Dated, Timed)  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| o. Are test/parameters listed for each sample?  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| p. Is the matrix of the samples noted?  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| q. Is the date/time of sample collection noted?   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| r. Is the client and project name/No. identified?   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| s. Was the sampler identified on the RFA/COC?   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |

SAMPLE RECEIVING ASSOCIATE: Andrew D. Flores DATE: 03-06-04

**TO BE COMPLETED BY PROJECT MANAGER :**

- |  |                          |                          |                                     |
|--|--------------------------|--------------------------|-------------------------------------|
| 1. Project manager "Sample Greet":                     | YES                      | NO                       | NA                                  |
| a. Quote number to be logged-in under _____            | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| b. Informed Login associates of special instructions ? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

PROJECT MANAGER : [Signature] DATE: 3/8/04

Client Sample ID	Analysis Requested	Condition (see legend)	Comments/Action
020404-AL-5008	8082	4B Seal	Not rec'd but on COC
All Samples	8082	4C	HT expired.

Client informed on 3/8/04 by email. Person contacted: Robert L.

Noted actions in comments section above.

No action necessary; process as is.

Project Manager: \_\_\_\_\_ Date: \_\_\_\_\_

H4C050117

HESS ENVIRONMENTAL SERVICES, INC.  
6057 Executive Centre Drive, Suite 6  
MEMPHIS, TENNESSEE 38134

SAMPLE IDENTIFICATION AND CUSTODY TAG

SOURCE OF SAMPLE: 0610.T5

TYPE SAMPLE: Soil

SAMPLE IDENTIFICATION NUMBERS: 020304-RL-S001, 020304-RL-S002, 020404-RL-S003,  
020404-RL-S004, 020404-RL-S005, 020404-RL-S006,  
020404-RL-S007, 020404-RL-S008, 020304-RL-S009

NUMBER OF SAMPLE CONTAINERS: 9  
COLLECTED, DATE: Feb. 3 & 4, 2004 TIME: VARIOUS

FIELD PROCEDURES/PRESERVATION: 1) PLACED IN 4oz Sample Container  
AND PLACED ON Wet ICE FOR TRANSPORT TO LAB, 2) STORED AT  
LAB @ < 40C, + 3) PLACED ON Wet ICE IN Sample Cooler For shipment  
TO STL.

TRANSPORTATION MODE: FedEx \*AIRBILL # 8414 5819 2388

SAMPLE SEALED BY: Robert A. Layzell DATE: 3-4-04

ANALYSIS REQUESTED: PCBs by USEPA SW 846 Method 8082  
By Congeners - SPECIFIC Method  
SEE ATTACHED CLIENT PROVIDED  
CONGENERS LIST Highlighted in yellow.

CUSTODY OF SAMPLE

- (a) Collected by \_\_\_\_\_ (date) \_\_\_\_\_ (time) \_\_\_\_\_
- Delivered to \_\_\_\_\_ (date) \_\_\_\_\_ (time) \_\_\_\_\_
- (b) Received by Robert A. Layzell (date) 3-4-04 (time) 08:56 a.m.
- Delivered to FedEx Air Bill # (date) 3-4-04 (time) 10:15 a.m.
- (c) Received by \_\_\_\_\_ (date) \_\_\_\_\_ (time) \_\_\_\_\_
- Delivered to \_\_\_\_\_ (date) \_\_\_\_\_ (time) \_\_\_\_\_
- (d) Received by \_\_\_\_\_ (date) \_\_\_\_\_ (time) \_\_\_\_\_
- Delivered to \_\_\_\_\_ (date) \_\_\_\_\_ (time) \_\_\_\_\_
- (e) Received in laboratory by Andrew D. Flood (date) 3-5-04 (time) 09:30
- From FEDEX (date) 3-5-04 (time) 09:30
- (f) Logged in by \_\_\_\_\_ (date) \_\_\_\_\_ (time) \_\_\_\_\_

FIELD ANALYSES AND RESULTS AT SAMPLING POINT: NONE

ANALYSIS	RESULT	DATE	TIME	ANALYST

REMARKS: ADF 03-05-04  
No Custody Seals Received Temp. 2°C  
Intact  
1 COOLER / FEDEX  
T# 8414 5819 2388

**APPENDIX I**

**SITE-SPECIFIC HEALTH  
AND SAFETY PLAN  
WITH  
SIGNATURE PAGE**

**SITE-SPECIFIC  
HEALTH AND SAFETY PLAN  
FOR THE PROPOSED  
NORTHWESTERN TENNESSEE HARBOR PROJECT**

**PREPARED FOR:  
HESS ENVIRONMENTAL SERVICES, INC.  
MEMPHIS, TENNESSEE  
AND ITS  
SUBCONTRACTORS**

**This Safety Plan meets the requirements set forth in 29 Code  
of Federal Regulations 1910.120 (b) of the  
Occupational Safety and Health Standards.**

**JANUARY 9, 2004**

**SITE-SPECIFIC  
HEALTH AND SAFETY PLAN  
FOR THE PROPOSED  
NORTHWESTERN TENNESSEE HARBOR PROJECT**

**UPDATE LOG**

<b>Revision Number</b>	<b>Date</b>
Original Issue	January 9, 2004 <i>BRP</i>
First Revision	
Second Revision	

## TABLE OF CONTENTS

	<b>PAGE</b>
1.0 INTRODUCTION	1
2.0 ORGANIZATIONAL STRUCTURE	2
3.0 COMPREHENSIVE WORK PLAN	3
4.0 HEALTH AND SAFETY HAZARDS	4
4.1 Chemical Exposure Hazards	4
4.2 Fire and Explosion Hazards	5
4.3 Biological Hazards	5
4.4 Physical Safety Hazards	5
4.5 Electrical Hazards	6
4.6 Heat Stress Hazards	6
4.7 Hypothermia Hazards	6
5.0 PERSONAL PROTECTIVE EQUIPMENT	7
5.1 Exposure to Chemicals	7
5.2 Exposure to Bodily Fluids	8
5.2.1 Personal Protective Equipment	8
5.2.2 Sanitary Conditions	9
5.2.3 Disposal of Infected Materials	9
5.2.4 Personal Hygiene	9
6.0 MEDICAL SURVEILLANCE PROGRAM	9
7.0 AIR MONITORING	10
8.0 SITE CONTROL	10
9.0 DECONTAMINATION PROCEDURES	11
10.0 EMERGENCY RESPONSE PLAN	11

## ATTACHMENTS

1. MAPS
2. MATERIAL SAFETY DATA SHEETS
3. EMERGENCY CONTACT NUMBERS
4. SIGNATURE SHEETS

## **1.0 INTRODUCTION**

Hess Environmental Services, Inc. (HES) has prepared this Site-Specific Health and Safety Plan (HASP) for the Sediment Study for the proposed Northwestern Tennessee Harbor Project. HES was contracted by the U.S. Army Corps of Engineers (USACE), Memphis District to conduct the Sediment Study. Because of the potential for physical and chemical hazards associated with the siltated channel study area, HES has prepared this HASP. Figure 1 shows the Sediment Study area, and is presented in Attachment 1.

This HASP includes the following points:

- HES and its subcontractors may be exposed to physical, chemical, and chemical compound hazards. Exposure pathways include, but are not limited to inhalation, ingestion, absorption and to physical contact;
- This HASP establishes guidelines and requirements for the safety of personnel with HES and its subcontractors while working at the Sediment Study area;
- This plan includes all site activities performed by HES personnel and/or its subcontractors;
- All HES personnel and/or its subcontractors are required to abide by the provisions set forth in the HASP; and
- All HES personnel and/or its subcontractors are required to read this plan and sign an accompanying HASP acknowledgment log (please see Attachment 4).

The HASP guidelines and requirements presented in this plan are based on a review of available information and an evaluation of potential hazards. This plan outlines the health and safety procedures and equipment required for emergency exposure and work activities at the Sediment Study site to minimize the potential for exposure of field personnel to potentially hazardous situations. This plan intentionally does not address confined space entry, Levels A & B Personal Protective Equipment (PPE), or blasting. If needed, these operations will not be performed by HES employees, but rather by trained individuals in accordance with their employer's written procedures. This plan may be modified as additional information is obtained regarding potential site hazards.

## 2.0 ORGANIZATIONAL STRUCTURE

During drilling and sampling operations the following organizational structure will be followed:

Title	Position	Training
On-Scene Incident Commander	Senior HES Official	40-hour OSHA/3 days On-Site Field Experience/8 hours training on Safety & Health Program
Assistant On-Scene Incident Commander	Appointed by On-Scene Incident Commander	40-hour OSHA/3 days On-Site Field Experience/8 hours training on Safety & Health Program
Site Safety and Health Supervisor	Corporate Health and Safety Officer	40-hour OSHA/3 days On-Site Field Experience/8 hours training on Safety & Health Program
Equipment Operators	Appointed by On-Site Incident Commander	40-hour OSHA/3 days On-Site Field Experience
General Laborers	Appointed by On-Site Incident Commander	40-hour OSHA/3 days On-Site Field Experience

The aforementioned individuals are tasked with the following responsibilities while on-site:

**On-Scene Incident Commander:** Overall Control of Site Systems (Site Control, Site Safety, Study Operations, Use of PPE, Air Monitoring, etc.); Initial Site Characterization and Preliminary Evaluation; Liaison to Regulators, Emergency Response Entities and Client.

**Assistant On-Scene Incident Commander:** Site Control; Study Operations; Duties as directed by On-Scene Incident Commander.

**Site Safety and Health Supervisor:** Site Safety; Hazard Identification; Use of PPE; Air Monitoring; Personnel Monitoring; Decontamination; Duties as directed by On-Scene Incident Commander.

**Equipment Operators:** Duties as directed by On-Scene Incident Commander.

**General Laborers:** Duties as directed by On-Scene Incident Commander.

Inside lines of communication shall be direct from all echelons, when possible. Otherwise communication shall proceed through the most efficient means. During large spills, two-way radios may be used to facilitate communications.

Outside communications shall only be through the On-Scene Incident Commander or his/her designee. Under no circumstances should any HES employee other than the On-Scene Incident Commander (or his/her designee) speak to anyone from the news media or the regulating community. All questions should be referred to the On-Scene Incident Commander. Client confidentiality is of the utmost importance.

### 3.0 COMPREHENSIVE WORK PLAN

Prior to beginning work on site, each individual who is to perform work involving the drilling and sampling operations will receive site-specific training on the following topics:

- Names of personnel and alternates responsible for site safety and health
- Safety, health and other hazards present on site
- Use of PPE including life vest
- Work practices by which the employee can minimize risks from hazards
- Safe use of engineering controls and equipment on site
- Medical surveillance requirements, including recognition of symptoms and signs which might indicate overexposure to hazards
- Decontamination procedures
- Confined space entry prohibitions
- Spill containment program
- Degree of exposure likely
- Evacuation routes
- Location of First Aid supplies, firefighting equipment and Emergency Assembly Point

Each task associated with the Sediment Study area operations has been evaluated with respect to the logistics and resources required for completion. Employees shall not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility.

**Initial Site Investigation**-Initial site investigation will be performed prior to commencing site work activities. For the project, the study team leaders accompanied the Client representatives to the Sediment Study Area. Unless site conditions dictate otherwise, Level D PPE shall be worn. Air monitoring will not be required at this time, but may become warranted. No work is to be performed at times of darkness. All ignition sources shall be extinguished.

Although it was determined that normal Level D PPE is sufficient for the Sediment Study field activities, Level C PPE may be warranted if site conditions change. The senior HES official onsite will make the determination to implement Level C PPE.

**Site Drilling** -Site drilling shall be performed in accordance with the Tri-State SOP (standard operating procedures). Site drilling shall be accomplished using appropriate equipment, run by trained, qualified operators. When an individual boards the barge-drilling platform, boarding will only be allowed after recognition from the drill equipment operator of the individual's intent. This

recognition can be in the form of a verbal or physical acknowledgment.

**Sample Collection**-Employees engaged in sampling events at the Sediment Study area shall wear a minimum of Level D PPE. During sampling operations, general sampling protocol/chain-of-custody procedures shall be followed. Samples shall not be taken from the Geoprobe sampler. Skin contact with the sample material is to be avoided.

**Clean Up Operations**-During general labor activities associated with cleanup of the drilling and sampling equipment, the laborer will be required to wear at least Level D PPE, unless site conditions dictate that more stringent controls are necessary. Skin contact with the sample material is to be avoided.

#### **4.0 HEALTH AND SAFETY HAZARDS**

##### **4.1 Chemical Exposure Hazards**

There is a limited potential for ground water and soil samples to contain hazardous constituents which include, but are not limited to benzene, lead, toluene, xylenes, petroleum hydrocarbons, other constituents of gasoline and to petroleum fuels (see the Attachment 2 for appropriate Material Safety Data Sheet (MSDS)). These hazardous chemicals may be encountered during site drilling and soil sampling activities. If present, these chemicals can volatilize rapidly and present an inhalation hazard, and also a contact hazard to the eyes and skin. Some of the compounds contained in the ground water and soils can be absorbed through the skin; therefore, personnel working on these sites must wear proper protective clothing.

Prior to the commencement of work at the beginning of each workday, air monitoring shall be performed to quantify the levels of air contaminants present in the area. If contaminant levels, as measured by an HNU Photoionization Detector (PID) analyzer (or equivalent) are above five (5) parts per million (ppm) or 10% of the Permissible Exposure Limit (PEL) for the chemicals in question, air monitoring shall be performed at least every two (2) hours until the completion of the work day (or more often at the discretion of the On-Site Incident Commander). If contaminant levels are found to be below the five (5) parts per million (ppm) or 10% action level, air monitoring should be performed at least every four (4) hours until the completion of the work day, unless site conditions indicate that more frequent testing is warranted.

Should Volatile Organic Compounds (VOCs), as measured by an HNU analyzer (or equivalent), exceed 50 ppm above background levels in the work area air or 50% of the PEL of the material present, or should benzene levels, as measured by benzene Drager tubes, exceed 0.5 ppm, the level of safety protection to be worn by site workers will automatically be upgraded to "Level C" which includes: Tyvek suits; Air Purifying Respirators (APRs) with organic vapor cartridges; disposable gloves (to be worn underneath chemically resistant gloves); steel-toed boots; safety glasses; and hard hats.

During drilling operations at a site, exposure to chemicals transported by buried pipe presents a chemical exposure hazard as do buried water, natural gas and sewer service lines. Before drilling

or digging, appropriate personnel must be consulted to determine the exact location of any buried piping including TN-One-Call. Drilling operations should be conducted at a safe distance from buried piping and overhead wiring.

#### **4.2 Fire and Explosion Hazards**

When working in release areas that have a high probability of involving fuel, it is likely that some of the chemicals on site are flammable or combustible and could present fire and/or explosion hazards. However, normal implementation of work, observing routine safety precautions, should not pose a significant risk of fire or explosion hazard. Routine safety practices in areas used for the storage, distribution or use of flammable or combustible fuels and chemicals should include, but not be limited to the prohibition of smoking or the use of open flames, placement of portable fire extinguishers, use of non-sparking tools and to the monitoring of atmospheric conditions. Workplace air will be monitored during each day's activities to determine if explosive limits of fuels or volatile chemicals in the area are approached. The explosive limits of common liquid fuels are between 0.7% volume in air (LEL for Jet Fuel) and 7.6% volume in air (UEL for gasoline).

Should workplace air levels of fuel vapors approach the LEL of a fuel a volatile chemical, if known, or exceed ½% (5,000 ppm) as measured by a specific or non-specific monitoring device, work in the area will stop until the levels of vapor in the area are reduced. Only personnel involved in the reduction efforts will remain in the area.

(Note: the LEL and UEL values for Gasoline, Kerosene (Jet Fuel) and Diesel are 1.4-7.6%, 0.7-5.0% and 0.9-7.0% respectively).

#### **4.3 Biological Hazards**

Due to the location of the Sediment Study area, the potential exists for contact with poisonous plants, insects and animals. All personnel shall be aware of the possible presence of these site hazards and take proper precautions to prevent contact.

#### **4.4 Physical Safety Hazards**

Safety hazards for this site include slow running deep to shallow river water, ditches, slippery surfaces, steep grades, uneven terrain, and unstable surfaces. Workers must be cognizant of slippery conditions on working surfaces. Sharp objects such as nails, metal shreds and broken glass should be removed from the work areas. All work areas will be evaluated prior to machinery and/or equipment placement for best location with regard to slopes and uneven terrain.

At all times, proper means of access/egress shall be maintained such that each employee can safely evacuate the work area in the event of an emergency. The capacity of means of access/egress shall be dependent upon the occupant load of the workspace. When possible, more than one entrance/exit shall be available to each employee.

At times when it is necessary for an employee to perform work in a location that is separated from

the main body of work, by either excessive distance or physical boundary, the buddy system shall be used. Under no circumstances shall an employee enter into a situation alone where outside communication is unavailable.

All personnel onsite will be required to wear: full length slacks; long sleeved shirts; steel-toed boots; safety glasses; Coast Guard Approved Flotation Devices, and hard hats. This constitutes "Level D" safety protection.

Should HNU readings in the work area exceed action levels (see Section 4.1), personnel will be required to wear "Level C" protective equipment which includes Tyvek suits and Air Purifying Respirators (APRs) with organic vapor cartridges; disposable gloves beneath chemically resistant gloves; chemically resistant, steel-toed boots; safety glasses; and hard hats.

First aid kits, fire extinguishers and safety equipment will be present at the site at all times during site activities.

#### **4.5 Electrical Hazards**

The area was visually surveyed before work began. Overhead power lines were not observed. TN-One-Call was contacted for line mark out for buried cables. None were located on Sediment Study Site.

In addition, lightning is a potential electrical hazard, especially to those personnel in contact with water and/or electrical machinery. Weather conditions will be monitored and work will be suspended during electrical storms.

#### **4.6 Heat Stress Hazards**

As this project will be performed in winter conditions, heat stress can be considered a minor health hazard associated with work on any site, but heat stress could be a problem if a worker overdresses in the Level C. In its early stages, heat stress can cause rashes, cramps, discomfort, and drowsiness resulting in an impaired ability to function that threatens the safety of both victim and co-workers. Continued exposure can lead to heat stroke and death. All personnel should be aware of the symptoms and consequences of heat stress. Should any site personnel experience these symptoms or observe them in a coworker, the HES professional supervising site activities should be immediately notified. In addition, this HES professional will be cognizant of this hazard at all times and shall visually monitor workers for symptoms. During work activities, employees involved in site activities should have an opportunity to take fresh water and breaks, as needed. Workers experiencing heat stress should be treated immediately.

#### **4.7 Hypothermia Hazards**

As this project will be performed in winter conditions, hypothermia can be considered a major health hazard associated with work at this site. Level D PPE including winter clothing should be adequate protection, but the Level C PPE should not be allowed to get wet. In its early stages,

hypothermia can cause redness of the skin, cramps, discomfort, and drowsiness resulting in an impaired ability to function that threatens the safety of both victim and coworkers. Continued exposure can lead to unconsciousness and death.

All personnel should be aware of the symptoms and consequences of hypothermia. Should any site personnel experience these symptoms or observe them in a coworker, the HES professional supervising site activities should be immediately notified. In addition, this HES professional will be cognizant of this hazard at all times and shall visually monitor workers for symptoms. During work activities, employees involved in site activities should have an opportunity to take warm-up breaks, as needed. Workers experiencing hypothermia should be treated immediately.

## **5.0 PERSONAL PROTECTIVE EQUIPMENT**

### **5.1 Exposure to Chemicals**

This section outlines the general personal protective equipment usage guidelines to be implemented if deemed necessary onsite.

#### **Level D PPE:**

All personnel employed by HES and its subcontractors will wear

- A. Skin Protection - Full-length slacks, long sleeved shirts and chemically resistant gloves.
- B. Foot Wear - steel-toed boots will be worn at the site by all personnel employed by HES and its subcontractors. Rubber booties will also be worn during drilling and soil sampling operations and at other times, as deemed necessary by the HES on-site professional supervising site activities.
- C. Eye Protection - Safety Glasses will be worn at the site by all personnel employed by HES and its subcontractors.
- D. Head Protection - Hard Hats will be worn at the site by all personnel employed by HES and subcontractors.
- E. Floatation Protection – A Coast Guard Approved Personal Floatation Device will be worn by HES and subcontractors during all phases of activities performed on the water.

#### **Level C PPE:**

Should Level C personnel protective equipment be required at the site, all personnel employed by HES and its subcontractors will be required to wear:

- A. Skin Protection - Disposable Tyvek Suits and disposable gloves beneath their chemically resistant gloves. The suits and disposable gloves (if used) will be disposed of on-site after each use or when they become worn or punctured.

B. Respiratory Protection - Full or Half-Face-Air Purifying Respirators (APRs) with Organic Vapor Cartridges will be stored in the work area, available for use should they be required. All personnel with HES and its subcontractors will be fit tested with their assigned APR.

C. Foot Protection - chemically resistant booties over chemically resistant, steel-toed boots.

D. Eye Protection - safety glasses.

E. Head Protection - hard hats.

F. Floatation Protection – A Coast Guard Approved Personal Floatation Device will be worn by HES and subcontractors during all phases of activities performed on the water.

## 5.2 Exposure to Bodily Fluids

Employer obligations, set forth by TOSHA, require each employer to provide a place of employment that is free from recognized hazards likely to cause death or serious physical harm. However, the Center for Disease Control (CDC) has established guidelines to protect workers from infectious diseases, particularly Hepatitis B Virus (HBV) and Human Immunodeficiency Virus (HIV), transmitted through bodily fluids.

The CDC has called for the use of "universal precautions" when exposed to blood and/or bodily fluids of another person most likely to be encountered while assisting an injured person.

"Universal Precautions" refers to a system of infectious disease control that assumes that every direct contact with bodily fluids is infectious and requires personal protection, as if the bodily fluids were HBV or HIV infected. Universal Precautions apply to: blood, semen, blood products, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, amniotic fluid, vomit and urine.

### 5.2.1 Personal Protective Equipment

The use of gloves is particularly important in the following circumstances:

- A. If you have cuts, abraded skin, chapped hands, dermatitis or other skin conditions.
- B. When exposed to active bleeding of an injured person.
- C. During clean-up of bodily fluids and disinfection procedures.

Gloves should be of the appropriate material (latex or vinyl) and of the appropriate size.

Gloves should be disposable.

Gloves should not be used if they are peeling, cracked or discolored.

### **5.2.2 Sanitary Conditions**

All places of employment should be maintained in clean, orderly and sanitary condition. Proper precautions (use of gloves) should be taken while cleaning up blood spills or infected areas.

Household bleach, diluted between 1:10 and 1:100 with water, is a suitable disinfectant.

All wastes, created by either assisting the injured person or disinfecting the area, shall be removed in such a manner as not to create a menace to health.

### **5.2.3 Disposal of Infected Materials**

Bags or other containers, used for disposing of infectious materials, shall be properly handled. The following precautions should be followed:

A tag reading "BIOHAZARD" shall be secured to bags or other containers used for disposal of infected materials.

The tag shall be readable at a distance of five (5) feet.

If the outside of the container to be disposed has been infected, or if puncturing of the container is likely, a second outer bag shall be used.

### **5.2.4 Personal Hygiene**

After removing and properly disposing of gloves, hands and other exposed skin surfaces shall thoroughly washed.

## **6.0 MEDICAL SURVEILLANCE PROGRAM**

All employees involved in the drilling and sampling operations, either directly or indirectly, shall be monitored medically during their employment. Employees covered under the Medical Surveillance Program shall be monitored for symptoms related to the handling of hazardous substances, and for fitness for duty including the ability to wear PPE under conditions that may be expected at the work site.

All medical examinations and procedures shall be performed by, or under the supervision of, a licensed physician. Records of medical monitoring shall be retained for a period of no less than 30 years.

## **7.0 AIR MONITORING**

Air quality monitoring is an integral part of a Health and Safety Plan. The air monitoring data will influence decisions regarding worker protective measures, routine work procedures and emergency events. Air monitoring measurements and instrument calibration data will be recorded in the field notebook. Air monitoring is accomplished with a PID or Drager tubes for VOCs and a Model 60 Gascope (or equivalent) for LELs. Any significant change in odor level at the site should be investigated via air monitoring.

Prior to the commencement of work at the beginning of each workday, air monitoring shall be performed to quantify the levels of air contaminants present in the area. If contaminant levels, as measured by a PID (or equivalent) are above five (5) ppm or 10% of the Permissible Exposure Limit (PEL) for the chemical in question, air monitoring shall be performed at least every two (2) hours until the completion of the work day (or more often at the discretion of the On-Site Incident Commander). If contaminant levels are found to be below the five (5) ppm or 10% action level, air monitoring should be performed at least every four (4) hours until the completion of the workday, unless site conditions indicate that more frequent testing is warranted.

If air concentrations, as measured by the PID, are less than 10 parts per million (ppm) of Volatile Organic Compounds (VOCs) above background, air-purifying respirators (APRs) need not be worn. If VOC concentrations in air are consistently 10 to 50 ppm above background concentrations, a benzene Drager tube must be used to determine the actual benzene concentration. If the level is greater than half the Short Term (15 minutes) Exposure Limit (STEL) of 5 ppm, APR protection will be worn by all site personnel employed by HES and its subcontractors. If VOC concentrations in the air exceed 50 ppm VOC above background, work shall be suspended in that area and the source of the organic vapors will be investigated. Appropriate actions will be determined on a case-by-case basis as determined by the HES professional supervising site activities.

If air concentrations of volatile materials, as measured by the Model 60 Gascope (or equivalent), approach 10% of the LEL, work will stop and measures will be taken to reduce the level of vapors present. Appropriate actions to reduce the levels of explosive vapors will be instituted promptly under the direction of the HES professional supervising site activities.

(Note: the LEL and UEL values for Gasoline, Kerosene (Jet Fuel) and Diesel by volume in air are 1.4-7.4%, 0.7-5.0% and 0.9-7.0%, respectively).

In the event that VOCs are above allowable limits set (as explained above) or explosive conditions exceed limits set (as explained above), the area of concern will be evacuated. Only personnel operating to reduce these levels should remain in the area of concern.

## **8.0 SITE CONTROL**

A site map will be provided by the client and/or HES depicting the general topography of the area including impoundments, ditches, building, process units, etc. Personnel employed by HES and its

subcontractors will review this map to become familiar with access routes, evacuation routes, potential problem areas, and locations of first aid and fire and safety equipment.

Should chemical hazardous conditions be identified at the site, a "Hot Zone" shall be established around the area of the drilling operations. A "Warm Zone" or "Contamination Reduction Zone" shall be established around the "Hot Zone", and a "Cool Zone" shall be established around the "Warm Zone." These zones shall categorically denote varying degrees of possible exposure to released materials, with "Hot" being the most severe. An "Access/Egress Corridor" shall be established (upwind of the "Hot Zone", when possible), with two lanes of passage (traffic should flow on the right-hand side), and a manned checkpoint at the entrance/exit. An "Access Lane" will be established within the "Access/Egress Corridor" for individuals entering the site. A "Decontamination Lane" will be established within the "Access/Egress Corridor" for individuals exiting the work area. This zone will be used by employees to remove all contaminated clothing and, when necessary, wash (or scrub) off all existing contamination. If necessary, a privacy chamber/portable shower, in accordance with 29 CFR 1910.141, will be provided. Outside of the "Cool Zone", a "Command Post" shall be erected. This shall serve as the center of operations for the On-Scene Incident Commander. Also, an "Emergency Assembly Point" shall be established in an area far enough away from the spill site to be safe from any hazardous situation that may arise within the spill area (preferably upwind, and on the far side of a protective barrier, when possible).

Entry into the site during drilling and cleanup operations will be limited to the drilling and cleanup team, client representatives, emergency response personnel (police, fire, emergency medical) and anyone else approved by the client or On-Site Incident Commander for entry into the site. Site delineation may be accomplished through the use of borders, checkpoints, fences, caution signs or tapes or other appropriate means.

A site map is enclosed as Figure 2 of Attachment 2.

## **9.0 DECONTAMINATION PROCEDURES**

Prior to exiting the work area, employees engaged in the Study operations will be required to remove all contaminated clothing and, if necessary, wash (or scrub) off all existing contamination. Contaminated clothing will be drummed and characterized for proper disposal. Decontamination rinsate shall be captured and drummed for characterization and proper disposal. If necessary, a privacy chamber/portable shower, in accordance with 29 CFR 1910.141, will be provided. Any equipment used for the decontamination procedures (brushes, sponges, etc.) shall be drummed and characterized for proper disposal.

## **10.0 EMERGENCY RESPONSE PLAN**

In the event that an emergency situation develops at a site, all personnel employed by HES and its subcontractors will be warned verbally, or with visual signals or other warning devices such as a compressed air horn. All personnel employed by HES or its subcontractors will meet at the pre-designated "Emergency Assembly Point." Emergency evacuation routes and the location of the "Emergency Assembly Point" will be determined before work begins each day. All personnel

employed by HES and its subcontractors will be briefed in these procedures.

During all phases of work at a site, personnel employed by HES and its subcontractors will maintain visual contact with other personnel in the work area via the "buddy" system. At no time will personnel employed by HES or its subcontractors work alone at the site.

First aid equipment and supplies will be maintained at all work sites. The exact location of the first aid supplies at the work area will be selected before work begins, and all personnel employed by HES and its subcontractors will be informed of these locations.

A list of emergency contact numbers is presented in Attachment 3.

**ATTACHMENTS**

**ATTACHMENT 1**

**MAPS**

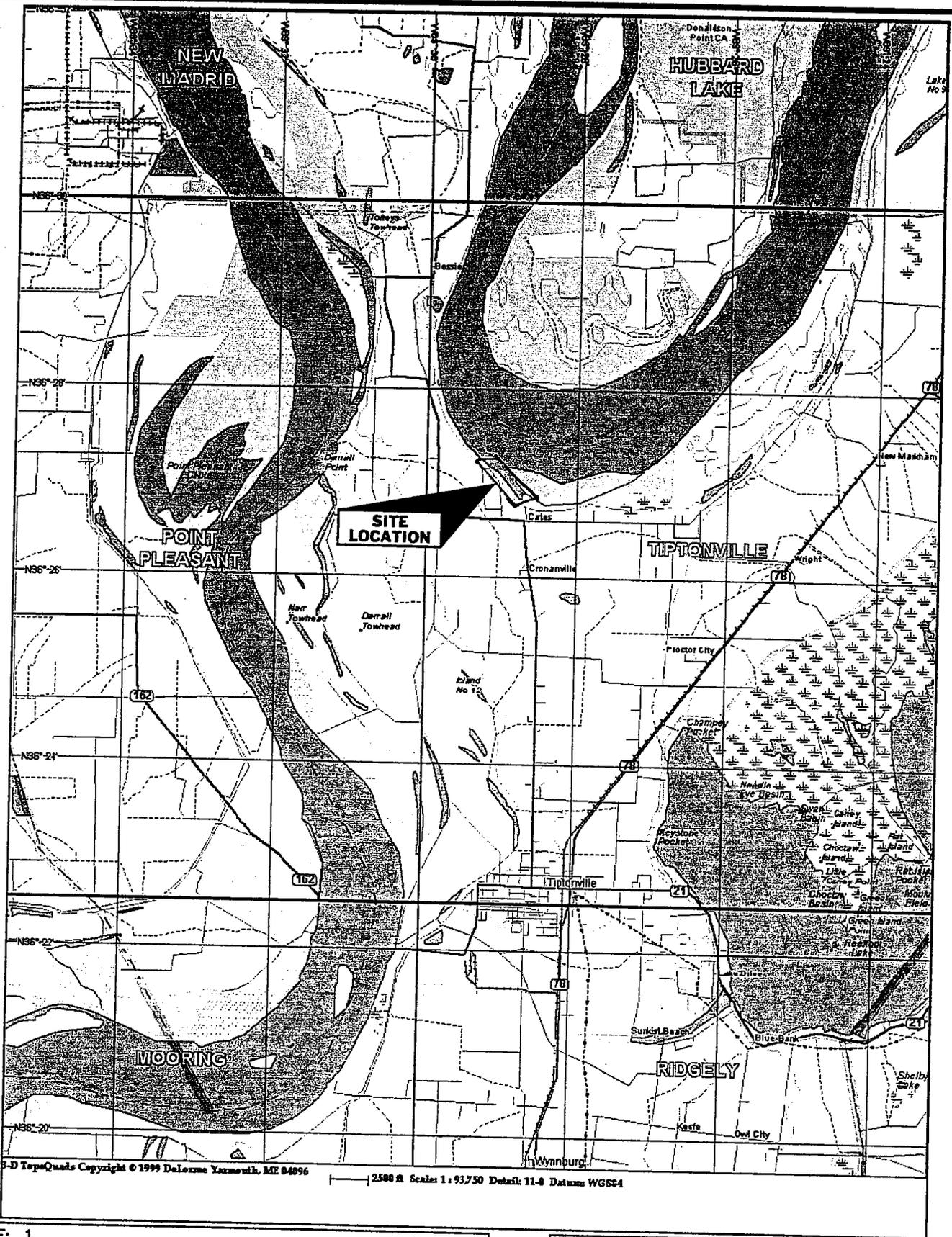


FIGURE: 1  
 TITLE: SUBJECT PROPERTY LOCATED ON A SELECTION OF DELORME 3-D TOPOQUADS TENNESSEE REGION 1  
 SUBJECT: PROPOSED NORTHWESTERN TENNESSEE HARBOR PROJECT CATES LANDING, LAKE COUNTY, TENNESSEE USACE P.R. #W38XGR-3276-0640

**HES** HESS ENVIRONMENTAL SERVICES, INC. MEMPHIS, TENNESSEE

SCALE: SEE ABOVE	CHECKED BY	DRAWN BY: DS
DATE: 1/5/05	<i>DS</i>	NUMBER: 0610-40
PROJECT NO. 0610.T5	TRACKING NO. 2840-04	



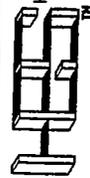
**Legend**

Alternative 5

Disposal Area

● = Proposed Boring Locations

FIGURE: 2  
 TITLE: SITE MAP SHOWING APPROXIMATE LOCATION OF SOIL BORINGS  
 SUBJECT: PROPOSED NORTHWESTERN TENNESSEE HARBOR PROJECT  
 CATES LANDING, LAKE COUNTY, TENNESSEE  
 USACE P.R. #W38XGR-3276-0640



HESS ENVIRONMENTAL SERVICES, INC.  
 MEMPHIS, TENNESSEE

SCALE: SEE ABOVE	CHECKED BY: <i>[Signature]</i>	DRAWN BY: DS
DATE: 1/5/04	LOG NUMBER: 2841-04	
PROJECT NUMBER: 0610.15		DRAWING NUMBER: 0610-041

**ATTACHMENT 2**

**MATERIAL SAFETY  
DATA SHEETS**

**MATERIAL SAFETY DATA SHEETS**

- 1) **Diesel**
- 2) **Diesel #2**
- 3) **Regular Unleaded Gasoline**

# Safety (MSDS) data for diesel

---

## General

Synonyms: diesel fuel, diesel oil

Molecular formula: depends upon formulation, typically composed of a hydrocarbon mix together with (often proprietary) additives. May contain a dye to indicate, for example, whether or not excise duty has been paid on the product.

CAS No: 68334-30-5

EC No:

## Physical data

Appearance: clear colourless or dyed liquid

Melting point:

Boiling point: typically > 149 C

Vapour density:

Vapour pressure: at 20 C typically < 1 mm

Specific gravity:

Flash point: typically > 52 C

Explosion limits:

Autoignition temperature:

## Stability

Stable. Flammable. Incompatible with strong acids, strong oxidizing agents, halogens.

## Toxicology

Respiratory and skin irritant. The product may contain polycyclic aromatic hydrocarbons which may be carcinogenic. Generally regarded as being of low toxicity unless contact is repeated and/or prolonged.

### Toxicity data

(The meaning of any abbreviations which appear in this section is given here.)

ORL-RAT LD50 >2000 mg kg<sup>-1</sup>

## **Personal protection**

Avoid skin contact and inhalation. Ensure good ventilation.

[Return to [Physical & Theoretical Chemistry Lab. Safety home page.](#)]

---

This information was last updated on December 22, 2003. We have tried to make it as accurate and useful as possible, but can take no responsibility for its use, misuse, or accuracy. We have not verified this information, and cannot guarantee that it is up-to-date.

**AMOCO INTERNATIONAL OILCO -- AMOFUEL NO. 2 DIESEL - DIESEL FUEL**  
**MATERIAL SAFETY DATA SHEET**

---

NSN: 9140002865294

Manufacturer's CAGE: 6G027

Part No. Indicator: A

Part Number/Trade Name: AMOFUEL NO. 2 DIESEL

---

---

General Information

---

---

Item Name: DIESEL FUEL

Company's Name: AMOCO INTERNATIONAL OILCO

Company's Street: 200 E RANDOLPH DR

Company's P. O. Box: 5910-A

Company's City: CHICAGO

Company's State: IL

Company's Country: US

Company's Zip Code: 60680

Company's Emerg Ph #: 800-447-8735

Company's Info Ph #: 312-856-3907

Distributor/Vendor # 1: AMOCO INTERNATIONAL OILCO

Distributor/Vendor # 1 Cage: 6G027

Record No. For Safety Entry: 082

Tot Safety Entries This Stk#: 112

Status: SE

Date MSDS Prepared: 25JUL89

Safety Data Review Date: 07MAR91

Supply Item Manager: KY

MSDS Preparer's Name: R. G. FARMER

MSDS Serial Number: BGWFD

Specification Number: VV-F-800

Spec Type, Grade, Class: DF-2

Hazard Characteristic Code: F4

Unit Of Issue: GL

Unit Of Issue Container Qty: BULK

Type Of Container: BULK

---

---

Ingredients/Identity Information

---

---

Proprietary: NO

Ingredient: ALIPHATIC PETROLEUM DISTILLATES

Ingredient Sequence Number: 01

NIOSH (RTECS) Number: 1003049AP

CAS Number: 68476-30-2

OSHA PEL: NOT ESTABLISHED

ACGIH TLV: NOT ESTABLISHED

Other Recommended Limit: NONE SPECIFIED

---

---

Physical/Chemical Characteristics

---

---

Appearance And Odor: CLEAR, BRIGHT LIQUID

Boiling Point: 340F,171C

Specific Gravity: 0.88

Decomposition Temperature: UNKNOWN

Solubility In Water: NEGLIGIBLE

Viscosity: 1.8 CS @100F

Corrosion Rate (IPY): UNKNOWN

---

---

Fire and Explosion Hazard Data

---

---

Flash Point: 120F,49C

Flash Point Method: TCC

Lower Explosive Limit: 0.6

Upper Explosive Limit: 7.5

Extinguishing Media: USE WATER FOG, CARBON DIOXIDE, FOAM, OR DRY CHEMICAL.

(EXTINGUISHING AGENTS APPROVED FOR CLASS B HAZARDS)

Special Fire Fighting Proc: FIRE FIGHTERS SHOULD USE NIOSH APPROVED SCBA &

FULL PROTECTIVE EQUIPMENT WHEN FIGHTING CHEMICAL FIRE. USE WATER SPRAY TO

COOL NEARBY CONTAINERS EXPOSED TO FIRE.

Unusual Fire And Expl Hazrds: FIRE OR EXCESSIVE HEAT MAY CAUSE PRODUCTION OF HAZARDOUS DECOMPOSITION PRODUCTS.

---

---

Reactivity Data

---

---

Stability: YES

Cond To Avoid (Stability): HIGH TEMPERATURES, SPARKS, AND OPEN FLAMES

Materials To Avoid: STRONG OXIDIZING AGENTS

Hazardous Decomp Products: BY FIRE: CARBON MONOXIDE, CARBON DIOXIDE

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NOT APPLICABLE

---

---

Health Hazard Data

---

---

LD50-LC50 Mixture: LD50 (ORAL RAT) IS EXPECTED > 5G/KG

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: EYE:IRRITATION. SKIN:MILDLY IRRITATING.

RESPIRATORY SYSTEM IRRITATION AND LIGHT HEADEDNESS. MAY CAUSE NAUSEA, HEADACHE, DROWSINESS, VOMITING. INGESTION:SOLVENT ASPIRATION INTO LUNGS AS A RESULT OF VOMITING MAY CAUSE LUNG AND DIGESTIVE SYSTEM DAMAGE

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: NONE OF THE COMPOUNDS IN THIS PRODUCT IS

LISTED BY IARC, NTP, OR OSHA AS A CARCINOGEN. (DIESEL EXHAUST IS POTENTIAL)

Signs/Symptoms Of Overexp: VAPORS IN HIGH CONCENTRATION ARE ANESTHETIC.

OVEREXPOSURE MAY RESULT IN FATIGUE, WEAKNESS, CONFUSION EUPHORIA, DIZZINESS, HEADACHE, DILATED PUPILS, LACRIMATION, NERVOUSNESS, MUSCLE FATIGUE, INSOMNIA, PARESTHESIA, DERMATITIS, AND PHOTOPHOBIA. CAN CAUSE TEARING, REDNESS OF EYES AND BLURRED VISION. IRRITATION OF SKIN.

Med Cond Aggravated By Exp: PERSONS WITH A HISTORY OF AILMENTS OR WITH A PRE-EXISTING DISEASE INVOLVING THE EYES, SKIN, RESPIRATORY TRACT OR NERVOUS SYSTEM MAY BE AT INCREASED RISK FROM EXPOSURE. DRYING/CRACKING OF SKIN.

Emergency/First Aid Proc: EYES: FLUSH WITH RUNNING WATER FOR 15 MINUTES

WHILE HOLDING EYELID. GET MEDICAL ATTENTION IMMEDIATELY. SKIN: WASH WITH REMOVE TO FRESH AIR. GIVE MOUTH-TO-MOUTH RESUSCITATION IF NOT BREATHING. GET MEDICAL ATTENTION. INGESTION: DO NOT INDUCE VOMITING. GIVE NOTHING BY MOUTH IF UNCONSCIOUS. GET MEDICAL ATTENTION IMMEDIATELY.

---

---

Precautions for Safe Handling and Use

---

---

Steps If Matl Released/Spill: REMOVE ALL SOURCES OF IGNITION. VENTILATE AND REMOVE WITH INERT ABSORBENT. USE NON-SPARKING TOOLS.

Neutralizing Agent: NOT APPLICABLE

Waste Disposal Method: WASTE MATERIAL MAY BE A HAZARDOUS WASTE (CODE D001) WHICH MUST BE DISPOSED OF ACCORDINGLY. DO NOT INCINERATE CLOSED CONTAINER.

DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS.

Precautions-Handling/Storing: CONTENTS ARE FLAMMABLE. KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME. DURING USE AND UNTIL ALL VAPORS ARE GONE: KEEP AREA

VENTILATED-DO NOT SMOKE.

Other Precautions: AVOID BREATHING OF VAPORS. LABORATORY TESTS ON ANIMALS

HAVE SHOWN THAT EXPOSURE CAN CAUSE SKIN TUMORS. ALWAYS PROMPTLY WASH OFF

ANY EXPOSED SKIN.

---

---

Control Measures

---

---

Respiratory Protection: WEAR A NIOSH/MSHA APPROVED RESPIRATOR IF

VENTILATION DOES NOT MAINTAIN INHALATION EXPOSURES BELOW PEL/TLV. WEAR SELF-CONTAINED BREATHING APPARATUS IF REQUIRED FOR HIGH LEVELS OF CONTAMINATES.

Ventilation: LOCAL EXHAUST PREFERABLE. GENERAL EXHAUST ACCEPTABLE IF THE EXPOSURE IS MAINTAINED BELOW APPLICABLE EXPOSURE LIMITS.

Protective Gloves: NEOPRENE OR NATURAL RUBBER GLOVES

Eye Protection: PAINT GOGGLES/SAFETY GLASSES AS REQUIRED

Other Protective Equipment: INDUSTRIAL-TYPE WORK CLOTHING, HAT AND APRON AS REQUIRED. AN EYE WASH AND DRENCH SHOWER FACILITY SHOULD BE AVAILABLE.

Work Hygienic Practices: USE WITH ADEQUATE VENTILATION. AVOID BREATHING VAPOR/SPRAY MIST. AVOID CONTACT WITH SKIN/EYES. WASH HANDS/SKIN AFTER USE

Suppl. Safety & Health Data: KEEP CONTAINER CLOSED WHEN NOT IN USE.

TRANSFER ONLY TO APPROVED CONTAINERS WITH COMPLETE AND APPROPRIATE LABELING. DO NOT TAKE INTERNALLY.

---

---

Transportation Data

---

---

Trans Data Review Date: 91066

DOT PSN Code: LKZ

DOT Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S. OR PETROLEUM PRODUCTS, N.O.S.

DOT Class: 3

DOT ID Number: UN1268

DOT Pack Group: III

DOT Label: FLAMMABLE LIQUID

IMO PSN Code: LMH

IMO Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S. o

IMO Regulations Page Number: 3375

IMO UN Number: 1268

IMO UN Class: 3.3

IMO Subsidiary Risk Label: -

IATA PSN Code: TJB

IATA UN ID Number: 1268

IATA Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S.

IATA UN Class: 3

IATA Label: FLAMMABLE LIQUID

AFI PSN Code: TJB

AFI Prop. Shipping Name: PETROLEUM DISTILLATES, N.O.S.

AFI Class: 3

AFI ID Number: UN1268

AFI Pack Group: III

AFI Basic Pac Ref: 7-7

N.O.S. Shipping Name: CONTAINS PETROLEUM DISTILLATE.

Additional Trans Data: MSDS GIVES FLASH POINT RANGE 120F-180F, BOILING  
POINT RANGE 340F-675F.

---

---

Disposal Data

---

---

Label Data

---

---

Label Required: YES

Technical Review Date: 07MAR91

Label Status: F

Common Name: AMOFUEL NO. 2 DIESEL

Chronic Hazard: NO

Signal Word: WARNING!

Acute Health Hazard-Slight: X

Contact Hazard-Slight: X

Fire Hazard-Moderate: X

Reactivity Hazard-None: X

Special Hazard Precautions: EYE:IRRITATION. SKIN:MILDLY IRRITATING.

RESPIRATORY SYSTEM IRRITATION AND LIGHT HEADEDNESS. MAY CAUSE NAUSEA,  
HEADACHE, DROWSINESS, VOMITING. INGESTION:SOLVENT ASPIRATION INTO  
LUNGS AS A RESULT OF VOMITING MAY CAUSE LUNG AND DIGESTIVE SYSTEM  
DAMAGE REMOVE ALL SOURCES OF IGNITION. VENTILATE AND REMOVE WITH  
INERT ABSORBENT. USE NON-SPARKING TOOLS. CONTENTS ARE FLAMMABLE. KEEP  
AWAY FROM HEAT, SPARKS, AND OPEN FLAME. DURING USE AND UNTIL ALL  
VAPORS ARE GONE: KEEP AREA VENTILATED- DO NOT SMOKE.

Protect Eye: Y

Protect Skin: Y

Protect Respiratory: Y

Label Name: AMOCO INTERNATIONAL OILCO

Label Street: 200 E RANDOLPH DR

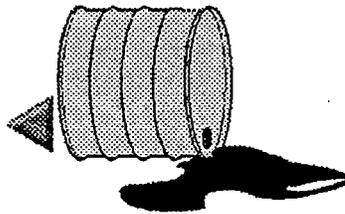
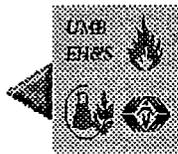
Label P.O. Box: 5910-A

Label City: CHICAGO

Label State: IL

Label Zip Code: 60680

Label Country: US



**AMERADA HESS -- REGULAR UNLEADED GASOLINE**

**MATERIAL SAFETY DATA SHEET**

---

NSN: 913000N023616

Manufacturer's CAGE: 4N717

Part No. Indicator: A

Part Number/Trade Name: REGULAR UNLEADED GASOLINE

---

---

General Information

---

---

Company's Name: AMERADA HESS CORP

Company's Street: 1 HESS PLAZA

Company's City: WOODBRIDGE

Company's State: NJ

Company's Country: US

Company's Zip Code: 07095

Company's Emerg Ph #: 800-424-9300(CHEMTREC)

Company's Info Ph #: 201-750-6000

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SMJ

Date MSDS Prepared: 13JAN89

Safety Data Review Date: 08JAN92

MSDS Serial Number: BLZXH

Hazard Characteristic Code: F2

---

---

Ingredients/Identity Information

---

---

Proprietary: NO

Ingredient: GASOLINE

Ingredient Sequence Number: 01

Percent: 100

NIOSH (RTECS) Number: LX3300000

CAS Number: 8006-61-9

OSHA PEL: 300 PPM;500 PPM STEL

ACGIH TLV: 300 PPM;500 PPM STEL

-----

Proprietary: NO

Ingredient: TERT-AMYL METHYL ETHER (BLEND OF ING 2&3 FOR A TOTAL OF 15% OF PRODUCT)

Ingredient Sequence Number: 02

Percent: MIX

NIOSH (RTECS) Number: 1007422AM

CAS Number: 994-05-8

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

-----

Proprietary: NO

Ingredient: ETHER, TERT-BUTYL METHYL; (METHYL TERT-BUTYL ETHER)

Ingredient Sequence Number: 03

Percent: MIX

NIOSH (RTECS) Number: KNS525000

CAS Number: 1634-04-4

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

-----

Proprietary: NO

Ingredient: TOLUENE

Ingredient Sequence Number: 04

Percent: 6-<3015

NIOSH (RTECS) Number: XS5250000

CAS Number: 108-88-3

OSHA PEL: 200 PPM/150 STEL

ACGIH TLV: 50 PPM; 9293

-----

Proprietary: NO

Ingredient: XYLENE

Ingredient Sequence Number: 05

Percent: 8.5-<15

NIOSH (RTECS) Number: ZE2100000

CAS Number: 1330-20-7

OSHA PEL: 100 PPM;150 PPM STEL

ACGIH TLV: 100 PPM;150 PPM STE

-----  
Proprietary: NO

Ingredient: BENZENE

Ingredient Sequence Number: 06

Percent: 0.1-<5

NIOSH (RTECS) Number: CY1400000

CAS Number: 71-43-2

OSHA PEL: 1 PPM; 5 STEL (MFR)

ACGIH TLV: 10 PPM  
-----

Proprietary: NO

Ingredient: BENZENE, ETHYL; (ETHYL BENZENE)

Ingredient Sequence Number: 07

Percent: <3

NIOSH (RTECS) Number: DA0700000

CAS Number: 100-41-4

OSHA PEL: 100 PPM;125 PPM STEL

ACGIH TLV: 100 PPM;125 PPM STEL  
-----

Proprietary: NO

Ingredient: BENZENE,1,2,4-TRIMETHYL-; (1,2,4-TRIMETHYLBENZENE)

Ingredient Sequence Number: 08

NIOSH (RTECS) Number: DC3325000

CAS Number: 95-63-6

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

-----

Proprietary: NO

Ingredient: SUPPORT DATA:IN AIR. HEAVIER/AIR VAPOR CAN FLOW ALONG SURFACES TO DISTANT SOURCES OF IGNITION AND FLASHBACK. FLOW GASOLINE CAN BE (ING 10)

Ingredient Sequence Number: 09

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

-----

Proprietary: NO

Ingredient: ING 9:IGNITED BY SELF-GENERATED STATIC ELECTRICITY RUNOFF TO SEWERS MAY CREATE FIRE &/OR EXPLOSION HAZARD

Ingredient Sequence Number: 10

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

-----

Proprietary: NO

Ingredient: EFFECTS OF OVEREXPOSURE:WILL FATIGUE OLFACTORY SENSES. IMMEDIATELY DANGEROUS TO HEALTH/LIFE IS REPRESENTED BY 2 THOUSANDS (2000)PPM. (ING 12)

Ingredient Sequence Number: 11

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

-----

Proprietary: NO

Ingredient: ING 11:INGESTION/INHALATION OF LIQUID &/OR EXCESS VAPOR CAN HAVE AN ANESTHETIZING EFFECT, CAUSING VERTIGO, BLURRED VISION, VOMIT & (ING 13)

Ingredient Sequence Number: 12

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

-----

Proprietary: NO

Ingredient: ING 12:CYANOSIS. OVEREXPOSURE MAY CAUSE CENTRAL NERVOUS SYSTEM DEPRESSION.

Ingredient Sequence Number: 13

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

-----

Proprietary: NO

Ingredient: SPILL PROCEDURES :ACQUATIC LIFE. CAUTION-EVACUATE ALL NON-ESSENTIAL PERSONNEL SPILLED MATERIAL MAY CAUSE SLIPPERY CONDITION. OPEN (ING 15)

Ingredient Sequence Number: 14

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

-----  
Proprietary: NO

Ingredient: ING 14:SPILLS MAY EMIT FLAMMABLE VAPOR APPROACH FROM UPWIND IF POSSIBLE. AVOID BREATHING EMITTED VAPOR WEAR SCBA IF REQUIRED TO PREVENT(ING 16)

Ingredient Sequence Number: 15

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE  
-----

Proprietary: NO

Ingredient: ING 15:INHAL OF VAPORS.

Ingredient Sequence Number: 16

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE  
-----

Proprietary: NO

Ingredient: WASTE DISPOSAL METHOD:FLAMMABLE, VAPORS.

Ingredient Sequence Number: 17

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE  
-----

Proprietary: NO

Ingredient: HANDLING/STORAGE PRECAUTIONS :BONDED/GROUNDED TO PREVENT POTENTIAL ACCUMULATION OF STATIC ELECTRICITY. NO SMOKING IN AREAS OF HANDLING/STORAGE (ING 19)

Ingredient Sequence Number: 18

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

-----

Proprietary: NO

Ingredient: ING 18:STORAGE SHOULD BE TIGHTLY CLOSED CONTAINER IN COOL/DRY/ISOLATED & WELL VENTED AREA AWAY FROM POTENTIAL SOURCES OF IGNITION.

Ingredient Sequence Number: 19

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

-----

Proprietary: NO

Ingredient: OTHER PRECAUTIONS :REGULAR/FREQUENT BASIS. VENTILATION MUST BE SUFFICIENT TO PREVENT ACCUMULATION OF TOXIC/FLAMMABLE CONCENTRATION OF VAPOR IN AIR. (ING 21)

Ingredient Sequence Number: 20

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

-----

Proprietary: NO

Ingredient: ING 20:EMPTY CONTAINER MAY CONTAIN TOXIC/FLAM/MABLE  
COMBUSTION RESIDUE/VAPOR. DO NOT CUT/GRIND/DRILL/WELD OR REUSE  
CONTAINER UNLESS ADEQUATE (ING 22)

Ingredient Sequence Number: 21

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

-----

Proprietary: NO

Ingredient: ING 21:PRECAUTIONS AGAINST THESE HAZARDS ARE TAKEN.

Ingredient Sequence Number: 22

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

-----

Proprietary: NO

Ingredient: HYGIENE PRACTICES: UPPWIND OF VAPOR OR MIST RELEASE, SPILL OR  
LEAK.

Ingredient Sequence Number: 23

NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE

ACGIH TLV: NOT APPLICABLE

=====

Physical/Chemical Characteristics

=====

Appearance And Odor: CLEAR LIQUID W/STRONG AROMATIC HYDROCARBON ODOR.  
MAY BE DYED CHARACTERISTIC(SUPDAT)

Boiling Point: 85.0F,29.4C

Vapor Pressure (MM Hg/70 F): SUPP DATA

Vapor Density (Air=1): 3.0-4.0

Specific Gravity: 0.76

Evaporation Rate And Ref: 10-11(BUTYL ACETATE=1)

Solubility In Water: SLIGHT

Percent Volatiles By Volume: 100

---

---

#### Fire and Explosion Hazard Data

---

---

Flash Point: -40F,-40C

Flash Point Method: TCC

Lower Explosive Limit: 1.4%

Upper Explosive Limit: 7.4%

Extinguishing Media: ANY APPROVED EXTINGUISHING AGENT FOR CLASS B FIRES/DRY  
CHEM/FOAM/CO\*2 OR HALON. H\*2O IS NOT ORDINARILY EFFECTIVE HOWEVER, H\*2O  
FOG(SUPP DATA)

Special Fire Fighting Proc: NIOSH/MSHA APPRVD SCBA & FULL PROTECTION EQUIPMENT  
(FPN). AVOID INHALATION OF VAPOR. H\*2O SHOULD BE USED TO KEEP EXPOSURE  
CONTROL COOL. APPROACH FROM UPWIND IF POSSIBLE.

Unusual Fire And Expl Hazrds: CLASS 1A FLAMMABLE LIQUID. KEEP AWAY FROM  
HEAT/SOURCES OF IGNITION/OXIDIZERS. BURN MAY CAUSE EMISSION OF TOXIC  
PRODUCTION OF COMBUSTION.

EMPTY PRODUCT CONTROL/VESSELS MAY CONTAIN (SUPP DATA)

---

---

#### Reactivity Data

---

---

Stability: YES

Cond To Avoid (Stability): AVOID HANDLING OR STORING NEAR HEAT, SPARKS OR OPEN FLAME.

Materials To Avoid: OXIDIZING AGENTS. COMBUSTION OF NITRIC AND SULFURIC ACIDS.

Hazardous Decomp Products: CONTACT W/NITRIC & SULFURIC ACIDS WILL FORM NITROCRESOLS THAT CAN DECOMPOSE VIOLENTLY.

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NOT RELEVANT.

---

---

#### Health Hazard Data

---

---

LD50-LC50 Mixture: LD50:ORAL(RBT)5 ML/KG

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: NO

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: ACUTE/CHRONIC:HARMFUL/FATAL IF SWALLOW/  
ASPIRATED. LONG TERM EXPOS TO VAP HAS CAUSED CANCER IN SOME LAB  
ANIMALS. INGEST MAY CAUSE GI DISTURB. ASPIR INTO LUNGS MAY CAUSE  
PNEUMONIA PROLONGED CONTACT W/SKIN MAY RESULT IN  
DEFAT/RED/ITCH/INFLAM/CRACK & POSS SECONDARY INFECTION.

HAS LOW ORDER OF ACUTE ORAL TOXICITY IF (EFFECTS OF OVEREXPOSURE)

Carcinogenicity - NTP: YES

Carcinogenicity - IARC: YES

Carcinogenicity - OSHA: YES

Explanation Carcinogenicity: GASOLINE - IARC 2B; BENZENE, A CONSTITUENT OF GASOLINE: OSHA REGULATED, GROUP 1 (IARC, NTP).

Signs/Symptoms Of Overexp: HEALTH HAZARD :INGESTED, BUT MINIMUM AMOUNT ASPIR DURING SUCH INGEST MAY CAUSE DEATH. HIGH PRESS SKIN INJECTIONS ARE SERIOUS MEDICAL EMERGENCY REPEATED/PROLONGED EXPOSURE TO VAPOR CONTAIN HIGH CONCENTRATION OF BENZENE MAY CAUSE ANEMIA &

OTHER BLOOD DISEASES, INCLUDING LEUKEMIA. INHALATION TO 100PPM MAY CAUSE SLIGHT DROWSINESS/HEADACHE. 100-200PPM MAY CAUSE FATIGUE/NAUSEA/ITCH & (ING 11)

Medical Conditions Aggravated By Exposure: OPEN WOUNDS, SKIN DISORDERS, CHRONIC RESPIRATORY DISEASE OR PRE-EXISTING CENTRAL NERVOUS SYSTEM DISEASE.

Emergency/First Aid Proc: INHALATION :REMOVE TO FRESH AIR, PROVIDE O\*2 THERAPY &/OR RESUSCITATION AS INDICATED. SKIN: REMOVE CONTAMINATED CLOTHING AND FLUSH WITH SOAP AND WATER. EYE: FLUSH WITH WATER FOR AT LEAST 15 MINUTES. INGEST: RINSE MOUTH WITH WATER. KEEP CALM AND WARM. DO NOT INDUCE VOMIT! ASPIRATION OF MATERIAL INTO LUNGS MAY CAUSE CHEMICAL PNEUMONIA. CALL PHYSICIAN IMMEDIATELY

---

---

Precautions for Safe Handling and Use

---

---

Steps If Matl Released/Spill: CONTAIN ALL SPILLS. ABSORB ALL FREE LIQUID. REMOVE ALL IGNITION SOURCES/SAFELY STOP FLOW OF SPILL. PREVENT FROM ENTER ALL BODIES OF H\*2O. COMPLY W/ALL APPLICABLE LAWS/REGS. ABSORBENT MATERIAL/PADS/SAND/EARTH MAY BE USED. CONTAMINATED H\*2O/SOIL MAY BE HAZARD TO ANIMAL/ (ING 14)

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: DISPOSE OF PRODUCT/CONTAMINATED MATERIAL AS EPA "IGNITABLE HAZARDOUS WASTE". USE ONLY APPROVED TREATMENT TRANSPORTERS & DISPOSAL SITES IN COMPLIANCE W/ALL APPLICABLE FEDERAL/STATE/LOCAL REGULATIONS MAINTAIN SURVEILLANCE OF ABSORBED MATERIAL UNTIL FINAL DISPOSAL TO OBSERVE FOR EMISSION OF VOLATILE, (ING 17)

Precautions-Handling/Storing: KEEP AWAY FROM HEAT/SPARKS/OPEN FLAME. AVOID BREATHING VAPOR/MIST. AVOID SKIN/EYE CONTACT. KEEP CONTAINER CLOSED & PLAINLY LABELED.

TRANSFER LINES MUST BE (ING 17)

Other Precautions: USE ONLY AS MOTOR FUEL. HANDLE/TRANSPORT/STORE IN ACCORDANCE W/APPLICABLE LAWS/REGULAITONS. ELECTRICAL EQUIPMENT SHOULD BE APPROVED FOR CLASSIFIED AREA. REMOVE SOILED CLTHG/LAUNDER BEFORE RE-USE. DISCARD OIL SOAKED SHOES. WEAR FULL

LENGTH CLOTHING/LAUNDER ON (ING 18)

---

---

#### Control Measures

---

---

Respiratory Protection: USE NIOSH/MSHA APPROVED SCBA IN CONFINED SPACES OR WHEN EXPOSED TO HEAVY MIST.

Ventilation: LOCAL EXHAUST:GENERALLY NOT REQUIRED. MECHANICAL (GENERAL): EXPLOSION PROOF(APPROVED FOR CLASSIFIED AREA).

Protective Gloves: IMERVIOUS GLOVES.

Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).

Other Protective Equipment: IMPERVIOUS CLOTHING, EYEWASH/BATH.

Work Hygienic Practices: WASH SKIN THOROUGHLY W/SOAP/H\*2O BEFORE EAT/DRINK/SMOKING. VENTILATION MAY BE USED TO CONTROL/REDUCE AIRBORNE CONCENTRATIONS STAND (ING 23)

Suppl. Safety & Health Data: VP: 275-475@68F. APPEAR/ODOR:COLOR FOR

IDENTIFICATION(CLEAR RED/BRONZE/YELLOW ARE TYPICAL). EXTINGUISHING MEDIA:MAY BE USED BY EXPERIENCED FIRE FIGHTER FOR INTENSITY CONTROL/TO COOL EXPOSED AREAS.

EXPLOSION HAZARD:EXPLOSIVE VAPOR DO NOT PRESSURIZE/CUT/HEAT/WELD/EXPOSE SUCH CONTROL OR VESSELS TO SOURCES OF IGNITION. VAPOR CAN READILY FORM EXPLOSIVE MIXTURE(ING 9)

---

---

#### Transportation Data

---

---

Trans Data Review Date: 92072

DOT PSN Code: GTN

DOT Proper Shipping Name: GASOLINE

DOT Class: 3

DOT ID Number: UN1203

DOT Pack Group: II

DOT Label: FLAMMABLE LIQUID

IMO PSN Code: HRV

IMO Proper Shipping Name: GASOLINE

IMO Regulations Page Number: 3141

IMO UN Number: 1203

IMO UN Class: 3.1

IMO Subsidiary Risk Label: -

IATA PSN Code: RMF

IATA UN ID Number: 1203

IATA Proper Shipping Name: MOTOR SPIRIT

IATA UN Class: 3

IATA Label: FLAMMABLE LIQUID

AFI PSN Code: MUC

AFI Prop. Shipping Name: GASOLINE

AFI Class: 3

AFI ID Number: UN1203

AFI Pack Group: II

AFI Basic Pac Ref: 7-7

---

---

Disposal Data

---

---

---

---

Label Data

---

---

Label Required: YES

Label Status: G

Common Name: REGULAR UNLEADED GASOLINE

Special Hazard Precautions: ACUTE/CHRONIC:HARMFUL/FATAL IF SWALLOW/

ASPIRATED. LONG TERM EXPOSURE TO VAPOR HAS CAUSED CANCER IN SOME LAB ANIMALS. INGESTION MAY CAUSE GI DISTURBANCE. ASPIRATE INTO LUNGS MAY CAUSE PNEUMONIA PROLONG CONTACT W/SKIN MAY RESULT IN DEFAT/RED/ITCH/INFLAM/CRACK & POSSIBLY SECONDARY INFECTION.

HAS LOW ORDER OF ACUTE ORAL TOXICITY IF (EFFECTS OF OVEREXPOSURE) HEALTH HAZARD: INGESTED, BUT MINIMUM AMOUNT ASPIRATED DURING SUCH INGEST MAY CAUSE DEATH. HIGH PRESS SKIN INJECTIONS ARE SERIOUS MEDICAL EMERGENCOES REPEATED/PROLONGED EXPOSURE TO VAPOR CONTAINING HIGH CONCENTRATION OF BENZENE MAY CAUSE ANEMIA & OTHER BLOOD DISEASES, INCLUDING LEUKEMIA. INHALATION TO 100PPM MAY CAUSE SLIGHT DROWSINESS/HEADACHE. 100-200PPM MAY CAUSE FATIGUE/NAUSEA/ ITCH & (ING 11)

Label Name: AMERADA HESS CORP

Label Street: 1 HESS PLAZA

Label City: WOODBRIDGE

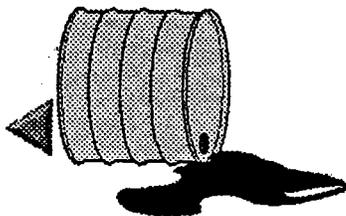
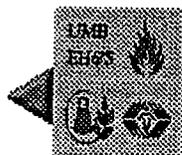
Label State: NJ

Label Zip Code: 07095

Label Country: US

Label Emergency Number: 00-424-9300(CHEMTREC)

---



**ATTACHMENT 3**  
**EMERGENCY CONTACT**  
**NUMBERS**

## EMERGENCY CONTACT NUMBERS

In the event that an emergency situation develops in the work area and/or on site, in the Lake County, Tennessee area, the following emergency numbers and a site map will be kept in each work area and may be used to request assistance:

Emergency Medical, Fire and Law Enforcement  
911

Hess Environmental Services, Inc.  
(901) 377-9139 or (901) 233-1666

Client, USACE Memphis District  
Ms. Verneda Joyner: (901) 544-3616  
Mr. Danny Ward: (901) 544-0709

City of Tiptonville Police Department  
(731) 253-6693 or 911

City of Tiptonville Fire Department  
(731) 253-7413 or 911

Union City Baptist Memorial Hospital  
1201 Bishop Street, Union City, TN  
(731) 885-2410

Tennessee Div. of Occupational Safety  
& Health Administration (TOSHA)  
Jackson: (731) 423-5640  
Memphis: (901) 543-7259

Tennessee Department of Environment and  
Conservation (TDEC), Jackson  
Environmental Assistance Center  
(731) 512-1300

Tennessee Emergency Management  
Agency  
(901) 543-6695 or 800-262-3300

Region IV, U.S. Environmental  
Protection Agency  
(800) 241-1754 or (404) 562-8700

**ATTACHMENT 4**  
**SIGNATURE SHEETS**



**Attachment 3**

**State of Tennessee  
Water Quality Standards**

**RULES  
OF  
TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
TENNESSEE WATER QUALITY CONTROL BOARD  
DIVISION OF WATER POLLUTION CONTROL**

**CHAPTER 1200-4-3  
GENERAL WATER QUALITY CRITERIA**

**TABLE OF CONTENTS**

1200-4-3-.01	Tennessee Water Quality Control Board	1200-4-3-.08	Ground Water Criteria
1200-4-3-.02	General Considerations	1200-4-3-.09	Site Specific Impaired Classification Application Process
1200-4-3-.03	Criteria For Water Uses		
1200-4-3-.04	Definitions	1200-4-3-.10	Point of Classification Change
1200-4-3-.06	Tennessee Antidegradation Statement	1200-4-3-.11	Appeals
1200-4-3-.07	Ground Water Classification		

**1200-4-3-.01 TENNESSEE WATER QUALITY CONTROL BOARD.**

The Water Quality Control Act, T.C.A., §69-3-101, et seq., makes it the duty of the Water Quality Control Board to study and investigate all problems concerned with the pollution of the Waters of the State and with its prevention, abatement, and control; and to establish such standards of quality for any Waters of the State in relation to their reasonable and necessary use as the Board shall deem to be in the public interest; and establish general policies relating to pollution as the Board shall deem necessary to accomplish the purposes of the Act. The following general considerations and criteria shall be used to determine the permissible conditions of waters with respect to pollution and preventative or corrective measures required to control pollution in various waters or in different sections of the same waters.

**Authority:** T.C.A. §§4-5-201 et seq., and 69-3-105. **Administrative History:** Original rule certified June 7, 1974. Amendment filed December 1, 1975; effective December 30, 1975. Amendment filed November 25, 1977; effective December 26, 1977. Amendment filed March 30, 1983; effective April 29, 1983. Amendment filed July 16, 1991; effective August 30, 1991. Amendment filed May 16, 1995; effective July 30, 1995. Amendment filed July 13, 1999; effective October 11, 1999. Amendment filed October 24, 2003; effective January 7, 2004.

**1200-4-3-.02 GENERAL CONSIDERATIONS.**

- (1) Tennessee water quality standards shall consist of the General Water Quality Criteria and the Antidegradation Statement found in Rule 1200-4-3, and the Use Classifications for Surface Waters found in Rule 1200-4-4.
- (2) Waters have many uses which in the public interest are reasonable and necessary. Such uses include: sources of water supply for domestic and industrial purposes; propagation and maintenance of fish and other aquatic life; recreation in and on the waters including the safe consumption of fish and shellfish; livestock watering and irrigation; navigation; generation of power; propagation and maintenance of wildlife; and the enjoyment of scenic and aesthetic qualities of waters.
- (3) The rigid application of uniform water quality is not desirable or reasonable because of the varying uses of such waters. The assimilative capacity of a stream for sewage and waste varies depending upon various factors and including the following: volume of flow, depth of channel, the presence of falls or rapids, rate of flow, temperature, natural characteristics, and the nature of the stream. Also, the relative importance assigned to each use will differ for different waters and sections of waters.
- (4) In order to permit the reasonable and necessary uses of the Waters of the State, existing pollution should be corrected as rapidly as practicable, and future pollution prevented through the best available technology economically achievable or that greater level of technology necessary to meet water

(Rule 1200-4-3-.02, continued)

- quality standards; i.e., modeling and stream survey assessments, treatment plants or other control measures.
- (5) Since all Waters of the State are classified for more than one use, the most stringent criteria will be applicable. In cases where criteria for protection of more than one use apply at different stream flows (e.g., aquatic life versus recreation), the most stringent criteria will also be applicable.
  - (6) Waters identified as wet weather conveyances according to the definition found in 1200-4-3-.04 (4), shall be protective of humans and wildlife that may come in contact with them and shall not degrade or adversely affect the quality of downstream waters. Applicable water quality standards will be maintained downstream of wet weather conveyances.
  - (7) Some general water quality criteria will be applied on a regional, ecoregional, or subcoregional basis. These criteria will be considered to apply to a stream if eighty percent of its watershed or catchment is contained within the unit upon which the criterion is based.
  - (8) All fish and aquatic life metals criteria are expressed as total recoverable, except cadmium, copper, lead, nickel, silver, and zinc which are expressed as dissolved. Translators will be used to convert the dissolved fraction into a total recoverable permit limit. One of three approaches to metals translation will be used: (1) translator is the same as the conversion factor, (2) translator is based on relationships derived from STORET data, (3) a site-specific translator is developed. Where available, a site-specific translator is preferred. For assessing whether criteria for cadmium, copper, lead, nickel, silver, and zinc are exceeded by ambient water quality conditions, the dissolved criteria will also be translated in order to allow direct comparison to the ambient data, if total recoverable. Site-specific criteria studies may be conducted on any appropriate fish and aquatic life criteria. When the Division develops or approves site-specific criteria for any substances for which generally applicable criteria have been adopted, the site-specific criteria will supersede the adopted criteria at that location. The Division can approve a site-specific criteria developed by others provided that an approved methodology is used and that both the study plan and results are approved. References on this subject include, but are not limited to: Technical Support Document for Water Quality-based Toxics Control (EPA - 505/2-90-001); Technical Guidance Manual for Performing Waste Load Allocations: Book VIII (EPA/600/6-85/002a/002b/002c); MinteqA2, An Equilibrium Metal Speciation Model (EPA/600/3-87/012); Water Quality Standards Handbook, Second Edition (EPA-823-B-93-002); The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit From a Dissolved Criteria (EPA-823-B-96-007), Interim Guidance on Determination and Use of Water-effect Ratios for Metals (EPA-823-B-94-001).
  - (9) Interpretation and application of narrative criteria shall be based on available scientific literature and EPA guidance and regulations.

**Authority:** T.C.A. §§4-5-201 et seq., and 69-3-105. **Administrative History:** Original rule certified June 7, 1974. Amendment filed December 1, 1975; effective December 30, 1975. Amendment filed November 25, 1977; effective December 26, 1977. Amendment filed March 30, 1983; effective April 29, 1983. Amendment filed July 16, 1991; effective August 30, 1991. Amendment filed May 16, 1995; effective July 30, 1995. Amendment filed July 13, 1999; effective October 11, 1999. Amendment filed October 24, 2003; effective January 7, 2004.

### 1200-4-3-.03 CRITERIA FOR WATER USES.

- (1) Domestic Water Supply.
  - (a) Dissolved Oxygen - There shall always be sufficient dissolved oxygen present to prevent odors of decomposition and other offensive conditions.
  - (b) pH - The pH value shall lie within the range of 6.0 to 9.0 and shall not fluctuate more than 1.0 unit in this range over a period of 24 hours.

(Rule 1200-4-3-.03, continued)

- (c) Hardness or Mineral Compounds - The hardness of or the mineral compounds contained in the water shall not appreciably impair the usefulness of the water as a source of domestic water supply.
- (d) Total Dissolved Solids - The total dissolved solids shall at no time exceed 500 mg/l.
- (e) Solids, Floating Materials and Deposits - There shall be no distinctly visible solids, scum, foam, oily slick, or the formation of slimes, bottom deposits or sludge banks of such size or character as may impair the usefulness of the water as a source of domestic water supply.
- (f) Turbidity or Color - There shall be no turbidity or color in amounts or characteristics that cannot be reduced to acceptable concentrations by conventional water treatment processes (See definition).
- (g) Temperature - The maximum water temperature change shall not exceed 3C° relative to an upstream control point. The temperature of the water shall not exceed 30.5°C and the maximum rate of change shall not exceed 2C° per hour. The temperature of impoundments where stratification occurs will be measured at a depth of 5 feet or mid-depth, whichever is less, and the temperature in flowing streams shall be measured at mid-depth.
- (h) Coliform - The concentration of the E. coli group shall not exceed 630 per 100 ml. as a geometric mean based on a minimum of 5 samples collected from a given sampling site over a period of not more than 30 consecutive days with individual samples being collected at intervals of not less than 12 hours. For the purpose of determining the geometric mean, individual samples having an E. coli group concentration of less than 1 per 100 ml shall be considered as having a concentration of 1 per 100 ml.
- (i) Taste or Odor - The waters shall not contain substances which will result in taste or odor that prevent the production of potable water by conventional water treatment processes.
- (j) Toxic Substances - The waters shall not contain toxic substances, whether alone or in combination with other substances, which will produce toxic conditions that materially affect the health and safety of man or animals, or impair the safety of conventionally treated water supplies. Available references include, but are not limited to: Quality Criteria for Water (Section 304(a) of Public Law 92-500 as amended); Federal Regulations under Section 307 of Public Law 92-500 as amended; and Federal Regulations under Section 1412 of the Public Health Service Act as amended by the Safe Drinking Water Act, (Public Law 93-523). Limits set for some of the most commonly occurring toxic substances are as follows:

Compound	Criteria (ug/L)	Compound	Criteria (ug/L)
Antimony	6	Diquat	20
Arsenic	10	Endothall	100
Beryllium	4	Glyphosate	700
Barium	2000	Hexachlorobenzene	1
Cadmium	5	Hexachlorocyclopentadiene	50
Chromium, total	100	Oxamyl (Vydate)	200
Lead	5	Picloram	500
Cyanide (as free cyanide)	200	Simazine	4
Mercury	2	2,3,7,8 TCDD (Dioxin)	0.00003
Nickel	100	Benzene	5

(Rule 1200-4-3-.03, continued)

Compound	Criteria (ug/L)	Compound	Criteria (ug/L)
Selenium	50	Carbon tetrachloride	5
Thallium	2	1,2-Dichloroethane	5
Alachlor	2	1,1-Dichloroethylene	7
Atrazine	3	1,1,1-Trichloroethane	200
Carbofuran	40	Trichloroethylene	5
Chlordane	2	Vinyl chloride	2
Dibromo chloropropane	0.2	para-Dichlorobenzene	75
2,4 Dichlorophenoxyacetic	70	cis 1,2-Dichloroethylene	70
Ethylene dibromide	0.05	1,2-Dichloropropane	5
Heptachlor	0.4	Ethyl benzene	700
Heptachlor epoxide	0.2	Monochlorobenzene	100
Lindane	0.2	ortho-Dichlorobenzene	600
Methoxychlor	40	Styrene	100
Polychlorinated biphenyls	0.5	Tetrachloroethylene	5
2,4,5 Trichloropheno- xypropionic acid	50	Toluene	1000
Pentachlorophenol	1	trans 1,2-Dichloroethylene	100
Benzo(a)pyrene	0.2	Xylenes, total	10000
Dalapon	200	Dichloromethane	5
Di(2-ethylhexyl) adipate	400	1,2,4-Trichlorobenzene	70
Di(2-ethylhexyl) phthalate	6	1,1,2-Trichloroethane	5
Dinoseb	7	Endrin	2.0
		Toxaphene	3

- (k) Other Pollutants - The waters shall not contain other pollutants in quantities that may be detrimental to public health or impair the usefulness of the water as a source of domestic water supply.
- (2) Industrial Water Supply.
- (a) Dissolved Oxygen - There shall always be sufficient dissolved oxygen present to prevent odors of decomposition and other offensive conditions.
- (b) pH - The pH value shall lie within the range of 6.0 to 9.0 and shall not fluctuate more than 1.0 unit in this range over a period of 24 hours.
- (c) Hardness or Mineral Compounds - The hardness of or the mineral compounds contained in the water shall not appreciably impair the usefulness of the water as a source of industrial water supply.
- (d) Total Dissolved Solids - The total dissolved solids shall at no time exceed 500 mg/l.
- (e) Solids, Floating Materials and Deposits - There shall be no distinctly visible solids, scum, foam, oily slick, or the formation of slimes, bottom deposits or sludge banks of such size or character as may impair the usefulness of the water as a source of industrial water supply.
- (f) Turbidity or Color - There shall be no turbidity or color in amounts or characteristics that cannot be reduced to acceptable concentrations by conventional water treatment processes.
- (g) Temperature - The maximum water temperature change shall not exceed 3C° relative to an upstream control point. The temperature of the water shall not exceed 30.5°C and the

(Rule 1200-4-3-.03, continued)

maximum rate of change shall not exceed 2C° per hour. The temperature of impoundments where stratification occurs will be measured at a depth of 5 feet or mid- depth, whichever is less, and the temperature in flowing streams shall be measured at mid-depth.

- (h) Taste or Odor - The waters shall not contain substances which will result in taste or odor that would prevent the use of the water for industrial processing.
  - (i) Toxic Substances - The waters shall not contain toxic substances whether alone or in combination with other substances, which will adversely affect industrial processing.
  - (j) Other Pollutants - The waters shall not contain other pollutants in quantities that may adversely affect the water for industrial processing.
- (3) Fish and Aquatic Life.
- (a) Dissolved Oxygen - The dissolved oxygen shall not be less than 5.0 mg/l with the following exceptions. In streams identified as trout streams, including tailwaters, dissolved oxygen shall not be less than 6 mg/L. The dissolved oxygen concentration of trout waters designated as supporting a naturally reproducing population shall not be less than 8.0 mg/L. (Tributaries to trout streams or naturally reproducing trout streams should be considered to be trout streams or naturally reproducing trout streams, unless demonstrated otherwise. Additionally, all streams within the Great Smoky Mountains National Park should be considered naturally reproducing trout streams.) In wadeable streams in subcoregion 73a and subcoregion 71i, dissolved oxygen levels shall not be less than a daily average of 5 mg/L with a minimum dissolved oxygen level of 4 mg/L. The dissolved oxygen level of streams in ecoregion 66 (Blue Ridge Mountains) not designated as naturally reproducing trout streams shall not be less than 7.0 mg/L.

Substantial and/or frequent variations in dissolved oxygen levels, including diurnal fluctuations, are undesirable if caused by man-induced conditions.

In lakes and reservoirs, the dissolved oxygen concentrations shall be measured at mid-depth in waters having a total depth of ten feet or less, and at a depth of five feet in waters having a total depth of greater than ten feet and shall not be less than 5.0 mg/L.

- (b) pH - The pH value shall not fluctuate more than 1.0 unit over a period of 24 hours and shall not be outside the following ranges:

Subcoregion	Stream Order	pH Range
68a	1 - 3	5.5 - 8.0
68a	4+	6.0 - 9.0
65j	1 - 2	5.5 - 8.5
65j	3+	6.0 - 9.0
74b	All	5.5 - 8.5
All other wadeable streams		6.0 - 9.0
All other waters (larger rivers, reservoirs, wetlands)		6.5 - 9.0

(Rule 1200-4-3-.03, continued)

- (c) Solids, Floating Materials and Deposits - There shall be no distinctly visible solids, scum, foam, oily slick, or the formation of slimes, bottom deposits or sludge banks of such size or character that may be detrimental to fish and aquatic life.
- (d) Turbidity or Color - There shall be no turbidity or color in such amounts or of such character that will materially affect fish and aquatic life.
- (e) Temperature - The maximum water temperature change shall not exceed 3C° relative to an upstream control point. The temperature of the water shall not exceed 30.5°C and the maximum rate of change shall not exceed 2C° per hour. The temperature of recognized trout waters shall not exceed 20°C. There shall be no abnormal temperature changes that may affect aquatic life unless caused by natural conditions. The temperature of impoundments where stratification occurs will be measured at mid-depth in the epilimnion for warm water fisheries and mid-depth in the hypolimnion for cold water fisheries. In the case of large impoundments (100 acres or larger) subject to stratification and recognized as trout waters, the temperature of the hypolimnion shall not exceed 20°C. The temperature in flowing streams shall be measured at mid-depth.
- (f) Taste or Odor - The waters shall not contain substances that will impart unpalatable flavor to fish or result in noticeable offensive odors in the vicinity of the water or otherwise interfere with fish or aquatic life. References include, but are not limited to: Quality Criteria for Water (section 304(a) of Public Law 92-500 as amended).
- (g) Toxic Substances - The waters shall not contain substances or a combination of substances including disease - causing agents which, by way of either direct exposure or indirect exposure through food chains, may cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), physical deformations, or restrict or impair growth in fish or aquatic life or their offspring. References on this subject include, but are not limited to: Quality Criteria for Water (Section 304(a) of Public Law 92-500 as amended); Federal Regulations under Section 307 of Public Law 92-500 as amended. The following criteria are for the protection of fish and aquatic life:

Compound	Criterion Maximum Concentration ug/l (CMC)	Criterion Continuous Concentration ug/l (CCC)
Arsenic (III)	340	150
Cadmium *	2.0	0.25
Chromium, total	---	100
Chromium, VI	16	11
Copper *	13	9.0
Lead *	65	2.5
Mercury	1.4	0.77
Nickel *	470	52
Selenium	20	5
Silver *	3.2	---
Zinc *	120	120
Cyanide**	22	5.2
Chlorine (TRC)	19	11
Pentachlorophenol***	19	15
Aldrin	3.0	---
g-BHC - Lindane	2.0	0.08
Chlordane	2.4	0.0043

(Rule 1200-4-3-.03, continued)

Compound	Criterion Maximum Concentration ug/l (CMC)	Criterion Continuous Concentration ug/l (CCC)
4-4'-DDT	1.1	0.001
Dieldrin	0.24	0.056
a-Endosulfan	0.22	0.056
b-Endosulfan	0.22	0.056
Endrin	0.086	0.036
Heptachlor	0.52	0.0038
Heptachlor epoxide	0.52	0.0038
PCB, each aroclor	---	0.014
Toxaphene	0.73	0.0002

\* Criteria for these metals are expressed as dissolved and are a function of total hardness (mg/L). Hardness-dependent metals criteria may be calculated from the following (values displayed above correspond to a total hardness of 100 mg/l and may have been rounded):

$$\text{CMC (dissolved)} = \exp\{m_A[\ln(\text{hardness})]+b_A\} \text{ (CF)}$$

$$\text{CCC (dissolved)} = \exp\{m_C [\ln(\text{hardness})]+b_C\} \text{ (CF)}$$

Chemical	M <sub>A</sub>	b <sub>A</sub>	M <sub>C</sub>	B <sub>C</sub>	Freshwater Conversion Factors (CF)	
					CMC	CCC
Cadmium	1.0166	-3.924	0.7409	-4.719	1.136672-[(ln hardness)(0.041838)]	1.101672-[(ln hardness)(0.041838)]
Copper	0.9422	-1.700	0.8545	-1.702	0.960	0.960
Lead	1.273	-1.460	1.273	-4.705	1.46203-[(ln hardness)(0.145712)]	1.46203-[(ln hardness)(0.145712)]
Nickel	0.8460	2.255	0.8460	0.0584	0.998	0.997
Silver	1.72	-6.59			0.85	
Zinc	0.8473	0.884	0.8473	0.884	0.978	0.986

If criteria are hardness-dependent, the Criterion Maximum Concentration (CMC) and Criterion Continuous Concentration (CCC) shall be based on the actual stream hardness. When an ambient hardness of less than 25 mg/l is used to establish criteria for cadmium or lead, the hardness dependent conversion factor (CF) shall not exceed one. When ambient hardness is greater than 400 mg/l, criteria shall be calculated according to one of the following two options: (1) calculate the criterion using a default Water Effects Ratio (WER) of 1.0 and a hardness of 400 mg/l in the hardness based equation; or (2) calculate the criterion using a WER and the actual ambient hardness of the surface water in the hardness based equation. For information concerning metals translation and site-specific criteria, see 1200-4-3-.02 (9).

\*\* If Standard Methods 4500-CN I (Weak Acid Dissociable), 4500-CN G (Cyanides Amenable to Chlorination after Distillation), or OIA-1677 are used, this criterion may be applied as free cyanide.

\*\*\* Criteria for pentachlorophenol are expressed as a function of pH. Values displayed above correspond to a pH of 7.8 and are calculated as follows:

(Rule 1200-4-3-.03, continued)

$$\text{CMC} = \exp(1.005(\text{pH}) - 4.869) \quad \text{CCC} = \exp(1.005(\text{pH}) - 5.134)$$

- (h) **ther Pollutants** - The waters shall not contain other pollutants that will be detrimental to fish or aquatic life.
- (i) **Nutrients** - The waters shall not contain nutrients in concentrations that stimulate aquatic plant and/or algae growth to the extent that aquatic habitat is substantially reduced and /or the biological integrity fails to meet regional goals. Additionally, the quality of downstream waters shall not be detrimentally affected.

Interpretation of this provision may be made using the document Development of Regionally-based Interpretations of Tennessee's Narrative Nutrient Criterion and/or other scientifically defensible methods.

- (j) **Coliform** - The concentration of the E. coli group shall not exceed 630 per 100 ml as a geometric mean based on a minimum of 5 samples collected from a given sampling site over a period of not more than 30 consecutive days with individual samples being collected at intervals of not less than 12 hours. For the purposes of determining the geometric mean, individual samples having an E. coli group concentration of less than 1 per 100 ml shall be considered as having a concentration of 1 per 100 ml. In addition, the concentration of the E. coli group in any individual sample shall not exceed 2,880 per 100 ml.
- (k) **Biological Integrity** - The waters shall not be modified through the addition of pollutants or through physical alteration to the extent that the diversity and/or productivity of aquatic biota within the receiving waters are substantially decreased or adversely affected, except as allowed under 1200-4-3-.06.

Interpretation of this provision for any stream which (a) has at least 80% of the upstream catchment area contained within a single bioregion and (b) is of the appropriate stream order specified for the bioregion and (c) contains the habitat (riffle or rooted bank) specified for the bioregion, may be made using the most current revision of the Department's Quality System Standard Operating Procedure for Macroinvertebrate Stream Surveys and/or other scientifically defensible methods.

Interpretation of this provision for all other streams, plus large rivers, reservoirs, and wetlands, may be made using Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers (EPA/841-B-99-002) and/or other scientifically defensible methods. Effects to biological populations will be measured by comparisons to upstream conditions or to appropriately selected reference sites in the same bioregion if upstream conditions are determined to be degraded.

- (l) **Habitat** - The quality of instream habitat shall provide for the development of a diverse aquatic community that meets regionally-based biological integrity goals. The instream habitat within each subcoregion shall be generally similar to that found at reference streams. However, streams shall not be assessed as impacted by habitat loss if it has been demonstrated that the biological integrity goal has been met.
- (4) **Recreation.**
- (a) **Dissolved Oxygen** - There shall always be sufficient dissolved oxygen present to prevent odors of decomposition and other offensive conditions.

(Rule 1200-4-3-.03, continued)

- (b) pH - The pH value shall lie within the range of 5.5 to 9.0 and shall not fluctuate more than 1.0 unit in this range over a period of 24 hours.
- (c) Solids, Floating Materials and Deposits - There shall be no distinctly visible solids, scum, foam, oily slick, or the formation of slimes, bottom deposits or sludge banks of such size or character that may be detrimental to recreation.
- (d) Turbidity or Color - There shall be no turbidity or color in such amounts or character that will result in any objectionable appearance to the water, considering the nature and location of the water.
- (e) Temperature - The maximum water temperature change shall not exceed 3C° relative to an upstream control point. The temperature of the water shall not exceed 30.5°C and the maximum rate of change shall not exceed 2C° per hour. The temperature of impoundments where stratification occurs will be measured at a depth of 5 feet, or mid- depth whichever is less, and the temperature in flowing streams shall be measured at mid-depth.
- (f) Coliform - The concentration of the E. coli group shall not exceed 126 colony forming units per 100 ml, as a geometric mean based on a minimum of 5 samples collected from a given sampling site over a period of not more than 30 consecutive days with individual samples being collected at intervals of not less than 12 hours. For the purposes of determining the geometric mean, individual samples having an E. coli concentration of less than 1 per 100 ml shall be considered as having a concentration of 1 per 100 ml.

Additionally, the concentration of the E. coli group in any individual sample taken from a lake, reservoir, State Scenic River, or Tier II or III stream (1200-4-3-.06) shall not exceed 487 colony forming units per 100 ml. The concentration of the E. coli group in any individual sample taken from any other waterbody shall not exceed 941 colony forming units per 100 ml.

- (g) Taste or Odor - The waters shall not contain substances that will result in objectionable taste or odor.
- (h) Nutrients - The waters shall not contain nutrients in concentrations that stimulate aquatic plant and/or algae growth to the extent that the public’s recreational uses of the stream or other downstream waters are detrimentally effected. Unless demonstrated otherwise, the nutrient criteria found in 1200-4-3-.03(3)(i) will be considered adequately protective of this use.
- (i) Toxic Substances - The waters shall not contain toxic substances, whether alone or in combination with other substances, that will render the waters unsafe or unsuitable for water contact activities including the capture and subsequent consumption of fish and shellfish, or will propose toxic conditions that will adversely affect man, animal, aquatic life, or wildlife. Human health criteria have been derived to protect the consumer from consumption of contaminated fish and water. The water and organisms criteria should only be applied to those waters classified for both recreation and domestic water supply. The criteria for recreation are as follows:

Compound	Water & Organisms Criteria * (ug/L)	Organisms Only Criteria (ug/L)
<u>INORGANICS</u>		
Antimony	5.6	640
Arsenic (c)	10.0	10.0

(Rule 1200-4-3-.03, continued)

Compound	Water & Organisms Criteria * (ug/L)	Organisms Only Criteria (ug/L)
Mercury	0.05	0.051
Nickel	610	4600
Thallium	1.7	6.3
Cyanide	700	220000
Dioxin **	0.000001	0.000001
<u>VOLATILES</u>		
Acrolein	190	290
Acrylonitrile (c)	0.51	2.5
Benzene (c)	22	510
Bromoform (c)	43	1400
Carbon tetrachloride (c)	2.3	16
Chlorobenzene	680	21000
Chlorodibromomethane (c)	4.0	130
Chloroform (c)	57	4700
Dichlorobromomethane (c)	5.5	170
1,2-Dichloroethane (c)	3.8	370
1,1-Dichloroethylene (c)	0.57	32
1,2-Dichloropropane (c)	5.0	150
1,3-Dichloropropene	10	1700
Ethylbenzene	3100	29000
Methyl bromide	47	1500
Methylene chloride (c)	46	5900
1,1,2,2-Tetrachloroethane (c)	1.7	40
Tetrachloroethylene (c)	6.9	33
Toluene	6800	200000
1,2-Trans-Dichloroethylene	700	140000
1,1,2-Trichloroethane (c)	5.9	160
Trichloroethylene (c)	25	300
Vinyl chloride (c)	20	5300
<u>ACID EXTRACTABLES</u>		
2-Chlorophenol	81	150
2,4-Dichlorophenol	77	290
2,4-Dimethylphenol	380	850
2-Methyl-4,6-dinitrophenol	13	280
2,4-Dinitrophenol	69	5300
Pentachlorophenol (c) (pH)	2.7	30
Phenol	21000	1700000
2,4,6-Trichlorophenol (c)	14	24
<u>BASE NEUTRALS</u>		
Acenaphthene	670	990

(Rule 1200-4-3-.03, continued)

Compound	Water & Organisms Criteria * (ug/L)	Organisms Only Criteria (ug/L)
Anthracene	8300	40000
Benzidine (c)	0.00086	0.0020
Benzo(a)anthracene (c)	0.038	0.18
Benzo(a)pyrene (c)	0.038	0.18
Benzo(b)fluoranthene (c)	0.038	0.18
Benzo(k)fluoranthene (c)	0.038	0.18
Bis(2-Chlorethyl)ether (c)	0.30	5.3
Bis(2-Chloro-isopropyl)ether	1400	65000
Bis(2-Ethylhexyl)phthalate (c)	12	22
Butylbenzyl Phthalate	1500	1900
2-Chloronaphthalene	1000	1600
Chrysene (c)	0.038	0.18
Dibenz(a,h)Anthracene (c)	0.038	0.18
1,2-Dichlorobenzene	2700	17000
1,3-Dichlorobenzene	320	960
1,4-Dichlorobenzene	400	2600
3,3-Dichlorobenzidine (c)	0.21	0.28
Diethyl phthalate	17000	44000
Dimethyl phthalate	270000	1100000
Di-n-butyl phthalate	2000	4500
2,4-Dinitrotoluene (c)	1.1	34
1,2-Diphenylhydrazine (c)	0.36	2.0
Fluoranthene	130	140
Fluorene	1100	5300
Hexachlorobenzene (c)	0.0028	0.0029
Hexachlorobutadiene (c)	4.4	180
Hexachlorocyclopentadiene	240	17000
Hexachloroethane (c)	14	33
Ideno(1,2,3-cd)Pyrene (c)	0.038	0.18
Isophorone (c)	350	9600
Nitrobenzene	17	690
N-Nitrosodimethylamine (c)	0.0069	30
N-Nitrosodi-n-Propylamine (c)	0.05	5.1
N-Nitrosodiphenylamine (c)	33	60
Pyrene	830	4000
1,2,4-Trichlorobenzene	260	940
<u>PESTICIDES</u>		
Aldrin (c)	0.00049	0.00050
a-BHC (c)	0.026	0.049
b-BHC (c)	0.091	0.17
g-BHC - Lindane (c)	0.19	0.63
Chlordane (c)	0.0080	0.0081
4-4'-DDT (c)	0.0022	0.0022
4,4'-DDE (c)	0.0022	0.0022
4,4'-DDD (c)	0.0031	0.0031
Dieldrin (c)	0.00052	0.00054

(Rule 1200-4-3-.03, continued)

Compound	Water & Organisms Criteria * (ug/L)	Organisms Only Criteria (ug/L)
a-Endosulfan	62	89
b-Endosulfan	62	89
Endosulfan Sulfate	62	89
Endrin	0.76	0.81
Endrin Aldehyde	0.29	0.30
Heptachlor (c)	0.00079	0.00079
Heptachlor epoxide (c)	0.00039	0.00039
PCB aroclors (c) (EPA 119-125)	0.00064	0.00064
PCB, total (c)	0.00064	0.00064
Toxaphene (c)	0.0028	0.0028

(c)  $10^{-5}$  risk level is used for all carcinogenic pollutants.

\* These criteria are for protection of public health due to consumption of water and organisms and should only be applied to these waters designated for both recreation and domestic water supply.

\*\* Total dioxin is the sum of the concentrations of all dioxin and dibenzofuran isomers after multiplication by Toxic Equivalent Factors (TEFs). Following are the TEFs currently recommended by EPA (subject to revision):

DIOXIN ISOMERS	TEF	FURAN ISOMERS	TEF
Mono-, Di-, & TriCDDs	0.0	Mono-, Di-, & TriCDFs	0.0
2,3,7,8 TCDD	1.0	2,3,7,8 TCDF	0.1
Other TCDDs	0.0	Other TCDFs	0.0
2,3,7,8 PeCDD	0.5	1,2,3,7,8 PeCDF	0.05
Other PeCDDs	0.0	2,3,4,7,8 PeCDF	0.5
		Other PeCDFs	0.0
2,3,7,8 HxCDD	0.1	Other PeCDFs	0.0
Other HxCDDs	0.0	2,3,7,8 HxCDF	0.1
		Other HxCDFs	0.0
2,3,7,8 HpCDD	0.01	2,3,7,8 HpCDF	0.01
Other HpCDDs	0.0	Other HpCDFs	0.0
OCDD	0.001	OCDF	0.001

(j) Other Pollutants - The waters shall not contain other pollutants in quantities which may have a detrimental effect on recreation.

(k) Fish Consumption Advisories - A public fishing advisory will be considered when the calculated risk of additional cancers exceeds  $10^{-4}$  for typical consumers or  $10^{-5}$  for atypical consumers (See definition). A "do not consume" advisory will be issued for the protection of typical consumers and a "precautionary advisory" will be issued for the protection of atypical consumers. The following formula will be used to calculate the risk of additional cancers :

(Rule 1200-4-3-.03, continued)

$$R = qE$$

where:

R= Plausible-upper-limit risk of cancer associated with a chemical in a fisheries species for a human subpopulation.

q = Carcinogenic Potency Factor for the chemical ( $\text{mg kg}^{-1} \text{ day}^{-1}$ )<sup>-1</sup> estimated as the upper 95 percent confidence limit of the slope of a linear dose-response curve. Scientifically defensible Potency Factors will be used.

E = Exposure dose of the chemical ( $\text{mg kg}^{-1} \text{ day}^{-1}$ ) from the fish species for the human subpopulation in the area. E is calculated by the following formula:

$$E = \frac{C I X}{W} \quad \text{where:}$$

C = Concentration of the chemical (mg/kg) in the edible portion of the species in the area. The average levels from multiple fillet samples of the same species will be used. Catfish will be analyzed skin-off with the belly flap included in the sample. Gamefish and carp will be analyzed skin-on with the belly flap included in the sample. Sizes of fish collected for analysis will represent the ranges of sizes likely to be collected and consumed by the public. References on this subject include, but are not limited to: EPA's Guidance for Assessing Chemical Contaminant Data for use in Fish Advisories.

I = Mean daily consumption rate (g/day averaged over 70 year lifetime) of the fish species by the human subpopulation in the area. 6.5 g/day will be used unless better site-specific information is available.

X = Relative absorption coefficient, or the ratio of human absorption efficiency to test animal absorption efficiency of the chemical. Assumed to be 1.0 unless better information is available.

W = Average human mass (kg). 75 kg will be used.

For substances for which the public health concern is based on toxicity, a "do not consume" advisory will be considered warranted when average levels of the substance in the edible portion of fish exceed U.S. Food and Drug Administration (FDA) Action Levels.

## (5) Irrigation.

- (a) Dissolved Oxygen - There shall always be sufficient dissolved oxygen present to prevent odors of decomposition and other offensive conditions.
- (b) pH - The pH value shall lie within the range of 6.0 to 9.0 and shall not fluctuate more than 1.0 unit in this range over a period of 24 hours.
- (c) Hardness or Mineral Compounds - The hardness of or the mineral compounds contained in the water shall not impair its use for irrigation.

(Rule 1200-4-3-.03, continued)

- (d) Solids, Floating Materials and Deposits - There shall be no distinctly visible solids, scum, foam, oily slick, or the formation of slimes, bottom deposits or sludge banks of such size or character as may impair the usefulness of the water for irrigation purposes.
  - (e) Temperature - The temperature of the water shall not interfere with its use for irrigation purposes.
  - (f) Toxic Substances - The waters shall not contain toxic substances whether alone or in combination with other substances which will produce toxic conditions that adversely affect the quality of the waters for irrigation.
  - (g) Other Pollutants - The waters shall not contain other pollutants in quantities which may be detrimental to the waters used for irrigation.
- (6) Livestock Watering and Wildlife.
- (a) Dissolved Oxygen - There shall always be sufficient dissolved oxygen present to prevent odors of decomposition and other offensive conditions.
  - (b) pH - The pH value shall lie within the range of 6.0 to 9.0 and shall not fluctuate more than 1.0 unit in this range over a period of 24 hours.
  - (c) Hardness or Mineral Compounds - The hardness of or the mineral compounds contained in the water shall not impair its use for livestock watering and wildlife.
  - (d) Solids, Floating Materials and Deposits - There shall be no distinctly visible solids, scum, foam, oily slick, or the formation of slimes, bottom deposits or sludge banks of such size or character as to interfere with livestock watering and wildlife.
  - (e) Temperature - The temperature of the water shall not interfere with its use for livestock watering and wildlife.
  - (f) Toxic Substances - The waters shall not contain substances whether alone or in combination with other substances, which will produce toxic conditions that adversely affect the quality of the waters for livestock watering and wildlife.
  - (g) Other Pollutants - The waters shall not contain other pollutants in quantities which may be detrimental to the water for livestock watering and wildlife.
- (7) Navigation.
- (a) Solids, Floating Materials and Deposits - There shall be no distinctly visible solids, scum, foam, oily slick, or the formation of slimes, bottom deposits or sludge banks of such size or character as to interfere with navigation.
  - (b) Other Pollutants - The waters shall not contain other pollutants in quantities which may be detrimental to the waters used for navigation.

**Authority:** T.C.A. §§4-5-201 et seq., and 69-3-105. **Administrative History:** Original rule certified June 7, 1974. Amendment filed December 1, 1975; effective December 30, 1975. Amendment filed November 25, 1977; effective December 26, 1977. Amendment filed March 30, 1983; effective April 29, 1983. Amendment filed July 16, 1991; effective August 30, 1991. Amendment filed May 16, 1995; effective July 30, 1995. Amendment filed July 13, 1999; effective October 11, 1999. Amendment filed October 24, 2003; effective January 7, 2004.

**1200-4-3-.04 DEFINITIONS.**

- (1) Conventional Water Treatment - Conventional water treatment as referred to in the criteria denotes coagulation, sedimentation, filtration, and chlorination or disinfection.
- (2) Mixing Zone - That section of a flowing stream or impounded waters in the immediate vicinity of an outfall where an effluent becomes dispersed and mixed.
- (3) Wet Weather Conveyance - Wet weather conveyances are man-made or natural watercourses, including natural watercourses that have been modified by channelization, that flow only in direct response to precipitation runoff in their immediate locality and whose channels are above the groundwater table and which do not support fish or aquatic life and are not suitable for drinking water supplies. [T.C.A. § 4-5-202, T.C.A. § 69-3-105.]
- (4) Degradation - The alteration of the properties of waters by the addition of pollutants or removal of habitat. Alterations not resulting in the condition of pollution that are of a temporary nature or those alterations having de minimus impact (no measurable or less than 5 percent loss of assimilative capacity) will not be considered degradation. Degradation will not be considered de minimus if a substantial loss (more than 50 percent) of assimilative capacity has already occurred.
- (5) Ecoregion - A relatively homogeneous area defined by similarity of climate, landform, soil, potential natural vegetation, hydrology, or other ecologically relevant variables.
- (6) Subcoregion - A smaller, more homegenous area that has been delineated within an ecoregion.
- (7) Reference site - least impacted waters within an ecoregion that have been monitored to establish a baseline to which alterations of other waters can be compared.
- (8) Reference condition - A parameter-specific set of data from regional reference sites that establish the statistical range of values for that particular substance at least-impacted streams.
- (9) Atypical consumers are those persons in the vicinity of a stream or lake who due to physiological factors or previous exposure are more sensitive to specific pollutants than is the population in general. Examples of atypical consumers may include, but are not limited to: children; pregnant or nursing women; subsistence fishermen; frequent purchasers of commercially harvested fish; and agricultural, industrial, or military personnel who may have had previous occupational exposure to the contaminant of concern.
- (10) Terminology not specifically defined herein shall be defined in accordance with the Tennessee Water Quality Control Act. [T.C.A. §§ 69-3-101, et seq.]

**Authority:** T.C.A. §§4-5-201 et seq., and 69-3-105. **Administrative History:** Original rule certified June 7, 1974. Amendment filed December 1, 1975; effective December 30, 1975. Amendment filed November 25, 1977; effective December 26, 1977. Amendment filed March 30, 1983; effective April 29, 1983. Amendment filed July 16, 1991; effective August 30, 1991. Amendment filed May 16, 1995; effective July 30, 1995. Amendment filed July 13, 1999; effective October 11, 1999. Amendment filed October 24, 2003; effective January 7, 2004.

**1200-4-3-.05 INTERPRETATION OF CRITERIA.**

- (1) Interpretation of the above criteria shall conform to any rules and regulations or policies adopted by the Water Quality Control Board.
- (2) The effect of treated sewage or waste discharge on the receiving waters shall be considered after they are mixed with the waters and beyond a reasonable zone of immediate effect. The extent to which this is practicable depends upon local conditions and the proximity and nature of other uses of the waters.

(Rule 1200-4-3-.05, continued)

Such mixing zones (See definition) shall be restricted in area and length and shall not (i) prevent the free passage of fish or cause aquatic life mortality in the receiving waters; (ii) contain materials in concentrations that exceed recognized acute toxicity levels for biota representative of the aquatic community in the receiving waters; (iii) result in offensive conditions; (iv) produce undesirable aquatic life or result in dominance of a nuisance species; (v) endanger the public health or welfare; or (vi) adversely affect the reasonable and necessary uses of the area; (vii) create a condition of chronic toxicity beyond the edge of the mixing zone; and (viii) adversely affect nursery and spawning areas.

- (3) The technical and economical feasibility of waste treatment, recovery, or adjustment of the method of discharge to provide correction shall be considered in determining the time to be allowed for the development of practicable methods and for the specified correction, to the extent allowable under Rule 1200-4-3-.06 (5).
- (4) With the exception of nutrient criteria [(1200-4-3-.03(3)(i)], the fish and aquatic life and livestock watering and wildlife criteria set forth shall be applied on the basis of the following stream flows: unregulated streams - stream flows equal to or exceeding the 7-day minimum, 10-year recurrence interval; regulated streams - all flows in excess of the minimum critical flow occurring once in ten years as determined by an analysis of records of operation and approved by the Commissioner of the Tennessee Department of Environment and Conservation. All other criteria, including nutrient criteria under the fish and aquatic life use, shall be applied on the basis of stream flows equal to or exceeding the 30 day minimum 5 year recurrence interval.
- (5) In general, deviations from normal water conditions are undesirable, but the magnitude and duration of the deviations shall be considered in interpreting the above criteria. When interpreting pathogen data, samples collected during or immediately after significant rain events may be treated as outliers unless caused by point source dischargers. Such outlier data may be given less weight in assessment decisions than non-rain event sampling results.
- (6) The criteria and standards provide that all discharges of sewage, industrial waste, and other waste shall receive the degree of treatment or effluent reduction necessary to comply with water quality standards, or state or federal laws and regulations pursuant thereto, and where appropriate will comply with the "Standards of Performance" as required by the Tennessee Water Quality Control Act, (T.C.A., §§69-3-101, et seq.).
- (7) Where naturally formed conditions (e.g., geologic formations) or background water quality conditions are substantial impediments to attainment of the water quality standards, these natural or background conditions shall be taken into consideration in establishing any effluent limitations or restrictions on discharges to such waters.
- (8) There are cases in which the in-stream criteria as established by this rule are less than current chemical technological capabilities for analytical detection. In instances where permit limits established through implementation of these criteria are below analytical capabilities, compliance with those limits will be determined using the following detection limits, unless in specific cases other detection limits are demonstrated to be the best achievable because of the particular nature of the wastewater being analyzed:

## REQUIRED DETECTION LEVELS [RDL] (ug/l)

<u>INORGANICS</u>	<u>RDL</u>	<u>BASE NEUTRALS</u>	<u>RDL</u>
Antimony	3.0	Acenaphthylene (c)	2.3
Arsenic, total (c)	1.0	Anthracene	0.7
Arsenic (III) (c)	1.0	Benzo(a)anthracene (c)	0.3
Beryllium (c)	1.0	Benzo(a)pyrene (c)	0.3
Cadmium	1.0	3,4-Benzofluoranthene (c)	0.3

(Rule 1200-4-3-.05, continued)

Chromium, total	1.0	Benzo(k)fluoranthene (c)	0.3
Chromium (III)	1.0	Bis(2-Chloroethyl)ether (c)	1.0
Chromium (VI)	10.0	Bis(2-Ethylhexyl)phthalate(c)	2.5
Copper	1.0	Chrysene	2.5
Lead	1.0	1,2-Dichlorobenzene	2.0
Mercury	0.2	1,3-Dichlorobenzene	2.0
Nickel	10.0	1,4-Dichlorobenzene -	
Selenium	2.0	para-Dichlorobenzene	4.4
Silver	1.0	Diethyl phthalate	1.9
Zinc	1.0	Dimethyl phthalate	1.6
Cyanide	5.0	Di-n-Butyl phthalate	2.5
Dioxin	0.00001	2,4-Dinitrotoluene (c)	1.0
		Fluoranthene	2.2
		Fluorene	0.3
		Hexachlorobenzene (c)	1.9
		Hexachlorobutadiene (c)	5.0
		Hexachloroethane (c)	0.5
		Nitrobenzene	10.0
		Phenanthrene	0.7
		Pyrene	0.3
		<u>PESTICIDES</u>	
		Aldrin (c)	0.5
		g-BHC - Lindane (c)	0.5
		Chlordane (c)	0.1
		4-4'-DDT (c)	0.1
		4,4'-DDE (c)	0.1
		4,4'-DDD (c)	0.1
		Dieldrin (c)	0.05
		a-Endosulfan	0.1
		b-Endosulfan	0.05
		Endrin	0.1
		Heptachlor (c)	0.05
		Heptachlor epoxide (c)	0.08
		PCB-1242 (c)	0.5
		PCB-1254 (c)	0.5
		PCB-1221 (c)	0.5
		PCB-1232 (c)	0.5
		PCB-1248 (c)	0.5
		PCB-1260 (c)	0.5
		PCB-1016 (c)	0.5
		PCB, total (c)	0.5
		Toxaphene (c)	0.5
		(c) - carcinogen	
		<u>VOLATILES</u>	
Acrolein	1.0		
Acrylonitrile (c)	1.0		
Benzene (c)	1.0		
Bromoform -			
Tribromomethane (c)	1.0		
Carbon tetrachloride (c)	1.0		
Chloroform -			
Trichloromethane (c)	0.5		
Dichlorobromomethane (c)	1.0		
1,2-Dichloroethane (c)	1.0		
1,1-Dichloroethylene (c)	1.0		
1,3-Dichloropropylene	1.0		
Ethylbenzene	1.0		
Methyl chloride -			
Chloromethane (c)	1.0		
Methylene chloride -			
Dichloromethane (c)	1.0		
1,1,2,2-Tetrachloroethane (c)	0.5		
Tetrachloroethylene (c)	0.5		
Toluene	1.0		
1,1,1-Trichloroethane	1.0		
1,1,2-Trichloroethane (c)	0.2		
Trichloroethylene (c)	1.0		
Vinyl chloride (c)	2.0		
		<u>ACID EXTRACTABLES</u>	
2-Methyl-4,6-dinitrophenol-			
4,6-Dinitro-o-cresol	24.0		
2,4-Dinitrophenol	42.0		
Pentachlorophenol	5.0		
2,4,6-Trichlorophenol (c)	2.7		

- (9) The criteria shall be applied using the total recoverable method, unless otherwise specified, or the Division conducts or approves a chemical speciation study which determines the bioavailable or toxic fraction of a specific chemical.

**Authority:** T.C.A. §§4-5-201 et seq., and 69-3-105. **Administrative History:** Original rule certified June 7, 1974. Amendment filed December 1, 1975; effective December 30, 1975. Amendment filed November 25, 1977; effective December 26, 1977. Amendment filed March 30, 1983; effective April 29, 1983. Amendment filed July 16, 1991; effective August 30, 1991. Amendment filed May 16, 1995; effective July 30, 1995. Amendment filed July 13, 1999; effective October 11, 1999. Amendment filed October 24, 2003; effective January 7, 2004.

**1200-4-3-.06 TENNESSEE ANTIDEGRADATION STATEMENT.**

- (1) It is the purpose of Tennessee's standards to fully protect existing uses of all surface waters as established under the Act. Existing uses are those actually attained in the waterbody on or after November 28, 1975. In bodies of water identified as Tier I by the Division, existing uses will be maintained by application of the General Water Quality Criteria. In Tier I waters found to not meet water quality standards for a substance, new or increased discharges of that substance will not be allowed.

For substances or conditions not currently at or in violation of water quality standards, new or additional degradation will only be allowed if the applicant has demonstrated to the Department that reasonable alternatives to degradation are not feasible. Reasonable alternatives for discharges include, but are not limited to, connection to an existing collection system, land application, water reuse, or water recycling. For small domestic discharges, connection to an existing system or land application will be considered preferable.

The alternatives analysis shall be part of the application process and shall include a discussion of the feasibility, social and economic considerations, and environmental consequences of each potential alternative. Alternatives analyses shall include, at a minimum, completed and accurate Worksheets A and B for public sector applicants or Worksheets A and G for private system applicants, except where these worksheets are inappropriate for the activity, in which case applicants may substitute materials that provide equivalent information. These forms are found in the EPA guidance document entitled Interim Economic Guidance for Water Quality Standards: Workbook (EPA 823/B-95-002) (Economic Guidance).

For authorized new or expanded discharges, a record of the antidegradation determination(s) will be maintained and will be available for public review. Public participation will be provided in conjunction with permitting activities.

- (2) The Tennessee Water Quality Standards shall not be construed as permitting the degradation (See definition) of high quality surface waters. High quality waters are Tier II or Tier III. In Tennessee, Tier III waters are also referred to as Outstanding National Resource Waters (ONRWs). Characteristics of high quality waters include:
  - (a) Waters that provide habitat for ecologically significant populations of aquatic or semi-aquatic plants or animals, including those proposed or listed for formal state or federal status.
  - (b) Waters that provide specialized recreational opportunities related to existing water quality.
  - (c) Waters that possess outstanding scenic or geologic values.
  - (d) Waters where existing conditions exceed water quality standards.
- (3) (a) In other waters identified by the Department as Tier II high quality waters in accordance with 1200-4-3-.06(2), no degradation will be allowed unless and until it is affirmatively demonstrated to the Department, after full satisfaction of the following intergovernmental and public participation provisions, that a change is justified as a result of necessary economic or social development and will not interfere with or become injurious to any classified uses existing in such waters. At the time of permit renewal, previously authorized discharges, including upstream discharges, which presently degrade Tier II waters, will be subject to alternatives analysis, but not to a determination of economic/social necessity. Public participation for these existing discharges will be provided in conjunction with permitting activities. Sources exempted from permit requirements under the Water Quality Control Act should utilize all cost-effective and reasonable best management practices.

(Rule 1200-4-3-.06, continued)

- (b) Determination of Economic/Social Necessity - Where reasonable alternatives to degradation to a Tier II stream are not feasible, applicants may ask the Department to determine that the proposed degradation is justified on the basis of economic or social necessity. The applicant shall have the burden of establishing to the Department that a change is justifiable as a result of necessary economic or social development and will not interfere with or become injurious to any classified uses existing in such waters. The Department's determination that degradation is justified or unjustified shall be subject to review by the Water Quality Control Board under the following procedures.
1. If the Department determines that degradation is justified, it will notify the applicant, the federal and state intergovernmental coordination agencies, and third persons who requested notification of the determination. Within 30 days after the date of the notification, any affected intergovernmental coordination agency or affected third person may petition the Board for a declaratory order under Tennessee Code Annotated § 4-5-223, and the Board shall convene a contested case. After the Board has convened a contested case in response to a declaratory order petition under this part, the Department shall within 5 business days thereafter transmit the petition to the Administrative Procedures Division of the Secretary of State so the contested case may be docketed and an administrative law judge may be assigned to the case. If a declaratory order petition is timely filed, the Department shall not proceed further in processing the permit application until the petition has been resolved before the Board. In the contested case, the petitioner shall have the burden of proof, and the Department's determination shall carry no presumption of correctness before the Board. The applicant is a necessary party to the declaratory order contested case, and if the applicant does not participate in the contested case, the Board shall render a decision that degradation is not justified. If no intergovernmental coordination agency or third person petitions for a declaratory order within 30 days of the notification date, then the Department shall proceed with processing the permit application.
  2. A declaratory order contested case conducted under this provision shall be subject to the following procedures. Mediation may occur if all the parties agree. Any proposed agreed order resulting from mediation shall be subject to approval by the Board. In order to provide for an expedited proceeding, the contested case is subject to the following time limitations. The time periods specified in this part shall commence on the day after the contested case has been docketed by the Administrative Procedures Division of the Secretary of State and an administrative law judge has been assigned to the case. Any alteration of the time periods set out in this part shall be granted only upon agreement of all the parties, or when there have been unforeseen developments that would cause substantial prejudice to a party, or when the parties have agreed to mediation. Within 20 days, the parties shall confer to try and develop a proposed agreed scheduling order. If the parties are unable to agree, then each party shall submit a proposed scheduling order, and the administrative law judge, after a hearing, shall enter a scheduling order. All discovery shall be completed no later than 20 days prior to the date the hearing before the Board is to begin. Within 120 days, the hearing before the Board shall begin, but the Board on its own initiative may exceed 120 days to complete the hearing and render its final decision. In order for degradation of Tier II waters to proceed pursuant to these rules, the Board must make a finding approving degradation by a majority vote of the members of the Board present and voting.
  3. If the Department determines that degradation is not justified, it will notify the applicant, the federal and state intergovernmental coordination agencies, and third persons who requested notification of the determination. The Department also will issue a tentative decision to deny the permit because degradation is not justified. In accordance with 1200-4-1-.05(3), the Department will provide the public with notice of and an

(Rule 1200-4-3-.06, continued)

opportunity to comment on its tentative denial decision. If no public hearing is requested within the 30 day public comment period, and if the Department does not alter its tentative decision to deny, the Department shall notify the applicant of its final decision to deny the permit because degradation is not justified. Within 30 days after receiving notice of the final decision to deny the permit, the applicant may seek review of the decision in a contested case before the Board in accordance with Tennessee Code Annotated § 69-3-105(i). Within 5 business days after the Department receives an applicant's written request for a contested case hearing before the Board, the Department shall transmit the written request to the Administrative Procedures Division of the Secretary of State so the contested case may be docketed and an administrative law judge may be assigned to the case. In the contested case, the applicant shall have the burden of proof, and the Department's determination shall carry no presumption of correctness before the Board. The federal and state intergovernmental coordination agencies, and third persons who requested notification of the Department's degradation determination will be notified by the Department of the applicant's permit appeal. The intergovernmental coordination agencies and third persons may seek to intervene in the contested case in accordance with Tennessee Code Annotated § 4-5-310.

(c) Information Requirements:

1. Applicants requesting an economic/social necessity determination to allow degradation under this provision must provide all information required in order for the Department to make a determination that reasonable alternatives to degradation are not feasible. Reasonable alternatives for discharges may include, but are not limited to, connection to an existing collection system, land application, water reuse, or water recycling. Applicants for permit renewals of previously authorized discharges, including upstream discharges, which presently degrade Tier II waters, shall submit as an alternatives analysis completed and accurate Worksheets A and B for public sector applicants or Worksheets A and G for private system applicants, except where these worksheets are inappropriate for the activity, in which case applicants may substitute materials that provide equivalent information. If needed, the Department may request the applicant to provide additional information. Alternatives analysis for new or additional degradation shall include, at a minimum, completed and accurate Worksheets A and B for public sector applicants or Worksheets A and G for private system applicants, except where these worksheets are inappropriate for the activity, in which case applicants may substitute materials that provide equivalent information. These forms are found in the EPA guidance document (Economic Guidance).
2. Additionally, to provide information to the Department regarding the applicant's claim of economic/social necessity, public sector applicants shall complete and submit, at a minimum, Forms O, P, Q, S, T, U, and AA, found in the EPA guidance document (Economic Guidance). Private sector applicants shall complete and submit, at a minimum, Forms O, R, V, W, X, Y, Z, and AB, found in the EPA guidance document (Economic Guidance). In instances when these worksheets are inappropriate for the activity, those applicants may substitute materials that provide equivalent information.

(d) Public Participation:

1. NPDES - Applicants seeking permission to degrade Tier II waters shall publish a notice in a newspaper of general distribution in the area of the degradation. The notice shall identify the proposed discharge, provide the specific location including affected waters, describe the general basis for requesting permission to degrade Tier II waters, inform the public of their opportunity to provide comments, and that a local public meeting will be held by the Department unless the Department notifies the public of its determination

(Rule 1200-4-3-.06, continued)

that the discharge will not result in degradation. The applicant shall also post a sign within sight of a public road containing the same general information as the newspaper notice. A copy of the newspaper notice and proof of signage shall be provided to the Department. The public meeting held by the Department shall be near the proposed degradation.

2. ARAP/Section 401 Water Quality Certification - If the Department determines that an applicant's proposed activity will not result in degradation, it will so notify the public. If the Department determines that the proposed activity will degrade Tier II waters, and the applicant intends to seek permission to do so, then the applicant shall publish a notice in a newspaper of general distribution in the area of the degradation. The notice shall identify the proposed activity, provide the specific location including affected waters, describe the general basis for requesting permission to degrade Tier II waters, inform the public of their opportunity to submit comments, and that a local public meeting will be held by the Department. The public meeting held by the Department shall be near the proposed degradation.
  3. Timing of Public Participation - Within 14 days of the Department being informed that an applicant will seek degradation, the applicant shall provide notice, as identified above, to the affected public. After the applicant provides public notice, the Department shall notify the public of the location, date and time of the public meeting in the area of degradation. Public notice by the Department shall occur at least 45 days prior to the meeting. For a proposed discharge, if the Department determines that the discharge will not result in degradation, it will so notify the public and in this circumstance, there will be no public meeting.
- (e) Intergovernmental Coordination - A notice concerning the request for an economic/social necessity determination shall be provided by the Department to federal and state agencies with jurisdiction over fish, wildlife, shellfish, plant and wildlife resources, parks, and advisory councils for historic preservation.
- (4) The Department may recommend to the Water Quality Control Board that certain waterbodies be designated as Outstanding National Resource Waters (ONRWs). These shall be high quality waters which constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance.

Designation of ONRWs must be made by the Water Quality Control Board and will be accomplished in accordance with Section 69-3-105(a)(1) of the Tennessee Water Quality Control Act and through the appropriate rulemaking process.

In surface waters designated by the Water Quality Control Board as ONRWs, no new discharges, expansions of existing discharges, or mixing zones will be permitted unless such activity will not result in degradation of the water quality. Existing water quality will be the criteria in these waters. Physical alterations that cause degradation to the ONRW will not be allowed. At time of permit renewal, previously authorized discharges, including upstream discharges, which presently degrade an ONRW, will be subject to alternatives analysis. Public participation for these existing discharges will be provided in conjunction with permitting activities.

An assessment of environmental, economic, and social impacts will be prepared for each stream or stream segment proposed for Tier 3 ONRW designation. The assessment content and process will be determined by the Division of Water Pollution Control but will contain sufficient data and information to inform the Water Quality Control Board about environmental, economic, and social impact of ONRW designation. Further, the process will provide for comprehensive public participation with a solicitation of position statements from appropriate local government agencies including but not

(Rule 1200-4-3-.06, continued)

limited to county and municipal governments, Soil Conservation Districts, Utility Districts, as well as other local, state, and federal agencies that may have responsibility for land and water resource management within the watershed of the proposed stream segment.

The following streams or portions of streams are designated as ONRW:

WATERBODY	PORTION DESIGNATED AS ONRW
(a) Little River	Portion within Great Smoky Mountains National Park.
(b) Abrams Creek	Portion within Great Smoky Mountains National Park.
(c) West Prong Little Pigeon River	Portion within Great Smoky Mountains National Park.
(d) Little Pigeon River	From the headwaters within Great Smoky Mountains National Park to the downstream boundary of Pittman Center.
(e) Big South Fork Cumberland River	Portion within Big South Fork National River and Recreation Area.
(f) Reelfoot Lake	Tennessee portion of the lake and its associated wetlands.

The portion of the Obed River that is designated as a federal wild and scenic river as of June 22, 1999 is designated as tier 3; provided however, that if the current search for a regional water supply by the Cumberland Plateau Regional Water Authority results in a determination that it is necessary to utilize the Obed River as its source of drinking water, for that purpose the Obed shall be designated tier 2 and any permit issued for that project, whether state, federal, or otherwise, shall be considered under the requirements for tier 2.

- (5) All discharges of municipal sewage, industrial waste, or other wastes shall receive the greatest degree of effluent reduction which the Commissioner of the Tennessee Department of Environment and Conservation determines to be achievable through application of stringent effluent limitations and schedules of compliance either promulgated by the Water Quality Control Board; required to implement any applicable water quality standards, including where practicable, a standard permitting no discharge of pollutants; necessary to comply with a State Water Quality Plan; or necessary to comply with other State or Federal laws or regulations.
- (6) In implementing the provisions of these rules as they relate to interstate streams, the Commissioner of the Tennessee Department of Environment and Conservation and the Tennessee Water Quality Control Board will cooperate with the appropriate Federal Agency in order to assist in carrying out responsibilities under the Federal Water Pollution Control Act, as amended.

**Authority:** T.C.A. §§4-5-201 et seq., and 69-3-105. **Administrative History:** Original rule certified June 7, 1974. Amendment filed December 1, 1975; effective December 30, 1975. Amendment filed November 25, 1977; effective December 26, 1977. Amendment filed March 30, 1983; effective April 29, 1983. Amendment filed July 16, 1991; effective August 30, 1991. Amendment filed May 16, 1995; effective July 30, 1995. Amendment filed July 13, 1999; effective October 11, 1999. Amendment filed October 24, 2003; effective January 7, 2004.

**1200-4-3-.07 GROUND WATER CLASSIFICATION.**

- (1) Purpose and Intent. It is one of the primary goals of the Tennessee Water Quality Control Act, T.C.A. 69-3-101 et. seq. (the "Act") to protect our valuable ground water resource. This rule classifies ground water across the state based on the factors stated in the Act, T.C.A. 69-3-105(a)(2) and establishes ground water quality criteria. The quality of ground water varies in Tennessee, some aquifers, or portions thereof, produce water with sufficient quality and quantity to be used by our citizens directly as a drinking water supply, other aquifers, or portions thereof, produce water in sufficient quantities to be used as a water supply but the water requires treatment before it can be used as such. Finally, some aquifers, or portions thereof, either have levels of naturally occurring constituents that make the resource unusable as a drinking water supply or the aquifer does not produce enough water to be used as a drinking water supply. The Board recognizes these rules apply to both permitting activities and response actions, as the term response is defined rule 1200-1-13-.02(1)(ff). The abatement of pollution is a goal of the Act and these rules. These rules provide appropriate flexibility in the regulatory process to protect our ground water resource. Allowing the beneficial use and/or reuse of brownfield areas for some permitted waste management activities reduces the use of greenfield areas for such purposes; which will conserve and protect our environment. However, the Site Specific Impaired classification does not apply in the context of activities involving areas with no ground water contamination. When ground water has been polluted by human activity, these rules set forth the procedures and standards for any necessary ground water remediation. In certain cases, due to site specific conditions, it may not be technologically feasible to clean up a site and/or the costs associated with such clean up or other factors may substantially outweigh the benefits of the restored resource. These rules establish a Site Specific Impaired classification that may apply in such areas after a thorough evaluation of feasibility of remediation and the potential risk of allowing contaminants to remain in ground water. The Board recognizes that several Divisions within the Department have a role in protecting ground water resources. It is not the intent of these rules to change the responsibilities of those programs. It is, however, the intent of these rules to provide a uniform basis for decisions involving ground water that may be applied by all Divisions of the Department. The Board does not intend these rules to affect in any way the ability of the State to seek natural resource damages from responsible parties when ground water has been contaminated by human activity.
- (2) The ground water of the State is classified as follows:
  - (a) Special Source Ground Waters - This is ground water with exceptional quality and quantity, which may serve as a valuable source for water supply or which is ecologically significant. Special source ground water is vulnerable to contamination. Through the rulemaking process, the Water Quality Control Board will amend this rule to include the specific area of an aquifer which receives this designation. The Board shall clearly define the horizontal and vertical boundaries of ground water designated as Special Source Ground Water. In making this decision, the Board shall consider the following factors as submitted by the applicant:
    1. The vulnerability of the aquifer, or portion thereof, to contamination due to hydrogeologic characteristics;
    2. The number of persons or the proportion of the population using the ground water as a drinking water supply;
    3. A comparison of the economic, social and environmental benefits and costs of maintaining the special source ground water with the economic, social and environmental benefits and costs of replacing the special source ground water;
    4. An evaluation of the ecological and environmental impact should the quality of the special source ground water be compromised; and
    5. Other pertinent information as deemed necessary by the petitioner or the Department.

(Rule 1200-4-3-.07, continued)

Because such action is a rulemaking procedure, public input may be made as provided in the Uniform Administrative Procedures Act, T.C.A. 4-5-201 et. seq., but not as a contested case under T.C.A. 4-5-301 et. seq.

- (b) General Use Ground Water - Except for aquifers, or portions thereof, that have been designated as Special Source Ground Water, all ground water which, as it is encountered, has naturally occurring levels of Total Dissolved Solids of 1000 parts per million or less is classified as General Use Ground Water upon certification by the Commissioner; provided the aquifer or portion of an aquifer can produce an average yield of at least one (1) gallon per minute over a twenty four (24) hour period in a properly constructed six (6) inch water well or a well of alternate construction and equivalent yield approved by the Department. The well shall have three well volumes purged before the twenty four (24) hour pump test begins. Any ground water which is used as a source of drinking water is also classified as General Use regardless of the well yield or the ground water's natural quality, unless that ground water meets the requirements for the Site Specific Impaired classification in 1200-4-3-.07(2)(d).
- (c) Limited Use Ground Water - This is ground water which is not currently a source of drinking water and is classified as Limited Use ground water upon certification by the Commissioner:
1. Ground water with naturally occurring levels of Total Dissolved Solids above 1,000 ppm but less than 3,000 ppm; or
  2. Any aquifer or portion of an aquifer which is not capable of producing an average yield of one (1) gallon per minute over a twenty four (24) hour period in a properly constructed six (6) inch diameter water well or a well of alternate construction and equivalent yield approved by the Department. The well shall have three well volumes purged before the twenty four (24) hour pump test begins; or
  3. Ground water contaminated by human activity previous to November 19, 1980 if:
    - (i) there are no liable parties as defined in T.C.A., 68-212-202 (3) (B), (C), or (D); and
    - (ii) the current property owner did not cause the ground water contamination.

When ground water is encountered and certified by the Commissioner to be Limited Use as described above, the areal extent of the Limited Use ground water shall be delineated. This means the vertical and horizontal boundaries shall be established by sampling from properly constructed ground water monitoring wells, existing water wells and/or springs or by use of other appropriate means; including, but not limited to, topographical evaluations, dye traces, geologic and hydrologic modeling, etc. The horizontal boundaries of the Limited Use ground water cannot extend beyond the perimeter investigated as described above. The vertical boundaries of the Limited Use ground water can not exceed the depth of the ground water investigated as described above. Figures which clearly depict the horizontal and vertical boundaries of the Limited Use ground water must be submitted with the plans/reports required by the response action or permitting action.

Any ground water used as a drinking water source, at the time of classification, regardless of its natural quality or the aquifer yield cannot be classified as Limited Use ground water.

(Rule 1200-4-3-.07, continued)

- (d) Site Specific Impaired Ground Water- This is ground water that has been contaminated by human activity and it is not technologically feasible to remediate the ground water to the level required by other classifications or if the costs of such a remediation substantially outweigh the benefits of the restored resource. Ground water shall be classified as Site Specific Impaired upon certification by the Commissioner. The process used to certify ground water as Site Specific Impaired is stated in 1200-4-3-.09.
1. When ground water is encountered and certified by the Commissioner to be Site Specific Impaired as described above, the areal extent of the Site Specific Impaired ground water shall be delineated. This means the vertical and horizontal boundaries shall be established by sampling from properly constructed ground water monitoring wells, existing water wells and/or springs or by use of other appropriate means; including, but not limited to, topographical evaluations, dye traces, geologic and hydrologic modeling, etc. The horizontal boundaries of the Site Specific Impaired ground water cannot extend beyond the perimeter investigated as described above. The vertical boundaries of the Site Specific Impaired ground water can not exceed the depth of the ground water investigated as described above. Figures which clearly depict the horizontal and vertical boundaries of the Site Specific Impaired ground water must be submitted to the Department in the plans/reports required by Rule 1200-4-3-.09.
- (e) Unusable Ground Water - The following ground water is classified as Unusable Ground Water upon certification by the Commissioner:
1. Ground water that is mineral, hydrocarbon or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II or III operation under Chapter 1200-4-6, Underground Injection Control, to contain minerals or hydrocarbons that, considering their quality and location are expected to be commercially producible; or
  2. Ground water at a depth and location which makes its use as a water supply economically or technically impractical; and
  3. Ground water with naturally occurring total dissolved solids of more than 3,000 ppm; or
  4. Ground water that was contaminated by human action in connection with the specific activity referenced below which:
    - (i) is located over a Class III well mining area subject to subsidence or catastrophic collapse; or
    - (ii) has been used to receive fluids and other substances from a Class I injection well, provided the Class I well was approved by the Department on or prior to September, 1985; or
  5. Ground water within the area excavated during the process of mining coal or other minerals pursuant to valid permits. Ground water beyond the excavation area will be classified as it is encountered as described elsewhere in this rule. Ground water which moves from the excavated area and becomes surface water shall be regulated as described in the surface water classification and criteria in these rules.

When ground water is encountered and certified by the Commissioner to be Unusable as described above, the areal extent of the Unusable ground water shall be delineated. This means the vertical and horizontal boundaries shall be established by sampling from properly constructed ground water monitoring wells, existing water wells and/or springs

(Rule 1200-4-3-.07, continued)

or by use of other appropriate means; including, but not limited to, topographical evaluations, dye traces, geologic and hydrologic modeling, etc. The horizontal boundaries of the Unusable ground water cannot extend beyond the perimeter investigated as described above. The vertical boundaries of the Unusable ground water can not exceed the depth of the ground water investigated as described above. Figures which clearly depict the horizontal and vertical boundaries of the Unusable ground water must be submitted with the plans/reports required by the response action or permitting action. Any aquifer or portion thereof classified for the placement of fluids or other substances by underground injection on or prior to September 1985 shall retain this classification and shall not be subject to the requirements of rules 1200-4-3-.09 and .10.

- (f) After the ground water in any specific location has been classified under these rules, a rulemaking action by the Water Quality Control Board will be required to reclassify that ground water.

**Authority:** T.C.A. §§4-5-201 et seq., and 69-3-105. **Administrative History:** Original rule filed June 28, 1999; effective September 11, 1999. Amendment filed July 13, 1999; effective October 11, 1999.

#### **1200-4-3-.08 GROUND WATER CRITERIA.**

The water quality criteria for the different classes are as follows:

- (1) Special Source Ground Water:
  - (a) except for naturally occurring levels, shall not contain constituents in excess of the concentrations listed in Table 1; and
  - (b) except for naturally occurring levels, shall not contain constituents at levels exceeding those in Rule 1200-4-3-.03 except that the criteria for fish and aquatic life and recreational use shall not apply.
- (2) General Use Ground Water:
  - (a) except for naturally occurring levels, shall not contain constituents in excess of the concentrations listed in Table 1; and
  - (b) except for naturally occurring levels, shall not contain constituents at levels exceeding those in Rule 1200-4-3-.03 except that the criteria for fish and aquatic life and recreational use shall not apply
- (3) Limited Use Ground Water:
  - (a) except for naturally occurring levels, shall not contain constituents at levels exceeding those for the use classifications in Rule 1200-4-3-.03 other than domestic water supply, fish and aquatic life and recreational use; and
  - (b) except for naturally occurring levels, in areas where historical contamination causes certain constituents to exceed the levels in rule 1200-4-3-.03, except for the criteria for domestic water supply, fish and aquatic life and recreational use, shall not contain those constituents at levels higher than those background levels; and
  - (c) shall contain no substances, whether alone or in combination with other substances, that are toxic, carcinogenic, mutagenic or teratogenic, other than those of natural origin, at levels and conditions which pose an unreasonable risk to the public health

(Rule 1200-4-3-.08, continued)

- (4) Site Specific Impaired Ground Water:
- (a) except for naturally occurring levels, shall contain no substances, whether alone or in combination with other substances, that are toxic, carcinogenic, mutagenic or teratogenic, other than those of natural origin, at levels and conditions which pose an unreasonable risk to public health or the environment;
  - (b) shall contain no other constituents which pose an unreasonable risk to the public health or the environment; and
  - (c) shall contain no constituents at levels that will prevent ground waters beyond the point of classification change from meeting the classification and criteria for those waters.
  - (d) Site Specific Impaired Criteria shall only apply to ground water that has been certified through the process set forth in Rule 1200-4-3-.09.
- (5) Unusable Ground Water:
- (a) except for naturally occurring levels, shall contain no substances, whether alone or in combination with other substances, that are toxic, carcinogenic, mutagenic or teratogenic, other than those of natural origin, at levels and conditions which pose an unreasonable risk to the public health; and
  - (b) shall contain no other constituents which pose an unreasonable risk to the public health

Table 1. Inorganic Criteria for General Use Ground Water

<u>Constituent</u>	<u>Concentration</u>
Aluminum	0.2 mg/l
Arsenic	0.05 mg/l
Asbestos	7,000,000 fibers/l
Barium	2.0 mg/l
Cadmium	0.005 mg/l
Chloride	250 mg/l
Chromium	0.1 mg/l (Total)
Copper	1.0 mg/l
Fluoride	4.0 mg/l
Iron	10.0 mg/l
Lead	0.05 mg/l
Manganese	0.5 mg/l
Mercury	0.002 mg/l
Nitrate	10.0 mg/l as Nitrogen
Nitrite	1.0 mg/l as Nitrogen
Total Nitrate & Nitrite	10.0 mg/l (as Nitrate)
Selenium	0.05 mg/l
Silver	0.1 mg/l
Sulfate	500 mg/l
TDS	1000 mg/l
(Total Dissolved Solids)	
Zinc	5.0 mg/l

(Rule 1200-4-3-.08, continued)

**Authority:** T.C.A. §§4-5-201 et seq., and 69-3-105. **Administrative History:** Original rule filed June 28, 1999; effective September 11, 1999. Amendment filed July 13, 1999; effective October 11, 1999.

**1200-4-3-.09 SITE SPECIFIC IMPAIRED CLASSIFICATION APPLICATION PROCESS.**

- (1) Any person who encounters ground water that may meet the requirements for Site Specific Impaired, may apply for the ground water at the site to be certified by the Department as meeting those requirements, using the process set forth in this rule. Any costs involved in making the application shall be borne by the applicant. The application shall include the following, unless it is determined by the Department in writing that the site conditions render any of them unnecessary:
  - (a) An assessment of the horizontal and vertical extent of the contamination;
  - (b) An evaluation of the hydrogeology of the area including but not limited to the ground water flow rate and direction, permeability, recharge area, ground water classification and location of local water wells, springs and seeps;
  - (c) An evaluation of the area geology including but not limited to soil type, soil permeability, soil porosity, depth to bedrock, identification of geologic formations;
  - (d) A description of the corrective actions or response actions taken or proposed;
  - (e) The chemical characteristics of the constituent(s) including but not limited to the constituent's solubility, mobility, toxicity, and carcinogenicity, the nature of and the level of constituents to remain or be present in the ground water as well as the calculations and rationale used in the determination;
  - (f) a feasibility study which evaluates clean-up alternatives, the cost, and the time to complete each alternative;
  - (g) An evaluation of current and future ground water use within a (1/2) one-half mile radius of the contaminant plume; in karst areas the impact of conduit flow shall be evaluated;
  - (h) An evaluation of current and future land uses within a (1/2) one-half mile radius of the contaminant plume;
  - (i) An evaluation of the potential of the constituent to migrate through soil and ground water to:
    1. homes;
    2. buildings;
    3. surface waters;
    4. subsurface utilities; and
    5. adjacent properties;
  - (j) A description of any existing or proposed monitoring program to observe constituent levels in soil and ground water;
  - (k) Evaluation of the existing or anticipated actual exposure pathways (inhalation, ingestion, dermal contact, etc.) of the constituents and an assessment of the human health risks presented by exposure to the constituents as well as the impact, if any, of the constituents on fish and aquatic life pursuant to 1200-4-3;

(Rule 1200-4-3-.09, continued)

- (l) Consideration of the classification in Rule 1200-4-3-.07 that would apply to the ground water at the site if it were not contaminated.
  - (m) Analysis of the technological feasibility of cleaning up the ground water to the level necessary for the criteria that would apply to the ground water at the site if it were not contaminated and a comparison of the costs of investigation and cleanup and/or any other relevant factors with the benefits of the restored resource;
  - (n) A description of how and when the contamination occurred, if known; and
  - (o) Other items as requested by the Department associated with the evaluation of the application to certify ground water as Site Specific Impaired.
- (2) The Department will issue a public notice, unless a process for public notice and input is required by other applicable regulations (in such case that regulation will be followed), when an application to certify ground water as Site Specific Impaired has been reviewed and a tentative decision to approve it has been made. The Department will conduct a public hearing concerning the application if the issue generates substantial public interest. The Department will explain the reasons it is proposing to certify the ground water as meeting the requirements for the Site Specific Impaired classification and will consider all written and oral comments received.
  - (3) In the evaluation of an application to certify ground water as Site Specific Impaired, the Commissioner or this Board shall consider:
    - (a) the extent of any threat to human health or safety;
    - (b) the extent of damage to the environment;
    - (c) technology commercially available to accomplish restoration;
    - (d) a comparison of the environmental and economic costs and benefits to be derived from ground water quality restoration with the environmental and economic costs and benefits to be derived from classification as Site Specific Impaired;
    - (e) the point of classification change;
    - (f) other appropriate information presented in the application.

**Authority:** T.C.A. §§4-5-201 et seq., and 69-3-105. **Administrative History:** Original rule filed June 28, 1999; effective September 11, 1999. Amendment filed July 13, 1999; effective October 11, 1999.

#### **1200-4-3-.10 POINT OF CLASSIFICATION CHANGE.**

- (1) “Point of Classification Change” shall mean the boundary location(s) within the relevant zone of an aquifer between the portion of the aquifer that is classified as Site Specific Impaired and any other classification. Compliance with the applicable criteria at this point shall be determined using sampling data, ground water modeling or other allowable mechanisms.
- (2) All areas with ground water classified as Site Specific Impaired must be owned or controlled by the person(s) subject to ground water cleanup or permitting obligations and/or subject to appropriate deed restrictions or other institutional controls. All locations outside the point of classification change must not exceed the applicable ground water criteria beyond the point of classification change.

(Rule 1200-4-3-.10, continued)

**Authority:** T.C.A. §§4-5-201 et seq., and 69-3-105. **Administrative History:** Original rule filed June 28, 1999; effective September 11, 1999. Amendment filed July 13, 1999; effective October 11, 1999.

#### **1200-4-3-.11 APPEALS.**

- (1) Any applicant aggrieved by the actions of the Department in applying Rules 1200-4-3-.07 through 1200-4-3-.10 may petition this Board for a hearing provided a written petition is submitted to and received by the Commissioner;
  - (a) within thirty (30) days of certification of ground water or disapproval of an application for certification of ground water.; or
  - (b) within thirty (30) days following the expiration of the one hundred and twenty (120) calendar days from receipt of an application for certification of ground water as Site Specific Impaired if the Department has not made written request for additional information.
- (2) The Commissioner's determination shall be final and not subject to review unless the written petition for hearing is submitted and received within this time frame. The written petition must set forth the basis for the appeal as required by the Administrative Procedures Act, T.C.A. Section 4-5-101 et. seq., and the rules promulgated thereunder, particularly Rule 1360-4-1-.05.

**Authority:** T.C.A. §§4-5-201 et seq., and 69-3-105. **Administrative History:** Original rule filed June 28, 1999; effective September 11, 1999. Amendment filed July 13, 1999; effective October 11, 1999.