ARCADIS
Infrastructure, environment, facilities

ARCADIS U.S., Inc.
10352 Plaza Americana Drive
Baton Rouge
Louisiana 70816
Tel 225.292.1004
Fax 225.218.9677
www.arcadis-us.com

Mr. Chris Sanders, P.E.
MDEQ – Office of Pollution Control
Environmental Compliance & Enforcement Division
P.O. Box 2261
Jackson, Mississippi 39225-2261

ENVIRONMENT

Subject:
Sludge Characterization and Bench Scale Treatability Report
Hercules Incorporated
Hattiesburg, Mississippi

Date:
20 August 2010

Contact:
Mr. John Ellis, P.G.

Extension:
208

Email:
john.ellis@arcadis-us.com

Our ref:
OH003000.MS24.00002
Ashland/OH3000.MS24/C/4/jk

Dear Mr. Sanders:

ARCADIS U.S., Inc., is pleased to submit this sludge characterization and treatability report for the Impoundment Basin investigation performed at the subject facility. As requested in your letter dated November 24, 2009, this report contains a plan for removal of the sludge.

Please contact one of the undersigned at (225) 292-1004 if you have any questions about this submittal or require additional information.

Sincerely,

ARCADIS U.S., Inc.

Craig A. Derouen, P.E.
Senior Engineer

John Ellis, P.G.
Principal Scientist/Geologist

David R. Escudé, P.E.
Vice President/Principal Engineer

CAD:JE:DRE:jk

Copies:
Mr. Bruce Hough, Hercules

RECEIVED
AUG 23 2010
DEQ-ECED

ARCADIS

Infrastructure, environment, buildings

Imagine the result

HERCULES

Sludge Characterization and Bench Scale Treatability Report

Hattiesburg, Mississippi

20 August 2010

RECEIVED
AUG 2 3 2010
DEQ-ECED

ARCADIS

Sludge Characterization and Bench Scale Treatability Report

Hattiesburg, Mississippi

Craig A. Derouen, P.E.
Senior Engineer

John Ellis, P.G.
Principal Scientist/Geologist

David R. Escudé, P.E.
Vice President/Principal Engineer

Prepared for:
Hercules Incorporated

Prepared by:
ARCADIS U.S., Inc.
10352 Plaza Americana Drive
Baton Rouge
Louisiana 70816
Tel 225 292 1004
Fax 225 218 9677

Our Ref.:
OH003000.MS24.00002

Date:
20 August 2010

This document is intended only for the use of the individual or entity for which it was prepared and may contain information that is privileged, confidential, and exempt from disclosure under applicable law. Any dissemination, distribution, or copying of this document is strictly prohibited.

Because we care
100% recycled paper produced by wind power energy

Table of Contents

Executive Summary i

1. Introduction 1

2. Objectives 1

3. Regulatory History 1

4. Rationale 2

5. Sludge Characterization 2

5.1 Mass and Volume Verification 2

5.2 Sample Collection 3

5.2.1 Analytical Sample Collection 3

5.2.2 Treatability Sample Collection 5

5.3 Analytical Testing and Results 5

5.3.1 Sludge Analytical Results 5

5.3.2 Native Soil Analytical Results 6

5.3.3 Investigation-Derived Waste (IDW) 7

5.3.4 Dewatered Solids Effluent Analysis 7

6. Sludge Treatability Determination 8

6.1 Overview 8

6.2 Dewatering Study 8

6.2.1 Criteria 9

6.2.2 Centrifuge 9

6.2.3 Baroid Screening 10

6.2.4 Filter Press 10

6.2.5 Gravity Dewatering 11

6.3 Solidification Study 11

6.3.1 Criteria 11

6.3.2 Methodology 12

6.3.3 Results 12

7. Feasibility Evaluation 13

7.1 Centrifuge Dewatering with Off-Site Disposal 13

FINAL

7.1.1 Effectiveness 13

7.1.2 Implementability 14

7.2 Filter Press Dewatering with Off-Site Disposal 14

7.2.1 Effectiveness 14

7.2.2 Implementability 14

7.3 Gravity Dewatering with Off-Site Disposal 15

7.3.1 Effectiveness 15

7.3.2 Implementability 15

7.4 Solidification with Off-Site Disposal 16

7.4.1 Effectiveness 16

7.4.2 Implementability 16

7.5 Solidification with On-Site Capping 17

7.5.1 Effectiveness 17

7.5.2 Implementability 17

7.6 Selected Technology 17

FINAL

Tables

1 Summary of Toxicity Characteristic Leaching Procedure (TCLP) Data

2 Summary of Total Analyte Data

3 Summary of Quality Assurance/Quality Control Data

4 Summary of Treatability Effluent Data

Figures

1 Site Location Map

2 2006 Aerial Photography

3 Detected TCLP Analyte Concentrations

4 Detected Total Analyte Concentrations

5 Sampling Protocol

6 Cross-Section Location Map

7 Cross-Sections A-A', B-B', and C-C'

8 Potential Dewatering Locations

Appendices

A MDEQ Correspondence

B Field Forms

C Analytical Reports

D 95% UCL for TCLP Benzene

E POTW Effluent Discharge Calculations

F Dewatering Report

G Solidification Report

H Feasibility Evaluation Matrix

I IB Decommissioning Work Plan

FINAL

Executive Summary

The purpose of the characterization and bench scale treatability project was to evaluate sludge within the impoundment basin (IB) at the Hercules Incorporated facility located at 613 West 7th Street in Hattiesburg, Mississippi. The primary objective was to identify an appropriate strategy for treatment and disposal of sludge within the IB. Based on the data collected during the April 2010 field effort and the subsequent laboratory analysis, an effective sludge management option has been identified.

The sludge sampling and analysis provides adequate characterization to support the project objectives. Using the characterization data, a statistical analysis was completed to determine if the IB sludge would be characteristically hazardous when managed. Based on this analysis, the sludge will be considered a nonhazardous waste for purposes of management and off-site disposal. Because the material is nonhazardous, Land Disposal Restrictions will not apply. Currently, off-site disposal at the Pine Belt Regional Landfill is anticipated.

The treatability work completed indicates the sludge readily dewaters under both passive and active treatment approaches. An evaluation of the technologies, using the criteria of effectiveness, implementability and cost, indicates that gravity dewatering in fabricated drying beds outside the IB is the most appropriate technology for dewatering the sludge prior to off-site disposal. Based on this analysis, an IB Decommissioning Work Plan has been developed. The Decommissioning Work Plan outlines the activities necessary to complete gravity dewatering of the sludge, management of the dewatering effluent through the current wastewater discharge permit, off-site disposal of the dewatered material at the Pine Belt Regional Landfill, backfilling of the IB, and reporting. Detailed plans and specifications will be developed for contractor bidding purposes. In the event another viable option is proposed by a contractor, Hercules will evaluate that option prior to decommissioning the IB.

Once the IB sludge has been effectively managed, monitoring of site-wide groundwater will continue under the Restricted Use Agreed Order (RUAO 5349 07). The purpose of the RUAO is to protect human health and the environment by restricting the use and activities on site while constituents in site-wide groundwater attenuate as described in the Corrective Action Plan Revision 01 (Groundwater & Environmental Services, Inc. dated January 20, 2005).

FINAL

FINAL

1. Introduction

ARCADIS U.S., Inc. (ARCADIS), submitted the *Sludge Characterization and Bench Scale Treatability Work Plan* (Work Plan) to Hercules Incorporated (Hercules) on March 1, 2010. The Work Plan presented a strategy and procedures for evaluation of the current conditions of an on-site impoundment basin (IB) located at Hercules' 613 West 7th Street facility in Hattiesburg, Mississippi (Figures 1 and 2). The Work Plan was submitted to the Mississippi Department of Environmental Quality (MDEQ) for review prior to implementation. MDEQ approved the Work Plan in a letter dated March15, 2010. Field activities were initiated in April 2010. This report presents the results of the characterization and treatability activities conducted to support the selection of an effective remedy for properly managing the IB sludge and decommissioning the IB.

2. Objectives

The primary objective of the activities conducted was to gather data that can be used to determine the most cost-effective treatment and disposal option for the IB sludge. Data were collected to evaluate technologies that can be implemented to decommission the IB under one of two closure scenarios: 1) dewatering with off-site disposal; and 2) in-place closure. These data included information on the volume, physical characteristics, chemical, and treatability characteristics of the sludge. This objective was established as a result of Hercules' desire to manage the sludge appropriately and decommission the IB.

3. Regulatory History

In December 2007, Hercules entered into a "Restrictive Use Agreed Order" (RUAO 5349 07) with MDEQ. The purpose of the RUAO is to protect human health and the environment by restricting the use and activities on site while constituents in site-wide groundwater attenuate as described in the Corrective Action Plan Revision 01 (Groundwater & Environmental Services, Inc. dated January 20, 2005).

Permitted water discharge to the City of Hattiesburg Publicly Owned Treatment Works (POTW) has occurred since March 1999. The current State of Mississippi Water Pollution Control Permit number is MSP091286. Because the IB was no longer necessary, Hercules contracted for the removal and disposal of the IB sludge. Following removal of the sludge, the IB would be backfilled to grade and revegetated. Monitoring of site-wide groundwater would continue under the RUAO.

Hercules notified MDEQ of its intent to decommission the IB in a letter dated April 22, 2008. In response to the notification, MDEQ requested, in a letter dated June 8, 2008, additional information regarding the closure operations including a request for Hercules to characterize the sludge within the IB prior to removal from the units. MDEQ also sent a letter to Hercules dated August 25, 2009 (Appendix A), following several meetings and submittal of a draft closure plan. In the letter, MDEQ outlined additional closure procedures. Those closure procedures addressed particular analysis and characterization of the sludge in regard to the management and disposal of the water and sludge from within the IB. Hercules submitted the characterization and treatability Work Plan to MDEQ for review. Based on MDEQ's approval, Hercules implemented the Work Plan to gather the additional data needed to proceed with decommissioning the IB.

FINAL

4. Rationale

In correspondence dated August 25, 2009, MDEQ outlined a general procedure for closure of the IB, which stated if the characterization indicates that the sludge is nonhazardous for benzene and other constituents, the Land Disposal Restrictions (LDR) in 40 Code of Federal Regulations (CFR) Part 268 would not apply.

An effort was undertaken in April 2010 as part of this characterization plan to preliminarily determine whether the LDR would apply to the IB sludge using the above procedure. The evaluation also gathered data to determine: 1) if the sludge can be dewatered or solidified/stabilized sufficiently to allow for transportation over public roadways to an off-site disposal facility; and 2) if sufficient strength can be imparted to the sludge to hold the weight of an engineered cap for on-site closure. The results of this evaluation are presented in the following sections.

5. Sludge Characterization

Sludge characterization consisted of surveying, sample collection, and laboratory analysis of the IB material. Figures 3 and 4 show the locations where samples were collected in April 2010. Figure 5 is a graphical depiction of the sampling protocol that was followed.

5.1 Mass and Volume Verification

A surveyor licensed by the State of Mississippi surveyed the areal extent of the IB. In addition, the elevations of the top of sludge at each of the locations sampled in the IB

were surveyed. During collection of IB samples, the on-site geologist measured the depth of the sludge material to native soil within the core barrels. Native soil was not encountered in the IBS-1 location at a depth of 10.2 feet below the top of sludge. For boring locations IBS-2 through IBS-8 (Figure 3), native soil was encountered at depths ranging from 4.3 to 9.5 feet below the top of sludge. Sludge was observed in each boring. Distinct upper and lower sludge layers were observed in five of the borings. The layers were visually delineated by color and texture changes. Physical observations and the depths of each layer were noted on Sample/Core Logs (Appendix B). Using the surveyed elevations and the measurements made in the field, the volume of the upper and lower sludge layers encountered in the IB were determined using AutoCAD® software. The upper and lower sludge layers contained approximately 3,800 cubic yards (cy) and 900 cy of material, respectively, for a total of approximately 4,700 cy (in-place) of sludge in the IB.

FINAL

5.2 Sample Collection

Sample collection activities were conducted from April 14, 2010, through April 16, 2010. MDEQ representatives observed the sample collection activities.

5.2.1 Analytical Sample Collection

Sludge and native soil samples were collected from the IB locations shown on Figure 3 using a flat-bottom boat, vibracoring equipment, and/or 1-gallon plastic buckets. The sludge samples collected using vibracoring equipment were brought to the surface and examined by a geologist. It was noted that sludge was present in distinct upper and lower layers. Upper layer sludge was black in color, while lower layer sludge was tan and had a firmer consistency. Only upper layer sludge was encountered at the IBS-3, IBS-4, and IBS-7 sample locations, and these locations terminated in native soil material. Analytical samples collected from the sludge material contain either "US" or "LS" in the sample identifier to indicate upper sludge or lower sludge, respectively. Three cross-sections (Figures 6 and 7) were developed that depict the approximate extent of the upper and lower sludge layers. Soil samples were collected from native materials beneath the lower sludge. The native soil was primarily sandy and/or silty clay material. Sand and silty clay were not observed in the sludge samples. The presence of a native soil layer containing these soil types beneath the IB is consistent with previous subsurface observations noted in this area. Copies of the forms used to log field observations are included in Appendix B.

Sludge samples were collected from the upper and lower half of the total sludge interval at eight IB sample locations and native soil samples were collected at seven sample locations (Figures 3 and 4). Each sample was analyzed for the following constituents:

- Volatile organic compounds (VOCs) by U.S. Environmental Protection Agency (USEPA) Method 8260B;
- Semivolatile organic compounds (SVOCs) by USEPA Method 8270C; and
- Resource Conservation and Recovery Act (RCRA) 8 metals by USEPA Method 6010/7470.

In addition to the total analyte analyses listed above, the sludge samples were also analyzed for:

- Toxicity Characteristic Leaching Procedure (TCLP)-VOCs;
- TCLP-SVOCs;
- TCLP-Pesticides and Herbicides;
- TCLP-Metals; and
- Reactivity, Corrosivity, and Ignitability by USEPA Method 1311.

The results of the TCLP and total analyte testing are included on Tables 1 through 3. Figure 3 depicts the detected TCLP concentrations in the IB and Figure 4 depicts the detected total analyte concentrations. Copies of the laboratory reports are included in Appendix C.

Samples selected for submission to the laboratory, including quality assurance/quality control samples (trip, field, and equipment rinsate blanks), were placed into laboratory-provided sample containers containing the appropriate preservatives. The samples were packaged on ice and shipped to TestAmerica Laboratories, Inc.'s (TestAmerica's), analytical laboratory in Savannah, Georgia, under proper chain-of-custody procedures.

FINAL

5.2.2 Treatability Sample Collection

During vibracoring operations to collect analytical sludge samples, it was observed that the majority of the depth of the IB above native soil contained a watery, black sludge in the upper layer (average thickness of 6.1 feet). This sludge appeared to be relatively uniform across the IB. Ten-gallon sludge samples of this material were collected from this layer at the locations shown on Figure 3. Each sludge sample was containerized in two new 5-gallon buckets with sealing lids.

The Work Plan called for the collection of upper and lower sludge samples for treatability testing. While two distinct layers were observed at most locations, the lower sludge layer (average thickness of 2.3 feet) appeared to be consolidated enough to pass the Paint Filter Liquids Test (USEPA Method 9095A) in the state it was observed in the vibracore sample tube. Because the purpose of the treatability sampling was to evaluate dewatering, it was determined that this testing was unnecessary for sludge from the lower layer. Therefore, treatability samples were not collected from the lower sludge layer.

Selected samples were submitted to geotechnical and treatability laboratories after the TCLP analytical results revealed that the sludge was nonhazardous (see Section 5.3.1). One of the sample buckets from each of the selected locations was submitted to Fugro Consultants, LLC (Fugro), in Baton Rouge, Louisiana, for the solidification study and the other buckets were submitted to TMA Environmental, Inc. (TMA), in Gonzales, Louisiana, for the dewatering study. Proper chain-of-custody procedures were followed during the transport and relinquishment of the samples.

FINAL

5.3 Analytical Testing and Results

Sixteen sludge samples were collected and submitted to TestAmerica for TCLP and total analyte testing using the protocol depicted on Figure 5. Copies of the analytical reports are included in Appendix C.

5.3.1 Sludge Analytical Results

Results of the TCLP testing are included in Table 1. Detected TCLP concentrations are shown on Figure 3. The TCLP results were compared to the toxicity characteristic (TC) levels contained in 40 CFR 261.24. Of the sixteen samples submitted for TCLP analyses, three samples (IBS-1-US, IBS-3-LS, and IBS-7-LS) contained benzene

concentrations above the TC levels. No other TCLP parameters were detected above regulatory levels.

It is not practicable to sample and test the entire volume of sludge in the IB to determine the TCLP-benzene results for all of the sludge in the IB. Additionally, mixing within the sludge will occur during removal, dewatering, solidification, and/or loading for off-site transport during closure of the IB. Therefore, it is appropriate to determine the 95% Upper Confidence Limit (UCL) value (as allowed under SW-846 Chapter 9) of the TCLP-benzene results as a means for assessing the characteristics of the sludge as it is being managed. The 95% UCL is a calculated statistical value used to represent the true mean of a set of data with 95% confidence. A 95% UCL analysis was performed on the TCLP-benzene concentrations. The analysis determined that the 95% UCL TCLP-benzene concentration in the IB is 0.159 milligram per liter (mg/L), well below the 0.5 mg/L benzene TC standard. This result indicates that with 95% confidence, the true mean of the TCLP-benzene concentrations of the entire volume of sludge in the IB is less than the TC standard for benzene. The options presented in this report are based on the non-hazardous characterization of the sludge using the 95% UCL concentration for benzene of 0.159 mg/L. The 95% UCL analysis is described in Appendix D.

Results of the total analyte testing of IB sludge are included in Table 2. All of the detected total analyte concentrations are shown on Figure 4.

5.3.2 Native Soil Analytical Results

Native soil samples were collected from beneath seven of the sludge locations (IBS-2-NS through IBS-8-NS). The native soil layer was not reached at the IBS-1-NS sample location at a depth of 11.5 feet below the water surface (10.2 feet below top of sludge) due to reaching the limit of the sampling device. The samples were submitted to TestAmerica for total analyte testing. The results of the testing are included in Table 2. Detected total analyte concentrations are shown on Figure 4.

The total analyte results for native soil beneath the IB were compared to the MDEQ Tier 1 TRGs for restricted soil use. 2-Nitroaniline, benzene, carbon tetrachloride, chloroform, dibenz(a,h)anthracene, and toluene were detected at concentrations exceeding their respective Tier 1 TRGs. It should be noted that these native soil samples were collected below the water table and, therefore, impacts present in these samples may be representative of groundwater conditions in the vicinity of the IB.

FINAL

5.3.3 Investigation-Derived Waste (IDW)

IDW, including personal protective equipment, disposable sampling equipment, packaging, etc., was disposed of in a municipal waste landfill. Sludge samples whose TCLP results were within TC limits were returned to the IB. IDW sludge samples from the individual sampling locations that failed the TC testing criteria were disposed of in July 2010 as hazardous waste. The disposal effort was contracted through Ashland Distribution Environmental Services.

5.3.4 Dewatered Solids Effluent Analysis

The Work Plan called for collection and sampling of the centrifuge, filter press, and gravity dewatering effluent water that came out of the IB sludge during treatability testing so a determination of how to manage this waste stream during IB sludge management could be completed. Effluent generated during the dewatering study was containerized. The analytical testing required by the POTW permit includes the following: VOCs, pH, SVOCs, biochemical oxygen demand (BOD), and oil and grease. Due to the limited volume of effluent generated during treatability testing, not all of the proposed testing was completed. Enough sample volume of the treatability effluent was available to conduct the VOC, pH, and SVOC analyses. There was insufficient volume to analyze the treatability laboratory effluent for BOD and oil and grease.

The results of the treatability effluent water analysis were within the limits set by the current POTW discharge permit, except for the following: IBS-8 Filter Press Filtrate sample had of pH of 11.5 standard units (s.u.), which slightly exceeded the limiting pH effluent range of 5.0 to 11.0 s.u.; benzene was detected at a concentration of 0.0013 mg/L in the IBS-8 Filter Press Filtrate sample; toluene was detected in the IBS-4 Centrifuge Centrate (250 parts per million [ppm] Cation Polymer), IBS-4 Filter Press Filtrate, and IBS-8 Filter Press Filtrate samples at concentrations of 0.00052J mg/L, 0.280J mg/L and 0.100 mg/L, respectively. The effluent water results are listed in Table 4.

The current IB discharge system has pH adjustment capabilities which can ensure that the pH of effluent discharged from the IB is within the limiting pH range.

The POTW permit is based on pounds per day of each parameter discharged to the POTW. The calculations in Appendix E show the limiting permit parameter and the volume of water that can be discharged per day from the IB during closure activities.

FINAL

These calculations apply only to the water entrained in the sludge, not the water that is currently discharged from the surface of the IB as a result of rain events.

The calculations in Appendix E were made assuming that there are 856,290 gallons of water contained in the sludge in the IB, based on the lowest in-situ solids content value reported of 10%. The potentially limiting parameter that will govern the pumping of effluent to the POTW is toluene. Using the maximum toluene effluent concentration of 0.280 mg/L as a conservative estimate, a total of 92,764 gallons per day of effluent can be discharged to the POTW during sludge dewatering activities. It should be noted that while the highest toluene value reported by the lab was used in this analysis, there were additional data that indicate lower toluene values. The actual toluene concentrations in water discharged to the POTW will be monitored at the interval specified by MDEQ in the POTW permit to ensure permit limits are met during dewatering activities associated with the IB decommissioning.

FINAL

6. Sludge Treatability Determination

6.1 Overview

The bench scale treatability testing consisted of determining the amenability of the sludge to dewatering and solidification processes. Both determinations consisted of testing limited quantities of sludge material. While efforts were made to collect representative sludge samples, the treatability of the sludge during field implementation of any of the evaluated technologies may differ from the observations made during bench scale testing.

Due to the observed uniformity of the upper sludge material and in-situ consolidation of the lower sludge material during characterization sampling activities, only upper sludge material samples were collected for bench scale testing purposes.

6.2 Dewatering Study

Three samples (IBS-2, IBS-4, and IBS-8) were containerized and submitted to TMA for dewatering analysis. TMA tested the sludge material before and after dewatering simulations were performed. The dewatering simulations consisted of:

- Centrifuge simulation;
- Baroid screening;

- Filter press simulation; and
- Gravity dewatering simulation.

The sludge material was analyzed for total solids prior to conducting the simulations. The solids percentage of the raw material (i.e., prior to dewatering) ranged from 12% to 20% by weight.

FINAL

6.2.1 Criteria

The dewatering study focused on determining the following:

- If dewatered material will pass the Paint Filter Liquids Test (USEPA Method 9095A), indicating a material is dry enough for transportation over public roadways and disposal in a permitted landfill without violating LDRs;
- The percent solids remaining in the samples that pass the Paint Filter Liquids Test (higher solids contents indicate more effective dewatering); and
- The quality of the effluent as related to the limitations of Hercules' POTW discharge permit (see Section 5.3.4 and Appendix E).

6.2.2 Centrifuge

Centrifuge technology was used to induce phase separation of the sample solids contained in a raw material sample from the liquid. The gravitational force of the laboratory centrifuge is a close approximation of the 3,000 times the force of gravity that can be expected for a typical full-scale centrifuge unit.

An initial centrifuge simulation was run on the raw sludge sample collected from IBS-2 without chemical addition and produced a filter cake with 47% solids, although the effluent was not clean. This material passed the Paint Filter Liquids Test. Two additional centrifuge simulations were performed on each of the IBS-2, IBS-4, and IBS-8 samples, one with the addition of 250 ppm cationic polymer, the other with 250 ppm anionic polymer. The simulations were each performed for 2 minutes. Both simulations produced filter cake that passed the Paint Filter Liquids Test for all samples. The resulting centrifuge filter cake solids ranged from 28% to 34%. The effluent had good clarity and light solids; however, the percent solids is less than the initial simulation.

FINAL

6.2.3 Baroid Screening

Baroid testing on various filter media and chemical treatments was conducted as a screening tool prior to conducting a recessed chamber filter press simulation. The recessed chamber simulation takes approximately 12 times the sample volume as a Baroid unit. All of the Baroid scenarios were conducted at 80 pounds per square inch (psi) and produced filter cake that passed the Paint Filter Liquids Test. The duration of the applied pressure lasted between 3 and 6 minutes. The first scenario was run without the use of a chemical reagent. The resultant filter cake had a solids content of 40 to 42%. While this represents a favorable increase in the percent solids as compared to the in-situ value, the filter cake was described as soft and sticky. The stickiness of the filter cake could pose machine-fouling problems during full-scale operations. Because of this potential problem, the second through seventh Baroid simulations tested the effectiveness of reagent additions to produce a more favorable filter cake.

The second and third Baroid scenarios tested the addition of 0.5% and 1.0% of diatomaceous earth to the sludge. The 0.5% diatomaceous earth addition yielded a good quality filter cake with 47% to 49% solids. The 1.0% diatomaceous earth addition resulted in 50% to 56% solids with a good quality filter cake.

The fourth and fifth Baroid scenarios consisted of adding 0.5% and 1.0% of hydrated lime to the sludge. The 0.5% and 1.0% hydrated lime additions resulted in percent solids ranging from 49% to 62% and 51% to 61% by weight, respectively, with good quality filter cake. The 62% solid content was the highest percent solids measured during Baroid testing.

The sixth and seventh Baroid simulations were conducted with the addition of 0.5% hydrated lime plus 0.5% ferric sulfate and 1.0% hydrated lime plus 0.5% ferric sulfate. The 0.5% hydrated lime plus 0.5% ferric sulfate resulted in fair quality filter cake with percent solids ranging from 45% to 55%. The 1.0% hydrated lime plus 0.5% ferric sulfate yielded a fair quality filter cake with 51% to 56% solids. When compared to the reagent addition with only hydrated lime testing, the ferric sulfate addition did not raise the percent solids content.

6.2.4 Filter Press

Based on the results of the Baroid testing, the 0.5% hydrated lime addition was tested in the recessed chamber filter press simulation unit. This simulation was conducted for

5.5 minutes at 120 psi. After the run, the filter cake solids were determined to pass the Paint Filter Liquids Test, be of good quality, and ranged from 55 to 62% solids. These results are the highest percent solids range measured during the dewatering portion of the treatability study.

6.2.5 Gravity Dewatering

A gravity dewatering simulation was conducted by TMA allowing three 1-gallon samples of sludge material to sit in aluminum pans with 1/16th-inch holes drilled in the bottom and spaced 2 inches apart. After 4.5 days, the filter cake from all three samples passed the Paint Filter Liquids Test conducted by TMA (Appendix F). The dewatered TMA samples were submitted to Fugro for additional testing. Two of the dewatered samples were analyzed as received and had total solids contents of 33.5% and 41.0%. Both of these samples passed the Paint Filter Liquids Test. Fugro re-mixed free liquid contained in the third sample and calculated a solids content of 16.1%. Fugro also conducted a Paint Filter Liquids Test on the TMA sample and this re-mixed material did not pass.

6.3 Solidification Study

A sludge solidification study was conducted to determine if desired characteristics can be imparted to the sludge through reagent amendments. The solidification study consisted of mixing raw sludge samples with Portland cement, quick lime, fly ash, and Calciment® in different percentages. The resultant mixtures were tested for paint filter liquids and unconfined compressive strength. The test results are included in Appendix G.

6.3.1 Criteria

The criteria for the solidification study are two-fold because solidified material may be disposed of off site or decommissioned in-place:

- Solidified material must pass the Paint Filter Liquids Test (USEPA Method 9095A), if this material will be disposed of off site, indicating the material is dry enough to transport over public roadways and for disposal in a permitted landfill; or

- The solidified sludge material must have an unconfined compressive strength (UCS) of 8 psi after 3 days, which will ensure that the solidified material can

FINAL

support the weight of an engineered cap if on-site closure is selected as a final remedy.

6.3.2 Methodology

Three 5-gallon samples of sludge material were submitted to Fugro for the solidification study. The raw sludge material (i.e., without the addition of any reagent) was subjected to moisture content, specific gravity, dry bulk density, percent solids, and the Paint Filter Liquids Test. Because all of the untreated material samples failed the Paint Filter Liquids Test, reagents were added to these samples and additional testing was completed. Two sets of sample molds were made of the mixed material, one for strength testing after 3 days and one for strength testing after 7 days.

6.3.3 Results

Portland cement, quick lime, fly ash, and Calciment® (a proprietary blend of solidification reagents) were added to the raw sludge in the following percentages: 5% Portland cement, 10% Portland cement, 5% quick lime, 10% quick lime, 15% fly ash, 25% fly ash, 25% quick lime, 10% Calciment®, and 20% Calciment®. Sample containers were molded and allowed to cure for 3 days. After 3 days, the molds were tested for bulk density (to determine weight of the final mixture), for UCS (to determine if the final mixture met the 8 psi criterion), and by the Paint Filter Liquids Test (to determine if the material is suitable for transport over public roadways).

After 3 days, the bulk density of both Portland cement and the 5% and 10% quick lime samples was less than the raw material. This indicates that enough of the water content was driven off by the reaction of the reagent to reduce the overall unit weight of the resultant mixture. The bulk density of the 15% fly ash, 25% fly ash, 25% quick lime 10% Calciment®, and 20% Calciment® samples were 0.3 pound per cubic foot (pcf), 7.7 pcf, 5.9 pcf, 3.1 pcf, and 9.1 pcf greater than the bulk density of the raw sample. This indicates that the reagent additions at these percentages increase the overall weight of the resultant mixture.

None of the reagent additions resulted in a sample that met the 8 psi after 3 day criterion established as the minimum strength required to support the weight of an engineered cap. The 25% addition of quick lime as a reagent mixture was added as a mixture to determine if a reagent addition of this magnitude, although likely economically unfeasible, would impart the required strength to the sludge. Because

FINAL

this mixture only achieved a UCS of 6.5 psi, the 25% quick lime addition was unsuccessful.

In addition to the 3-day strengths, the remaining molded samples were tested after allowing 7 days for reaction to take place. Only the 25% addition of quick lime yielded a strength (13.6 psi) greater than the required strength of 8 psi.

7. Feasibility Evaluation

This feasibility evaluation was conducted in a manner to explore the merits of applying each of the closure technologies evaluated as the final remedy for the IB sludge. The technologies were evaluated on the following two criteria:

- Effectiveness – The ability of the technology to be used to efficaciously decommission the IB; and
- Implementability – The ability of the closure technology to be employed within site-specific constraints.

The merits of each technology were evaluated as discussed below. A matrix summarizing the results of the evaluation is included in Appendix H.

7.1 Centrifuge Dewatering with Off-Site Disposal

Centrifuge dewatering would be employed to dewater the IB sludge. The effluent from the centrifuge would be routed back to the IB and discharged under Hercules' POTW permit. The resultant solidified material would be tested for passage of the Paint Filter Liquids Test. Once passage of the Paint Filter Liquids Test was verified, the material would be loaded and transported for disposal at the Pine Belt Regional Landfill (Appendix A).

7.1.1 Effectiveness

Centrifuge technology is capable of dewatering the solidified material to the extent needed to pass the Paint Filter Liquids Test. The resultant effluent can be physically routed for disposal through Hercules' POTW permit. Disposal of the resultant solids can be achieved by transporting the solidified sludge to the Pine Belt Regional Landfill. This technology can be employed effectively at this site.

FINAL

FINAL

7.1.2 Implementability

Centrifuges are specialized mechanical equipment requiring an electrical source. In the event that the facility is demolished prior to closure of the IB, a portable electrical generator would suffice to power the unit. This can be made available at the site. Because mechanical processing of the sludge is not weather dependent, the duration of active implementation of this technology should be among the shortest of the evaluated technologies. In addition, ability of this technology to work with a water layer over the IB surface should aid in the prevention of nuisance odors during implementation. Use of a centrifuge is susceptible to mechanical failures which could adversely affect the schedule. This technology is considered implementable.

7.2 Filter Press Dewatering with Off-Site Disposal

Under this scenario, the IB sludge would be dewatered using a filter press. The effluent from the press would be routed back to the IB and discharged under Hercules' POTW permit. The resultant solidified material would be tested for passage of the Paint Filter Liquids Test. Once passage of the Paint Filter Liquids Test was verified, the material would be loaded and transported for disposal at the Pine Belt Regional Landfill.

7.2.1 Effectiveness

Filter press technology is capable of dewatering the solidified material to the extent needed to pass the Paint Filter Liquids Test. The resultant effluent can be physically routed for disposal through Hercules' POTW permit. Disposal of the resultant solids can be achieved by transporting the solidified sludge to the Pine Belt Regional Landfill. This technology can be employed effectively at this site.

7.2.2 Implementability

A filter press is a specialized mechanical device requiring an electrical source. In the event that the facility is demolished prior to closure of the IB, a portable electrical generator would suffice to power the unit. This can be made available at the site. Because mechanical processing of the sludge is not weather dependent, the duration of active implementation of this technology should be among the shortest of the evaluated technologies. In addition, ability of this technology to work with a water layer over the IB surface should aid in the prevention of nuisance odors during

implementation. Use of a filter press is susceptible to mechanical failures which could adversely affect the schedule. This technology is considered implementable.

7.3 Gravity Dewatering with Off-Site Disposal

Gravity dewatering would be employed by constructing dewatering cells in the vicinity of the IB to passively dewater the sludge material to the extent that the dewatered material would pass the Paint Filter Liquids Test. Once passage of the Paint Filter Liquids Test was verified, the material would be loaded and transported to Pine Belt Regional Landfill.

7.3.1 Effectiveness

Gravity dewatering technology is capable of dewatering the solidified material in the dewatering cells. Further, dewatered material could be augmented with reagent addition (5% Portland cement or 10% quick lime), if required to pass the Paint Filter Liquids Test. The resultant liquid effluent can be physically routed for disposal through Hercules' POTW permit. Disposal of the resultant solids can be achieved by transporting the solidified sludge to the Pine Belt Regional Landfill. This technology can be employed effectively at this site.

7.3.2 Implementability

Gravity dewatering can be accomplished with self-powered equipment. This technology would be implemented by initially stacking the sludge on the west end of the IB, while discharging water through the permitted POTW discharge. If the sludge can be dewatered in the IB, dewatering will take place in the IB. If the sludge cannot be sufficiently dewatered due to groundwater infiltration, a dewatering area(s) located near the site would be constructed as dewatering cells. Potential dewatering sites are shown on Figure 8. The sludge would be excavated and/or pumped to the cell(s). Water discharged from the cell adjacent to the western IB boundary would be drained directly into the IB. The potential dewatering area located south of the IB has a drainage pipe that gravity discharges to the IB. The eastern boundary of the potential dewatering cells located north of the IB is adjacent to a concrete-lined ditch that gravity drains to the industrial sewer system. The concrete-lined ditch gravity discharges to the POTW through Hercules' POTW permit. Because passive dewatering is weather dependent, the duration of active implementation of this technology may be among the longest of the evaluated technologies. This technology is conducted in an open atmosphere; therefore, control of nuisance odors may become necessary during

FINAL

implementation. Gravity dewatering is not as susceptible to mechanical failures causing project delays as the centrifuge and filter press options. This technology is considered implementable.

7.4 Solidification with Off-Site Disposal

Under this scenario, reagent would be added to the IB sludge for the purpose of passing the Paint Filter Liquids Test. Because groundwater levels in the vicinity of the IB are above the level of the sludge, solidification may be conducted after the sludge is removed from the IB. Once passage of the Paint Filter Liquids Test was verified, the material would be loaded and transported for disposal at the Pine Belt Regional Landfill.

7.4.1 Effectiveness

Solidification is capable of dewatering the solidified material to the extent needed to pass the Paint Filter Liquids Test. The resultant effluent can be physically routed for disposal through Hercules' POTW permit. Disposal of the resultant solids can be achieved by transporting the solidified sludge to the Pine Belt Regional Landfill. This technology can be employed effectively at this site.

7.4.2 Implementability

Solidification can be accomplished with self-powered equipment. This technology would be implemented by discharging water through the permitted POTW discharge. If the sludge can be sufficiently dewatered in the IB, dewatering will take place in the IB. If the sludge cannot be sufficiently dewatered in the IB due to infiltration of groundwater, a mixing area(s) located near the IB will be constructed to facilitate reagent mixing. At the point in which the material is dewatered to the highest extent practicable, the most cost-effective reagent at the time of implementation would be added to the ex-situ sludge. Once an area was mixed, reagent would be added to an adjacent area. A long-reach excavator would be necessary to accomplish the mixing due to the limited access for equipment on the south side of the IB. Once sufficient time has passed for the reagent to react with the sludge, a Paint Filter Liquids Test would be conducted to determine the endpoint of reagent addition. Because reagent additions would occur in the mixing area, this technology is weather dependent. However, by using a reagent with a quick reaction time (3 days), the amount of material that might have to be reworked due to an unexpected rain event would be minimized. Because this technology is conducted in an open atmosphere, control of

FINAL

nuisance odors may become necessary during implementation. This technology is considered implementable.

7.5 Solidification with On-Site Capping

Solidification with on-site capping was evaluated. Under this scenario, reagent would be added to the IB sludge to yield a compressive strength of 8 psi after 3 days. The solidified material would then be suitable for the installation of an engineered cap.

7.5.1 Effectiveness

The required strength could not be achieved in 3 days. This option is not effective.

7.5.2 Implementability

While waiting 7 days for the 25% quick lime reagent addition to achieve the required strength is technically feasible, this reagent addition is eliminated from consideration due to the amount of reagent and time required to achieve this strength. In addition, mixing under field conditions is not as controlled as during a laboratory simulation and field conditions may require more reagent than the laboratory setting. Further mixing of sludge below the groundwater level within the IB is unlikely to achieve the necessary strength. This technology is not implementable.

7.6 Selected Technology

Based on the above evaluation, the application of centrifuge, filter press, gravity dewatering, and solidification dewatering with off-site disposal are viable options. Because all of these technologies are effective and implementable, cost becomes a differentiating factor. It is recommended to select gravity dewatering with off-site disposal due to the fact it is the simplest, effective, and implementable option among the evaluated technologies. Appendix I contains a work plan that describes how gravity dewatering would be implemented at this site. Detailed plans and specification will be developed for contractor bidding purposes. In the event another viable option is proposed by a contractor, Hercules will evaluate that option prior to decommissioning the IB.

FINAL

TABLES

ARCADIS

Table 1. Summary of Toxicity Characteristic Leaching Procedure (TCLP) Data, Sludge Characteriztion and Bench Scale Treatability Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: Sample Date: Unit:	RCRA TCLP Limit	IBS-1-LS 4/14/2010	IBS-1-US 4/15/2010	IBS-2-LS 4/16/2010	IBS-2-US 4/16/2010	IBS-3-LS 4/14/2010	IBS-3-US 4/15/2010	IBS-4-LS 4/14/2010	IBS-4-US 4/15/2010
General Chemistry										
Cyanide - Total	mg/kg	NA	1.7J	1.3J	6.4J	1.2J	6.8J	< 20	1.6J	< 22
Sulfide	mg/kg	NA	340	3100	350	3400	480	610	790	1900
Ignitability	mm/sec	<60°C	NB	NB	NB	NB	NB	NB	NB	NB
pH	S.U.	<2 or >12.5	3.27	6.64	3.26	6.25	3.58	6.4	5	6.36
Metals - TCLP										
Arsenic	mg/L	5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Barium	mg/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	mg/L	1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chromium	mg/L	5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Lead	mg/L	5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Mercury	mg/L	0.2	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Selenium	mg/L	1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Silver	mg/L	5	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Organochlorine Pesticides & PCBs (GC)-TCLP										
Chlordane	mg/L	0.03	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Endrin	mg/L	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Gamma-Bhc (Lindane)	mg/L	0.4	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025
Heptachlor	mg/L	0.008	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025
Heptachlor Epoxide	mg/L	0.008	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025
Methoxychlor	mg/L	10	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025
Toxaphene	mg/L	0.5	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Herbicides (GC)-TCLP										
2,4-D	mg/L	10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Silvex (2,4,5-TP)	mg/L	1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
VOCs - TCLP										
1,1-Dichloroethylene	mg/L	0.7	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
1,2-Dichloroethane	mg/L	0.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
2-Butanone (Mek)	mg/L	200	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Benzene	mg/L	0.5	0.21	0.06	0.13	0.058	0.96	0.12	0.052	0.038
Carbon Tetrachloride	mg/L	0.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Chlorobenzene	mg/L	100	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Chloroform	mg/L	6	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Tetrachloroethene	mg/L	0.7	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Trichloroethylene	mg/L	0.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Vinyl Chloride	mg/L	0.2	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

ARCADIS

Table 1. Summary of Toxicity Characteristic Leaching Procedure (TCLP) Data, Sludge Characteriztion and Bench Scale Treatability Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: Sample Date: Unit:	RCRA TCLP Limit	IBS-1-LS 4/14/2010	IBS-1-US 4/15/2010	IBS-2-LS 4/16/2010	IBS-2-US 4/16/2010	IBS-3-LS 4/14/2010	IBS-3-US 4/15/2010	IBS-4-LS 4/14/2010	IBS-4-US 4/15/2010
SVOCs - TCLP										
1,4-Dichlorobenzene	mg/L	7.5	< 0.25	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.25	< 0.05
2,4,5-Trichlorophenol	mg/L	400	< 0.25	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.25	< 0.05
2,4,6-Trichlorophenol	mg/L	2	< 0.25	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.25	< 0.05
2,4-Dinitrotoluene	mg/L	0.13	< 0.25	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.25	< 0.05
Hexachloro-1,3-Butadiene	mg/L	0.5	< 0.25	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.25	< 0.05
Hexachlorobenzene	mg/L	0.13	< 0.25	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.25	< 0.05
Hexachloroethane	mg/L	3	< 0.25	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.25	< 0.05
Methyl Phenols,Total	mg/L	200	**1.4**	**0.5**	**0.88**	**0.15**	**0.65**	0.4	**1.7**	**0.23**
Nitrobenzene	mg/L	2	< 0.25	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.25	< 0.05
Pentachlorophenol	mg/L	100	< 1.2	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 1.2	< 0.25
Pyridine	mg/L	5	< 1.2	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 1.2	< 0.25

mg/kg	Milligram per kilogram.
mg/L	Milligram per liter.
mm/sec	Millimeter per second.
NA	Not applicable.
NB	No burn. Material did not burn during ignitability test.
RCRA	Resource Conservation and Recovery Act.
S.U.	Standard unit.
SVOCs	Semivolatile Organic Compounds.
TCLP	Toxicity Characteristic Leaching Procedure.
VOCs	Volatile Organic Compounds.

Because we care
100% recycled paper produced by wind power energy

ARCADIS

Table 1. Summary of Toxicity Characteristic Leaching Procedure (TCLP) Data, Sludge Characteriztion and Bench Scale Treatability Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: Sample Date: Unit:	RCRA TCLP Limit	IBS-5-LS 4/15/2010	IBS-5-US 4/15/2010	IBS-6-LS 4/15/2010	IBS-6-US 4/15/2010	IBS-7-LS 4/15/2010	IBS-7-US 4/15/2010	IBS-8-LS 4/15/2010	IBS-8-US 4/15/2010
General Chemistry										
Cyanide - Total	mg/kg	NA	< 15	4.1J	1.0J	< 28	5.4J	3.5J	< 20	< 37
Sulfide	mg/kg	NA	710	4500	1500	3600	1300	1900	1800	3700
Ignitability	mm/sec	<60°C	NB	NB	NB	NB	NB	NB	NB	NB
pH	S.U.	<2 or >12.5	3.88	6.22	3.67	6.57	6.15	6.55	3.54	6.49
Metals - TCLP										
Arsenic	mg/L	5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Barium	mg/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	mg/L	1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chromium	mg/L	5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Lead	mg/L	5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Mercury	mg/L	0.2	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Selenium	mg/L	1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Silver	mg/L	5	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Organochlorine Pesticides & PCBs (GC)-TCLP										
Chlordane	mg/L	0.03	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Endrin	mg/L	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Gamma-Bhc (Lindane)	mg/L	0.4	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025
Heptachlor	mg/L	0.008	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025
Heptachlor Epoxide	mg/L	0.008	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025
Methoxychlor	mg/L	10	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025
Toxaphene	mg/L	0.5	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Herbicides (GC)-TCLP										
2,4-D	mg/L	10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Silvex (2,4,5-TP)	mg/L	1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
VOCs - TCLP										
1,1-Dichloroethylene	mg/L	0.7	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
1,2-Dichloroethane	mg/L	0.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
2-Butanone (Mek)	mg/L	200	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Benzene	mg/L	0.5	0.043	0.025	0.14	< 0.02	1.3	< 0.02	0.1	< 0.02
Carbon Tetrachloride	mg/L	0.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Chlorobenzene	mg/L	100	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Chloroform	mg/L	6	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Tetrachloroethene	mg/L	0.7	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Trichloroethylene	mg/L	0.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Vinyl Chloride	mg/L	0.2	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

ARCADIS

Table 1. Summary of Toxicity Characteristic Leaching Procedure (TCLP) Data, Sludge Characteriztion and Bench Scale Treatability Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: Sample Date: Unit:	RCRA TCLP Limit	IBS-5-LS 4/15/2010	IBS-5-US 4/15/2010	IBS-6-LS 4/15/2010	IBS-6-US 4/15/2010	IBS-7-LS 4/15/2010	IBS-7-US 4/15/2010	IBS-8-LS 4/15/2010	IBS-8-US 4/15/2010
SVOCs - TCLP										
1,4-Dichlorobenzene	mg/L	7.5	< 0.05	< 0.05	< 0.05	< 0.05	< 0.25	< 0.25	< 0.05	< 0.05
2,4,5-Trichlorophenol	mg/L	400	< 0.05	< 0.05	< 0.05	< 0.05	< 0.25	< 0.25	< 0.05	< 0.05
2,4,6-Trichlorophenol	mg/L	2	< 0.05	< 0.05	< 0.05	< 0.05	< 0.25	< 0.25	< 0.05	< 0.05
2,4-Dinitrotoluene	mg/L	0.13	< 0.05	< 0.05	< 0.05	< 0.05	< 0.25	< 0.25	< 0.05	< 0.05
Hexachloro-1,3-Butadiene	mg/L	0.5	< 0.05	< 0.05	< 0.05	< 0.05	< 0.25	< 0.25	< 0.05	< 0.05
Hexachlorobenzene	mg/L	0.13	< 0.05	< 0.05	< 0.05	< 0.05	< 0.25	< 0.25	< 0.05	< 0.05
Hexachloroethane	mg/L	3	< 0.05	< 0.05	< 0.05	< 0.05	< 0.25	< 0.25	< 0.05	< 0.05
Methyl Phenols,Total	mg/L	200	0.96	0.21	1.4	0.33	1.8	1.7	0.53	0.14
Nitrobenzene	mg/L	2	< 0.05	< 0.05	< 0.05	< 0.05	< 0.25	< 0.25	< 0.05	< 0.05
Pentachlorophenol	mg/L	100	< 0.25	< 0.25	< 0.25	< 0.25	< 1.2	< 1.2	< 0.25	< 0.25
Pyridine	mg/L	5	< 0.25	< 0.25	< 0.25	< 0.25	< 1.2	< 1.2	< 0.25	< 0.25

mg/kg	Milligram per kilogram.
mg/L	Milligram per liter.
mm/sec	Millimeter per second.
NA	Not applicable.
NB	No burn. Material did not burn during ignitability test.
RCRA	Resource Conservation and Recovery Act.
S.U.	Standard unit.
SVOCs	Semivolatile Organic Compounds.
TCLP	Toxicity Characteristic Leaching Procedure.
VOCs	Volatile Organic Compounds.

Because we care
100% recycled paper produced by wind power energy

ARCADIS

Table 2. Summary of Total Analyte Data, Sludge Characterization and Bench Scale Treatabilility Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: / Sample Date: / Unit:	MDEQ Tier 1 TRG	IBS-1-LS 4/14/2010	IBS-1-US 4/15/2010	IBS-2-LS 4/16/2010	IBS-2-NS 4/16/2010	IBS-2-US 4/16/2010	IBS-3-LS 4/14/2010	IBS-3-NS 4/14/2010	IBS-3-US 4/15/2010	IBS-4-LS 4/14/2010	IBS-4-NS 4/14/2010	IBS-4-US 4/15/2010	IBS-5-LS 4/15/2010
VOCs														
1,1,1,2-Tetrachloroethane	µg/kg	220000	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
1,1,1-Trichloroethane	µg/kg	1190000	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
1,1,2,2-Tetrachloroethane	µg/kg	1000	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
1,1,2-Trichloroethane	µg/kg	1670	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
1,1-Dichloroethane	µg/kg	116000	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 180000	< 990000	< 5500	< 31000	< 520000
1,1-Dichloroethene	µg/kg	118	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
1,2,3-Trichloropropane	µg/kg	818	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5800	< 160000	< 990000	< 5500	< 31000	< 520000
1,2-Dibromo-3-Chloropropane (Dbcp)	µg/kg	99.9	< 38000000	< 79000	< 2300000	< 19000	< 73000	< 610000	< 11000	< 320000	< 2000000	< 11000	< 62000	< 1000000
1,2-Dichloroethane	µg/kg	621	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5800	< 160000	< 990000	< 5500	< 31000	< 520000
1,2-Dichloropropane	µg/kg	445	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
2-Butanone (Mek)	µg/kg	84500	< 96000000	< 200000	< 5700000	< 46000	< 180000	180000J	< 28000	< 800000	480000J	< 27000	< 180000	< 2600000
2-Chloro-1,3-butadiene	µg/kg	4080000	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
3-Chloro-1-Propene	µg/kg	NS	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5800	< 160000	< 990000	< 5500	< 31000	< 520000
2-Hexanone	µg/kg	81800000	< 96000000	< 200000	< 5700000	< 46000	< 180000	< 1500000	< 28000	< 800000	< 4900000	< 27000	< 160000	< 2800000
4-Methyl-2-Pentanone (MIBK)	µg/kg	163000000	< 96000000	< 200000	< 5700000	< 46000	< 180000	< 1500000	< 28000	< 800000	< 4900000	< 27000	< 160000	< 2600000
Acetone	µg/kg	104000000	< 190000000	< 390000	< 11000000	< 93000	< 370000	< 3100000	< 56000	< 1600000	< 9900000	< 55000	< 310000	< 5200000
Acetonitrile	µg/kg	111000	< 770000000	< 1600000	< 48000000	< 370000	< 1500000	< 12000000	< 220000	< 6400000	< 40000000	< 220000	< 1200000	< 21000000
Acrolein	µg/kg	40900000	< 380000000	< 790000	< 23000000	< 190000	< 730000	< 8100000	< 110000	< 3200000	< 20000000	< 110000	< 620000	< 10000000
Acrylonitrile	µg/kg	10600	< 380000000	< 790000	< 23000000	< 190000	< 730000	< 6100000	< 110000	< 3200000	< 20000000	< 110000	< 620000	< 10000000
Benzene	µg/kg	1360	< 19000000	55000	< 1100000	17000	12000J	55000J	2500J	< 160000	< 990000	37000	< 31000	< 520000
Bromoform	µg/kg	90100	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
Bromomethane	µg/kg	2970	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
Carbon Disulfide	µg/kg	7970	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
Carbon Tetrachloride	µg/kg	589	< 19000000	< 39000	< 1100000	14000	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
Dichlorodifluoromethane	µg/kg	409000000	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
Chlorobenzene	µg/kg	1190	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
Chlorodibromomethane	µg/kg	88100	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 180000	< 990000	< 5500	< 31000	< 520000
Chloroethane	µg/kg	1970000	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
Chloroform	µg/kg	478	< 19000000	< 39000	< 1100000	2100J	< 37000	< 310000	< 5800	< 160000	< 990000	< 5500	< 31000	< 520000
Chloromethane	µg/kg	440000	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
Cis-1,3-Dichloropropene	µg/kg	352	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 180000	< 990000	< 5500	< 31000	< 520000
Dibromomethane	µg/kg	20400000	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5800	< 160000	< 990000	< 5500	< 31000	< 520000
Dichlorobromomethane	µg/kg	1890	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 180000	< 990000	< 5500	< 31000	< 520000
Ethyl Methacrylate	µg/kg	18400000	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
Ethylbenzene	µg/kg	395000	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
Ethylene Dibromide	µg/kg	67.3	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 180000	< 990000	< 5500	< 31000	< 520000
Iodomethane	µg/kg	NS	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5800	< 160000	< 990000	< 5500	< 31000	< 520000
Isobutyl alcohol	µg/kg	613000000	< 770000000	< 1600000	< 46000000	< 370000	< 1500000	< 12000000	< 220000	< 6400000	< 40000000	< 220000	< 1200000	< 21000000

Because we care
100% recycled paper produced by wind power energy

ARCADIS

Table 2. Summary of Total Analyte Data, Sludge Characterization and Bench Scale Treatability Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: / Sample Date: / Unit:	MDEQ Tier 1 TRG	IBS-1-LS 4/14/2010	IBS-1-US 4/15/2010	IBS-2-LS 4/16/2010	IBS-2-NS 4/18/2010	IBS-2-US 4/16/2010	IBS-3-LS 4/14/2010	IBS-3-NS 4/14/2010	IBS-3-US 4/15/2010	IBS-4-LS 4/14/2010	IBS-4-NS 4/14/2010	IBS-4-US 4/15/2010	IBS-5-LS 4/15/2010
VOCs (Continued)														
Methyl Methacrylate	µg/kg	16300000	< 38000000	< 79000	< 2300000	< 19000	< 73000	< 610000	< 11000	< 320000	< 2000000	< 11000	< 62000	< 1000000
Methylacrylonitrile	µg/kg	204000	< 380000000	< 790000	< 23000000	< 190000	< 730000	< 6100000	< 110000	< 3200000	< 20000000	< 110000	< 620000	< 10000000
Methylene Chloride	µg/kg	21900	< 19000000	< 39000	< 1100000	< 9300	< 37000	530000	< 5600	< 160000	740000J	< 5500	< 31000	< 520000
Pentachloroethane	µg/kg	NS	< 96000000	< 200000	< 5700000	< 46000	< 180000	< 1500000	< 28000	< 800000	< 4900000	< 27000	< 160000	< 2600000
Propionitrile	µg/kg	NS	< 380000000	< 790000	< 23000000	< 190000	< 730000	< 6100000	< 110000	< 3200000	< 20000000	< 110000	< 620000	< 10000000
Styrene	µg/kg	384000	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
Tetrachloroethene	µg/kg	18200	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
Toluene	µg/kg	38000	160000000	820000	9400000	290000	640000	6800000	190000	2000000	13000000	150000	1100000	9800000
Trans-1,2-Dichloroethene	µg/kg	3070000	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
Trans-1,3-Dichloropropene	µg/kg	352	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
Trans-1,4-Dichlorobutene	µg/kg	NS	< 38000000	< 79000	< 2300000	< 19000	< 73000	< 610000	< 11000	< 320000	< 2000000	< 11000	< 62000	< 1000000
Trichloroethene	µg/kg	7920	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
Trichlorofluoromethane	µg/kg	143000000	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
Vinyl Acetate	µg/kg	9130	< 38000000	< 79000	< 2300000	< 19000	< 73000	< 610000	< 11000	< 320000	< 2000000	< 11000	< 62000	< 1000000
Vinyl Chloride	µg/kg	939	< 19000000	< 39000	< 1100000	< 9300	< 37000	< 310000	< 5600	< 160000	< 990000	< 5500	< 31000	< 520000
Xylenes, Total	µg/kg	318000	< 38000000	< 79000	< 2300000	< 19000	< 73000	< 610000	< 11000	< 320000	< 2000000	< 11000	< 62000	< 1000000
SVOCs														
1,1'-Biphenyl	µg/kg	10200000	1100000	230000	470000	33000	55000	1000000	51000	340000	1600000	360000	180000	940000
1,2,4,5-Tetrachlorobenzene	µg/kg	613000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
1,2,4-Trichlorobenzene	µg/kg	824000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
1,2-Dichlorobenzene	µg/kg	279000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
1,3-Dichlorobenzene	µg/kg	1840000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
1,3-Dinitrobenzene	µg/kg	204000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
1,3,5-Trinitrobenzene	µg/kg	102000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
1,4-Dichlorobenzene	µg/kg	817000	< 140000	< 180000	< 400000	< 38000	< 62000	< 140000	< 8400	< 410000	< 330000	< 75000	< 150000	< 210000
1,4-Dioxane	µg/kg	520000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
1,4-Naphthoquinone	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
1-Naphthylamine	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
2,3,4,6-Tetrachlorophenol	µg/kg	61300000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
2,4,5-Trichlorophenol	µg/kg	204000000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
2,4,6-Trichlorophenol	µg/kg	314000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
2,4-Dichlorophenol	µg/kg	613000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
2,4-Dimethylphenol	µg/kg	40800000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
2,4-Dinitrophenol	µg/kg	408000	< 360000	< 450000	< 1000000	< 99000	< 160000	< 360000	< 22000	< 1000000	< 860000	< 190000	< 380000	< 530000
2,4-Dinitrotoluene	µg/kg	408000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
2,6-Dichlorophenol	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
2,6-Dinitrotoluene	µg/kg	2040000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000

Because we care
100% recycled paper produced by wind power energy

ARCADIS

Table 2. Summary of Total Analyte Data, Sludge Characterization and Bench Scale Treatability Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: / Sample Date: / Unit:	MDEQ Tier 1 TRG	IBS-1-LS 4/14/2010	IBS-1-US 4/15/2010	IBS-2-LS 4/16/2010	IBS-2-NS 4/16/2010	IBS-2-US 4/16/2010	IBS-3-LS 4/14/2010	IBS-3-NS 4/14/2010	IBS-3-US 4/15/2010	IBS-4-LS 4/14/2010	IBS-4-NS 4/14/2010	IBS-4-US 4/15/2010	IBS-5-LS 4/15/2010
SVOCs (Continued)														
2-Chloronaphthalene	µg/kg	164000000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
2-Chlorophenol	µg/kg	10200000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
2-Methylnaphthalene	µg/kg	40900000	21000J	15000J	< 200000	< 19000	< 31000	9800J	680J	< 200000	< 170000	< 38000	< 74000	< 100000
2-Methylphenol	µg/kg	102000000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
2-Naphthylamine	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
2-Nitroaniline	µg/kg	492	< 360000	< 450000	< 1000000	< 99000	< 160000	< 360000	< 22000	< 1000000	< 860000	< 190000	< 380000	< 530000
2-Nitrophenol	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
2-Picoline	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
2-Acetylaminofluorene	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
2-Toluidine	µg/kg	23800	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
3 & 4 Methylphenol	µg/kg	10200000	12000J	< 88000	< 200000	< 19000	< 31000	< 71000	1600J	< 200000	< 170000	< 38000	< 74000	< 100000
3,3'-Dichlorobenzidine	µg/kg	12700	< 140000	< 180000	< 400000	< 38000	< 62000	< 140000	< 8400	< 410000	< 330000	< 75000	< 150000	< 210000
3,3'-Dimethylbenzidine	µg/kg	622	< 360000	< 450000	< 1000000	< 99000	< 160000	< 360000	< 22000	< 1000000	< 860000	< 190000	< 380000	< 530000
3-Methylchloranthrene	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
3-Nitroaniline	µg/kg	NS	< 360000	< 450000	< 1000000	< 99000	< 160000	< 360000	< 22000	< 1000000	< 860000	< 190000	< 380000	< 530000
4,6-Dinitro-2-Methylphenol	µg/kg	204000	< 360000	< 450000	< 1000000	< 99000	< 160000	< 360000	< 22000	< 1000000	< 860000	< 190000	< 380000	< 530000
4-Aminobiphenyl	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
4-Bromophenyl Phenyl Ether	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
4-Chloro-3-Methylphenol	µg/kg	408000000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
4-Chlorophenyl Phenyl Ether	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
4-Chloroaniline	µg/kg	238000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
4-Nitroaniline	µg/kg	NS	< 360000	< 450000	< 1000000	< 99000	< 160000	< 360000	< 22000	< 1000000	< 860000	< 190000	< 380000	< 530000
4-Nitrophenol	µg/kg	16400000	< 360000	< 450000	< 1000000	< 99000	< 160000	< 360000	< 22000	< 1000000	< 860000	< 190000	< 380000	< 530000
4-Nitroquinoline-N-Oxide	µg/kg	NS	< 710000	< 880000	< 2000000	< 190000	< 310000	< 710000	< 42000	< 2000000	< 1700000	< 380000	< 740000	< 1000000
7,12-Dimethylbenz(a)anthracene	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Acenaphthene	µg/kg	123000000	< 71000	< 88000	< 200000	< 19000	< 31000	10000J	770J	< 200000	< 170000	< 38000	< 74000	< 100000
Acenaphthylene	µg/kg	123000000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Acetophenone	µg/kg	2630000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Alpha,Alpha-Dimethyl Phenethylamine	µg/kg	NS	< 14000000	< 18000000	< 40000000	< 3900000	< 6300000	< 14000000	< 850000	< 41000000	< 34000000	< 7600000	< 15000000	< 21000000
Aniline	µg/kg	1000000	< 140000	< 180000	< 400000	< 38000	< 62000	< 140000	< 8400	< 410000	< 330000	< 75000	< 150000	< 210000
Anthracene	µg/kg	613000000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Aramite, Total	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Benzo(a)anthracene	µg/kg	7840	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Benzo(a)pyrene	µg/kg	784	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Benzo(b)fluoranthene	µg/kg	7840	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Benzo(g,h,i)perylene	µg/kg	61300000	32000J	< 88000	< 200000	< 19000	< 31000	< 71000	910J	< 200000	< 170000	< 38000	< 74000	< 100000
Benzo(k)fluoranthene	µg/kg	78400	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Benzyl Alcohol	µg/kg	204000000	< 71000	< 88000	< 200000	5900J	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Bis(2-Chloroethoxy)Methane	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Bis(2-Chloroethyl)Ether	µg/kg	419	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Bis(2-Ethylhexyl) Phthalate	µg/kg	409000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Bis(Chloroisopropyl) Ether	µg/kg	9080	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Butyl benzyl phthalate	µg/kg	928000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Chrysene	µg/kg	784000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000

Because we care
100% recycled paper produced by wind power energy

ARCADIS

Table 2. Summary of Total Analyte Data, Sludge Characterization and Bench Scale Treatability Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: / Sample Date: / Unit:	MDEQ Tier 1 TRG	IBS-1-LS 4/14/2010	IBS-1-US 4/15/2010	IBS-2-LS 4/16/2010	IBS-2-NS 4/16/2010	IBS-2-US 4/16/2010	IBS-3-LS 4/14/2010	IBS-3-NS 4/14/2010	IBS-3-US 4/15/2010	IBS-4-LS 4/14/2010	IBS-4-NS 4/14/2010	IBS-4-US 4/15/2010	IBS-5-LS 4/15/2010
SVOCs (Continued)														
Diallate	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Dibenz(a,h)anthracene	µg/kg	784	34000J	< 88000	< 200000	< 19000	< 31000	< 71000	800J	< 200000	< 170000	< 38000	< 74000	< 100000
Dibenzofuran	µg/kg	8180000	< 71000	< 88000	< 200000	< 19000	< 31000	7900J	510J	< 200000	< 170000	< 38000	< 74000	< 100000
Diethyl Phthalate	µg/kg	1970000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	470J	< 200000	< 170000	< 38000	< 74000	< 100000
Dimethoate	µg/kg	NS	27000J	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Dimethyl Phthalate	µg/kg	2.04E+10	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Di-N-Butyl Phthalate	µg/kg	2280000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Di-N-Octyl Phthalate	µg/kg	4080000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Dinoseb	µg/kg	204000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Diphenyl Ether	µg/kg	NS	2500000	780000	1400000	120000	160000	2400000	140000	1100000	5200000	1200000	570000	2800000
Disulfoton	µg/kg	8170	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Ethyl Methanesulfonate	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Ethyl Parathion	µg/kg	1230000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Famphur	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Fluoranthene	µg/kg	81700000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Fluorene	µg/kg	81700000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	500J	< 200000	< 170000	< 38000	< 74000	< 100000
Hexachlorobutadiene	µg/kg	135	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Hexachlorobenzene	µg/kg	1650	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Hexachlorocyclopentadiene	µg/kg	951	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Hexachloroethane	µg/kg	93300	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Hexachlorophene (Hcp)	µg/kg	613000	< 36000000	< 45000000	< 100000000	< 9900000	< 16000000	< 36000000	< 2200000	< 100000000	< 86000000	< 19000000	< 38000000	< 53000000
Hexachloropropene	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Indeno[(1,2,3-Cd)Pyrene	µg/kg	7840	32000J	< 88000	< 200000	< 19000	< 31000	< 71000	720J	< 200000	< 170000	< 38000	< 74000	< 100000
Isophorone	µg/kg	4570000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Isosafrole	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Methapyrilene	µg/kg	NS	< 14000000	< 18000000	< 40000000	< 3900000	< 6300000	< 14000000	< 850000	< 41000000	< 34000000	< 7600000	< 15000000	< 21000000
Methyl Methanesulfonate	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Methyl Parathion	µg/kg	408000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Naphthalene	µg/kg	247000	8000J	< 88000	< 200000	< 19000	< 31000	35000J	2000J	< 200000	< 170000	< 38000	< 74000	< 100000
Nitrobenzene	µg/kg	8410	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
N-Nitro-o-toluidine	µg/kg	173000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
N-Nitrosodiethylamine	µg/kg	38.2	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
N-Nitrosodimethylamine	µg/kg	112	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
N-Nitrosodi-n-butylamine	µg/kg	1080	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
N-Nitrosodi-n-propylamine	µg/kg	818	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
N-Nitrosodiphenylamine	µg/kg	1170000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
N-Nitrosomethylethylamine	µg/kg	260	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
N-Nitrosomorpholine	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
N-Nitrosopiperidine	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
N-Nitrosopyrrolidine	µg/kg	2730	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
o,o',o''-Triethylphosphorothioate	µg/kg	NS	20000J	< 88000	< 200000	8600J	< 31000	< 71000	1200J	< 200000	< 170000	< 38000	< 74000	< 100000
p-Dimethylamino azobenzene	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000

ARCADIS

Table 2. Summary of Total Analyte Data, Sludge Characterization and Bench Scale Treatability Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: / Sample Date: / Unit:	MDEQ Tier 1 TRG	IBS-1-LS 4/14/2010	IBS-1-US 4/15/2010	IBS-2-LS 4/16/2010	IBS-2-NS 4/16/2010	IBS-2-US 4/16/2010	IBS-3-LS 4/14/2010	IBS-3-NS 4/14/2010	IBS-3-US 4/15/2010	IBS-4-LS 4/14/2010	IBS-4-NS 4/14/2010	IBS-4-US 4/15/2010	IBS-5-LS 4/15/2010
SVOCs (Continued)														
Pentachlorobenzene	µg/kg	1630000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Pentachloronitrobenzene	µg/kg	22000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Pentachlorophenol	µg/kg	23800	< 360000	< 450000	< 1000000	< 99000	< 160000	< 360000	< 22000	< 1000000	< 860000	< 190000	< 380000	< 530000
Phenacetin	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Phenanthrene	µg/kg	61300000	**6800J**	< 88000	< 200000	< 19000	< 31000	**11000J**	**1100J**	< 200000	< 170000	< 38000	< 74000	< 100000
Phenol	µg/kg	123000000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Phorate	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
p-Phenylene diamine	µg/kg	388000000	< 360000	< 450000	< 1000000	< 99000	< 160000	< 360000	< 22000	< 1000000	< 860000	< 190000	< 380000	< 530000
Pronamide	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Pyrene	µg/kg	61300000	< 71000	< 88000	< 200000	< 19000	**5000J**	< 71000	< 4200	**22000J**	< 170000	< 38000	< 74000	< 100000
Pyridine	µg/kg	2040000	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Safrole, Total	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Sulfotep	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Thionazin	µg/kg	NS	< 71000	< 88000	< 200000	< 19000	< 31000	< 71000	< 4200	< 200000	< 170000	< 38000	< 74000	< 100000
Metals														
Arsenic	mg/kg	3.82	**1.5**	**3**	**3.4**	< 2.1	**2.5**	**2.5**	< 2.1	**2.8**	**2.1**	< 2	**3.3**	**2.5**
Barium	mg/kg	14300	**37**	**28**	**39**	**4.2**	**23**	**22**	**4**	**13**	**16**	**3.5**	**27**	**23**
Cadmium	mg/kg	1020	**0.24**	**0.33**	**0.46**	< 0.53	**0.51**	**0.27**	< 0.53	**0.38**	**0.4**	< 0.51	**0.77**	**0.55**
Chromium	mg/kg	3070000	**13**	**22**	**23**	< 1.1	**19**	**16**	**1.6**	**11**	**13**	**1.5**	**23**	**24**
Lead	mg/kg	1700	**120**	**24**	**41**	**1.7**	**36**	**41**	**2.9**	**40**	**59**	**0.95**	**49**	**75**
Mercury	mg/kg	61.3	**3.8**	**0.72**	**1.1**	**0.012**	**1.1**	**0.66**	**0.012**	**0.24**	**0.26**	< 0.02	**1.1**	**0.4**
Selenium	mg/kg	1020	< 4.9	< 5.8	< 6.7	< 2.7	< 10	< 4.5	< 2.6	< 9.6	< 5.9	< 2.5	< 10	< 6.6
Silver	mg/kg	1020	**0.3**	**0.24**	**0.88**	< 1.1	< 4.2	**0.62**	< 1.1	< 3.8	**0.41**	**0.1**	**0.42**	**0.42**

Bolded	Constitutent has been detected
J	Estimated concentration.
MDEQ	Mississippi Department of Environmental Quality.
mg/kg	Milligram per kilogram.
NS	No Standard.
SVOCs	Semivolatile Organic Compounds.
TRG	Target Remediation Goal for soil under a restricted use scenario.
µg/kg	Microgram per kilogram.
VOCs	Volatile Organic Compounds.

Because we care
100% recycled paper produced by wind power energy

ARCADIS

Table 2. Summary of Total Analyte Data, Sludge Characterization and Bench Scale Treatability Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: / Sample Date: / Unit:	MDEQ Tier 1 TRG	IBS-5-NS 4/15/2010	IBS-5-US 4/15/2010	IBS-6-LS 4/15/2010	IBS-6-NS 4/15/2010	IBS-6-US 4/15/2010	IBS-7-LS 4/15/2010	IBS-7-NS 4/15/2010	IBS-7-US 4/15/2010	IBS-8-LS 4/15/2010	IBS-8-NS 4/15/2010	IBS-8-US 4/15/2010
VOCs													
1,1,1,2-Tetrachloroethane	µg/kg	220000	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
1,1,1-Trichloroethane	µg/kg	1190000	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
1,1,2,2-Tetrachloroethane	µg/kg	1000	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
1,1,2-Trichloroethane	µg/kg	1670	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
1,1-Dichloroethane	µg/kg	116000	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
1,1-Dichloroethene	µg/kg	118	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
1,2,3-Trichloropropane	µg/kg	818	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
1,2-Dibromo-3-Chloropropane (Dbcp)	µg/kg	99.9	< 510	< 180000	< 750000	< 4800	< 170000	< 1000000	< 19000	< 580000	< 1300000	< 2700	< 110000
1,2-Dichloroethane	µg/kg	621	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
1,2-Dichloropropane	µg/kg	445	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
2-Butanone (Mek)	µg/kg	84500	< 1300	< 450000	< 1900000	< 12000	< 410000	< 2500000	< 49000	< 1400000	< 3300000	840J	< 290000
2-Chloro-1,3-butadiene	µg/kg	4080000	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
3-Chloro-1-Propene	µg/kg	NS	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
2-Hexanone	µg/kg	81800000	< 1300	< 450000	< 1900000	< 12000	< 410000	< 2500000	< 49000	< 1400000	< 3300000	< 6600	< 290000
4-Methyl-2-Pentanone (MIBK)	µg/kg	163000000	< 1300	< 450000	< 1900000	< 12000	< 410000	< 2500000	< 49000	< 1400000	< 3300000	< 6600	< 290000
Acetone	µg/kg	104000000	2100J	< 910000	< 3700000	< 24000	< 830000	< 5000000	< 97000	< 2900000	< 6600000	< 13000	< 570000
Acetonitrile	µg/kg	111000	< 10000	< 3600000	< 15000000	< 97000	< 3300000	< 20000000	< 390000	< 12000000	< 26000000	< 53000	< 2300000
Acrolein	µg/kg	40900000	< 5100	< 1800000	< 7500000	< 48000	< 1700000	< 10000000	< 190000	< 5800000	< 13000000	< 27000	< 1100000
Acrylonitrile	µg/kg	10600	< 5100	< 1800000	< 7500000	< 48000	< 1700000	< 10000000	< 190000	< 5800000	< 13000000	< 27000	< 1100000
Benzene	µg/kg	1360	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	110000	< 290000	< 660000	390J	< 57000
Bromoform	µg/kg	90100	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Bromomethane	µg/kg	2970	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Carbon Disulfide	µg/kg	7970	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Carbon Tetrachloride	µg/kg	569	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Dichlorodifluoromethane	µg/kg	409000000	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Chlorobenzene	µg/kg	1190	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Chlorodibromomethane	µg/kg	68100	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Chloroethane	µg/kg	1970000	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Chloroform	µg/kg	478	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Chloromethane	µg/kg	440000	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Cis-1,3-Dichloropropene	µg/kg	352	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Dibromomethane	µg/kg	20400000	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Dichlorobromomethane	µg/kg	1890	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Ethyl Methacrylate	µg/kg	18400000	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Ethylbenzene	µg/kg	395000	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Ethylene Dibromide	µg/kg	67.3	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Iodomethane	µg/kg	NS	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Isobutyl alcohol	µg/kg	613000000	< 10000	< 3600000	< 15000000	< 97000	< 3300000	< 20000000	< 390000	< 12000000	< 26000000	< 53000	< 2300000

Because we care
100% recycled paper produced by wind power energy

Table 2. Summary of Total Analyte Data, Sludge Characterization and Bench Scale Treatability Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: / Sample Date: / Unit:	MDEQ Tier 1 TRG	IBS-5-NS 4/15/2010	IBS-5-US 4/15/2010	IBS-6-LS 4/15/2010	IBS-6-NS 4/15/2010	IBS-6-US 4/15/2010	IBS-7-LS 4/15/2010	IBS-7-NS 4/15/2010	IBS-7-US 4/15/2010	IBS-8-LS 4/15/2010	IBS-8-NS 4/15/2010	IBS-8-US 4/15/2010
VOCs (Continued)													
Methyl Methacrylate	µg/kg	16300000	< 510	< 180000	< 750000	< 4800	< 170000	< 1000000	< 19000	< 580000	< 1300000	< 2700	< 110000
Methylacrylonitrile	µg/kg	204000	< 5100	< 1800000	< 7500000	< 48000	< 1700000	< 10000000	< 190000	< 5800000	< 13000000	< 27000	< 1100000
Methylene Chloride	µg/kg	21900	< 260	< 91000	420000	< 2400	< 83000	< 500000	< 9700	< 290000	610000J	1600	< 57000
Pentachloroethane	µg/kg	NS	< 1300	< 450000	< 1900000	< 12000	< 410000	< 2500000	< 49000	< 1400000	< 3300000	< 6600	< 290000
Propionitrile	µg/kg	NS	< 5100	< 1800000	< 7500000	< 48000	< 1700000	< 10000000	< 190000	< 5800000	< 13000000	< 27000	< 1100000
Styrene	µg/kg	384000	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Tetrachloroethene	µg/kg	18200	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Toluene	µg/kg	38000	1100	980000	14000000	33000	1800000	5900000	70000	2800000	14000000	17000	810000
Trans-1,2-Dichloroethene	µg/kg	3070000	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Trans-1,3-Dichloropropene	µg/kg	352	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Trans-1,4-Dichlorobutene	µg/kg	NS	< 510	< 180000	< 750000	< 4800	< 170000	< 1000000	< 19000	< 580000	< 1300000	< 2700	< 110000
Trichloroethene	µg/kg	7920	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Trichlorofluoromethane	µg/kg	143000000	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Vinyl Acetate	µg/kg	9130	< 510	< 180000	< 750000	< 4800	< 170000	< 1000000	< 19000	< 580000	< 1300000	< 2700	< 110000
Vinyl Chloride	µg/kg	939	< 260	< 91000	< 370000	< 2400	< 83000	< 500000	< 9700	< 290000	< 660000	< 1300	< 57000
Xylenes, Total	µg/kg	318000	< 510	< 180000	< 750000	< 4800	< 170000	< 1000000	< 19000	< 580000	< 1300000	< 2700	< 110000
SVOCs													
1,1'-Biphenyl	µg/kg	10200000	< 4300	160000J	800000	290000	140000J	620000	18000	230000	760000	< 4600	33000J
1,2,4,5-Tetrachlorobenzene	µg/kg	613000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
1,2,4-Trichlorobenzene	µg/kg	824000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
1,2-Dichlorobenzene	µg/kg	279000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
1,3-Dichlorobenzene	µg/kg	1840000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
1,3-Dinitrobenzene	µg/kg	204000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
1,3,5-Trinitrobenzene	µg/kg	102000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
1,4-Dichlorobenzene	µg/kg	817000	< 8600	< 380000	< 320000	< 41000	< 380000	< 220000	< 7900	< 380000	< 270000	< 9100	< 480000
1,4-Dioxane	µg/kg	520000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
1,4-Naphthoquinone	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
1-Naphthylamine	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
2,3,4,6-Tetrachlorophenol	µg/kg	61300000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
2,4,5-Trichlorophenol	µg/kg	204000000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
2,4,6-Trichlorophenol	µg/kg	314000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
2,4-Dichlorophenol	µg/kg	613000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
2,4-Dimethylphenol	µg/kg	40800000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
2,4-Dinitrophenol	µg/kg	408000	< 22000	< 980000	< 840000	< 110000	< 980000	< 580000	< 20000	< 970000	< 690000	< 23000	< 1200000
2,4-Dinitrotoluene	µg/kg	408000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
2,6-Dichlorophenol	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
2,6-Dinitrotoluene	µg/kg	2040000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000

Because we care
100% recycled paper produced by wind power energy

ARCADIS

Table 2. Summary of Total Analyte Data, Sludge Characterization and Bench Scale Treatability Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: Sample Date: Unit:	MDEQ Tier 1 TRG	IBS-5-NS 4/15/2010	IBS-5-US 4/15/2010	IBS-6-LS 4/15/2010	IBS-6-NS 4/15/2010	IBS-6-US 4/15/2010	IBS-7-LS 4/15/2010	IBS-7-NS 4/15/2010	IBS-7-US 4/15/2010	IBS-8-LS 4/15/2010	IBS-8-NS 4/15/2010	IBS-8-US 4/15/2010
SVOCs (Continued)													
2-Chloronaphthalene	µg/kg	164000000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
2-Chlorophenol	µg/kg	10200000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
2-Methylnaphthalene	µg/kg	40900000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
2-Methylphenol	µg/kg	102000000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
2-Naphthylamine	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
2-Nitroaniline	µg/kg	492	3500J	< 980000	< 840000	< 110000	< 980000	< 580000	< 20000	< 970000	< 690000	< 23000	< 1200000
2-Nitrophenol	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
2-Picoline	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
2-Acetylaminofluorene	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
2-Toluidine	µg/kg	23800	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
3 & 4 Methylphenol	µg/kg	10200000	630J	< 190000	< 160000	< 21000	< 190000	25000J	530J	< 190000	< 130000	< 4600	< 240000
3,3'-Dichlorobenzidine	µg/kg	12700	< 8600	< 380000	< 320000	< 41000	< 380000	< 220000	< 7900	< 380000	< 270000	< 9100	< 480000
3,3'-Dimethylbenzidine	µg/kg	622	< 22000	< 980000	< 840000	< 110000	< 980000	< 580000	< 20000	< 970000	< 690000	< 23000	< 1200000
3-Methylchloranthrene	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
3-Nitroaniline	µg/kg	NS	< 22000	< 980000	< 840000	< 110000	< 980000	< 580000	< 20000	< 970000	< 690000	< 23000	< 1200000
4,6-Dinitro-2-Methylphenol	µg/kg	204000	< 22000	< 980000	< 840000	< 110000	< 980000	< 580000	< 20000	< 970000	< 690000	< 23000	< 1200000
4-Aminobiphenyl	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
4-Bromophenyl Phenyl Ether	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
4-Chloro-3-Methylphenol	µg/kg	408000000	< 4300	< 190000	< 180000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
4-Chlorophenyl Phenyl Ether	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
4-Chloroaniline	µg/kg	238000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
4-Nitroaniline	µg/kg	NS	< 22000	< 980000	< 840000	< 110000	< 980000	< 580000	< 20000	< 970000	< 690000	< 23000	< 1200000
4-Nitrophenol	µg/kg	16400000	< 22000	< 980000	< 840000	< 110000	< 980000	< 580000	< 20000	< 970000	< 690000	< 23000	< 1200000
4-Nitroquinoline-N-Oxide	µg/kg	NS	< 43000	< 1900000	< 1600000	< 210000	< 1900000	< 1100000	< 40000	< 1900000	< 1300000	< 46000	< 2400000
7,12-Dimethylbenz(a)anthracene	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Acenaphthene	µg/kg	123000000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Acenaphthylene	µg/kg	123000000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Acetophenone	µg/kg	2630000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Alpha,Alpha-Dimethyl Phenethylamine	µg/kg	NS	< 880000	< 39000000	< 33000000	< 4200000	< 39000000	< 23000000	< 810000	< 38000000	< 27000000	< 930000	< 49000000
Aniline	µg/kg	1000000	< 8600	< 380000	< 320000	< 41000	< 380000	< 220000	< 7900	< 380000	< 270000	< 9100	< 480000
Anthracene	µg/kg	613000000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Aramite, Total	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Benzo(a)anthracene	µg/kg	7840	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Benzo(a)pyrene	µg/kg	784	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Benzo(b)fluoranthene	µg/kg	7840	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Benzo(g,h,i)perylene	µg/kg	61300000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Benzo(k)fluoranthene	µg/kg	78400	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Benzyl Alcohol	µg/kg	204000000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Bis(2-Chloroethoxy)Methane	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Bis(2-Chloroethyl)Ether	µg/kg	419	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Bis(2-Ethylhexyl) Phthalate	µg/kg	409000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Bis(Chloroisopropyl) Ether	µg/kg	9080	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Butyl benzyl phthalate	µg/kg	928000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Chrysene	µg/kg	784000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000

ARCADIS

Table 2. Summary of Total Analyte Data, Sludge Characterization and Bench Scale Treatability Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: / Sample Date: / Unit:	MDEQ Tier 1 TRG	IBS-5-NS 4/15/2010	IBS-5-US 4/15/2010	IBS-6-LS 4/15/2010	IBS-6-NS 4/15/2010	IBS-6-US 4/15/2010	IBS-7-LS 4/15/2010	IBS-7-NS 4/15/2010	IBS-7-US 4/15/2010	IBS-8-LS 4/15/2010	IBS-8-NS 4/15/2010	IBS-8-US 4/15/2010
SVOCs (Continued)													
Diallate	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Dibenz(a,h)anthracene	µg/kg	784	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Dibenzofuran	µg/kg	8180000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Diethyl Phthalate	µg/kg	1970000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Dimethoate	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Dimethyl Phthalate	µg/kg	2.04E+10	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Di-N-Butyl Phthalate	µg/kg	2280000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Di-N-Octyl Phthalate	µg/kg	4080000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Dinoseb	µg/kg	204000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Diphenyl Ether	µg/kg	NS	12000	530000	2500000	830000	400000	2100000	59000	680000	2500000	700J	110000J
Disulfoton	µg/kg	8170	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	410J	< 190000	< 130000	< 4600	< 240000
Ethyl Methanesulfonate	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Ethyl Parathion	µg/kg	1230000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Famphur	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Fluoranthene	µg/kg	81700000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Fluorene	µg/kg	81700000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Hexachlorobutadiene	µg/kg	135	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Hexachlorobenzene	µg/kg	1650	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Hexachlorocyclopentadiene	µg/kg	951	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Hexachloroethane	µg/kg	93300	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Hexachlorophene (Hcp)	µg/kg	613000	< 2200000	< 98000000	< 84000000	< 11000000	< 98000000	< 58000000	< 2000000	< 97000000	< 69000000	< 2300000	< 120000000
Hexachloropropene	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Indeno[(1,2,3-Cd)Pyrene	µg/kg	7840	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Isophorone	µg/kg	4570000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Isosafrole	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Methapyrilene	µg/kg	NS	< 880000	< 39000000	< 33000000	< 4200000	< 39000000	< 23000000	< 810000	< 38000000	< 27000000	< 930000	< 49000000
Methyl Methanesulfonate	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Methyl Parathion	µg/kg	408000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Naphthalene	µg/kg	247000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Nitrobenzene	µg/kg	8410	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
N-Nitro-o-toluidine	µg/kg	173000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
N-Nitrosodiethylamine	µg/kg	38.2	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
N-Nitrosodimethylamine	µg/kg	112	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
N-Nitrosodi-n-butylamine	µg/kg	1060	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
N-Nitrosodi-n-propylamine	µg/kg	818	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
N-Nitrosodiphenylamine	µg/kg	1170000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
N-Nitrosomethylethylamine	µg/kg	260	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
N-Nitrosomorpholine	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
N-Nitrosopiperidine	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
N-Nitrosopyrrolidine	µg/kg	2730	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
o,o',o"-Triethylphosphorothioate	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
p-Dimethylamino azobenzene	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000

Because we care
100% recycled paper produced by wind power energy

Table 2. Summary of Total Analyte Data, Sludge Characterization and Bench Scale Treatablility Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: Sample Date: Unit:	MDEQ Tier 1 TRG	IBS-5-NS 4/15/2010	IBS-5-US 4/15/2010	IBS-6-LS 4/15/2010	IBS-6-NS 4/15/2010	IBS-6-US 4/15/2010	IBS-7-LS 4/15/2010	IBS-7-NS 4/15/2010	IBS-7-US 4/15/2010	IBS-8-LS 4/15/2010	IBS-8-NS 4/15/2010	IBS-8-US 4/15/2010
SVOCs (Continued)													
Pentachlorobenzene	µg/kg	1630000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Pentachloronitrobenzene	µg/kg	22000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Pentachlorophenol	µg/kg	23800	< 22000	< 980000	< 840000	< 110000	< 980000	< 580000	< 20000	< 970000	< 690000	< 23000	< 1200000
Phenacetin	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Phenanthrene	µg/kg	61300000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Phenol	µg/kg	123000000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Phorate	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
p-Phenylene diamine	µg/kg	388000000	< 22000	< 980000	< 840000	< 110000	< 980000	< 580000	< 20000	< 970000	< 690000	< 23000	< 1200000
Pronamide	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Pyrene	µg/kg	61300000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	490J	< 190000	15000J	< 4600	< 240000
Pyridine	µg/kg	2040000	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Safrole, Total	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Sulfotep	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Thionazin	µg/kg	NS	< 4300	< 190000	< 160000	< 21000	< 190000	< 110000	< 4000	< 190000	< 130000	< 4600	< 240000
Metals													
Arsenic	mg/kg	3.82	2	3.6	1.3	2	3.4	3.1	< 2.1	2.6	3.3	1.1	< 14
Barium	mg/kg	14300	120	18	16	150	18	18	18	12	37	120	15
Cadmium	mg/kg	1020	0.18	0.52	0.31	< 0.59	0.61	0.47	< 0.52	0.48	0.67	< 0.61	< 3.6
Chromium	mg/kg	3070000	18	27	17	13	15	31	7.3	24	54	15	23
Lead	mg/kg	1700	12	28	51	7.6	43	27	2.6	32	100	13	38
Mercury	mg/kg	61.3	< 0.024	0.25	0.43	< 0.021	0.33	0.52	< 0.023	0.59	0.86	< 0.022	0.48
Selenium	mg/kg	1020	< 3	< 13	< 5.3	< 3	< 14	< 7.5	< 2.6	< 8.9	< 9.8	< 3.1	< 18
Silver	mg/kg	1020	0.15	< 5.2	0.53	< 1.2	0.52	0.3	< 1	< 3.6	0.51	< 1.2	< 7.2

Bolded	Constitutent has been detected
J	Estimated concentration.
MDEQ	Mississippi Department of Environmental Quality.
mg/kg	Milligram per kilogram.
NS	No Standard.
SVOCs	Semivolatile Organic Compounds.
TRG	Target Remediation Goal for soil under a restricted use scenario.
µg/kg	Microgram per kilogram.
VOCs	Volatile Organic Compounds.

ARCADIS

Table 3. Summary of Quality Assurance/Quality Control Data, Sludge Characterization and Bench Scale Treatability Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: Sample Date: Unit	Field Blank 4/15/2010	Field Blank 4/16/2010	Rinsate Blank 4/16/2010	Trip Blank 4/14/2010	Trip Blank 4/15/2010
Metals						
Arsenic	µg/L	NA	NA	< 20	NA	NA
Barium	µg/L	NA	NA	**2.8**	NA	NA
Cadmium	µg/L	NA	NA	< 5	NA	NA
Chromium	µg/L	NA	NA	< 10	NA	NA
Lead	µg/L	NA	NA	< 10	NA	NA
Mercury	µg/L	NA	NA	< 0.2	NA	NA
Selenium	µg/L	NA	NA	< 20	NA	NA
Silver	µg/L	NA	NA	< 10	NA	NA
VOCs						
1,1,1,2-Tetrachloroethane	µg/L	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	µg/L	< 1	< 1	< 1	< 1	< 1
1,1,2,2-Tetrachloroethane	µg/L	< 1	< 1	< 1	< 1	< 1
1,1,2-Trichloroethane	µg/L	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	µg/L	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethene	µg/L	< 1	< 1	< 1	< 1	< 1
1,2,3-Trichloropropane	µg/L	< 1	< 1	< 1	< 1	< 1
1,2-Dibromo-3-Chloropropane	µg/L	< 1	< 1	< 1	< 1	< 1
1,2-Dichloroethane	µg/L	< 1	< 1	< 1	< 1	< 1
1,2-Dichloropropane	µg/L	< 1	< 1	< 1	< 1	< 1
2-Butanone (MEK)	µg/L	**1.5J**	**1.7J**	**1.2J**	< 10	< 10
2-Chloro-1,3-butadiene	µg/L	< 1	< 1	< 1	< 1	< 1
2-Hexanone	µg/L	< 10	< 10	< 10	< 10	< 10
3-Chloro-1-propene	µg/L	< 1	< 1	< 1	< 1	< 1
4-Methyl-2-pentanone (MIBK)	µg/L	< 10	< 10	< 10	< 10	< 10
Acetone	µg/L	**8.4J**	**7.7J**	**9.5J**	**5.0J**	< 25
Acetonitrile	µg/L	< 40	< 40	< 40	< 40	< 40
Acrolein	µg/L	< 20	< 20	< 20	< 20	< 20
Acrylonitrile	µg/L	< 20	< 20	< 20	< 20	< 20
Benzene	µg/L	< 1	< 1	< 1	< 1	< 1
Bromoform	µg/L	< 1	< 1	< 1	< 1	< 1
Bromomethane	µg/L	< 1	< 1	< 1	< 1	< 1
Carbon disulfide	µg/L	< 2	< 2	< 2	< 2	< 2
Carbon tetrachloride	µg/L	< 1	< 1	< 1	< 1	< 1
Chlorobenzene	µg/L	< 1	< 1	< 1	< 1	< 1
Chlorodibromomethane	µg/L	< 1	< 1	< 1	< 1	< 1
Chloroethane	µg/L	< 1	< 1	< 1	< 1	< 1
Chloroform	µg/L	< 1	< 1	< 1	< 1	< 1
Chloromethane	µg/L	< 1	< 1	< 1	< 1	< 1
cis-1,3-Dichloropropene	µg/L	< 1	< 1	< 1	< 1	< 1
Dibromomethane	µg/L	< 1	< 1	< 1	< 1	< 1
Dichlorobromomethane	µg/L	< 1	< 1	< 1	< 1	< 1
Dichlorodifluoromethane	µg/L	< 1	< 1	< 1	< 1	< 1
Ethyl methacrylate	µg/L	< 1	< 1	< 1	< 1	< 1
Ethylbenzene	µg/L	**0.18J**	**0.14J**	< 1	< 1	< 1
Ethylene Dibromide	µg/L	< 1	< 1	< 1	< 1	< 1
Iodomethane	µg/L	< 5	< 5	< 5	< 5	< 5
Isobutyl alcohol	µg/L	< 40	< 40	< 40	< 40	< 40
Methacrylonitrile	µg/L	< 20	< 20	< 20	< 20	< 20
Methyl methacrylate	µg/L	< 1	< 1	< 1	< 1	< 1
Methylene Chloride	µg/L	< 5	< 5	< 5	< 5	< 5
Pentachloroethane	µg/L	< 5	< 5	< 5	< 5	< 5
Propionitrile	µg/L	< 20	< 20	< 20	< 20	< 20
Styrene	µg/L	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	µg/L	< 1	< 1	< 1	< 1	< 1
Toluene	µg/L	**2.7**	**2.5**	**1.3**	< 1	< 1
trans-1,2-Dichloroethene	µg/L	< 1	< 1	< 1	< 1	< 1
trans-1,3-Dichloropropene	µg/L	< 1	< 1	< 1	< 1	< 1
trans-1,4-Dichloro-2-butene	µg/L	< 2	< 2	< 2	< 2	< 2
Trichloroethene	µg/L	< 1	< 1	< 1	< 1	< 1

ARCADIS

Table 3. Summary of Quality Assurance/Quality Control Data, Sludge Characterization and Bench Scale Treatability Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: Sample Date: Unit	Field Blank 4/15/2010	Field Blank 4/16/2010	Rinsate Blank 4/16/2010	Trip Blank 4/14/2010	Trip Blank 4/15/2010
VOCs (Continued)						
Trichlorofluoromethane	µg/L	< 1	< 1	< 1	< 1	< 1
Vinyl acetate	µg/L	< 2	< 2	< 2	< 2	< 2
Vinyl chloride	µg/L	< 1	< 1	< 1	< 1	< 1
Xylenes, Total	µg/L	**0.39J**	**0.40J**	< 2	< 2	< 2
SVOCs						
1,1'-Biphenyl	µg/L	NA	NA	< 9.4	NA	NA
1,2,4,5-Tetrachlorobenzene	µg/L	NA	NA	< 9.4	NA	NA
1,2,4-Trichlorobenzene	µg/L	NA	NA	< 9.4	NA	NA
1,2-Dichlorobenzene	µg/L	NA	NA	< 9.4	NA	NA
1,3,5-Trinitrobenzene	µg/L	NA	NA	< 9.4	NA	NA
1,3-Dichlorobenzene	µg/L	NA	NA	< 9.4	NA	NA
1,3-Dinitrobenzene	µg/L	NA	NA	< 9.4	NA	NA
1,4-Dichlorobenzene	µg/L	NA	NA	< 9.4	NA	NA
1,4-Dioxane	µg/L	NA	NA	< 9.4	NA	NA
1,4-Naphthoquinone	µg/L	NA	NA	< 9.4	NA	NA
1-Naphthylamine	µg/L	NA	NA	< 9.4	NA	NA
2,3,4,6-Tetrachlorophenol	µg/L	NA	NA	< 9.4	NA	NA
2,4,5-Trichlorophenol	µg/L	NA	NA	< 9.4	NA	NA
2,4,6-Trichlorophenol	µg/L	NA	NA	< 9.4	NA	NA
2,4-Dichlorophenol	µg/L	NA	NA	< 9.4	NA	NA
2,4-Dimethylphenol	µg/L	NA	NA	< 9.4	NA	NA
2,4-Dinitrophenol	µg/L	NA	NA	< 47	NA	NA
2,4-Dinitrotoluene	µg/L	NA	NA	< 9.4	NA	NA
2,6-Dichlorophenol	µg/L	NA	NA	< 9.4	NA	NA
2,6-Dinitrotoluene	µg/L	NA	NA	< 9.4	NA	NA
2-Acetylaminofluorene	µg/L	NA	NA	< 9.4	NA	NA
2-Chloronaphthalene	µg/L	NA	NA	< 9.4	NA	NA
2-Chlorophenol	µg/L	NA	NA	< 9.4	NA	NA
2-Methylnaphthalene	µg/L	NA	NA	< 9.4	NA	NA
2-Methylphenol	µg/L	NA	NA	< 9.4	NA	NA
2-Naphthylamine	µg/L	NA	NA	< 9.4	NA	NA
2-Nitroaniline	µg/L	NA	NA	< 47	NA	NA
2-Nitrophenol	µg/L	NA	NA	< 9.4	NA	NA
2-Picoline	µg/L	NA	NA	< 9.4	NA	NA
2-Toluidine	µg/L	NA	NA	< 9.4	NA	NA
3 & 4 Methylphenol	µg/L	NA	NA	< 9.4	NA	NA
3,3'-Dichlorobenzidine	µg/L	NA	NA	< 57	NA	NA
3,3'-Dimethylbenzidine	µg/L	NA	NA	< 19	NA	NA
3-Methylcholanthrene	µg/L	NA	NA	< 9.4	NA	NA
3-Nitroaniline	µg/L	NA	NA	< 47	NA	NA
4,6-Dinitro-2-methylphenol	µg/L	NA	NA	< 47	NA	NA
4-Aminobiphenyl	µg/L	NA	NA	< 9.4	NA	NA
4-Bromophenyl phenyl ether	µg/L	NA	NA	< 9.4	NA	NA
4-Chloro-3-methylphenol	µg/L	NA	NA	< 9.4	NA	NA
4-Chloroaniline	µg/L	NA	NA	< 19	NA	NA
4-Chlorophenyl phenyl ether	µg/L	NA	NA	< 9.4	NA	NA
4-Nitroaniline	µg/L	NA	NA	< 47	NA	NA
4-Nitrophenol	µg/L	NA	NA	< 47	NA	NA
4-Nitroquinoline-1-oxide	µg/L	NA	NA	< 19	NA	NA
7,12-Dimethylbenz(a)anthracene	µg/L	NA	NA	< 9.4	NA	NA
Acenaphthene	µg/L	NA	NA	< 9.4	NA	NA
Acenaphthylene	µg/L	NA	NA	< 9.4	NA	NA
Acetophenone	µg/L	NA	NA	< 9.4	NA	NA
alpha,alpha-Dimethyl phenethylamine	µg/L	NA	NA	< 1900	NA	NA
Aniline	µg/L	NA	NA	< 19	NA	NA
Anthracene	µg/L	NA	NA	< 9.4	NA	NA
Aramite, Total	µg/L	NA	NA	< 9.4	NA	NA
Benzo[a]anthracene	µg/L	NA	NA	< 9.4	NA	NA
Benzo[a]pyrene	µg/L	NA	NA	< 9.4	NA	NA

ARCADIS

Table 3. Summary of Quality Assurance/Quality Control Data, Sludge Characterization and Bench Scale Treatability Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: Sample Date: Unit	Field Blank 4/15/2010	Field Blank 4/16/2010	Rinsate Blank 4/16/2010	Trip Blank 4/14/2010	Trip Blank 4/15/2010
SVOCs (Continued)						
Benzo[b]fluoranthene	µg/L	NA	NA	< 9.4	NA	NA
Benzo[g,h,i]perylene	µg/L	NA	NA	< 9.4	NA	NA
Benzo[k]fluoranthene	µg/L	NA	NA	< 9.4	NA	NA
Benzyl alcohol	µg/L	NA	NA	< 9.4	NA	NA
Bis(2-chloroethoxy)methane	µg/L	NA	NA	< 9.4	NA	NA
Bis(2-chloroethyl)ether	µg/L	NA	NA	< 9.4	NA	NA
Bis(2-ethylhexyl) phthalate	µg/L	NA	NA	< 9.4	NA	NA
bis(chloroisopropyl) ether	µg/L	NA	NA	< 9.4	NA	NA
Butyl benzyl phthalate	µg/L	NA	NA	< 9.4	NA	NA
Chrysene	µg/L	NA	NA	< 9.4	NA	NA
Diallate	µg/L	NA	NA	< 9.4	NA	NA
Dibenz(a,h)anthracene	µg/L	NA	NA	< 9.4	NA	NA
Dibenzofuran	µg/L	NA	NA	< 9.4	NA	NA
Diethyl phthalate	µg/L	NA	NA	< 9.4	NA	NA
Dimethoate	µg/L	NA	NA	< 9.4	NA	NA
Dimethyl phthalate	µg/L	NA	NA	< 9.4	NA	NA
Di-n-butyl phthalate	µg/L	NA	NA	< 9.4	NA	NA
Di-n-octyl phthalate	µg/L	NA	NA	< 9.4	NA	NA
Dinoseb	µg/L	NA	NA	< 9.4	NA	NA
Disulfoton	µg/L	NA	NA	< 9.4	NA	NA
Ethyl methanesulfonate	µg/L	NA	NA	< 9.4	NA	NA
Ethyl Parathion	µg/L	NA	NA	< 9.4	NA	NA
Famphur	µg/L	NA	NA	< 9.4	NA	NA
Fluoranthene	µg/L	NA	NA	< 9.4	NA	NA
Fluorene	µg/L	NA	NA	< 9.4	NA	NA
Hexachlorobenzene	µg/L	NA	NA	< 9.4	NA	NA
Hexachlorobutadiene	µg/L	NA	NA	< 9.4	NA	NA
Hexachlorocyclopentadiene	µg/L	NA	NA	< 9.4	NA	NA
Hexachloroethane	µg/L	NA	NA	< 9.4	NA	NA
Hexachlorophene	µg/L	NA	NA	< 4700	NA	NA
Hexachloropropene	µg/L	NA	NA	< 9.4	NA	NA
Indeno[1,2,3-cd]pyrene	µg/L	NA	NA	< 9.4	NA	NA
Isophorone	µg/L	NA	NA	< 9.4	NA	NA
Isosafrole	µg/L	NA	NA	< 9.4	NA	NA
Methapyrilene	µg/L	NA	NA	< 1900	NA	NA
Methyl methanesulfonate	µg/L	NA	NA	< 9.4	NA	NA
Methyl Parathion	µg/L	NA	NA	< 9.4	NA	NA
Naphthalene	µg/L	NA	NA	< 9.4	NA	NA
Nitrobenzene	µg/L	NA	NA	< 9.4	NA	NA
N-Nitro-o-toluidine	µg/L	NA	NA	< 9.4	NA	NA
N-Nitrosodiethylamine	µg/L	NA	NA	< 9.4	NA	NA
N-Nitrosodimethylamine	µg/L	NA	NA	< 9.4	NA	NA
N-Nitrosodi-n-butylamine	µg/L	NA	NA	< 9.4	NA	NA
N-Nitrosodi-n-propylamine	µg/L	NA	NA	< 9.4	NA	NA
N-Nitrosodiphenylamine	µg/L	NA	NA	< 9.4	NA	NA
N-Nitrosomethylethylamine	µg/L	NA	NA	< 9.4	NA	NA
N-Nitrosomorpholine	µg/L	NA	NA	< 9.4	NA	NA
N-Nitrosopiperidine	µg/L	NA	NA	< 9.4	NA	NA
N-Nitrosopyrrolidine	µg/L	NA	NA	< 9.4	NA	NA
o,o',o"-Triethylphosphorothioate	µg/L	NA	NA	< 9.4	NA	NA
p-Dimethylamino azobenzene	µg/L	NA	NA	< 9.4	NA	NA
Pentachlorobenzene	µg/L	NA	NA	< 9.4	NA	NA
Pentachloronitrobenzene	µg/L	NA	NA	< 9.4	NA	NA
Pentachlorophenol	µg/L	NA	NA	< 47	NA	NA
Phenacetin	µg/L	NA	NA	< 9.4	NA	NA
Phenanthrene	µg/L	NA	NA	< 9.4	NA	NA
Phenol	µg/L	NA	NA	< 9.4	NA	NA
Phorate	µg/L	NA	NA	< 9.4	NA	NA
p-Phenylene diamine	µg/L	NA	NA	< 1900	NA	NA
Pronamide	µg/L	NA	NA	< 9.4	NA	NA

ARCADIS

Table 3. Summary of Quality Assurance/Quality Control Data, Sludge Characterization and Bench Scale Treatability Report, Hercules Incorporated, Hattiesburg, Mississippi.

Chemical Name	Location ID: Sample Date: Unit	Field Blank 4/15/2010	Field Blank 4/16/2010	Rinsate Blank 4/16/2010	Trip Blank 4/14/2010	Trip Blank 4/15/2010
SVOCs (Continued)						
Pyrene	µg/L	NA	NA	< 9.4	NA	NA
Pyridine	µg/L	NA	NA	< 47	NA	NA
Safrole, Total	µg/L	NA	NA	< 9.4	NA	NA
Sulfotepp	µg/L	NA	NA	< 9.4	NA	NA
Thionazin	µg/L	NA	NA	< 9.4	NA	NA

SVOCs Semivolatile Organic Compounds.
µg/L Microgram per liter.
VOCs Volatile Organic Compounds.

ARCADIS

Table 4. Summary of Treatability Test Effluent Analytical Data, Hercules Incorporated, Hattiesburg, Mississippi.

POTW Discharge Permit Parameter	Units	Sample Results					
		IBS-4 Centrifuge Centrate (250 ppm Anion Polymer)	IBS-4 Centrifuge Centrate (250 ppm Cation Polymer)	IBS-4 Centrifuge Centrate (No Polymer)	IBS-4 Filter Press Filtrate	IBS-4 Gravity Dewatering Liquid	IBS-8 Filter Press Filtrate
		6/23/2010	6/23/2010	6/23/2010	6/23/2010	6/23/2010	6/23/2010
Flow Effluent	******	NA	NA	NA	NA	NA	NA
Oil and Grease Effluent	mg/L	IV	IV	IV	IV	IV	IV
Oxygen Demand, Biochemical, 5-day (20 degrees Celsius) Effluent	mg/L	IV	IV	IV	IV	IV	IV
pH Effluent	SU	6	6.5	6	9.5	6	11.5
Solids (Total Suspended) Effluent	mg/L	IV	IV	IV	IV	IV	IV
1,1,1-Trichloroethane Effluent	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001
1,1,2-Trichloroethane Effluent	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001
1,1-Dichloroethane Effluent	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001
1,1-Dichloroethylene Effluent	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001
1,2,4-Trichlorobenzene Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
1,2-Dichlorobenzene Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
1,2-Dichloroethane Effluent	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001
1,2-Dichloropropane Effluent	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001
1,2-Transdichloroethylene Effluent	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001
1,3-Dichlorobenzene Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
1,3-Dichloropropylene, cis Effluent[1]	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001
1,3-Dichloropropylene, trans Effluent[1]	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001
1,4-Dichlorobenzene Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
2-Nitrophenol Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
4,6-Dinitro-o-cresol Effluent	mg/L	< 0.330	< 0.330	< 0.250	< 0.170	< 0.050	< 0.140
4-Nitrophenol Effluent	mg/L	< 0.330	< 0.330	< 0.250	< 0.170	< 0.050	< 0.140
Acenaphthene Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
Anthracene Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
Benzene Effluent	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	0.0013
Bis(2-ethylhexyl)phthalate Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
Carbon tetrachloride Effluent	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001
Chlorobenzene Effluent	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001
Chloroethane Effluent	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001
Chloroform Effluent	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001
Diethyl phthalate Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
Dimethyl phthalate Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
Di-N-Butyl Phthalate Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
Ethyl benzene Effluent	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001
Fluoranthene Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
Fluorene Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029

Because we care
100% recycled paper produced by wind power energy

ARCADIS

Table 4. Summary of Treatability Test Effluent Analytical Data, Hercules Incorporated, Hattiesburg, Mississippi.

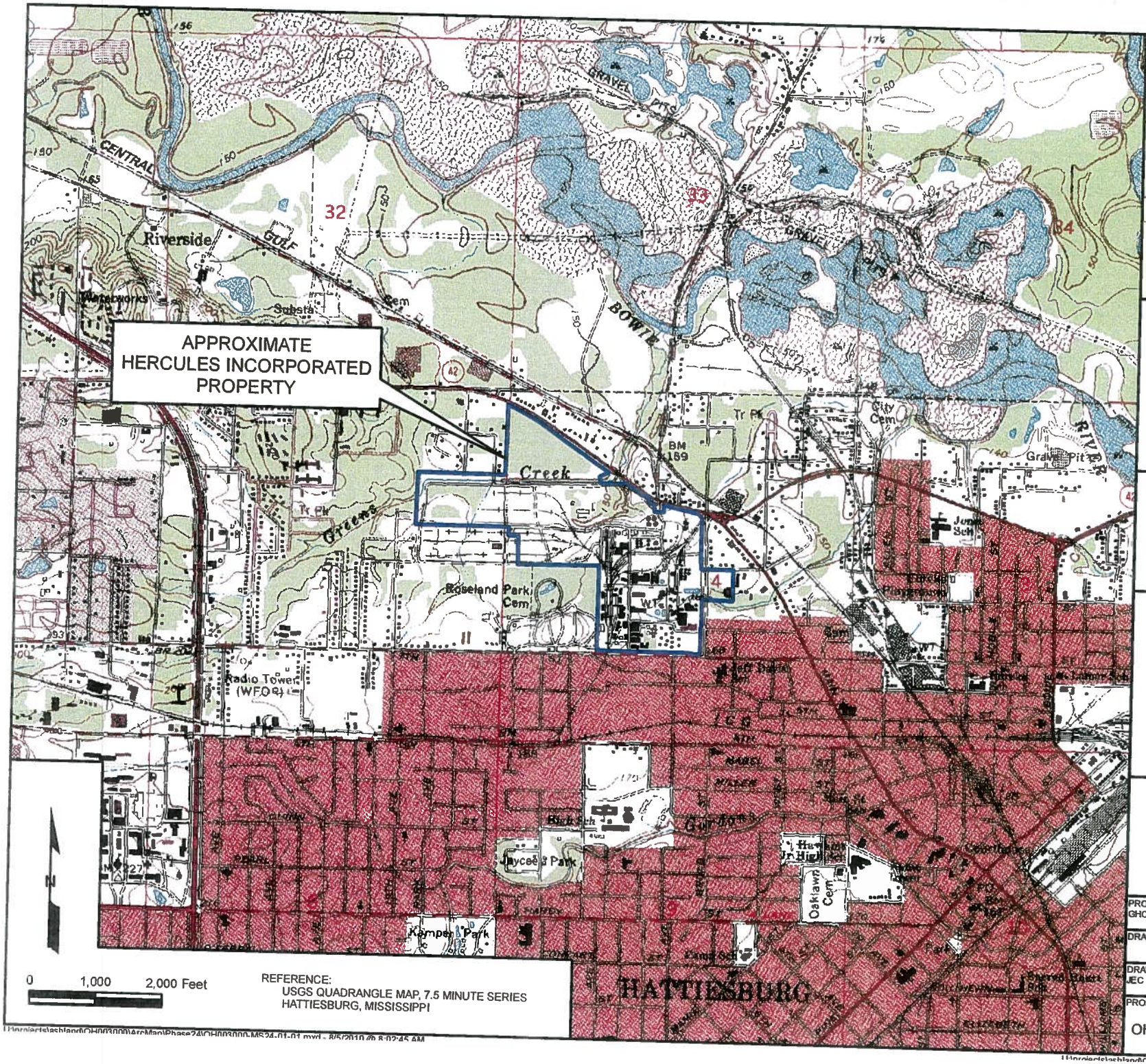
POTW Discharge Permit Parameter	Units	Sample Results					
		IBS-4 Centrifuge Centrate (250 ppm Anion Polymer)	IBS-4 Centrifuge Centrate (250 ppm Cation Polymer)	IBS-4 Centrifuge Centrate (No Polymer)	IBS-4 Filter Press Filtrate	IBS-4 Gravity Dewatering Liquid	IBS-8 Filter Press Filtrate
		6/23/2010	6/23/2010	6/23/2010	6/23/2010	6/23/2010	6/23/2010
Hexachlorobenzene Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
Hexachlorobutadiene Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
Hexachloroethane Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
Methyl Chloride (Chloromethane) Effluent	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001
Methylene Chloride Effluent	mg/L	< 0.005	< 0.005	< 0.005	< 2.500	< 0.005	< 0.005
Naphthalene Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
Nitro-Benzene Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
Phenanthrene Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
Pyrene Effluent	mg/L	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029
Tetrachloroethylene Effluent	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001
Toluene Effluent	mg/L	< 0.001	**0.00052J**	< 0.001	**0.280J**	< 0.001	**0.100**
Trichloroethylene Effluent	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001
Vinyl chloride Effluent	mg/L	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001

(1) The MDEQ POTW Discharge Permit lists a discharge limit for 1,3-Dichloropropylene. This limit was used for the cis- or trans- isomer listed.

IV Insufficient sample volume to run this test.
J Estimated concentration.
mg/L Milligrams per liter.
NA Not applicable.
POTW Publicly Owned Treatment Works.
SU Standard units.

Because we care
100% recycled paper produced by wind power energy

FIGURES



REFERENCE:
USGS QUADRANGLE MAP, 7.5 MINUTE SERIES
HATTIESBURG, MISSISSIPPI

SITE LOCATION MAP

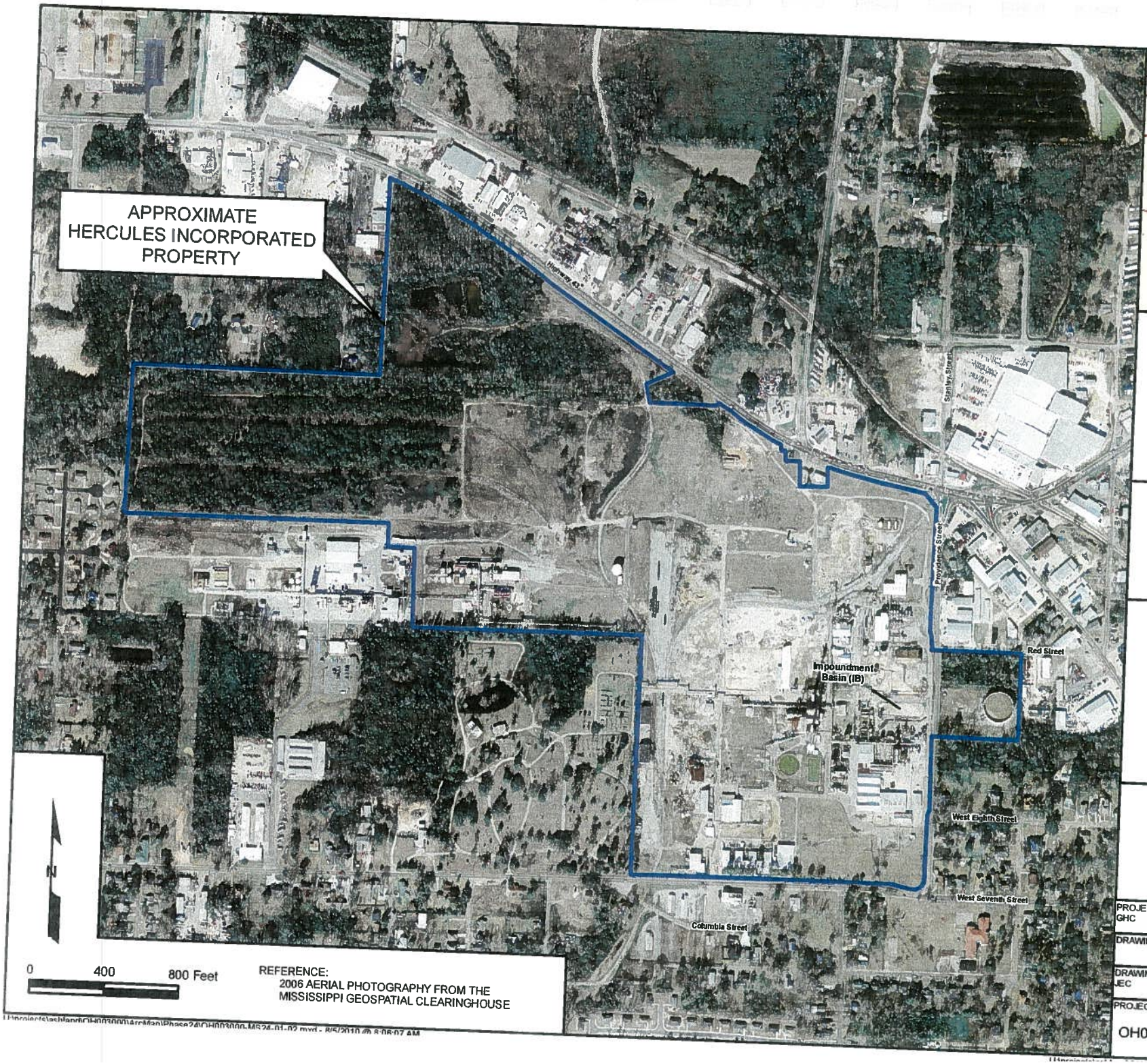
INVESTIGATION AREA
HERCULES INCORPORATED
Hattiesburg, Mississippi

ARCADIS
10352 PLAZA AMERICANA DRIVE
BATON ROUGE, LA 70816
TEL: 225-292-1004
FAX: 225-218-9677
WWW.ARCADIS-US.COM

PROJECT MANAGER: GHC	CHECKED BY: CD
DRAWING FILE:	GIS FILE:
DRAWING BY: JEC	DATE: 08/05/2010
PROJECT NUMBER: OH003000.MS24	FIGURE NUMBER: 1

I:\projects\ashland\OH003000\ArcMap\Phase24\OH003000-MS24-01-01.mxd - 8/5/2010 @ 8:02:45 AM

I:\projects\ashland\OH003000\inkfiles\Phase24\OH003000-MS24-01-01.ai



REFERENCE:
2006 AERIAL PHOTOGRAPHY FROM THE MISSISSIPPI GEOSPATIAL CLEARINGHOUSE

2006 AERIAL PHOTOGRAPHY

INVESTIGATION AREA
HERCULES INCORPORATED
Hattiesburg, Mississippi

ARCADIS
10352 PLAZA AMERICANA DRIVE
BATON ROUGE, LA 70816
TEL: 225-292-1004
FAX: 225-218-9677
WWW.ARCADIS-US.COM

PROJECT MANAGER: GHC	CHECKED BY: CD
DRAWING FILE:	GIS FILE:
DRAWING BY: JEC	DATE: 08/05/2010
PROJECT NUMBER: OH003000.MS24	FIGURE NUMBER: 2

U:\projects\ashland\OH003000\ArcMap\Phase2\OH003000-MS24-01-02.mxd - 8/5/2010 @ 8:06:07 AM

APPENDIX A

ARCADIS

Appendix A

MDEQ Correspondence

Because we care
100% recycled paper produced by wind power energy

RECEIVED
AUG 31 2009
LAW DEPARTMENT

STATE OF MISSISSIPPI
HALEY BARBOUR
GOVERNOR
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
TRUDY D. FISHER, EXECUTIVE DIRECTOR

August 25, 2009

Via Certified Mail: 7009 1410 0000 2467 7004

Mr. Rodney S. Bolton
Ashland Hercules Water Technologies
5228 N. Hopkins Street
Milwaukee, WI 53209

Re: Hercules Inc
Hattiesburg, Mississippi
Forrest County
Surface Impoundment Closure

Dear Mr. Bolton:

As you know, a continuing topic of discussion in recent months between Ashland Hercules Water Technologies ("Hercules") and the Mississippi Department of Environmental Quality ("MDEQ") has been the closure of the wastewater treatment basin at the Hercules Hattiesburg, Mississippi facility (the "basin"). Of particular concern has been the proper disposal of the sludge that is to be removed from the basin and whether the Land Disposal Restrictions ("LDR") of 40 C.F.R. Part 268 ("LDR regulations") apply to that sludge.

MDEQ has reviewed the LDR regulations, particularly 40 C.F.R. § 268.1(c) and footnote 8 to the 40 C.F.R. § 268.40 Table, in light of the facts of this case. Based upon that review, and having consulted with, and received guidance from, EPA Region 4, MDEQ has determined that the basin may be closed in accordance with the following general procedure:

(1) Hercules shall submit an update to its Pretreatment permit application, which shall describe the filter press operation that was proposed by Hercules during our June 10, 2009, meeting to be used to "de-water" the sludge. This filter press operation description must include a description of the waste water flow and the waste water characteristics (including analytical data as appropriate).

2022
ENF20080001

(2) The MDEQ Environmental Permits Division shall then review the updated permit application. If the updated application is determined to be acceptable, a revised permit will, if necessary, be issued to include the filter press as part of the permitted treatment system.

(3) At that point, the sludge must be adequately characterized, either *in situ* or after being removed from the basin, but before being managed in the filter press.

(4) If the sludge, before management in the filter press, is determined to be non-hazardous for benzene (or other constituents), the LDR will not apply, and the de-watered sludge solids may be disposed of in accordance with existing solid waste management regulations, and the sludge "water phase" may be discharged in accordance with the provisions and limitations of Hercules' NPDES permit.

(5) If the sludge, before management in the filter press, is determined to be hazardous for benzene (or other constituents), the LDR will apply in full.

Before closure activities may begin, Hercules will be required to submit, for MDEQ review and approval, a detailed Closure Plan for the basin which complies with this general procedure. Included in that basin Closure Plan must be a proposal for sampling and analyzing the sludge prior to management in the filter press in a manner sufficient to ensure adequate characterization. Thorough waste-sampling procedures are described in Part Two of the EPA Guidance Manual: "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Wastes," OSWER 9938.4-03.

Closure of the basin in accordance with the above-described general procedure and an approved Closure Plan will not resolve the outstanding violations cited in the Notice of Violation dated November 24, 2008. Those violations will remain to be resolved.

If you have any questions concerning this matter, please contact me at (601) 961-5682.

Sincerely,

Chris Sanders, P.E.
Chief, Environmental Compliance & Enforcement Division

cc: Kristina M. Woods, Esq.
Kenneth M. Kastner, Esq.

THIS COPY FOR

2022
ENF20080001

STATE OF MISSISSIPPI
HALEY BARBOUR
GOVERNOR
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
TRUDY D. FISHER, EXECUTIVE DIRECTOR

September 19, 2008

via fax: 601-545-6665

Mr. James A. Harrison, Executive Director
Pine Belt Regional Solid Waste Management Authority
P. O. Box 389
Petal, Mississippi 39465

Dear Mr. Harrison:

Re: Disposal of Two Waste Streams, SS2 and SS3
from Hercules Corporation, Hattiesburg, MS
at the Pine Belt Landfill, SW0560010436
Perry County

We have reviewed the Industrial Waste Profile sheets and TCLP analyses submitted by facsimile on September 15 & 18, 2008 for the two waste streams from Hercules Corporation, Hattiesburg, MS. The wastes are industrial wastewater treatment sludges. You indicate that any needed solidification will be done at Hercules prior to delivery to the landfill. Based on the information submitted, the MDEQ has no objection to the disposal of these two waste streams at the Pine Belt Regional Landfill in accordance with all pertinent laws, ordinances, regulations and permit conditions.

If you have any questions or comments, please call me at (601) 961-5074.

Sincerely,

Louis Lavallee, P.E.
Solid Waste & Mining Compliance

OFFICE OF POLLUTION CONTROL
POST OFFICE BOX 2261 - JACKSON, MISSISSIPPI 39225-2261 - TEL: (601) 961-5171 - FAX: (601) 354-6612 - www.deq.state.ms.us
AN EQUAL OPPORTUNITY EMPLOYER

APPENDIX B

ARCADIS

Appendix B

Field Forms

Because we care
100% recycled paper produced by wind power energy

ARCADIS
10352 Plaza Americana Drive
Baton Rouge, LA 70816

SAMPLE / CORE LOG

Boring/Well: IBS-1 Project No.: Hercules/OH003000.MS24.00001

Site Location: Hattiesburg, Mississippi Drilling Started: 4/14/10 0930 Drilling Completed: 4/14/10

Land-Surface Elev.: 162.52 Surveyed: X Estimated: ____ Datum: NAD83-State Plane Mississippi East 2301

Drilling Fluid: None Drilling Method Used: Vibracore

Drilling Contractor: Devonian Group, LLC Driller: Lonny Helper: Mark

Prepared By: S. Henderson Hammer Weight: NA Hammer Drop (inches): NA

Fill, Silty Clay, Silt, Sandy Silt, Silty Sand, Shelby Tube, Water First Encountered
Clay, Sandy Clay, Clayey Silt, Sand, Clayey Sand, Split Spoon, Water Level After 10 Minutes

SAMPLE DEPTH (ft)	SAMPLE TYPE	RECOVERY (ft)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP H	PP V	OVM (wo/F) (ppm)	REMARKS
0				WATER:					
1									
2				SLUDGE: Sludge, top of sludge (16")					
3									
4		0							
5									
6									
7									
8		1		- black, friable sludge (moist)					
9				- layered, light brown and gray, spongy sludge with light tan nodules (moist) (> 3.5' thick)					
10		3.5							
11									
12				- Total Depth 11.5 ft bls					Note: Bottom of sludge not encountered. Could not reach native soil with sampling equipment.
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

ARCADIS
10352 Plaza Americana Drive
Baton Rouge, LA 70816

SAMPLE / CORE LOG

Boring/Well: IBS-2 Project No.: Hercules/OH003000.MS24.00001

Site Location: Hattiesburg, Mississippi Drilling Started: 4/16/10 0815 Drilling Completed: 4/16/10

Land-Surface Elev.: 160.63 Surveyed: X Estimated: ____ Datum: NAD83-State Plane Mississippi East 2301

Drilling Fluid: None Drilling Method Used: Vibracore

Drilling Contractor: Devonian Group, LLC Driller: Lonny Helper: Mark

Prepared By: S. Henderson Hammer Weight: NA Hammer Drop (inches): NA

Fill, Silty Clay, Silt, Sandy Silt, Silty Sand, Shelby Tube, Water First Encountered
Clay, Sandy Clay, Clayey Silt, Sand, Clayey Sand, Split Spoon, Water Level After 10 Minutes

SAMPLE DEPTH (ft)	SAMPLE TYPE	RECOVERY (ft)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP H	PP V	OVM (wo/F) (ppm)	REMARKS
0				WATER:					
1				SLUDGE: Top of sludge (7")					
2									
3									
4		0							
5									
6									
7									
8				- layered brown and gray sludge with tan nodules (2.25' thick)					
9		2.25							
10		1.25		SAND: Tan, well sorted (saturated), bottom of sludge (9.25')					
11				- Total Depth 10.5 ft bls					Bottom of tube (160").
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

ARCADIS
10352 Plaza Americana Drive
Baton Rouge, LA 70816

SAMPLE / CORE LOG

Boring/Well: IBS-3 Project No.: Hercules/OH003000.MS24.00001

Site Location: Hattiesburg, Mississippi Drilling Started: 4/14/10 1230 Drilling Completed: 4/14/10

Land-Surface Elev.: 160.60 Surveyed: X Estimated: ____ Datum: NAD83-State Plane Mississippi East 2301

Drilling Fluid: None Drilling Method Used: Vibracore

Drilling Contractor: Devonian Group, LLC Driller: Lonny Helper: Mark

Prepared By: S. Henderson Hammer Weight: NA Hammer Drop (inches): NA

Fill, Silty Clay, Silt, Sandy Silt, Silty Sand, Shelby Tube, Water First Encountered
Clay, Sandy Clay, Clayey Silt, Sand, Clayey Sand, Split Spoon, Water Level After 10 Minutes

SAMPLE DEPTH (ft)	SAMPLE TYPE	RECOVERY (ft)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP H	PP V	OVM (wo/F) (ppm)	REMARKS
0				WATER:					
1				SLUDGE: Top of sludge (1')					
2									
3									
4		0							
5									
6									
7		1		- black fluid sludge (saturated), bottom of sludge (6.75')					
8		2		SAND: Tan, moist					
9				- Total Depth 8.75 ft bls					
10									Bottom of tube (160").
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

ARCADIS
10352 Plaza Americana Drive
Baton Rouge, LA 70816

SAMPLE / CORE LOG

Boring/Well: IBS-4 Project No.: Hercules/OH003000.MS24.00001

Site Location: Hattiesburg, Mississippi Drilling Started: 4/14/10 1700 Drilling Completed: 4/14/10

Land-Surface Elev.: 160.64 Surveyed: X Estimated: ____ Datum: NAD83-State Plane Mississippi East 2301

Drilling Fluid: None Drilling Method Used: Vibracore

Drilling Contractor: Devonian Group, LLC Driller: Lonny Helper: Mark

Prepared By: S. Henderson Hammer Weight: NA Hammer Drop (inches): NA

Fill, Silty Clay, Silt, Sandy Silt, Silty Sand, Shelby Tube, Water First Encountered
Clay, Sandy Clay, Clayey Silt, Sand, Clayey Sand, Split Spoon, Water Level After 10 Minutes

SAMPLE DEPTH (ft)	SAMPLE TYPE	RECOVERY (ft)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP H	PP V	OVM (wo/F) (ppm)	REMARKS
0									
1				WATER: SLUDGE: Top of sludge 4"					
2									
3									
4		0							
5									
6									
7		2		- Black fluid, friable sludge (saturated), bottom of sludge (8')					
8									
9		2		SAND: Tan and gray sand with gravel, strong odor, saturated					
10				- Total Depth 10.3 ft bls					Bottom of tube (160").
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

ARCADIS
10352 Plaza Americana Drive
Baton Rouge, LA 70816

SAMPLE / CORE LOG

Boring/Well: IBS-5 Project No.: Hercules/OH003000.MS24.00001

Site Location: Hattiesburg, Mississippi Drilling Started: 4/15/10 0930 Drilling Completed: 4/15/10

Land-Surface Elev.: 160.61 Surveyed: X Estimated: ____ Datum: NAD83-State Plane Mississippi East 2301

Drilling Fluid: None Drilling Method Used: Vibracore

Drilling Contractor: Devonian Group, LLC Driller: Lonny Helper: Mark

Prepared By: S. Henderson Hammer Weight: NA Hammer Drop (inches): NA

Fill, Silty Clay, Silt, Sandy Silt, Silty Sand, Shelby Tube, Water First Encountered
Clay, Sandy Clay, Clayey Silt, Sand, Clayey Sand, Split Spoon, Water Level After 10 Minutes

SAMPLE DEPTH (ft)	SAMPLE TYPE	RECOVERY (ft)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP H V	OVM (wo/F) (ppm)	REMARKS
0				WATER:				
1				SLUDGE: Top of sludge (17"), black fluid sludge				
2								
3								
4		0						
5								
6								
7								
8		2		- gray and tan sludge with a trace of orange resin nodules (moist) (2' thick)				
9				- bottom of sludge (9')				
10		1		SILTY CLAY: Gray, dry - Total Depth 9.75 ft bls				Bottom of tube (160").
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

ARCADIS
10352 Plaza Americana Drive
Baton Rouge, LA 70816

SAMPLE / CORE LOG

Boring/Well: IBS-6 Project No.: Hercules/OH003000.MS24.00001

Site Location: Hattiesburg, Mississippi Drilling Started: 4/15/10 1020 Drilling Completed: 4/15/10

Land-Surface Elev.: 160.66 Surveyed: X Estimated: ____ Datum: NAD83-State Plane Mississippi East 2301

Drilling Fluid: None Drilling Method Used: Vibracore

Drilling Contractor: Devonian Group, LLC Driller: Lonny Helper: Mark

Prepared By: S. Henderson Hammer Weight: NA Hammer Drop (inches): NA

Fill, Silty Clay, Silt, Sandy Silt, Silty Sand, Shelby Tube, Water First Encountered
Clay, Sandy Clay, Clayey Silt, Sand, Clayey Sand, Split Spoon, Water Level After 10 Minutes

SAMPLE DEPTH (ft)	SAMPLE TYPE	RECOVERY (ft)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP H	PP V	OVM (wo/F) (ppm)	REMARKS
0				WATER:					
1				SLUDGE: Top of sludge (6"), black, fluid sludge					
2									
3									
4		0							
5									
6									
7									
8									
9		2		- gray and tan sludge with light tan nodules (2' thick)					
10		0.5		- bottom of sludge (10') SILTY CLAY: Gray, dry - Total Depth 10.5 ft bls					
11									Bottom of tube (160").
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

ARCADIS
10352 Plaza Americana Drive
Baton Rouge, LA 70816

SAMPLE / CORE LOG

Boring/Well: IBS-7 Project No.: Hercules/OH003000.MS24.00001

Site Location: Hattiesburg, Mississippi Drilling Started: 4/15/10 1420 Drilling Completed: 4/15/10

Land-Surface Elev.: 160.57 Surveyed: X Estimated: ____ Datum: NAD83-State Plane Mississippi East 2301

Drilling Fluid: None Drilling Method Used: Vibracore

Drilling Contractor: Devonian Group, LLC Driller: Lonny Helper: Mark

Prepared By: S. Henderson Hammer Weight: NA Hammer Drop (inches): NA

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | Water First Encountered
Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | Water Level After 10 Minutes

SAMPLE DEPTH (ft)	SAMPLE TYPE	RECOVERY (ft)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP H V	OVM (wo/F) (ppm)	REMARKS
0				WATER:				
1								
2		0		SLUDGE: Top of sludge (2')				
3								
4								
5				- black, fluid sludge, soft, saturated				
6		1.5		- bottom of sludge (6.25')				
7		1		SANDY CLAY: Gray with gravel, dry				
8				- Total Depth 7.75 ft bls				Bottom of tube (160").
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

ARCADIS
10352 Plaza Americana Drive
Baton Rouge, LA 70816

SAMPLE / CORE LOG

Boring/Well: IBS-8 Project No.: Hercules/OH003000.MS24.00001

Site Location: Hattiesburg, Mississippi Drilling Started: 4/15/10 1530 Drilling Completed: 4/15/10

Land-Surface Elev.: 160.67 Surveyed: X Estimated: ____ Datum: NAD83-State Plane Mississippi East 2301

Drilling Fluid: None Drilling Method Used: Vibracore

Drilling Contractor: Devonian Group, LLC Driller: Lonny Helper: Mark

Prepared By: S. Henderson Hammer Weight: NA Hammer Drop (inches): NA

Fill | Silty Clay | Silt | Sandy Silt | Silty Sand | Shelby Tube | Water First Encountered
Clay | Sandy Clay | Clayey Silt | Sand | Clayey Sand | Split Spoon | Water Level After 10 Minutes

SAMPLE DEPTH (ft)	SAMPLE TYPE	RECOVERY (ft)	SYMBOL	VISUAL DESCRIPTION	USCS (LL/PL/PI)	PP H V	OVM (wo/F) (ppm)	REMARKS
0				WATER:				
1								
2				SLUDGE: Top of sludge (1.8'), black, fluid sludge				
3								
4		0						
5								
6								
7				- layered gray and brown sludge with light tan nodules (moist) (2' thick)				
8		2						
9		1		- bottom of sludge (8.5') SILTY CLAY: Gray with some sand, dry - Total Depth 9.5 ft bls				
10								Bottom of tube (160").
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

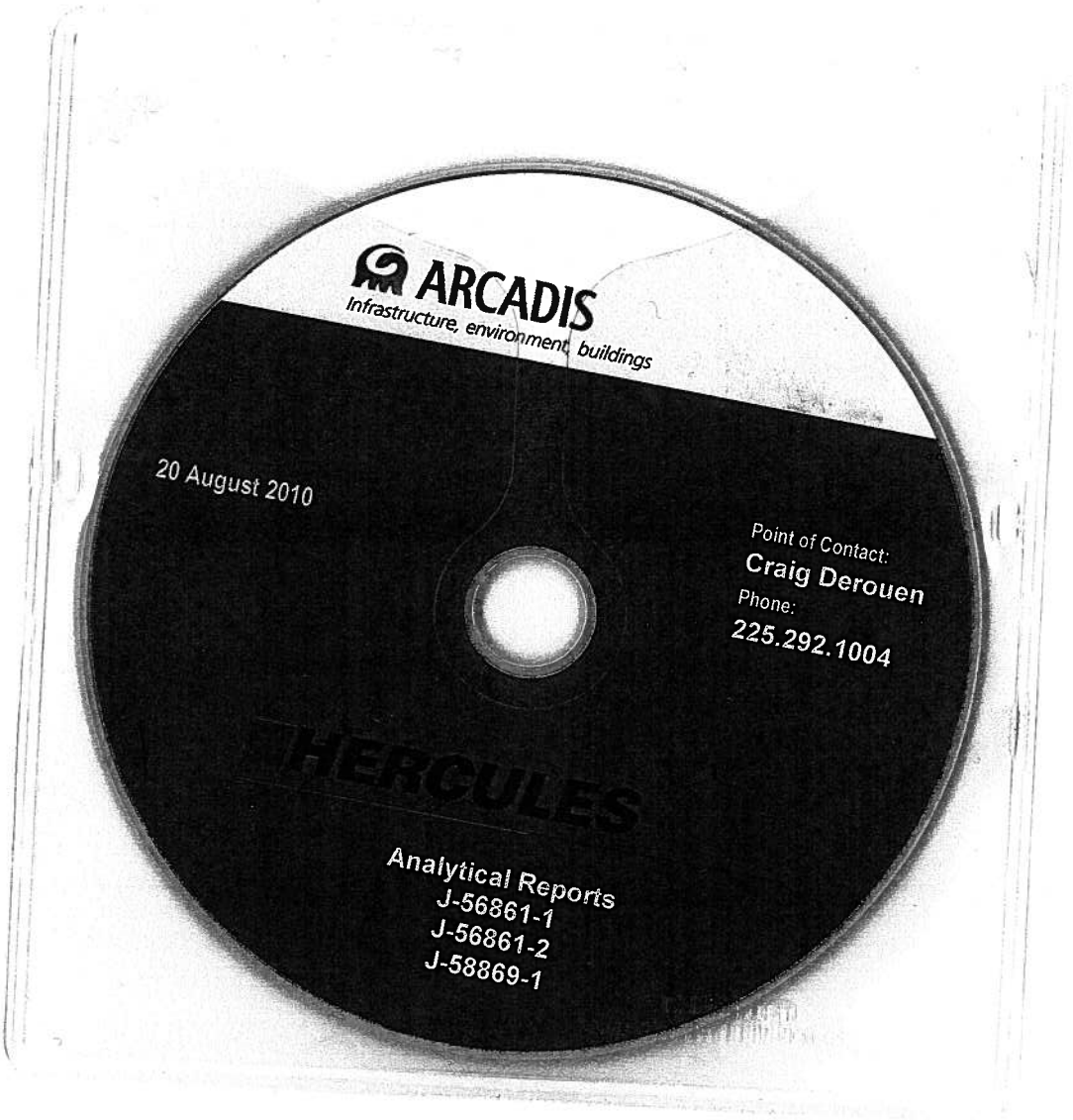
APPENDIX C

ARCADIS

Appendix C

Analytical Reports

Because we care
100% recycled paper produced by wind power energy


ARCADIS
Infrastructure, environment, buildings
20 August 2010
Point of Contact:
Craig Derouen
Phone:
225.292.1004
HERCULES
Analytical Reports
J-56861-1
J-56861-2
J-58869-1

APPENDIX D

ARCADIS

Appendix D

95% UCL for TCLP Benzene

Because we care
100% recycled paper produced by wind power energy

ARCADIS

ARCADIS U.S., Inc.
284 Cramer Creek Court
Dublin
Ohio 43017
Tel 614.764.2310
Fax 614.764.1270

MEMO

To:
Jay Reid

Copies:
Craig Derouen, Tim Ratchford

From:
Mark Lupo

Date:
May 28, 2010

ARCADIS Project No.:
OH003000.MS24

Subject:
Benzene TCLP Data Evaluation, Hattiesburg, Mississippi

The Toxicity Characteristic Leaching Procedure (TCLP) was used to evaluate the leaching potential of benzene in sludge samples collected from the IB Basin at the Hercules Facility location in Hattiesburg, Mississippi. The purpose of this memo is to estimate the true mean of the TCLP results for comparison to United States Environmental Protection Agency (USEPA) Resource Conservation and Recovery Act (RCRA) standards to determine if the material exhibits hazardous characteristics.

Data Evaluation

The 16 data points are presented in Table 1 in descending numerical order. Three of the data points had benzene concentrations below the detection limit of 0.02 mg/L. These points were replaced by half of the analytical detection limit. The adjusted data set was evaluated.

The sample mean of the data is 0.2348 mg/L, but the true mean is not known, because to measure this would require sampling the entire volume of the sludge, which is not practical. Statistics can be used to construct an interval that contains the true mean with 95% confidence. The rationale is that the upper limit of this interval, the 95% upper confidence limit (UCL) represents the upper limit of the true mean with 95% confidence.

One necessary precondition for the construction of a confidence limit is that the data be normally distributed. The USEPA recommends the Shapiro-Wilk test for normality. The data were tested with the

Shapiro-Wilk test and found to exhibit non-normal characteristics. These data failed the normality test because of the presence of three high data points. The data set was tested for outliers using the Dixon Test for Outliers, and the three high points were identified as statistically significant outliers. The data were transformed with successive transformations following the ladder of powers. The first transformation to pass the normality test at 5% significance was the logarithmic transformation. Therefore, the data set is lognormally distributed. Attached to this memo is a probability plot generated by the ChemStat statistical package (version 5.2.0.0) of the log-transformed data. The linear trend can be seen for all but the three non-detections.

Table 1 shows the log-transformed data. A natural logarithm was used to transform the data. It should be noted that when the transformed data set was tested with Dixon's Test for Outliers, no statistically significant outliers were identified.

The 95% UCL was computed from the sample mean $\bar{x}$, the sample standard deviation s, and the number of data points n, using the following formula:

$$UCL = \exp\left(\bar{x} + \frac{s\,t_{(n-1,0.95)}}{\sqrt{n}}\right)$$

The t-statistic $t_{(n-1,\ 0.95)}$ was obtained from a table in the groundwater statistical guidance document (USEPA, 1989). The inputs and the result are presented in Table 1. The 95% UCL was computed to be 0.159 mg/L.

Discussion

The computed 95% UCL was lower than the arithmetic mean. This was to be expected in a lognormal data set, because the arithmetic mean in such a skewed data set is dominated by the highest data points. In data that are logarithmically distributed, it is the geometric mean, and not the arithmetic mean around which the confidence interval is constructed. The geometric mean of the adjusted, non-transformed data set was 0.082 mg/L (Table 1). To construct an interval around the arithmetic mean in a lognormally distributed data set, Land's procedure is often used. However, this procedure can introduce results that are described as "biased" and "extreme" (USEPA, 2009), particularly when the coefficient of variation is high. This procedure was not used for these data.

The data set is partially censored; there were 3 nondetections out of 16 data points. This is a detection frequency of 81.3%. USEPA guidance recommends that some form of adjustment, such as Cohen's Adjustment, be applied when the detection frequency is between 50% and 85%, and that nonparametric

methods be used when the detection frequency is below 50%. Cohen's adjustment was not applied, because it can introduce bias in transformed data sets. It was considered to introduce less bias to omit the adjustment on a data set that was only somewhat more censored than the 85% detection guideline.

Had the normality issue been ignored and a UCL been computed around the untransformed arithmetic mean, the "UCL" would have been estimated as 0.401 mg/L, a value that is still below the 0.5 mg/L criterion.

Conclusion

The benzene TCLP data were found to be lognormally distributed. The sample geometric mean of the benzene TCLP data set was 0.082 mg/L. One can be 95% confident that the true geometric mean of these data is 0.159 mg/L or less. Therefore, the true mean TCLP concentration is expected to be less than 0.5 mg/L, the TCLP limit for benzene.

ARCADIS

Table 1. Calculation of the 95% Upper Confidence Limit of Benzene TCLP Results, Ashland Inc., Hattiesburg, Mississippi

Location	Original Benzene mg/L	Adjusted Benzene mg/L	Log-transformed Benzene mg/L
IBS-7-LS	1.3	1.3	0.2624
IBS-3-LS	0.96	0.96	-0.0408
IBS-1-US	0.55	0.55	-0.5978
IBS-1-LS	0.21	0.21	-1.5606
IBS-6-LS	0.14	0.14	-1.9661
IBS-2-LS	0.13	0.13	-2.0402
IBS-3-US	0.12	0.12	-2.1203
IBS-8-LS	0.1	0.1	-2.3026
IBS-2-US	0.058	0.058	-2.8473
IBS-4-LS	0.052	0.052	-2.9565
IBS-5-LS	0.043	0.043	-3.1466
IBS-4-US	0.038	0.038	-3.2702
IBS-5-US	0.025	0.025	-3.6889
IBS-6-US	<0.02	0.01	-4.6052
IBS-7-US	<0.02	0.01	-4.6052
IBS-8-US	<0.02	0.01	-4.6052
Sample mean		0.2348	-2.5057
Standard deviation		0.3784	1.5255
number		16	16
frequency		81.3%	81.3%
$t_{(n-1,0.95)}$		1.753	1.753
raw UCL			-1.837
UCL		0.401	**0.159**
median		0.079	
Coefficant of variation		1.61	-0.61
geometric mean		0.082	

Notes:

mg/L: milligrams per liter

Data were adjusted by replacing the non-detections with numerical values equal to half of the detection limit.

A natural logarithm was used for the transformation.

The term "raw UCL" refers to a UCL computed prior to the necessary step of inverse transformation.

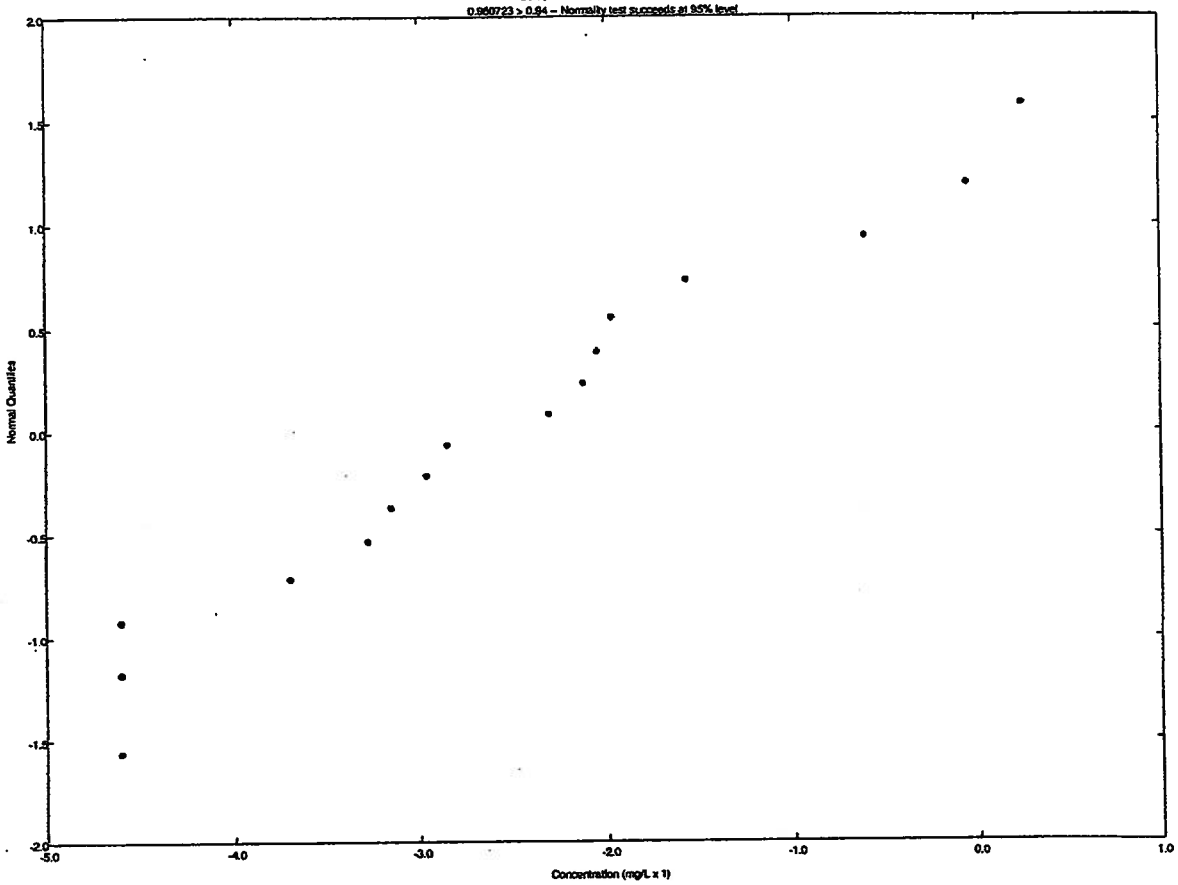
Because we care
100% recycled paper produced by wind power energy

Benzene

Probability Plot of Measured Values for All Wells

Correlation Coefficient = 0.980723

0.980723 > 0.94 – Normality test succeeds at 95% level



APPENDIX E

ARCADIS

Appendix E

POTW Effluent Discharge Calculations

Because we care
100% recycled paper produced by wind power energy

ARCADIS

Appendix E.

Summary of Potential POTW Effluent Data,
Hercules Incorporated, Hattiesburg, Mississippi.

POTW Discharge Permit Parameter	Discharge Limitations			Sample Results							Maximum Daily Discharge[1]	
	Quantity / Loading Average (Monthly Average)	Quantity / Loading Maximum (Daily Maximum)	Units	IBS-4 Centrifuge Centrate (250 ppm Anion Polymer) 6/23/2010	IBS-4 Centrifuge Centrate (250 ppm Cation Polymer) 6/23/2010	IBS-4 Centrifuge Centrate (No Polymer) 6/23/2010	IBS-4 Filter Press Filtrate 6/23/2010	IBS-4 Gravity Dewatering Liquid 6/23/2010	IBS-8 Filter Press Filtrate 6/23/2010	Units	Pounds of Parameter Per Gallon of Water Pounds	Maximum Amount of Water that Can be Discharged per Day Gallons
1,1,1-Trichloroethane Effluent	0.064	0.175	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA
1,1,2-Trichloroethane Effluent	0.093	0.371	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA
1,1-Dichloroethane Effluent	0.064	0.172	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA
1,1-Dichloroethylene Effluent	0.064	0.175	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA
1,2,4-Trichlorobenzene Effluent	0.572	2.32	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
1,2-Dichlorobenzene Effluent	0.572	2.32	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
1,2-Dichloroethane Effluent	0.525	1.68	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA
1,2-Dichloropropane Effluent	0.572	2.32	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA
1,2-Transdichloroethylene Effluent	0.073	0.193	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA
1,3-Dichlorobenzene Effluent	0.414	1.11	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
1,3-Dichloropropylene, cis Effluent[2]	0.572	2.32	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA
1,3-Dichloropropylene, trans Effluent[2]	0.572	2.32	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA
1,4-Dichlorobenzene Effluent	0.414	1.11	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
2-Nitrophenol Effluent	0.19	0.674	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
4,6-Dinitro-o-cresol Effluent	0.228	0.809	lbs/day	< 0.330	< 0.330	< 0.250	< 0.170	< 0.050	< 0.140	mg/L	NA	NA
4-Nitrophenol Effluent	0.473	1.68	lbs/day	< 0.330	< 0.330	< 0.250	< 0.170	< 0.050	< 0.140	mg/L	NA	NA
Acenaphthene Effluent	0.055	0.137	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
Anthracene Effluent	0.055	0.137	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
Benzene Effluent	0.166	0.391	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	**0.0013**	mg/L	1.08108E-07	3,616,754
Bis(2-ethylhexyl)phthalate Effluent	0.277	0.753	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
Carbon tetrachloride Effluent	0.414	1.11	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA
Chlorobenzene Effluent	0.414	1.11	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA
Chloroethane Effluent	0.321	0.861	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA
Chloroform Effluent	324	0.949	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA
Diethyl phthalate Effluent	0.134	0.33	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
Dimethyl phthalate Effluent	0.055	0.137	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
Di-N-Butyl Phthalate Effluent	0.058	0.126	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
Ethyl benzene Effluent	0.414	1.11	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA
Fluoranthene Effluent	0.064	0.158	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
Fluorene Effluent	0.055	0.137	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
Hexachlorobenzene Effluent	0.572	2.32	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
Hexachlorobutadiene Effluent	0.414	1.11	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
Hexachloroethane Effluent	0.572	2.32	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
Methyl Chloride (Chloromethane) Effluent	0.321	0.861	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA
Methylene Chloride Effluent	0.105	0.496	lbs/day	< 0.005	< 0.005	< 0.005	< 2.500	< 0.005	< 0.005	mg/L	NA	NA
Naphthalene Effluent	0.055	0.137	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA

ARCADIS

Appendix E. Summary of Potential POTW Effluent Data,
Hercules Incorporated, Hattiesburg, Mississippi.

POTW Discharge Permit Parameter	Discharge Limitations			Sample Results							Maximum Daily Discharge[1]	
	Quantity / Loading Average (Monthly Average)	Quantity / Loading Maximum (Daily Maximum)	Units	IBS-4 Centrifuge Centrate (250 ppm Anion Polymer) 6/23/2010	IBS-4 Centrifuge Centrate (250 ppm Cation Polymer) 6/23/2010	IBS-4 Centrifuge Centrate (No Polymer) 6/23/2010	IBS-4 Filter Press Filtrate 6/23/2010	IBS-4 Gravity Dewatering Liquid 6/23/2010	IBS-8 Filter Press Filtrate 6/23/2010	Units	Pounds of Parameter Per Gallon of Water Pounds	Maximum Amount of Water that Can be Discharged per Day Gallons
Nitro-Benzene Effluent	6.53	18.7	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
Phenanthrene Effluent	0.055	0.137	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
Pyrene Effluent	0.058	0.14	lbs/day	< 0.067	< 0.067	< 0.050	< 0.330	< 0.010	< 0.029	mg/L	NA	NA
Tetrachloroethylene Effluent	0.152	0.479	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA
Toluene Effluent	0.082	0.216	lbs/day	< 0.001	**0.00052 J**	< 0.001	**0.280 J**	< 0.001	**0.100**	mg/L	2.32848E-06	**92,764**
Trichloroethylene Effluent	0.076	0.201	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA
Vinyl chloride Effluent	0.283	0.502	lbs/day	< 0.001	< 0.001	< 0.001	< 0.500	< 0.001	< 0.001	mg/L	NA	NA

Maximum gallons per day that can be discharged within the current permit limitations.

(1) The MDEQ POTW Discharge Permit limitations are based on a loading rate. This rate does not take into consideration exceedances of RCRA toxicity characteristic levels. The discharge limitations presented herein area based on the assumption that all parameter concentrations remain below toxicity characteristic levels.

(2) The MDEQ POTW Discharge Permit lists a discharge limit for 1,3-Dichloropropylene. This limit was used for the cis- or trans- isomer listed.

J Estimated concentration.

lbs/day Pounds per day.

MDEQ Mississippi Department of Environmental Quality.

mg/L Milligrams per liter.

NA Not applicable.

POTW Publicly Owned Treatment Works.

RCRA Resource Conservation and Recovery Act.

APPENDIX F

ARCADIS

Appendix F

Dewatering Report

Because we care
100% recycled paper produced by wind power energy

ENVIRONMENTAL TMA®

TMA Environmental, Inc.
P.O. Box 150 • Gonzales, LA 70707-0150
Phone: 225.677.8800 • Fax: 225.673.9286

June 21, 2010

Mr. Craig Derouen
ARCADIS U.S. Inc.
10352 Plaza America
Baton Rouge, La 70816

Job No. 36810

Re: Sludge Dewatering Overview

TMA appreciates the opportunity to submit this information on the above referenced project.
We are a *"Total Service Company"* assuring our clients the value-added service necessary to meet their Chemical cleaning, Hydroblasting and Vacuum truck services needs in the most cost effective manner.

Overview:
TMA Environmental received 4 samples of sludge in 4 separate 5 gallon plastic buckets (with lids) to be studied for dewatering treatability and dewatering simulations performed. The 4 sample buckets were labeled IBS-2, IBS-4, IBS-8 and ETS-2.

We performed bench scale treatability studies and simulations to enable Arcadis to evaluate filter press, centrifuge and gravitational dewatering technologies. We evaluated the insitu sludge samples with a variety of test for physical data. The physical data was used for our evaluation of the different dewatering technologies, volume reductions and additives required for processing.

Before performing the testing and simulations the insitu sludge samples were thoroughly mixed. Each sample was mixed using an electrically powered drill and a five gallon paint mixer for a duration of 5 minutes each. The mixing achieved a homogenous mix ofthe flowable sludge, settled solids and clumped solids. The samples were remixed as needed before each test. No dilution was needed for mixing and no dilution was used for any testing.

As requested, the dewatering test and simulations included Baroid, plate and frame, centrifuge, and stacking (i.e.-gravity drainage or gravitational dewatering). Each technology study used a variety of chemicals, materials and dosages to arrive at the best results. Below or the results of each sample:

Baroid:
The Baroid equipment was used in conjunction with various filter media and chemical treatments to obtain an indication for the best result for the recessed chamber filter press simulation. Various dosages of diatomaceous earth, lime, ferric sulfate and combinations were used in the Baroid testing. All samples were also tested using no additives. Decisions were based on cake hardness, estimated % solids of filter cake, estimated minimal filter aid required, time required for dewatering/filtering, cleanliness of filter cloth and cleanliness of filtrate/effluent.
Our estimated best results were achieved by adding and mixing 0.5% by weight hydrated lime with the insitu sludge samples. Similar results were achieved on all 4 samples. Filter cake was firm, filter cloth remained clean and filtrate/effluent was good.
Basically all samples showed the ability to be filter pressed using D,E., lime, ferric and most combinations mentioned. Also, all samples showed the ability to be filter pressed without using any filter aid, although the cake was sticky which left filter cloth dirty.

Plate and Frame / Filter Press:
Filter press technology achieved the best results when considering volume and mass reduction. Also as expected, filter press technology achieved the best effluent of the dewatering technologies tested.
The filter press simulation samples were achieved using the insitu sludge, no dilution and 0.5% by weight of hydrated lime added. The filter cake definitely would pass paint filter testing. The filter cake was firm which should achieve a good compressive strength and suspended solids percentage. All 4 samples IBS-2, IBS-4, IBS-8 and ETS-2 were very similar in the testing and simulations.

Centrifuge:
Centrifuge technology is a very good candidate however the solids content would be lower than that of a filter press. The initial centrifuge simulation was run without chemical addition. The solids phase would definitely pass paint filter test but the centrate/effluent was not as clean as when polymer was not used.
The addition of polymer to enhance the solids/liquids separation process showed positive results in the centrate/effluent. The lab studies show a good two phase separation with very clean water. A minimal amount of light solids particles is noticed in the liquid phase (centrated/effluent).
The samples were jar tested for polymer dosage using cationic and anionic polymers of various charges (low, medium and high charge). The high charge cationic polymer showed the best estimated results based on solids percentage and cleanliness of the centrate/effluent.
Again, all 4 samples IBS-2, IBS-4, IBS-8 and ETS-2 were very similar in the testing and simulations.

Gravity Drainage (gravity dewatering/stacking)
Based upon the Arcadis recommended procedure for the "Stacking Simulation", this dewatering process also shows some positive results. The final solids phase from the study will pass the paint filter test without additional solidification. The liquid phase/effluent contained a reasonable amount of suspended solids. An addition of polymer could enhance solids settling and clean up the effluent.
Again, all 4 samples IBS-2, IBS-4, IBS-8 and ETS-2 were very similar in the testing and simulations.

Conclusion:
This material (all 4 samples) showed positive signs of dewatering by all the tested technologies.
All 4 samples showed very similar dewatering characteristics.

Once again, thank you for this opportunity to be of service to you. We look forward to your review of this testing study. Should you have any questions or require additional information, please do not hesitate to contact us.

For TMA Environmental

_____
Jody Elisar
Business Development Manager

TMA Environmental, Inc.
P.O. Box 150 • Gonzales, LA 70707-0150
Phone: 225.677.8800 • Fax: 225.673.9286

TEST	results	test performed	comments	time for test	effluent phase	solids phase
IBS-2 in situ	47	% In Situ solids by volume (spin-out)	Bench Test	2 minutes @ 100%		
	8.82	Lbs. per gallon in Situ	Bench Test			
	20% by weight	% Solids in Situ	Bench Test (oven)			pass paint filter
	same	In Situ Solids (Including Oil&Grease)	N/A		effluent not clear after spin-out	
IBS-2 centrifuge with						
250 ppm cationic	-	Dilution Factor	N/A			
polymer	31	% Solids by weight in Cake	Bench Test (oven)		sample sent to Arcadis	sample sent to Arcadis
	did not test	% solids in effluent	clarity good, light solids	2 minutes @ 100%	very light solids	
IBS-2 centrifuge with						
250 ppm anionic	-	Dilution Factor	N/A			
polymer	29	% Solids in Cake	Bench Test (oven)			
	did not test	% solids in effluent	clarity good, light solids	2 minutes @ 100%	light solid particles floating	
IBS-2 Baroid with no						
additives	-	Dilution Factor	N/A			
	40	% Solids in Cake	Bench Test (oven)		soft and sticks to cloth	pass paint filter
	did not test	% solids in effluent	effluent has some solids	4.75 minutes @ 80 psi	slight dark color	
IBS-2 Baroid with 1.0% by						
wt. diatomacous earth	-	Dilution Factor	N/A			
	52	% Solids in Cake	Bench Test (oven)	good cake, crumbles		
	did not test	% solids in effluent		3.0 minutes @ 80 psi	clear, no visible solids	clear, no visible solids
IBS-2 Baroid with 0.5% by						
wt. diatomacous earth	-	Dilution Factor	N/A			
	47	% Solids in Cake	Bench Test (oven)	good cake, slightly soft		
	did not test	% solids in effluent	clarity good, light solids	3.5 minutes @ 80 psi	clear, no visible solids	clear, no visible solids
IBS-2 Baroid with 1.0% by						
wt. hydrated lime	-	Dilution Factor	N/A			
	51	% Solids in Cake	Bench Test (oven)	good cake, firm		good cake, very firm
	did not test	% solids in effluent	clarity good, light solids	3.0 minutes @ 80 psi	clear, no visible solids	
IBS-2 Baroid with 0.5% by						
wt. hydrated lime	-	Dilution Factor	N/A			
	49	% Solids in Cake	Bench Test (oven)	sample sent to Arcadis		good cake, firm
	did not test	% solids in effluent	clarity good	3.25 minutes @ 80 psi	sample sent to Arcadis	
IBS-2 Baroid with 1.0% by						
wt. hydrated lime	-	Dilution Factor	N/A			
& 0.5% ferric sulfate	51	% Solids in Cake	Bench Test (oven)	fair cake, soft on top		
	did not test	% solids in effluent	clarity good, light solids	4.0 minutes @ 80 psi	slight dark color, no visible solids	

TMA Environmental, Inc.
P.O. Box 150 • Gonzales, LA 70707-0150
Phone: 225.677.8800 • Fax: 225.673.9286

TEST	results	test performed	comments	time for test	effluent phase	solids phase
IBS-2 Baroid with 0.5% by						
wt. hydrated lime	-	Dilution Factor	N/A			
& 0.5% ferric sulfate	45	% Solids in Cake	Bench Test (oven)	fair cake, soft on top		fair cake
	did not test	% solids in effluent	clarity good, light solids	4.0 minutes @ 80 psi	slight color, no visible solids	
IBS-2 filter press with 0.5% by						
wt. hydrated lime	-	Dilution Factor	N/A			
	55	% Solids in Cake	Bench Test (oven)	sample sent to Arcadis		good cake, firm
	did not test	% solids in effluent	clarity good	5.5 minutes @ 120 psi	sample sent to Arcadis	
IBS-2						
gravity dewatering				4.5 days	sample sent to Arcadis	sample sent to Arcadis

TMA Environmental, Inc.
P.O. Box 150 • Gonzales, LA 70707-0150
Phone: 225.677.8800 • Fax: 225.673.9286

TEST	results	test performed	comments	time for test	effluent phase	solids phase
IBS-4 in situ	47	% In Situ solids by volume (spin-out)	Bench Test	2 minutes @ 100%		
	8.82	Lbs. per gallon In Situ	Bench Test			
	18% by weight	% Solids In Situ	Bench Test (oven)			pass paint filter
IBS-4 centrifuge with 250 ppm cationic polymer						
	-	Dilution Factor	N/A			
	34	% Solids by weight in Cake	Bench Test (oven)		sample sent to Arcadis	sample sent to Arcadis
	did not test	% solids in effluent	clarity good, light solids	2 minutes @ 100%	light solids on bottom	
IBS-4 centrifuge with 250 ppm anionic polymer						
	-	Dilution Factor	N/A			
	33	% Solids in Cake	Bench Test (oven)		sample sent to Arcadis	sample sent to Arcadis
	did not test	% solids in effluent	clarity good, light solids	2 minutes @ 100%	light solids floating	
IBS-4 Baroid with no additives						
	-	Dilution Factor	N/A			
	40	% Solids in Cake	Bench Test (oven)		soft and slightly sticky	pass paint filter
	did not test	% solids in effluent	effluent has some solids	4.75 minutes @ 80 psi	slight dark color	
IBS-4 Baroid with 1.0% by wt. diatomacous earth						
	-	Dilution Factor	N/A			
	50	% Solids in Cake	Bench Test (oven)	good cake, crumbles		
	did not test	% solids in effluent		3.0 minutes @ 80 psi	clear, no viisible solids	clear, no visible solids
IBS-4 Baroid with 0.5% by wt. diatomacous earth						
	-	Dilution Factor	N/A			
	47	% Solids in Cake	Bench Test (oven)	good cake, slightly soft		
	did not test	% solids in effluent	clarity good, light solids	3.5 minutes @ 80 psi	clear, no visible solids	clear, no visible solids
IBS-4 Baroid with 1.0% by wt. hydrated lime						
	-	Dilution Factor	N/A			
	61	% Solids in Cake	Bench Test (oven)	good cake, firm		
	did not test	% solids in effluent	clarity good, light solids	3.0 minutes @ 80 psi	clear, no visible solids	clear, no visible solids
IBS-4 Baroid with 0.5% by wt. hydrated lime						
	-	Dilution Factor	N/A			
	62	% Solids in Cake	Bench Test (oven)		good cake, firm	
	did not test	% solids in effluent	clarity good	3.25 minutes @ 80 psi		clear, no visible solids
IBS-4 Baroid with 1.0% by wt. hydrated lime & 0.5% ferric sulfate						
	-	Dilution Factor	N/A			
	did not test	% Solids in Cake		fair cake, soft on top		
	did not test	% solids in effluent	clarity good, light solids	4.5 minutes @ 80 psi	slight dark color, no visible solids	clear, no visible solids

TMA Environmental, Inc.
P.O. Box 150 • Gonzales, LA 70707-0150
Phone: 225.677.8800 • Fax: 225.673.9286

TEST	results	test performed	comments	time for test	effluent phase	solids phase
IBS-4 Baroid with 0.5% by						
wt. hydrated lime	-	Dilution Factor	N/A			
& 0.5% ferric sulfate	did not test	% Solids in Cake		fair cake, soft on top		
	did not test	% solids in effluent	clarity good, light solids	4.5 minutes @ 80 psi		clear, no visible solids
IBS-4 filter press with 0.5% by						
wt. hydrated lime	-	Dilution Factor	N/A			
	62	% Solids in Cake	Bench Test (oven)	sample sent to Arcadis		good cake, firm
	did not test	% solids in effluent	clarity good	5.5 minutes @ 120 psi	sample sent to Arcadis	
IBS-4						
gravity dewatering				4.5 days	sample sent to Arcadis	sample sent to Arcadis

TMA Environmental, Inc.
P.O. Box 150 • Gonzales, LA 70707-0150
Phone: 225.677.8800 • Fax: 225.673.9286

TEST	results	test performed	comments	time for test	effluent phase	solids phase
IBS-8 In situ	44	% In Situ solids by volume (spin-out)	Bench Test	2 minutes @ 100%		
	8.90	Lbs. per gallon In Situ	Bench Test			
	17%	% Solids In Situ	Bench Test (oven)			pass paint filter
	same	In Situ Solids (Including Oil&Grease)	N/A		effluent not clear after spin-out	
IBS-8 centrifuge with						
250 ppm cationic	-	Dilution Factor	N/A			
polymer	28	% Solids by weight in Cake	Bench Test (oven)		sample sent to Arcadis	sample sent to Arcadis
	did not test	% solids in effluent	clarity good, light solids	2 minutes @ 100%	light solids on bottom	
IBS-8 centrifuge with						
250 ppm anionic	-	Dilution Factor	N/A			
polymer	28	% Solids in Cake	Bench Test (oven)			
	did not test	% solids in effluent	clarity good, light solids	2 minutes @ 100%	light solids floating	
IBS-8 Baroid with no						
additives	-	Dilution Factor	N/A			
	42	% Solids in Cake	Bench Test (oven)		soft and slightly sticky	
	did not test	% solids in effluent	effluent has some solids	6.0 minutes @ 80 psi	slight dark color	
IBS-8 Baroid with 1.0% by						
wt. diatomacous earth	-	Dilution Factor	N/A			
	56	% Solids in Cake	Bench Test (oven)	good cake, crumbles		
	did not test	% solids in effluent		4.0 minutes @ 80 psi	clear, no viisible solids	clear, no visible solids
IBS-8 Baroid with 0.5% by						
wt. diatomacous earth	-	Dilution Factor	N/A			
	49	% Solids in Cake	Bench Test (oven)	good cake, slightly soft		
	did not test	% solids in effluent	clarity good, light solids	4.25 minutes @ 80 psi	clear, no visible solids	clear, no visible solids
IBS-8 Baroid with 1.0% by						
wt. hydrated lime	-	Dilution Factor	N/A			
	60	% Solids in Cake	Bench Test (oven)	good cake, firm		
	did not test	% solids in effluent	clarity good, light solids	3.5 minutes @ 80 psi	clear, no visible solids	clear, no visible solids
IBS-8 Baroid with 0.5% by						
wt. hydrated lime	-	Dilution Factor	N/A			
	56	% Solids in Cake	Bench Test (oven)	sample sent to Arcadis	good cake, firm	
	did not test	% solids in effluent	clarity good	4.0 minutes @ 80 psi	sample sent to Arcadis	clear, no visible solids
IBS-8 Baroid with 1.0% by						
wt. hydrated lime	-	Dilution Factor	N/A			
& 0.5% ferric sulfate	56	% Solids in Cake	Bench Test (oven)	fair cake, soft on top		
	did not test	% solids in effluent	clarity good, light solids	4.0 minutes @ 80 psi	slight dark color, no visible solids	clear, no visible solids

TMA Environmental, Inc.
P.O. Box 150 • Gonzales, LA 70707-0150
Phone: 225.677.8800 • Fax: 225.673.9286

TEST	results	test performed	comments	time for test	effluent phase	solids phase
IBS-8 Baroid with 0.5% by						
wt. hydrated lime	-	Dilution Factor	N/A			
& 0.5% ferric sulfate	55	% Solids in Cake	Bench Test (oven)	fair cake, soft on top		
	did not test	% solids in effluent	clarity good, light solids	4.0 minutes @ 80 psi		clear, no visible solids
IBS-8 filter press with 0.5% by						
wt. hydrated lime	-	Dilution Factor	N/A			
	62	% Solids in Cake	Bench Test (oven)	sample sent to Arcadis		good cake, firm
	did not test	% solids in effluent	clarity good	5.5 minutes @ 120 psi	sample sent to Arcadis	
IBS-8						
gravity dewatering				4.5 days	sample sent to Arcadis	sample sent to Arcadis

TMA Environmental, Inc.
P.O. Box 150 • Gonzales, LA 70707-0150
Phone: 225.677.8800 • Fax: 225.673.9286

TEST	results	test performed	comments	time for test	effluent phase	solids phase
ETS-2 in situ	33	% In Situ solids by volume (spin-out)	Bench Test	2 minutes @ 100%		
	8.90	Lbs. per gallon In Situ	Bench Test			pass paint filter
	12% by weight	% Solids In Situ	Bench Test (oven)		effluent not clear after spin-out	
	same	In Situ Solids (Including Oil&Grease)	N/A			
ETS-2 centrifuge with						
250 ppm cationic	-	Dilution Factor	N/A			
polymer	28	% Solids by weight in Cake	Bench Test (oven)		sample sent to Arcadis	sample sent to Arcadis
	did not test	% solids in effluent	clarity good, light solids	2 minutes @ 100%	light solids on bottom	
ETS-2 centrifuge with						
250 ppm anionic	-	Dilution Factor	N/A			
polymer	24	% Solids in Cake	Bench Test (oven)			
	did not test	% solids in effluent	clarity good, light solids	2 minutes @ 100%	light solids floating	
ETS-2 Baroid with no						
additives	-	Dilution Factor	N/A			
	39	% Solids in Cake	Bench Test (oven)		soft and slightly sticky	
	did not test	% solids in effluent	effluent has some solids	4.75 minutes @ 80 psi	slight dark color	
ETS-2 Baroid with 1.0% by						
wt. diatomacous earth	-	Dilution Factor	N/A			
	55	% Solids In Cake	Bench Test (oven)	good cake, crumbles		
	did not test	% solids in effluent		3.0 minutes @ 80 psi	clear, no viisible solids	clear, no visible solids
ETS-2 Baroid with 0.5% by						
wt. diatomacous earth	-	Dilution Factor	N/A			
	55	% Solids in Cake	Bench Test (oven)	good cake, slightly soft		
	did not test	% solids in effluent	clarity good, light solids	3.5 minutes @ 80 psi	clear, no visible solids	clear, no visible solids
ETS-2 Baroid with 1.0% by						
wt. hydrated lime	-	Dilution Factor	N/A			
	52	% Solids In Cake	Bench Test (oven)	good cake, firm		
	did not test	% solids in effluent	clarity good, light solids	3.0 minutes @ 80 psi	clear, no visible solids	clear, no visible solids
ETS-2 Baroid with 0.5% by						
wt. hydrated lime	-	Dilution Factor	N/A			
	46	% Solids in Cake	Bench Test (oven)		good cake, firm	sample sent to Arcadis
	did not test	% solids in effluent	clarity good	3.25 minutes @ 80 psi	sample sent to Arcadis	clear, no visible solids
ETS-2 Baroid with 1.0% by						
wt. hydrated lime	-	Dilution Factor	N/A			
& 0.5% ferric sulfate	48	% Solids in Cake	Bench Test (oven)	fair cake, soft on top		
	did not test	% solids in effluent	clarity good, light solids	4.0 minutes @ 80 psi	slight dark color, no visible solids	clear, no visible solids

TMA Environmental, Inc.
P.O. Box 150 • Gonzales, LA 70707-0150
Phone: 225.677.8800 • Fax: 225.673.9286

TEST	results	test performed	comments	time for test	effluent phase	solids phase
ETS-2 Baroid with 0.5% by						
wt. hydrated lime	-	Dilution Factor	N/A			
& 0.5% ferric sulfate	45	% Solids in Cake	Bench Test (oven)	fair cake, soft on top		
	did not test	% solids in effluent	clarity good, light solids	4.0 minutes @ 80 psi		clear, no visible solids
ETS-2 filter press with 0.5% by						
wt. hydrated lime	-	Dilution Factor	N/A			
	50	% Solids in Cake	Bench Test (oven)		good firm cake	sample sent to Arcadis
	did not test	% solids in effluent	clarity good	7.0 minutes @ 120 psi	sample sent to Arcadis	
ETS-2						
gravity dewatering				4.5 days	sample sent to Arcadis	sample sent to Arcadis

APPENDIX G

ARCADIS

Appendix G

Solidification Report

Because we care
100% recycled paper produced by wind power energy

FUGRO CONSULTANTS, INC.

4233 Rhoda Drive
Baton Rouge, Louisiana 70816
Tel: 225-292-5084
Fax: 225-292-8084

August 09, 2010

Mr. Craig Derouen
Arcadis
10352 Plaza Americana Drive
Baton Rouge, LA 70816

Re: Sludge Mix Design
Hercules, Inc.
Hattiesburg, MS
Fugro Project Number: 04.55101011

Mr. Derouen:

We have completed the mix study of the onsite sludge of the referenced site. Attached are Tables 1 and 2 of our findings.

If you have any questions regarding this information, please contact me at (225) 292-5084.

It has been a pleasure servicing you and Arcadis on this project.

Sincerely,

George Perkins
CMET Manager

GLP/kkb

Enclosure

Hercules, Inc. Solidification Study

Raw Sludge Data
Table 1

ARCADIS
Hercules, Inc. - Hattiesburg, MS

Date: 7/22/2010

Fugro Project Number: 04.55101011

Sludge Type	Moisture Content (%)[1]	Specific Gravity	Bulk Density (pcf)	Paint Filter (P/F)	% Solids
ETS-2	87.2	1.03	62.0	FAIL	12.8
IBS-2	84.8	0.99	61.0	FAIL	15.2
IBS-4	83.8	1.03	62.5	FAIL	16.2
IBS-8	90.0	1.01	63.0	FAIL	10.0

Raw Sludge After Dewatering

Sludge Type	Moisture Content (%)[1]	Type of Dewatering	Bulk Density (pcf)	Paint Filter (P/F)	% Solids
ETS	83.9	Gravity	54.2	FAIL	16.1
ETS	76.2	Centrifuge	53.2	PASS	23.8
ETS	58.0	Filter Press	66.1	PASS	42.0
IBS-4	59.0	Gravity	-	PASS	41.0
IBS-2	66.5	Gravity	56.7	PASS	33.5
IBS-2	52.0	Filter Press	61.7	PASS	48.0
IBS-2	65.5	Centrifuge	62.9	PASS	34.5

Note: [1] Moisture content based on the total weight of sample

4233 Rhoda Drive
Baton Rouge, LA 70816

Hercules, Inc. Solidification Study

Sludge Reagent Data
Table 2

ARCADIS
Hercules, Inc. - Hattiesburg, MS

Date: 7/26/2010

Fugro Project Number: 04.55101011

Sludge Type	Mix Number	Reagent Type	Reagent (%)	Days Cured	Bulk Density (pcf)[1]	Compressive Strength (psi)	Paint Filter P/F	After 3 day cure P/F
IBS-2	1-A	Portland Cement	5	3	58.5	0.264	Fail	Pass
	1-B	Portland Cement	5	7	58.5	0.64	Fail	Pass
	2-A	Portland Cement	10	3	61.0	1.78	Fail	Pass
	2-B	Portland Cement	10	7	61	3.36	Fail	Pass
	3-A	Quick Lime	5	3	58.6	(2)	Fail	Fail
	4-A	Quick Lime	10	3	60.4	(2)	Fail	Pass
	4-B	Quick Lime	10	7	60.4	0.61	Fail	Pass
	5-A	Fly Ash	15	3	61.3	(2)	Fail	Fail
	6-A	Fly Ash	25	3	68.7	0.320	Fail	Pass
	6-B	Fly Ash	25	7	68.7	1.02	Fail	Pass
	7-A	Quick Lime	25	3	66.9	6.50	Pass	Pass
	7-B	Quick Lime	25	7	66.9	13.6	Pass	Pass
	8-A	Calciment	10	3	63.1	0.44	Fail	Fail
	8-B	Calciment	10	-	62.5	-	Fail	-
	9-A	Calciment	20	3	69.1	3.54	Fail	Pass
	9-B	Calciment	20	-	69.7	-	Fail	-

Notes:
(1) Bulk density at time of molding
(2) Slumped under own weight
(3) Reagent % is by volume

4233 Rhoda Drive
Baton Rouge, LA 70816

NO CHANGE

ARCADIS
Infrastructure, environment, buildings

ID#:

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

Page 1 of 1

Lab Work Order #

Send Results to:

Contact & Company Name: ARCADIS Craig Derouen
Telephone:
Address: 10352 Plaza Americana Dr
Fax:
City: BR State: LA Zip: 70816
E-mail Address: craig.derouen@arcadis-us.com
Project Name/Location (City, State): Hercules / Hattiesburg, MS
Project #: DH003000.MS24.00002
Sampler's Printed Name: Craig A. Derouen
Sampler's Signature: [signature]

Preservative	—	—	—	—	—	—	
Filtered (✓)	—	—	—	—	—	—	
# of Containers	1	1	1	1	1	1	
Container Information							

Keys

Preservation Key:
A. H_2SO_4
B. HCL
C. HNO_3
D. NaOH
E. None
F. Other: _____
G. Other: _____
H. Other: _____

Container Information Key:
1. 40 ml Vial
2. 1 L Amber
3. 250 ml Plastic
4. 500 ml Plastic
5. Encore
6. 2 oz. Glass
7. 4 oz. Glass
8. 8 oz. Glass
9. Other: _____
10. Other: _____

Matrix Key:
SO - Soil, SE - Sediment, NL - NAPL/Oil
W - Water, SL - Sludge, SW - Sample Wipe
T - Tissue, A - Air, Other: _____

PARAMETER ANALYSIS & METHOD

Sample ID	Collection Date	Collection Time	Type (✓) Comp	Type (✓) Grab	Matrix	Paint Filter	Moisture Content	% and suspended solids	specific gravity	bulk density	UCS		REMARKS
ETS-2 (Filter Press)	6-23-10	1320		✓	SL	1	1	1	1	1	1		
ETS-2 (Centrifuge)	6-23-10	1320		✓	SL	1	1	1	1	1	1		
ETS-2 (Gravity Decanting)	6-23-10	1320		✓	SL	1	1	1	1	1	1		

Special Instructions/Comments:

☐ Special QA/QC Instructions(✓):

Laboratory Information and Receipt		Relinquished By	Received By	Relinquished By	Laboratory Received By
Lab Name: Fugro Consultants	Cooler Custody Seal (✓)	Printed Name: Craig Derouen	Printed Name:	Printed Name:	Printed Name: George Perkins
☐ Cooler packed with ice (✓)	☐ Intact ☐ Not Intact	Signature: [signature]	Signature:	Signature:	Signature: [signature]
Specify Turnaround Requirements: std.	Sample Receipt:	Firm:	Firm/Courier:	Firm/Courier:	Firm:
Shipping Tracking #:	Condition/Cooler Temp: _____	Date/Time: 6-23-10 / 1403	Date/Time:	Date/Time:	Date/Time: 6-23-10 / 1403

20730826 CofC AR Form 01.12.2007

Distribution: WHITE – Laboratory returns with results YELLOW – Lab copy PINK – Retained by ARCADIS

APPENDIX H

ARCADIS

Appendix H

Feasibility Evaluation Matrix

Because we care
100% recycled paper produced by wind power energy

Appendix H. Feasibility Evaluation Matrix, Sludge Characterization and Bench Scale Treatability Report, Hercules Incorporated, Hattiesburg, Mississippi.

Technology / Feasibility Criteria	Centrifuge Dewatering with Off-Site Disposal	Filter Press with Off-Site Disposal	Gravity Dewatering with Off-Site Disposal	Solidification with Off-Site Disposal	Solidification with On-Site Capping
Effectiveness	Effective long term. Removes sludge of concern from site.	Effective long term. Removes sludge of concern from site.	Effective long term. Removes sludge of concern from site.	Effective long term. Removes sludge of concern from site.	Not effective. Does not alleviate problem.
Implementability	Electrical power source and specialty equipment required. Not weather dependent. Shortest duration. Implementable.	Electrical power source and specialty equipment required. Mechanical processing is not weather dependent. Should be faster than non-mechanical technologies. Shortest duration. Implementable.	No electrical power source required. Can be accomplished with standard construction equipment. May require construction of dewatering cell(s). Technology is weather dependent. Longest duration. Implementable.	No electrical power source required. Can be accomplished with standard construction equipment. Reagent addition required. Technology is weather dependent. Moderate duration. Implementable.	Not implementable.

APPENDIX I

ARCADIS

Appendix I

IB Decommissioning Work Plan

Because we care
100% recycled paper produced by wind power energy

ARCADIS

Infrastructure, environment, buildings

Imagine the result

HERCULES

Impoundment Basin Decommissioning Work Plan

Hattiesburg, Mississippi

20 August 2010

ARCADIS

Impoundment Basin Decommissioning Work Plan

Hattiesburg, Mississippi

Craig A. Derouen, P.E.
Senior Engineer

John Ellis, P.G.
Principal Scientist/Geologist

David R. Escudé, P.E.
Vice President/Principal Engineer

Prepared for:
Hercules Incorporated

Prepared by:
ARCADIS U.S., Inc.
10352 Plaza Americana Drive
Baton Rouge
Louisiana 70816
Tel 225 292 1004
Fax 225 218 9677

Our Ref.:
OH003000.MS24.00002

Date:
20 August 2010

This document is intended only for the use of the individual or entity for which it was prepared and may contain information that is privileged, confidential, and exempt from disclosure under applicable law. Any dissemination, distribution, or copying of this document is strictly prohibited.

Table of Contents

1. Introduction **1**

2. Decommissioning Method **1**

2.1 Pre-Decommissioning Activities 1

2.2 Dewatering Cell Construction 1

2.3 Dewatering Methodology 2

2.4 Backfill Activities 3

2.5 Site Restoration 3

3. Reporting **3**

4. Post-Decommissioning **3**

Figures

1 Site Location Map

2 Potential Dewatering Locations

FINAL

1. Introduction

ARCADIS U.S., Inc. (ARCADIS), submitted the *Sludge Characterization and Bench Scale Treatability Report* (C&T Report) to Hercules Incorporated, (Hercules). Hercules will submit the C&T Report to the Mississippi Department of Environmental Quality (MDEQ). The C&T Report presents the results of a bench scale treatability effort conducted to determine an effective and implementable strategy for decommissioning of the on-site impoundment basin (IB) located at Hercules' 613 West 7th Street facility in Hattiesburg, Mississippi (Figure 1). The C&T Report recommends that the IB sludge be gravity dewatered and disposed off site as a non-hazardous material and the IB backfilled to grade. In the event that another viable option is identified by the implementation contractors as more cost effective, Hercules may implement that option to decommission the IB. This work plan presents the methodology for implementing the decommissioning of the IB using gravity dewatering.

2. Decommissioning Method

2.1 Pre-Decommissioning Activities

Decommissioning of the IB must be approved by MDEQ. Hercules will work with MDEQ to obtain the necessary approvals.

Throughout the process of removing and dewatering the sludge, water originating from the IB will be discharged to the Publicly Owned Treatment Works (POTW) as needed. Hercules will communicate with the POTW so they are aware of the decommissioning activities.

Prior to implementation of the decommissioning, an approved waste disposal profile will be obtained from the Pine Belt Regional Landfill (landfill) using the current sludge data.

2.2 Dewatering Cell Construction

Treatment of the IB sludge will be accomplished through gravity dewatering. Dewatering cells will be constructed on available open space in the vicinity of the IB. Figure 2 shows proposed locations for up to three dewatering cells. It is anticipated that decommissioning can be implemented using two dewatering cells, with the third location identified as a contingency to be used only if required. The subgrade for each dewatering cell will be prepared by using soil from the existing backfill stockpile located

FINAL

west of the IB. This material will be placed and graded at a 2% slope to promote drainage of the water from the sludge back to the IB. This drained water will flow directly to the IB from the West Cell, through a grated drain pipe directly to the IB from the South Cell, or via a concrete-lined ditch from the North Cell. The concrete-lined ditch discharges to the facility's industrial sewer. This sewer is currently covered by Hercules' permit.

A 24-inch soil berm will be built to surround each dewatering cell. The exterior and interior berms of the prepared subgrade will be lined with a 20-mil plastic liner (high density polyethylene [HDPE], or approved equivalent). A geosynthetic drainage composite (GDC) will be placed over the plastic liner. Both the plastic liner and GDC will be placed so that gravity drainage allows water released from the sludge to flow directly into the basin, grated drain piped to the IB, or the concrete-lined ditch, as appropriate. To protect the liner and GDC, 6 inches of rounded stone, or sand, will be placed over the GDC.

2.3 Dewatering Methodology

Sludge will be pumped or removed with a bucket excavator onto the upper surface in each dewatering cell until the cell is filled to within 6 inches of the top of the berm. The sludge will be allowed to dewater until it passes the Paint Filter Liquids Test (USEPA Method 9095A). Multiple applications of sludge to each cell will be necessary to dewater the entire volume of sludge in the IB. In the event that the primary decommissioning method cannot be implemented or is not effective at achieving sufficient dewatering to pass the Paint Filter Liquids Test, the partially dewatered IB sludge will be solidified with Portland cement or quick lime and transported off site for disposal. The dewatered sludge will be loaded for off-site transport to Pine Belt Regional Landfill, a municipal solid waste landfill site. Prior to disposal at the facility, an approved profile will be obtained.

Sludge will be removed from the IB until visual evidence indicates that all sludge has been removed and native soil remains on the bottom of the IB. It is anticipated that an additional 6 inches of native soil from the bottom of the IB will be removed, transported to, and disposed of at the landfill as part of this sludge removal process.

During dewatering, air monitoring will be conducted. In the event that nuisance odors are detected, an odor suppressant may be applied to the dewatering cell.

FINAL

2.4 Backfill Activities

Once it has been confirmed that sludge has been removed, the dewatering cells will be removed. All of the material above (stone or sand layer and GDC) and including the plastic liner will be disposed of at the landfill. The soils used to construct the subgrade and berms for the dewatering cells will be excavated and used as backfill material, along with any soil remaining in the stockpile west of the IB. Once these sources have been depleted, additional fill will be imported and placed in the IB. Dewatering of the IB will be conducted concurrently with backfilling, if necessary.

2.5 Site Restoration

The filled basin and dewatering cells will be graded to promote positive drainage to existing surface water conveyances. Disturbed areas will be seeded with a native grass species and fertilized. After fertilization, all project equipment will be demobilized from the site.

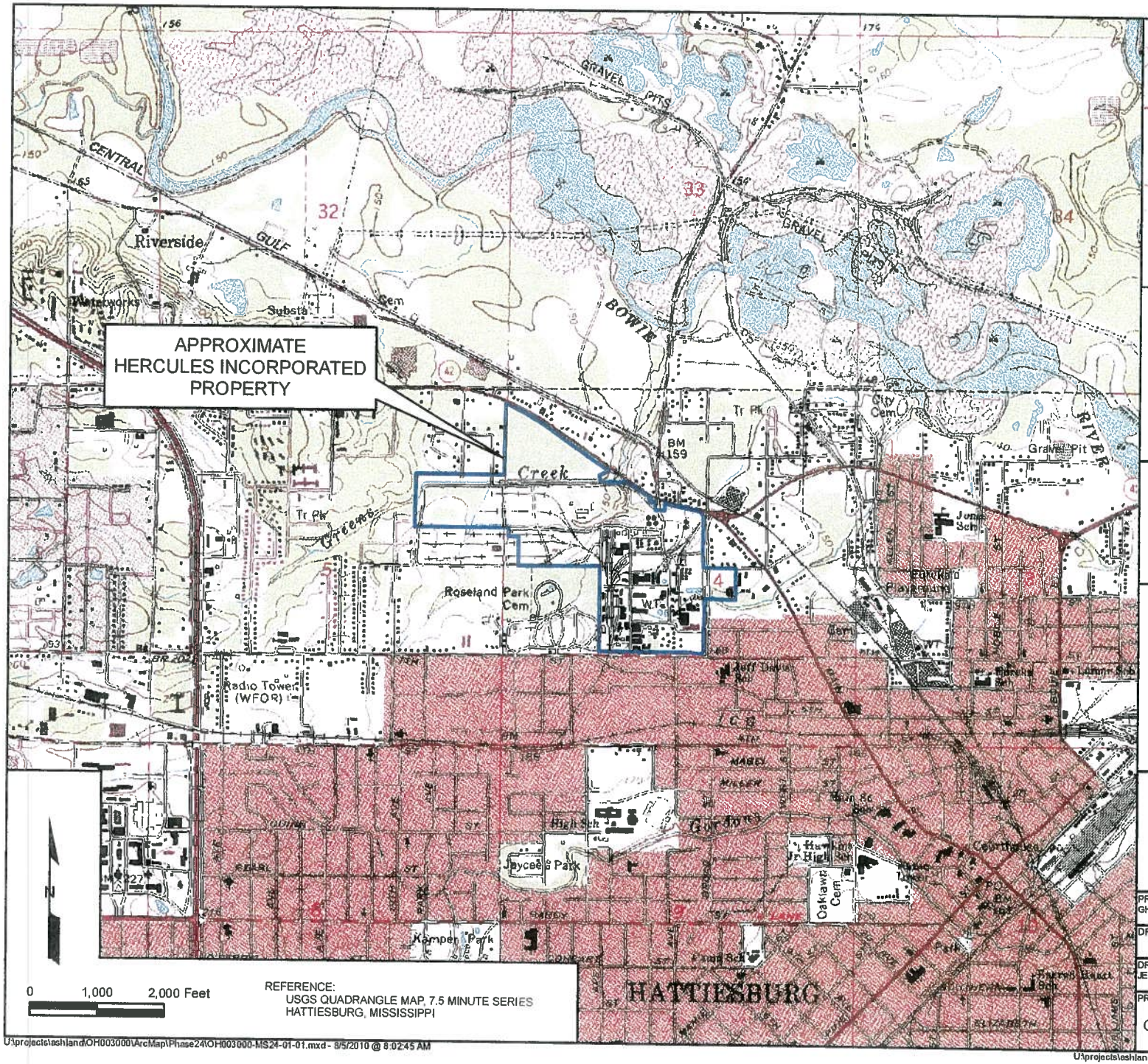
3. Reporting

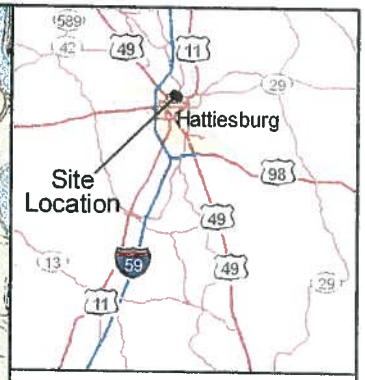
Upon completion of decommissioning activities, a Decommissioning Certification Report will be submitted to MDEQ. The report will document the activities undertaken to decommission the IB and request no further action status for the IB sludge.

4. Post-Decommissioning

Post-decommissioning activities related to the IB sludge are not anticipated because of the removal action. The on-site groundwater monitor wells currently surrounding the IB will be left in place to facilitate future groundwater monitoring activities conducted under the Restrictive Use Agreed Order in place for this property.

FINAL





SITE LOCATION MAP

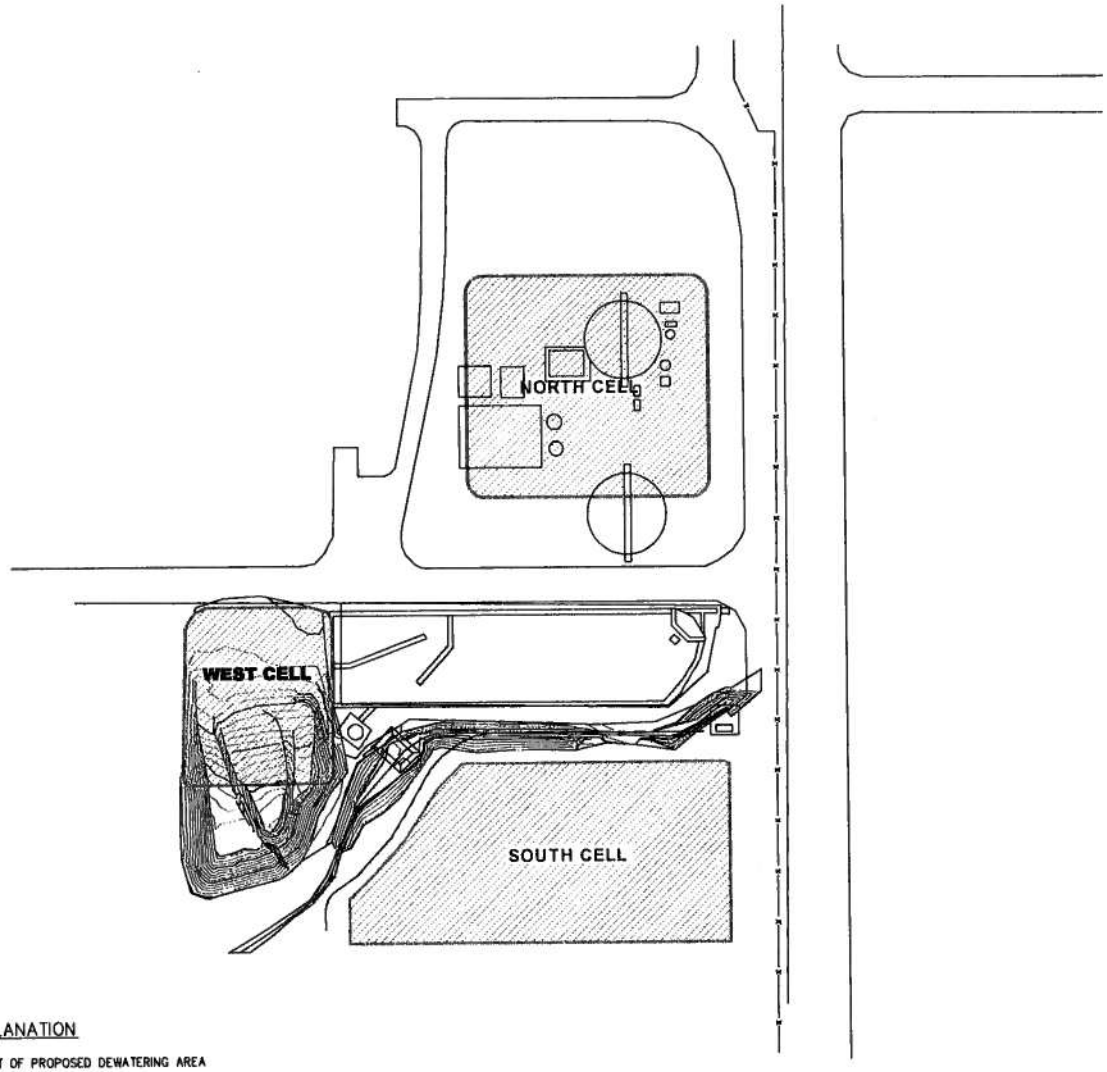
INVESTIGATION AREA
HERCULES INCORPORATED
Hattiesburg, Mississippi

ARCADIS
10352 PLAZA AMERICANA DRIVE
BATON ROUGE, LA 70816
TEL: 225-292-1004
FAX: 225-218-9677
WWW.ARCADIS-US.COM

PROJECT MANAGER: GHC	CHECKED BY: CD
DRAWING FILE:	GIS FILE:
DRAWING BY: JEC	DATE: 08/05/2010
PROJECT NUMBER: OH003000.MS24	FIGURE NUMBER: 1

U:\projects\ashland\OH003000\ArcMap\Phase24\OH003000-MS24-01-01.mxd - 8/5/2010 @ 8:02:45 AM

U:\projects\ashland\OH003000\plotfiles\Phase24\OH003000-MS24-01-01.pdf



EXPLANATION

EXTENT OF PROPOSED DEWATERING AREA

0 40' 80'

Hercules Incorporated
IB Basin Closure Work Plan
Hattiesburg, Mississippi

POTENTIAL DEWATERING LOCATIONS

ARCADIS

FIGURE 2