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HERCULES

Phase I Sampling and Analysis Work Plan

USEPA RCRA 3013(a)
Administrative Order
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Docket No. RCRA-04-2011-4251
MDEQ AI No. 2022

Hattiesburg, Mississippi

14 July 2011

ARCADIS

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1. Introduction

Hercules Incorporated (Hercules) submits this Phase I Sampling and Analysis Work Plan (Work Plan) pursuant to Paragraph 74 of the May 9, 2011, Administrative Order (the AO) issued by Region 4 of the United States Environmental Protection Agency (USEPA). The AO was issued pursuant to Section 3013(a) of the Resource Conservation and Recovery Act, 42 United States Code §6934(a), and is specific to Hercules' Hattiesburg, Mississippi, site (referred to as the "Site" or the "former Hercules Plant" herein). As discussed during the June 9, 2011, meeting, components of the Phase II activities, as required in Paragraph 75 of the AO, are also addressed in this Work Plan. Specifically, a portion of the groundwater assessment identified as part of Phase II will be conducted under Phase I as required to properly assess the potential migration of Site-related constituents to off-site properties because this may affect the soil gas and indoor air.

1.1 Purpose and Scope

The scope of the AO, and the activities required under the AO, including implementation of the Work Plan, is limited to assessing the presence, magnitude, extent, direction, and rate of movement of the constituents to be monitored under the AO (the "Constituents"). The Work Plan approach includes incorporating and utilizing existing sampling data previously collected as part of Site-related assessments conducted in the area by Hercules, USEPA, or the State of Mississippi (the State) that relate to the purposes of the AO, including assessments to characterize the source(s) of Constituents, characterize the potential pathways of migration of Constituents, define the degree and extent of the presence of any Constituents, and identify actual or potential human and/or ecological receptors. Detected Constituents will be investigated to determine the nature and extent of these Constituents relative to any identified or potential human or ecological receptors.

2. Background

The Hercules Hattiesburg facility began operations in 1923. Throughout the facility's history the operations consisted of extracting and/or working with rosins to produce rosin derivatives, paper chemicals, and Delnav, an agricultural insecticide (miticide). Structures at the Site included offices, a laboratory, a powerhouse, production buildings, a wastewater treatment plant, settling ponds, a landfill, and central loading and packaging areas. The plant began to reduce production in the 1980s. Process operations at the Site were shut down at the end of 2009. Many of the former plant

buildings have been demolished. Hercules has had air, storm water, National Pollutant Discharge Elimination System, and State of Mississippi-issued Water Pollution Control (pre-treatment) permits that covered discharges from the Site when it was in operation. Hercules continues to conduct sampling and reporting activities associated with storm water and pre-treatment discharges.

As part of plant demolition and decommissioning activities, Hercules has been working with the Mississippi Department of Environmental Quality (MDEQ) to decommission the on-site wastewater treatment impoundment basin (IB) and is awaiting approval of the August 2010 IB Decommissioning Work Plan (ARCADIS 2010).

Various environmental investigations have been conducted at the Hercules Site since the early 1980s. The work has included geophysical investigations and sampling of soil, groundwater, surface water (Green's Creek), and stream sediment for analysis of various constituents, including volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, cyanide, Dioxathion (cis- and trans-), and Dioxenethion.

In 2005, after site investigations conducted under the MDEQ Voluntary Evaluation Program were approved, a Corrective Action Plan (2005 CAP, Groundwater & Environmental Services, Inc. 2005) was submitted to MDEQ. MDEQ approved the 2005 CAP, which called for a remedy that included monitored natural attenuation (MNA) with institutional controls. Additionally, Hercules and MDEQ established a Restricted Use Agreed Order (RUAO, No. 5349 07) in 2008 for management of the Site. The components of the 2005 CAP and RUAO are discussed further in Section 2.3. A monitoring program was implemented and controls were established to restrict the land use and activities on site. The monitoring program for groundwater and surface water is currently conducted on a semiannual basis and consists of water level gauging and analysis of select samples for VOCs (semiannually) and Dioxathion/Dioxenethion (annually).

2.1 Site Location

The Hercules Site is located on approximately 200 acres of land north of West Seventh Street in Hattiesburg, Forrest County, Mississippi (Figure 1). The Site is located in Township 4 North, Range 13 West, within Sections 4 and 5 just north of Hattiesburg, Mississippi. The geographic coordinates of the Site are 31° 20' 20" North latitude and 89° 18' 25" West longitude. The physical address of the Site is 613 West Seventh

Street, Hattiesburg, Mississippi. Figure 2 presents a plan view of the Site depicting the physical layout of the Site prior to recent demolition activities.

The Site is bordered to the north by Highway 42, beyond which is the Illinois-Central & Gulf Railroad, as well as various residential and commercial properties. The southern property boundary is bordered by West Seventh Street and by Roseland Park cemetery and Zeon Chemical Corporation to the south-southwest. Across from these locations are residential areas. The eastern and western boundaries are bordered by residential and commercial areas.

The Site is zoned for industrial use and this zoning category is unlikely to change in the future due to the size of the property and available infrastructure, as well as the RUAO. Figure 3 shows the zoning categories for the parcels located in the vicinity of the Hercules Site.

2.2 Previous Investigations

Various investigations have been conducted at the Hercules Site since the early 1980s. The work has included geophysical investigations and sampling of soil, groundwater, surface water, and stream sediment for analysis of various constituents, including VOCs, SVOCs, pesticides, PCBs, metals, cyanide, Dioxathion, and Dioxenethion. The results of previous investigations are discussed in reports, which have been submitted to or developed by the MDEQ and/or USEPA. Summaries of the non-routine groundwater monitoring reports listed below are included in Appendix A:

- *Preliminary Assessment,* Mississippi Bureau of Pollution Control, December 1989.
- *Site Inspection Report*, Black & Veach (B&V) Waste Science and Technology Corp., April 1993 (commissioned by USEPA).
- *Work Plan for Well Installation,* Bonner Analytical Testing Company (BATCO), June 1997.
- *Installation, Sampling, and Analysis Report,* BATCO, December 1997.
- *Quarterly Monitor Well Sampling Event Reports,* BATCO, June 1998 through October 1998.
- *Site Investigation Work Plan*, Eco-Systems, Inc. (Eco-Systems), February 1999.

- *Interim Groundwater Monitoring Report,* Eco-Systems, January 2003.
- *Site Investigation Report,* Eco-Systems, April 2003.
- *Work Plan for Supplemental Site Investigation,* Eco-Systems, June 2003.
- *Supplemental Site Investigation Report,* Eco-Systems, November 2003.
- *Hattiesburg, Mississippi, Investigations,* MDEQ, April 2004.
- *Remedial Action Evaluation,* Eco-Systems, July 2004.
- *Corrective Action Plan Revision 01,* Groundwater & Environmental Services, Inc., January 2005.
- *Sludge Characterization and Bench Scale Treatability Work Plan*, ARCADIS, March 2010.
- *Sludge Characterization and Bench Scale Treatability Report*, ARCADIS, August 2010.
- *Response to Sludge Characterization and Bench Scale Treatability Report*, ARCADIS, January 2011.

2.3 Corrective Action Plan and Restrictive Use Agreed Order

The 2005 CAP (Groundwater & Environmental Services, Inc. 2005) summarized the findings of the Site investigations between 1999 and 2003 as follows:

- Delineation of the lateral limits of the Landfill based on geophysical investigation;
- Detection of VOCs in groundwater at concentrations above MDEQ Tier 1 Target Remedial Goals (TRGs) near the Landfill and other areas of the Site;
- Presence of VOCs and Dioxathion at concentrations less than TRGs in surface water and sediment samples collected from Green's Creek with some indication of upstream off-site sources;

- Presence of VOCs and Dioxathion in one of three groundwater monitoring wells located hydraulically downgradient of the sludge pits; and

- No migration of VOCs or Dioxathion onto off-site properties via groundwater or surface water.

Additionally, the 2005 CAP presented the following conclusions:

- Sources, source area constituents of concern (COCs) concentrations, and vertical and horizontal extent of groundwater containing COCs were defined sufficiently for remedial planning purposes;

- The existing data do not indicate that the Site poses a significant threat to human health and the environment in its current use as a chemical production facility; and

- If changes in land use occur or additional information is obtained, the current risk scenario for the Site could also change.

Based on an evaluation of the data obtained during the previous site investigations, a remedy consisting of MNA and institutional controls was proposed in the 2005 CAP to address the environmental conditions at the Site. In 2005, MDEQ approved the implementation of MNA of groundwater and surface water and institutional controls as proposed in the 2005 CAP. In January 2008, Hercules also entered into RUAO with MDEQ to restrict the land use and activities on site while constituents in site-wide groundwater attenuate. In conjunction with the RUAO, Hercules executed a Notice of Land Use Restrictions documenting that soil and groundwater contained benzene, chlorobenzene, carbon tetrachloride, chloroform, 1,1,2-dichloroethane, and toluene in excess of MDEQ's TRGs. As a result, the following restrictions were placed on the property:

- There shall be no excavating, drilling, or other activities that could create exposure to contaminated media without approval from MDEQ;

- The groundwater at the Site shall not be used, unless otherwise approved by MDEQ;

- Monitoring wells shall be protected and maintained. In the event that a monitoring well is destroyed or damaged or is no longer needed, a plan for repair,

reinstallation or abandonment of the well(s) must be submitted to MDEQ for approval; and

- No wells shall be installed without prior approval from MDEQ.

MDEQ indicated in the RUAO that, "...once the requirements of it have been completed that (1) the Site will be protective of the public health and the environment; and (2) no further corrective action will be required at this time."

The Site has been operated in accordance with the 2005 CAP and RUAO since 2007. Compliance with the RUAO has consisted of routine groundwater sampling and reporting. Since 2007, Hercules has conducted groundwater sampling and submitted routine groundwater monitoring reports to MDEQ in accordance with the RUAO. To date, after 5 years of monitoring, COC concentrations have not changed at the Site to warrant implementation of contingency plans called for in the Remedial Action Plan.

Current info suggests changes required for CSM

3. Preliminary Conceptual Site Model

The regional geology, Site-specific geology, known physical characteristics of the Site, and observations made of the community near the Hercules Site were composited into a graphical conceptual site model (CSM) (Figure 4). The graphic CSM highlights potential areas of release (former production operations, wastewater IB, landfill, sludge pits), impacted media, transport mechanisms, and exposure pathways specific to the Site. As shown on the CSM, soil, groundwater, surface water, and soil gas to indoor air pathways potentially exist at the Site, and, therefore, will be the focus of the data collection efforts of this Phase I Investigation. Additional detail related to the development and use of the CSM to investigate conditions at the Site is provided in the subsections below.

3.1 Regional Hydrology

The Site is located within the Pine Hills physiographic region of the Coastal Plain physiographic province (Foster 1941). The topography of the region is characterized by a maturely dissected plain which slopes generally to the southeast. The topography is dominated by the valleys of the Bouie and Leaf Rivers coupled with the nearly flat or gently rolling bordering terrace uplands.

The geologic formations beneath the Site are as follows (in descending order):

- Pleistocene alluvial and terrace deposits;

- The Miocene-aged Hattiesburg and Catahoula Sandstone formations;
- The Oligocene-aged Baynes Hammock Sand and Chickasawhay Limestone formations; and
- The Oligocene-aged Bucatunna Clay member of the Byron formation of the Vicksburg group.

The recent-aged alluvial and terrace deposits consist of gravel, silts, and clays. The thicknesses of the alluvial and terrace deposits are variable due to erosion. Based upon driller's logs of wells located in the vicinity of the Site, thickness of the alluvial and terrace deposits is estimated to be approximately 30 feet on site and extends to 50 feet closer to the rivers. The first groundwater-bearing unit at the Site occurs within the alluvial and terrace deposits.

Beneath the alluvial and terrace deposits lies the Hattiesburg formation, which is comprised predominantly of clay. Regionally within Forrest County, the Hattiesburg formation contains at least two prominent sand beds at depth beneath the clay from which a viable water supply is obtained. Logs from area wells indicate that the Hattiesburg formation ranges from approximately 130 feet to 260 feet in thickness.

The Catahoula sandstone underlies the Hattiesburg formation. It is not exposed near the Site, but is penetrated by numerous wells in the area. A driller's log of a municipal well approximately 1.25 miles northwest of the Site indicated that approximately 770 feet of Catahoula sandstone was encountered.

Near the Site, the Catahoula sandstone overlies the Chickasawhay limestone. Neither the Chickasawhay limestone nor the Bucatunna formation is considered to be a viable aquifer. The Bucatunna formation is comprised of clay and effectively acts as a confining layer for the underlying Oligocene aquifer.

The Miocene aquifer is comprised of both the Hattiesburg and Catahoula sandstone formations. The aquifer system is composed of numerous interbedded layers of sand and clay. Because of their interbedded nature, the Hattiesburg and Catahoula sandstone cannot be reliably separated. The formations dip southeastward approximately 30 feet to 100 feet per mile. While this dip steepens near the coast, the formations thicken. The shallowest portions of the aquifer system are unconfined with the surficial water table ranging from a few inches to greater than 6 feet below land surface. Deeper portions of the aquifer are confined, with artesian conditions common.

3.2 Site-Specific Hydrogeology

Surficial soils in the vicinity of the Hercules Site include the Prentice-Urban Land Complex; the Trebloc silt loam; and the Brassfield-Urban Land complex. In general, these soils are described as poorly to moderately well drained and strongly acidic. The parent material from which the soil was derived is mainly marine deposits of sandy, loamy, and clayey material.

Borings installed during Site investigations encountered soils that are generally described as gray and tan, fine-grained sand with varying amounts of silt, clay, and gravel from the surface to depths ranging from 5 feet below ground surface (ft bgs) to greater than 18 ft bgs. These sandy soils are typical of the Pleistocene alluvial and terrace deposits. Underlying the sandy soils is a gray to orange-brown, stiff, silty and/or sandy clay. Descriptions of the clay are consistent with descriptions of the Miocene Hattiesburg formation.

The Hattiesburg Formation has been encountered in all Site borings that have penetrated the overlying alluvial material indicating the formation is consistent across the Site. An exploratory boring was installed in the northern portion of the Site to obtain Site-specific information for thickness and vertical permeability of the Hattiesburg Formation (EcoSystems 2004). Information obtained from the boring indicates that the Hattiesburg formation is at least 20 feet thick beneath the Site and has a hydraulic conductivity of 1.28×10^{-7} centimeters per second (cm/sec).

Water level information is routinely collected from monitoring wells, piezometers, and several Green's Creek staff gauges. Groundwater in the uppermost, saturated interval beneath the Site tends to follow the surface topography. In the former production areas, which are located in the southeastern portion of the Site, the potentiometric surface indicates the presence of a groundwater divide, which trends southwest and northwest. Potentiometric surface maps (Appendix B) indicate that groundwater located to the northwest of the divide moves northwestward toward Green's Creek. Groundwater southeast of the divide moves southeastward. On the north side of Green's Creek, the potentiometric surface indicates that groundwater in the uppermost, saturated interval moves generally southward toward Green's Creek.

Slug testing was conducted at on-site Monitor Wells MW-2 (Northern Area), MW-6 (Former Landfill Area), and MW-7 (Former Production Area) (EcoSystems 2004). Estimates of hydraulic conductivity were calculated using methods described by Bouwer & Rice (Bouwer and Rice 1976; Bouwer 1989). Hydraulic conductivity

estimates varied from 1.31 x 10^{-3} cm/sec (3.71 feet per day [ft/day]) for MW-6 to 4.19 x 10^{-3} cm/sec (11.9 ft/day) for MW-2 with an average of 2.51 X 10^{-3} cm/sec (7.12 ft/day). Using the mean of the hydraulic conductivity estimates and historic potentiometric data, the estimated horizontal groundwater velocity from three areas of the Site were estimated using Darcy's Law. Darcy's Law can be expressed by the following equation:

$$V = \frac{Ki}{\eta}$$

Where:

V = Average linear groundwater velocity

K = Hydraulic conductivity

i = Hydraulic gradient

η = Effective porosity

Based on a review of historic potentiometric maps and published information, the following inputs were used to calculate the estimated groundwater flow for each area:

Area	Hydraulic Conductivity (ft/day)	Effective Porosity (%)	Hydraulic Gradient (ft/ft)	Groundwater Velocity (ft/day / ft/yr)
Northern Area (MW-2)	11.9	33%	0.006	0.216 / 78.8
Former Landfill Area (MW-6)	3.71	33%	0.03	0.337 / 123
Former Production Area (MW-7)	8.14	33%	0.007	0.173 / 63.0

ft/day Feet per day.
ft/ft Feet per feet.
ft/yr Feet per year.

This analysis determined that the horizontal groundwater velocity ranged from 0.173 ft/day (63 feet per year [ft/yr]) in the Former Production Area (MW-7) to 0.337 ft/day (123 ft/yr) in the Former Landfill Area (MW-6).

3.3 Topography and Surface Water

The topography of the Site ranges from 170 feet mean sea level (ft msl) to 150 ft msl. Surface water drainage patterns at the Site conform generally to the topography. Topography slopes generally to the south in the Sludge Disposal Area and to the north/northwest in the former Industrial Landfill Area and the Former Delnav Production Area. A topographic divide located south/southwest of the Former Delnav Production Area separates surface water drainage flowing in a northerly direction from surface water that flows in an east to southeasterly direction. The east-trending, perennial stream Green's Creek and its natural and man-made tributaries are the main surface drainage features in the area (Drainage A). Green's Creek leaves the Site at its northeast corner and subsequently flows into Bouie River, located approximately 1 mile to the north/northeast. Two unnamed intermittent drainage features are also present. One flows from the northeast corner of the Site (Drainage B) and the other flows from the southeastern portion of the Site (Drainage C). These drainage features are depicted on Figure 5.

Elevations of surface water within Green's Creek are significantly lower than the groundwater. This indicates that, while groundwater may contribute to flow in Green's Creek, hydraulic connection between the uppermost saturated interval and Green's Creek is retarded. The retardation of the water moving from the alluvial material to the creek is likely due to silt and clay in the sand adjacent to the creek.

3.4 Preliminary Conceptual Exposure Model

A component of the CSM is a preliminary conceptual exposure model. An exposure model evaluates potential exposure pathways that may result in exposure of a target population. An exposure pathway consists of the following four elements: (1) a source and mechanism of constituent release to the environment; (2) a retention or transport medium for the released constituent; (3) a point of potential contact by the receptor with the impacted medium (the exposure point); and (4) a route of exposure to the receptor at the exposure point (e.g., ingestion, inhalation, or dermal contact).

The conceptual exposure model provides the framework for the exposure assessment. It characterizes the primary and secondary potential sources and their release mechanisms and identifies the primary potential exposure points, receptors, and exposure routes. Exposure points are places or "points" where exposure could potentially occur, and exposure routes are the basic pathways through which

constituents may potentially be taken up by the receptor (e.g., ingestion, inhalation, dermal contact).

The conceptual exposure model incorporates the Site-specific analytical data with constituent-specific fate and transport information to identify migration pathways, and activity and use patterns to identify the unique receptors and exposure pathways. Figure 6 identifies the sources, release mechanisms, transport pathways, and potential receptors for the Hattiesburg Site. These are discussed in detail below.

3.4.1 Sources

Operations began at the Hattiesburg Site in 1923. Rosin derivatives, paper chemicals, and Delnav (a miticide), were produced at the Site. Structures at the Site included offices, a laboratory, a powerhouse, production buildings, a wastewater treatment plant, settling ponds, a landfill, and central loading and packaging areas. Site-related Constituents associated with these operations have been detected in soil, groundwater, surface water, and sediment on the Hercules property.

3.4.2 Release Mechanisms

Constituents detected in environmental media during the previous Site investigations have included organic constituents, metals, and pesticides. The migration of constituents released in the past is influenced by Site environmental factors and the physical and chemical properties of the constituents.

Constituents could potentially migrate from the former Hercules Plant via several mechanisms. The impacted soils at the Site can act as a source of Constituents to other media. Migration into air may occur via volatilization or fugitive dust emissions; transport into the surface water can occur via surface runoff and groundwater discharge; and migration into groundwater can occur by infiltrating rainwater through impacted soil with subsequent leaching and transport. One other process that will influence migration is the attenuation of certain Constituents through naturally occurring processes.

3.4.3 Potential Receptors

The Site is inactive and thus exposure of current Site workers is not expected to be significant; however, in the future, the Site could be redeveloped for industrial use and hypothetical future construction workers and Site workers could be exposed to

Constituents in soil on the Site. It is unlikely that exposure to constituents in groundwater would occur because of restrictions to use of on-site groundwater as a potable water supply.

The Site is surrounded by commercial, industrial, and residential land uses. Data collected during the Phase I and Phase II site investigations under the AO will be used to evaluate the potential exposure to Site-related constituents. This will include an evaluation of potential exposure to off-site receptors.

3.4.4 Potential Exposure Pathways

There are currently no points of exposure to groundwater on site. Workers on the property could be exposed to constituents in the surface soil through incidental ingestion, dermal contact, and inhalation of vapors or dust. While the presence of trespassers is unlikely, any trespassers on the property could also contact the surface soils and be exposed to Site-related constituents. If the hypothetical trespasser were to wade in the surface water on or leaving the Hercules property, they could contact Site-related constituents in the surface water or sediments. Additionally, aquatic biota are identified as potential receptors.

Shallow groundwater at the property boundary contains Site-related constituents. If Site-related constituents in groundwater extend beyond the property boundary, and groundwater is extracted for some purpose, then the potential exists for this pathway to be complete. Further, if volatile constituents associated with the former Hercules Plant are present off site, these VOCs could migrate from the groundwater into the vapor phase resulting in potential exposure.

4. Preliminary Constituents of Concern

Consistent with the AO, the Appendix IX constituent list will be initially considered to identify preliminary COCs for the Phase I investigation. Currently, plans are in place to conduct the next semiannual groundwater sampling event pursuant to the RUAO utilizing the Appendix IX analyte list. An evaluation and screening of the groundwater data and historic data will be conducted to modify the Appendix IX constituent list and identify the Site-related constituents on which to focus future assessments. Factors to be considered in the data evaluation step may include protection of human health and the environment and availability of analytical standards with which to identify the presence or absence of a constituent in environmental media.

5. Phase I Project Objectives

5.1 Administrative Order Objectives

The objectives of the Phase I Work Plan are to:

- Determine the presence of Site-related Constituents at off-site locations; and
- Evaluate the nature and extent of Site-related Constituents at off-site locations.

Execution of the activities set forth in this Work Plan will obtain data that can be used to determine if impacts exist off site. Media that will be evaluated may include surface water, groundwater, sediment, soil gas, and/or indoor air.

5.2 Data Quality Objectives

Data collected in accordance with the procedures described in this Work Plan will be evaluated in accordance with the objectives described in the Quality Assurance Project Plan (QAPP) included in Appendix C. Data quality objectives (DQOs) established for this project are included in the QAPP. The project activities will be performed as required by the USEPA AO for the investigation of potential environmental impacts at the Site.

6. Phase I Environmental Investigation

The scope of work for the investigation described below is designed to meet the requirements of the AO. All field work will be conducted in accordance with the Health and Safety Plan included in Appendix D.

6.1 Drinking Water Wells

The AO requires that Hercules perform "an inventory of all wells on and within a 4-mile radius of the Site, and a schedule for sampling of all such wells either on or within a 0.5-mile radius of the Facility." Details of the well inventory were discussed at a June 9, 2011, technical meeting and the USEPA provided clarification that the inventory should include public and private drinking water, irrigation, and production supply wells where water is extracted for human consumption or where humans may come in direct contact with the water. Other types of wells such as those used for groundwater monitoring, environmental remediation, injection, or dry wells would not

need to be included in the inventory. The drinking water media will be evaluated consistent with the decision matrix provided on Figure 7.

Initial response actions performed by Hercules shortly after receiving the AO included performing a public records search of registered wells that exist within a 4-mile radius of the Site. This initial well inventory identified a total of 806 well records within the search radius. A figure showing the wells is included in Appendix E. The well inventory search radius was refined to show only the registered wells that exist on or within a 0.5-mile radius of the Site and those wells are listed in Table 1 and shown on Figure 5. This initial public records survey indicates that 20 wells exist within a 0.5-mile radius of the Site; however, there may be other wells within this radius that are not listed in public records. Further investigation into the existence of wells in the area will be performed as described in the following sections.

6.1.1 Identification of Drinking Water Well Locations

An initial evaluation of public records has already been performed as described above to identify public and private drinking water wells within the search radii specified in the Order. Site records indicated that historical well surveys including the 1993 B&V Waste Science and Technology Corporation report (1993 B&V) have also been performed. The 1993 B&V report documented that five municipal suppliers of potable water having wells within 4 miles of the Site existed at that time.

Hercules will also perform a neighborhood survey of residents and businesses located within a 0.5-mile radius of the Site by distributing a questionnaire to collect information on the presence and use of public and private wells. A copy of the questionnaire is provided in Appendix F. The questionnaire will be mailed to residents and businesses located within the 0.5-mile radius to inform them of the importance of the survey and will request that respondents provide information regarding wells on their property. The survey will be further supported by performing a windshield survey of properties within the 0.5-mile radius to look for signs typically associated with private water well use (staining on structures and sidewalks, small enclosures or well houses, etc.). Well verification may be performed using a door-to-door follow-up survey to further support either a questionable windshield survey observation or a response from the questionnaire that requires clarification. Data collected from survey responses, the windshield survey, and from other public information sources mentioned above will be compiled into a geographic information system database for use in determining wells that may require sampling.

6.1.2 Water Well Sampling Procedure

Hercules will pursue access to properties where wells exist within the 0.5-mile radius and where sampling is advised based on the schedule outlined in Table 2. The schedule utilizes the decision logic process illustrated on Figure 7 to prioritize the collection of samples for wells having the highest potential for being influenced by Site-related Constituents. Access agreements will be presented to each well owner for review and approval. The sampling event will be scheduled with the well owner once the access agreement is signed. No samples will be collected without the owner's signed access agreement.

The sampling team will perform a short interview with the owner during the sampling event to ascertain information regarding the well and water use at the property. Interviews will be conducted with the owners (or their current tenants) using a form developed to record specific information on the well and each form will be added to the data record for the investigation.

It is Hercules' intent, for wells that are equipped with an operable pump system, to use the existing pumping system for purging the well and samples will be collected from a valve or spigot in the piping system. For public or private wells to be sampled that do not have an operable pump in place, a method for properly purging and sampling the well (either pump or bailer) will be developed based on specific construction details of the well to be sampled.

Hercules will utilize USEPA Science and Ecosystem Support Division (SESD) guidance document SESDPROC-305-R1, as appropriate, during the collection of water samples for laboratory analysis. Conditions that require deviations from practices in the guidance will be documented in field books and well sampling sheets that will become part of the project records. Samples that are collected from water wells will be preserved, handled, and shipped in accordance with SESDPROC-305-R1 and the project-specific QAPP. The analytical program for the water well program is discussed in Section 7 and the evaluation process is described in Section 8.

Priority 1- highest 5- lowest	Water Use Type	Distance in Feet from Well to Site	Depth in Feet to Well Screen Below Ground	Location Hydraulically Downgradient of Known Impact
1	Potable	<100	<100	Yes
1	Irrigation/other	<100	<100	Yes

Priority 1- highest 5- lowest	Water Use Type	Distance in Feet from Well to Site	Depth in Feet to Well Screen Below Ground	Location Hydraulically Downgradient of Known Impact
2	Potable	<100	>100	Yes
2	Irrigation/other	<100	>100	Yes
2	Potable	>100 to 500	<100	Yes
2	Irrigation/other	>100 to 500	<100	Yes
3	Potable	>100 to 500	>100	Yes
3	Irrigation/other	>100 to 500	>100	Yes
3	Potable	> 500	Any depth	Yes
3	Irrigation/other	> 500	Any depth	Yes
3	Potable	<100	<100	No
3	Irrigation/other	<100	<100	No
4	Potable	<100	>100	No
4	Irrigation/other	<100	>100	No
4	Potable	>100 to 500	<100	No
4	Irrigation/other	>100 to 500	<100	No
4	Potable	>100 to 500	>100	No
4	Irrigation/other	>100 to 500	>100	No
5	Potable	> 500	Any depth	No
5	Irrigation/other	> 500	Any depth	No

6.2 Surface Water and Sediment

A survey will be conducted to identify any wetlands, creeks, lakes, or other surface water bodies, including any ditches (collectively called "water bodies"), located on and within a 0.5-mile radius of the Site. A preliminary evaluation of the potential for these water bodies to be used for public recreational purposes or which may contain threatened and endangered (T&E) species will be included in this survey. Based on the location and hydrogeologic characteristics of these water bodies, the water bodies that could potentially be connected to discharges from the facility will be identified for sampling and analysis of surface water and sediment.

Preliminary analysis of surface water on the Site has identified three major drainages which will, at a minimum, be sampled during implementation of Phase I under the AO, as described below. Other water bodies, not currently identified, which are identified in

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Table 3. Calculation of USEPA Groundwater Regional Screening Levels, Phase I Sampling and Analysis Work Plan, Hercules Incorporated, Hattiesburg Facility, Hattiesburg, Forrest County, Mississippi.

Location Date DTW Nov 2010	GW to IA Screen 1x10-4	GW to IA Screen 1x10-5	GW to IA Screen 1x10-6	MW-18 May-09 7.11	MW-18 Dec-09 7.11	MW-18 May-10 7.11	MW-18 Dec-10 7.11	MW-19 May-09 12.17	MW-19 Dec-09 12.17	MW-19 May-10 12.17	MW-19 Dec-10 12.17
Acetone	100,000,000	100,000,000	100,000,000	<25	<25	<25	<25	<25	<25	<25	<25
Benzene	705.0	70.5	7.1	<1	<1	1.1	<1	65	64	52	61
Chlorobenzene	1,730	1,730	1,730	24	21	20	18	14	12	10	9.1
Carbon Tetrachloride	177	18	1.8	<1	<1	<1	<1	11	4.5	3.2	<1
Chloroform	353	35	3.5	<1	<1	<1	<1	4.7	2.9	3.6	2.7
1,2-Dichloroethane	974	97	10	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	3,826	3,826	3,826	<1	<1	1	<1	1.3	<1	1.4	<1
Ethylbenzene	1,531	153	15.3	<1	<1	<1	<1	2	2.4	1.9	2.2
Toluene	81,042	81,042	81,042	<1	<1	<1	<1	2.7	2.4	3	2.5
Total Xylenes	2,095	2,095	2,095	<2	<2	<2	<2	<2	2.2	<2	<2
Methylene Chloride	20,000	2,000	200	<5	<5	<5	<5	<5	<5	<5	<5
Methyl Isobutyl Ketone	2,321,429	2,321,429	2,321,429	<10	<10	<10	<10	<10	<10	<10	<10

Notes:
"<" indicates that the concentration of the analyte is less than the value shown.
Shaded cells exceed the screening value for the 1x10-6 risk level.
Bolded cells exceed the screening value for the 1x10-4 risk level.
DTW Depth to Water.

ARCADIS

Table 3. Calculation of USEPA Groundwater Regional Screening Levels, Phase I Sampling and Analysis Work Plan, Hercules Incorporated, Hattiesburg Facility, Hattiesburg, Forrest County, Mississippi.

Location Date DTW Nov 2010	GW to IA Screen 1x10-4	GW to IA Screen 1x10-5	GW to IA Screen 1x10-6	MW-20 Sep-09 7.71	MW-20 May-10 7.71	MW-20 Dec-10 7.71	MW-21 Sep-09 4.05	MW-21 May-10 4.05	MW-21 Dec-10 4.05	MW-22 Sep-09 7.37	MW-22 May-10 7.37
Acetone	100,000,000	100,000,000	100,000,000	<25	<25	<25	<1,200*	<1,200*	<1200	86	<25
Benzene	705.0	70.5	7.1	<1	<1	<1	**4400**	**3500**	**4400**	9.8	6.6
Chlorobenzene	1,730	1,730	1,730	<1	<1	<1	170	150	180	7.7	4.9
Carbon Tetrachloride	177	18	1.8	<1	<1	<1	<50	**280**	<50	<1	<1
Chloroform	353	35	3.5	<1	<1	<1	**6800**	**7800**	**7300**	<1	<1
1,2-Dichloroethane	974	97	10	<1	<1	<1	<50*	<50*	84	<1	<1
1,1-Dichloroethene	3,826	3,826	3,826	<1	<1	<1	<50*	<50*	<50	<1	<1
Ethylbenzene	1,531	153	15.3	<1	<1	<1	<50	<50	<50	<1	<1
Toluene	81,042	81,042	81,042	<1	<1	<1	4800	4500	4500	<1	<1
Total Xylenes	2,095	2,095	2,095	<2	<2	<2	<100	<100	<100	<2	<2
Methylene Chloride	20,000	2,000	200	<5	<5	<5	<250*	<250*	<250*	<5	<5
Methyl Isobutyl Ketone	2,321,429	2,321,429	2,321,429	<10	<10	<10	640	<500*	510	<10	<10

Notes:
"<" indicates that the concentration of the analyte is less than the value shown.
Shaded cells exceed the screening value for the 1x10-6 risk level.
Bolded cells exceed the screening value for the 1x10-4 risk level.
DTW Depth to Water.

ARCADIS

Table 3. Calculation of USEPA Groundwater Regional Screening Levels, Phase I Sampling and Analysis Work Plan, Hercules Incorporated, Hattiesburg Facility, Hattiesburg, Forrest County, Mississippi.

Location Date DTW Nov 2010	GW to IA Screen 1x10-4	GW to IA Screen 1x10-5	GW to IA Screen 1x10-6	MW-22 Dec-10 7.37	MW-23 Sep-09 4.85	MW-23 May-10 4.85	MW-23 Dec-10 4.85	MW-24 Sep-09 8.64	MW-24 May-10 8.64	MW-24 Dec-10 8.64
Acetone	100,000,000	100,000,000	100,000,000	<25	1,600*	<2,500*	<2,500*	<25	<25	<25
Benzene	705.0	70.5	7.1	6.3	**9200**	**10000**	**7600**	<1	<1	<1
Chlorobenzene	1,730	1,730	1,730	2.3	190	180	<100	<1	<1	<1
Carbon Tetrachloride	177	18	1.8	<1	<50*	<100*	<100*	<1	<1	<1
Chloroform	353	35	3.5	<1	**1400**	**2000**	**2900**	<1	<1	<1
1,2-Dichloroethane	974	97	10	<1	<50*	<100*	<100*	<1	<1	<1
1,1-Dichloroethene	3,826	3,826	3,826	<1	<50*	<100*	<100*	<1	<1	<1
Ethylbenzene	1,531	153	15.3	<1	<50	<100	<100	<1	<1	<1
Toluene	81,042	81,042	81,042	<1	3300	3300	1400	<1	<1	<1
Total Xylenes	2,095	2,095	2,095	<2	<100	<200	<200	<2	<2	<2
Methylene Chloride	20,000	2,000	200	<5	290	<500*	<500*	<5	<5	<5
Methyl Isobutyl Ketone	2,321,429	2,321,429	2,321,429	<10	1300	1000	<1,000*	<10	<10	<10

Notes:
"<" indicates that the concentration of the analyte is less than the value shown.
Shaded cells exceed the screening value for the 1x10-6 risk level.
Bolded cells exceed the screening value for the 1x10-4 risk level.
DTW Depth to Water.

ARCADIS

Table 4. Results of Initial Groundwater Screening, Phase I Sampling and Analysis Work Plan, Hercules Incorporated, Hattiesburg Facility, Hattiesburg, Forrest County, Mississippi.

Location Date DTW Nov 2010	GW to IA Screen 1x10-4	GW to IA Screen 1x10-5	GW to IA Screen 1x10-6	MW-02 May-09 7.89	MW-02 Dec-09 7.89	MW-02 May-10 7.89	MW-02 Nov-10 7.89	MW-03 May-09 9.19	MW-03 Dec-09 9.19	MW-03 May-10 9.19	MW-03 Nov-10 9.19	MW-04 May-09 12.04	MW-04 Dec-09 12.04
Acetone	22,857,143	22,857,143	22,857,143	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Benzene	137	14	1.4	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	409	409	409	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbon Tetrachloride	36	3.6	0.36	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroform	73	7.3	0.73	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	195	19	1.9	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	913	913	913	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	303	30	3.0	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	19,155	19,155	19,155	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Xylenes	476	476	476	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Methylene Chloride	4,000	400	40	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Methyl Isobutyl Ketone	553,571	553,571	553,571	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Notes:
"<" indicates that the concentration of the analyte is less than the value shown.
Shaded cells exceed the screening value for the 1x10-6 risk level
Bolded cells exceed the screening value for the 1x10-4 risk level
DTW Depth to Water.

ARCADIS

Table 4. Results of Initial Groundwater Screening, Phase I Sampling and Analysis Work Plan, Hercules Incorporated, Hattiesburg Facility, Hattiesburg, Forrest County, Mississippi.

Location Date DTW Nov 2010	GW to IA Screen 1x10-4	GW to IA Screen 1x10-5	GW to IA Screen 1x10-6	MW-04 May-10 12.04	MW-04 Dec-10 12.04	MW-05 May-09 11.79	MW-05 Dec-09 11.79	MW-05 May-10 11.79	MW-05 Dec-10 11.79	MW-06 May-09 10.72	MW-06 Dec-09 10.72	MW-06 May-10 10.72	MW-06 Dec-10 10.72
Acetone	22,857,143	22,857,143	22,857,143	<25	<25	<25	<25	<25	27	<25	<25	<25	<25
Benzene	137	14	1.4	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	409	409	409	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbon Tetrachloride	36	3.6	0.36	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroform	73	7.3	0.73	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	195	19	1.9	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	913	913	913	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	303	30	3.0	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	19,155	19,155	19,155	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Xylenes	476	476	476	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Methylene Chloride	4,000	400	40	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Methyl Isobutyl Ketone	553,571	553,571	553,571	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Notes:
"<" indicates that the concentration of the analyte is less than the value shown.
Shaded cells exceed the screening value for the 1x10-6 risk level
Bolded cells exceed the screening value for the 1x10-4 risk level
DTW Depth to Water.

ARCADIS

Table 4. Results of Initial Groundwater Screening, Phase I Sampling and Analysis Work Plan, Hercules Incorporated, Hattiesburg Facility, Hattiesburg, Forrest County, Mississippi.

Location Date DTW Nov 2010	GW to IA Screen 1x10-4	GW to IA Screen 1x10-5	GW to IA Screen 1x10-6	MW-07 May-09 15.95	MW-07 Dec-09 15.95	MW-07 May-10 15.95	MW-07 Dec-10 15.95	MW-08 May-09 16.10	MW-08 Dec-09 16.10	MW-08 May-10 16.10	MW-08 Dec-10 16.10	MW-09 May-09 13.81	MW-09 Dec-09 13.81
Acetone	22,857,143	22,857,143	22,857,143	<25	<25	<25	<25	<620	<620	<250	<1200	<25	210
Benzene	137	14	1.4	<1	<1	<1	<1	**540**	<1000	**2900**	**6000**	1.1	1.6
Chlorobenzene	409	409	409	<1	<1	<1	<1	110	180	180	150	<1	<1
Carbon Tetrachloride	36	3.6	0.36	<1	<1	<1	<1	**2,300**	**2,700**	**8,000**	**1,000**	<1	<1
Chloroform	73	7.3	0.73	<1	<1	<1	<1	**1,300**	**610**	**1,400**	**300**	<1	<1
1,2-Dichloroethane	195	19	1.9	<1	<1	<1	<1	<25	<25	63	<50*	<1	<1
1,1-Dichloroethene	913	913	913	<1	<1	<1	<1	<25	<25	<10*	<50*	<1	<1
Ethylbenzene	303	30	3.0	<1	<1	<1	<1	<25	68	22	74	<1	<1
Toluene	19,155	19,155	19,155	<1	<1	<1	<1	<25	43	10	<50	<1	<1
Total Xylenes	476	476	476	<2	<2	<2	<2	<25	95	<20	<100	<2	<2
Methylene Chloride	4,000	400	40	<5	<5	<5	<5	<125	380	230	560	<5	<5
Methyl Isobutyl Ketone	553,571	553,571	553,571	<10	<10	<10	<10	<250	<250	<100	<500	<10	<10

Notes:
"<" indicates that the concentration of the analyte is less than the value shown.
Shaded cells exceed the screening value for the 1x10-6 risk level
Bolded cells exceed the screening value for the 1x10-4 risk level
DTW Depth to Water.

ARCADIS

Table 4. Results of Initial Groundwater Screening, Phase I Sampling and Analysis Work Plan, Hercules Incorporated, Hattiesburg Facility, Hattiesburg, Forrest County, Mississippi.

Location Date DTW Nov 2010	GW to IA Screen 1x10-4	GW to IA Screen 1x10-5	GW to IA Screen 1x10-6	MW-09 May-10 13.81	MW-09 Dec-10 13.81	MW-10 May-09 12.63	MW-10 Dec-09 12.63	MW-10 May-10 12.63	MW-10 Dec-10 12.63	MW-11 May-09 9.33	MW-11 Dec-09 9.33	MW-11 May-10 9.33	MW-11 Dec-10 9.33
Acetone	22,857,143	22,857,143	22,857,143	<25	<25	<25	<25	<25	<25	42	<25	<25	<25
Benzene	137	14	1.4	<1	3	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	409	409	409	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbon Tetrachloride	36	3.6	0.36	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroform	73	7.3	0.73	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	195	19	1.9	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	913	913	913	<1	1.3	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	303	30	3.0	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	19,155	19,155	19,155	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Xylenes	476	476	476	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Methylene Chloride	4,000	400	40	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Methyl Isobutyl Ketone	553,571	553,571	553,571	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Notes:
"<" indicates that the concentration of the analyte is less than the value shown.
Shaded cells exceed the screening value for the 1x10-6 risk level
Bolded cells exceed the screening value for the 1x10-4 risk level
DTW Depth to Water.

ARCADIS

Table 4. Results of Initial Groundwater Screening, Phase I Sampling and Analysis Work Plan, Hercules Incorporated, Hattiesburg Facility, Hattiesburg, Forrest County, Mississippi.

Location Date DTW Nov 2010	GW to IA Screen 1x10-4	GW to IA Screen 1x10-5	GW to IA Screen 1x10-6	MW-12 May-09 9.99	MW-12 Dec-09 9.99	MW-12 May-10 9.99	MW-12 Dec-10 9.99	MW-13 May-09 10.86	MW-13 Dec-09 10.86	MW-13 May-10 10.86	MW-13 Dec-10 10.86	MW-14 May-09 14.94	MW-14 Dec-09 14.94
Acetone	22,857,143	22,857,143	22,857,143	28	<25	<25	<25	<620	<620	<500	<250	260	<25
Benzene	137	14	1.4	<1	<1	<1	<1	**1,200**	**790**	**2,600**	**530**	<2	<1
Chlorobenzene	409	409	409	<1	<1	<1	<1	<25	29	110	25	<2	<1
Carbon Tetrachloride	36	3.6	0.36	<1	<1	<1	<1	**3,500**	**2,000**	**4,000**	**970**	<2	<1
Chloroform	73	7.3	0.73	<1	<1	<1	<1	**340**	**310**	**1,900**	**230**	<2	<1
1,2-Dichloroethane	195	19	1.9	<1	<1	<1	<1	<25	<25	<20*	<10*	<2	<1
1,1-Dichloroethene	913	913	913	<1	<1	<1	<1	<25	<25	<20*	<10*	<2	<1
Ethylbenzene	303	30	3.0	<1	<1	<1	<1	<25	<25	<20	<10	<2	<1
Toluene	19,155	19,155	19,155	<1	<1	<1	<1	<25	<25	<20	<10	<2	<1
Total Xylenes	476	476	476	<2	<2	<2	<2	<25	<50	<40	<20	<4	<2
Methylene Chloride	4,000	400	40	<5	<5	<5	<5	<125	<120	<100*	<50*	<10	<5
Methyl Isobutyl Ketone	553,571	553,571	553,571	<10	<10	<10	<10	<250	<250	<200*	<100	<20	<10

Notes:
"<" indicates that the concentration of the analyte is less than the value shown.
Shaded cells exceed the screening value for the 1x10-6 risk level
Bolded cells exceed the screening value for the 1x10-4 risk level
DTW Depth to Water.

ARCADIS

Table 4. Results of Initial Groundwater Screening, Phase I Sampling and Analysis Work Plan, Hercules Incorporated, Hattiesburg Facility, Hattiesburg, Forrest County, Mississippi.

Location Date DTW Nov 2010	GW to IA Screen 1x10-4	GW to IA Screen 1x10-5	GW to IA Screen 1x10-6	MW-14 May-10 14.94	MW-14 Dec-10 14.94	MW-15 May-09 17.41	MW-15 Dec-09 17.41	MW-15 May-10 17.41	MW-15 Dec-10 17.41	MW-16 May-09 17.99	MW-16 Dec-09 17.99	MW-16 May-10 17.99	MW-16 Dec-10 17.99
Acetone	22,857,143	22,857,143	22,857,143	<25	<25	1300	<25	<25	<25	<25	<25	<25	<25
Benzene	137	14	1.4	<1	<1	<5	<1	<1	<1	<1	<1	1.1	<1
Chlorobenzene	409	409	409	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1
Carbon Tetrachloride	36	3.6	0.36	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1
Chloroform	73	7.3	0.73	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	195	19	1.9	<1	<1	<5	<1	<1	<1	<1	<1	1.3	<1
1,1-Dichloroethene	913	913	913	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	303	30	3.0	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1
Toluene	19,155	19,155	19,155	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1
Total Xylenes	476	476	476	<2	<2	<10	<2	<2	<2	<2	<2	3.5	<1
Methylene Chloride	4,000	400	40	<5	<5	<25	<5	<5	<5	<5	<5	<5	<2
Methyl Isobutyl Ketone	553,571	553,571	553,571	<10	<10	<50	<10	<10	<10	<10	<10	<10	<5
													<10

Notes:
"<" indicates that the concentration of the analyte is less than the value shown.
Shaded cells exceed the screening value for the 1x10-6 risk level
Bolded cells exceed the screening value for the 1x10-4 risk level
DTW Depth to Water.

ARCADIS

Table 4. Results of Initial Groundwater Screening, Phase I Sampling and Analysis Work Plan, Hercules Incorporated, Hattiesburg Facility, Hattiesburg, Forrest County, Mississippi.

Location Date DTW Nov 2010	GW to IA Screen 1x10-4	GW to IA Screen 1x10-5	GW to IA Screen 1x10-6	MW-17 May-09 19.21	MW-17 Dec-09 19.21	MW-17 May-10 19.21	MW-17 Dec-10 19.21	MW-18 May-09 7.11	MW-18 Dec-09 7.11	MW-18 May-10 7.11	MW-18 Dec-10 7.11	MW-19 May-09 12.17	MW-19 Dec-09 12.17
Acetone	22,857,143	22,857,143	22,857,143	<5000	<12000	<2,500*	<12000	<25	<25	<25	<25	<25	<25
Benzene	137	14	1.4	**8,100**	**4,500**	**7,500**	<500	<1	<1	1.1	<1	65	64
Chlorobenzene	409	409	409	**640**	**1,200**	**740**	**760**	24	21	20	18	14	12
Carbon Tetrachloride	36	3.6	0.36	**39,000**	**54,000**	**40,000**	**32,000**	<1	<1	<1	<1	11	4.5
Chloroform	73	7.3	0.73	**2,900**	**7,100**	**8,400**	**5,900**	<1	<1	<1	<1	4.7	2.9
1,2-Dichloroethane	195	19	1.9	<200	<500	<100*	<500	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	913	913	913	<200	<500	<100*	<500	<1	<1	1	<1	1.3	<1
Ethylbenzene	303	30	3.0	<200	<500	230	<500	<1	<1	<1	<1	2	2.4
Toluene	19,155	19,155	19,155	<200	<500	520	<500	<1	<1	<1	<1	2.7	2.4
Total Xylenes	476	476	476	<400	<1000	**830**	<1000	<2	<2	<2	<2	<2	2.2
Methylene Chloride	4,000	400	40	<1000	<2500	660	<2500	<5	<5	<5	<5	<5	<5
Methyl Isobutyl Ketone	553,571	553,571	553,571	<2000	<5000	<1,000*	<5000	<10	<10	<10	<10	<10	<10

Notes:
"<" indicates that the concentration of the analyte is less than the value shown.
Shaded cells exceed the screening value for the 1x10-6 risk level
Bolded cells exceed the screening value for the 1x10-4 risk level
DTW Depth to Water.

ARCADIS

Table 4. Results of Initial Groundwater Screening, Phase I Sampling and Analysis Work Plan, Hercules Incorporated, Hattiesburg Facility, Hattiesburg, Forrest County, Mississippi.

Location Date DTW Nov 2010	GW to IA Screen 1x10-4	GW to IA Screen 1x10-5	GW to IA Screen 1x10-6	MW-19 May-10 12.17	MW-19 Dec-10 12.17	MW-20 Sep-09 7.71	MW-20 May-10 7.71	MW-20 Dec-10 7.71	MW-21 Sep-09 4.05	MW-21 May-10 4.05	MW-21 Dec-10 4.05	MW-22 Sep-09 7.37	MW-22 May-10 7.37
Acetone	22,857,143	22,857,143	22,857,143	<25	<25	<25	<25	<25	<1,200*	<1,200*	<1200	86	<25
Benzene	137	14	1.4	52	61	<1	<1	<1	**4400**	**3500**	**4400**	9.8	6.6
Chlorobenzene	409	409	409	10	9.1	<1	<1	<1	170	150	180	7.7	4.9
Carbon Tetrachloride	36	3.6	0.36	3.2	<1	<1	<1	<1	<50	**280**	<50	<1	<1
Chloroform	73	7.3	0.73	3.6	2.7	<1	<1	<1	**6800**	**7800**	**7300**	<1	<1
1,2-Dichloroethane	195	19	1.9	<1	<1	<1	<1	<1	<50*	<50*	84	<1	<1
1,1-Dichloroethene	913	913	913	1.4	<1	<1	<1	<1	<50*	<50*	<50	<1	<1
Ethylbenzene	303	30	3.0	1.9	2.2	<1	<1	<1	<50	<50	<50	<1	<1
Toluene	19,155	19,155	19,155	3	2.5	<1	<1	<1	4800	4500	4500	<1	<1
Total Xylenes	476	476	476	<2	<2	<2	<2	<2	<100	<100	<100	<2	<2
Methylene Chloride	4,000	400	40	<5	<5	<5	<5	<5	<250*	<250*	<250*	<5	<5
Methyl Isobutyl Ketone	553,571	553,571	553,571	<10	<10	<10	<10	<10	640	<500*	510	<10	<10

Notes:
"<" indicates that the concentration of the analyte is less than the value shown.
Shaded cells exceed the screening value for the 1x10-6 risk level
Bolded cells exceed the screening value for the 1x10-4 risk level
DTW Depth to Water.

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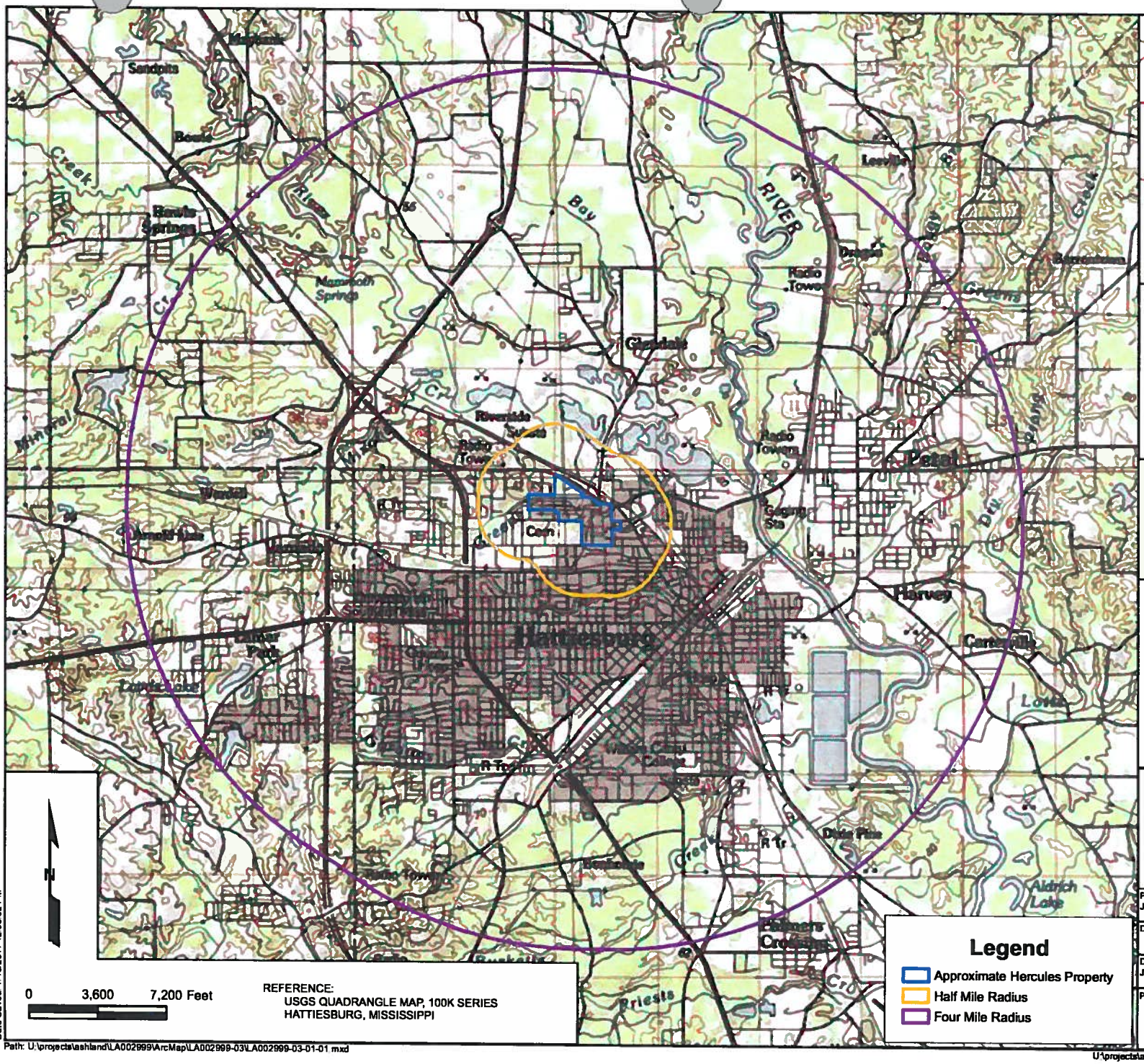
Table 4. Results of Initial Groundwater Screening, Phase I Sampling and Analysis Work Plan, Hercules Incorporated, Hattiesburg Facility, Hattiesburg, Forrest County, Mississippi.

Location Date DTW Nov 2010	GW to IA Screen 1x10-4	GW to IA Screen 1x10-5	GW to IA Screen 1x10-6	MW-22 Dec-10 7.37	MW-23 Sep-09 4.85	MW-23 May-10 4.85	MW-23 Dec-10 4.85	MW-24 Sep-09 8.64	MW-24 May-10 8.64	MW-24 Dec-10 8.64
Acetone	22,857,143	22,857,143	22,857,143	<25	1,600*	<2,500*	<2,500*	<25	<25	<25
Benzene	137	14	1.4	6.3	**9200**	**10000**	**7600**	<1	<1	<1
Chlorobenzene	409	409	409	2.3	190	180	<100	<1	<1	<1
Carbon Tetrachloride	36	3.6	0.36	<1	<50*	<100*	<100*	<1	<1	<1
Chloroform	73	7.3	0.73	<1	**1400**	**2000**	**2900**	<1	<1	<1
1,2-Dichloroethane	195	19	1.9	<1	<50*	<100*	<100*	<1	<1	<1
1,1-Dichloroethene	913	913	913	<1	<50*	<100*	<100*	<1	<1	<1
Ethylbenzene	303	30	3.0	<1	<50	<100	<100	<1	<1	<1
Toluene	19,155	19,155	19,155	<1	3300	3300	1400	<1	<1	<1
Total Xylenes	476	476	476	<2	<100	<200	<200	<2	<2	<2
Methylene Chloride	4,000	400	40	<5	290	<500*	<500*	<5	<5	<5
Methyl Isobutyl Ketone	553,571	553,571	553,571	<10	1300	1000	<1,000*	<10	<10	<10

Notes:
"<" indicates that the concentration of the analyte is less than the value shown.
Shaded cells exceed the screening value for the 1x10-6 risk level
Bolded cells exceed the screening value for the 1x10-4 risk level
DTW Depth to Water.



SITE LOCATION MAP

HERCULES INCORPORATED
Hattiesburg, Mississippi

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PROJECT MANAGER: JE	CHECKED BY: CD
DRAWING FILE:	GIS FILE:
DRAWING BY: JEC	DATE: 06/28/2011
PROJECT NUMBER: LA002999.0003	FIGURE NUMBER: 1

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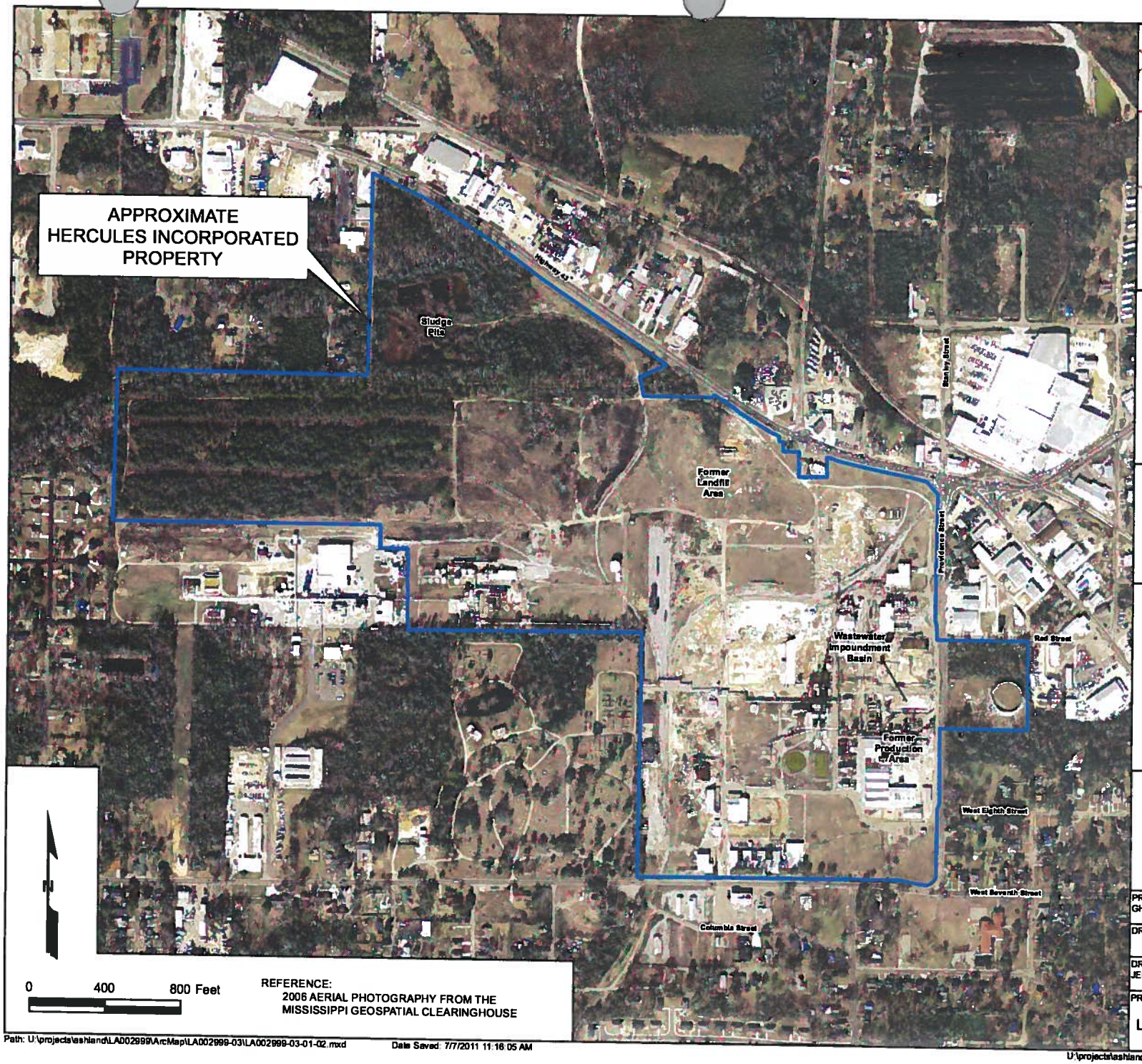

SITE LAYOUT MAP

Phase I Sampling and Analysis Work Plan

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DRAWING BY: JEC	DATE: 07/07/2011
PROJECT NUMBER: LA002999.0003	FIGURE NUMBER: 2

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