



SAL 000098

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Subject: **BACKGROUND SOIL AND GROUNDWATER STUDY, SALMON SITE. LAMAR COUNTY, MISSISSIPPI**

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## 1.0 Introduction

This memorandum details the collection of soil and groundwater samples that were collected as part of a special background study at the Salmon Site, Lamar County, Mississippi. The contents of this memorandum, as defined in *Technical Change to the Work Plan for the Remedial Investigation of the Salmon Site, Lamar County, Mississippi: Sampling and Analysis Plan, Background Soil and Groundwater Study* (April 1998), is 1) a description of activities, 2) a list of samples along with maps indicating collection locations; 3) any exceptions and/or occurrences associated with the sample collection, handling, and analysis; and 4) the analytical results. The purpose of this sampling effort was to collect enough data to determine that the CPOC are naturally occurring and are not a result of the experiments conducted at the site. The risk assessment identified several constituents of concern (COPC) that potentially could have a negative impact on ecological and human health. These COPC are the primary risk drivers for the Salmon Site and are defined as those constituents that have an Incremental Lifetime Cancer Risk (ILCR) exceeding  $1.0 \times 10^{-6}$ . If it can be demonstrated that similar concentrations of these constituents occur naturally in surrounding areas, they can be removed from consideration in the risk assessment.

## **2.0 Summary of Sample Collection**

### **2.1 Soil Sampling**

The sampling effort was conducted April 23 through April 25, 1998. Soil samples were collected from 6 sites around the periphery of the site (Plate 1). Seven samples were collected from each location. The samples were collected using a decontaminated hand auger for the deeper samples and stainless steel trowels for the shallow samples. The augers and sampling equipment was decontaminated by washing with Alconox, rinsing with tap water, rinsing with nitric acid and then rinsing with deionized water. The equipment was laid on plastic sheeting in preparation for the next location. Three samples were collected from the central point (designated "A") from depths of 0-30, 46-76, and 107-137 centimeters (cm) (0-12, 18-30, and 42-54 inches (in), respectively). One additional sample was collected from 0-30 cm, from a point approximately 30 meters (m) (100 feet (ft)) in each of the cardinal directions from point "A". These points are designated, beginning at the northern cardinal and rotating counterclockwise, "B", "C", "D" and "E". The soil was collected into stainless steel bowls, mixed thoroughly, and transferred into sample containers. Equipment was decontaminated and wrapped in plastic in preparation for the next sample location. These samples were packaged and shipped to the laboratory for analysis for Target Analyte List (TAL) inorganics by method ILM04.0 (Table 2-1) and gamma spectroscopy by method WR-EP-325 (DataChem Laboratories). The requested analyses included specific reporting requirements for isotopes identified in the Risk Assessment portion of the Remedial Investigation Report (Table 2-2).

Table 2-1: List of Inorganic Analytes Requested for Soil Analysis

Aluminum	Cobalt	Potassium
Antimony	Copper	Selenium
Arsenic	Iron	Silver
Barium	Lead	Sodium
Beryllium	Magnesium	Thallium
Cadmium	Manganese	Vanadium
Calcium	Mercury	Zinc
Chromium	Nickel	

Table 2-2. Isotopes of Interest

Actinium-228	Lead-214
Bismuth-212	Potassium-40
Bismuth-214	Radium-228
Cesium-137	Thallium-208
Lead-210	Thorium-234
Lead-212	Uranium-235

Table 2-3: Sample Locations, Depths and Associated Sample Numbers

Sample Location	Point	Depth (m (in))	Sample Number(s)
<b>OS-P1</b>	A	0-0.3 (0-12)	SS-0522
		0.5- 0.8 (18-30)	SS-0523
		107-137 (42-54)	SS-0524
	B	0-0.3 (0-12)	SS-0525
	C	0-0.3 (0-12)	SS-0526
	D	0-0.3 (0-12)	SS-0527
	E	0-0.3 (0-12)	SS-0528, SS-0529(DUP)
<b>OS-P2</b>	A	0-0.3 (0-12)	SS-0532
		0.5- 0.8 (18-30)	SS-0533
		107-137 (42-54)	SS-0534
	B	0-0.3 (0-12)	SS-0535
	C	0-0.3 (0-12)	SS-0536
	D	0-0.3 (0-12)	SS-0537
	E	0-0.3 (0-12)	SS-0538
<b>OS-P3</b>	A	0-0.3 (0-12)	SS-0539
		0.5- 0.8 (18-30)	SS-0540
		107-137 (42-54)	SS-0541
	B	0-0.3 (0-12)	SS-0542
	C	0-0.3 (0-12)	SS-0543
	D	0-0.3 (0-12)	SS-0544
	E	0-0.3 (0-12)	SS-0545
<b>OS-P4</b>	A	0-0.3 (0-12)	SS-0547
		0.5- 0.8 (18-30)	SS-0548
		107-137 (42-54)	SS-0549
	B	0-0.3 (0-12)	SS-0550

Sample Location	Point	Depth (m (in))	Sample Number(s)
<b>OS-P4</b>	C	0-0.3 (0-12)	SS-0551
	D	0-0.3 (0-12)	SS-0552
	E	0-0.3 (0-12)	SS-0553, SS-0554(DUP)
<b>OS-P5</b>	A	0-0.3 (0-12)	SS-0555
		0.5- 0.8 (18-30)	SS-0556
		107-137 (42-54)	SS-0557
	B	0-0.3 (0-12)	SS-0558
	C	0-0.3 (0-12)	SS-0559
	D	0-0.3 (0-12)	SS-0560
	E	0-0.3 (0-12)	SS-0561
<b>OS-P6</b>	A	0-0.3 (0-12)	SS-0515
		0.5- 0.8 (18-30)	SS-0516
		107-137 (42-54)	SS-0517
	B	0-0.3 (0-12)	SS-0518
	C	0-0.3 (0-12)	SS-0519
	D	0-0.3 (0-12)	SS-0520
	E	0-0.3 (0-12)	SS-0521

Note: Depths are given as a range from below ground surface. (DUP) indicates a field duplicate was taken at that location.

### 2.1.1 Quality Control

Quality control samples were collected at two locations: OS-P1-E and OS-P4-E. Field duplicates were collected and sent to the laboratory with no identification as to other than the sample number and an alias collection time, along with the other samples. Matrix Spike samples were collected for use by the laboratory. Equipment rinse blanks were collected following decontamination activities. The equipment rinse blanks and the matrix spike samples were collected at a frequency of 1 per sample delivery group (SDG) or 1 per 21 samples. The purpose

of these sample was to ensure that the decontamination of the equipment was effective.

Equipment rinse blanks were collected following decontamination after OS-P3 and OS-P5.

## 2.2 Groundwater Sampling

Groundwater sampling was conducted on April 25 th. The plan identified seven wells proposed for sampling. Several of these wells were no longer in use or were unavailable for sampling due to mechanical problems. Alternate wells were identified and sampled. The intention was to collect water samples from aquifers that occupied similar stratigraphic position to the local aquifer. Table 2-4 indicates the well name, associated sample, and well depths. The depths of the wells are from the reports by the land/well owner. The wells were sampled at the well head. The samples were collected into 1 liter polyethylene bottles preserved with HNO<sub>3</sub>. The samples were shipped to the laboratory for analysis for arsenic using SW-846 Method 7060A.

Table 2-4: Summary of Wells, Locations and Sample Numbers Associated with Groundwater Sampling

Well Name	Sample Number	Well Depth	Location (St. Stephens Meridian)				
			Quarter	Quarter	Section	TWP	RNG
Billy Hibley	SS-0563	360	SE	SW	3	2N	16W
D. Parker	SS-0564	275	NE	NW	9	2N	16W
M. Bobo	SS-0565	200	NW	SE	22	2N	16W
T. Anderson	SS-0566 SS-0567 (DUP)	85	SE	SW	23	2N	16W
Nightengale	SS-0568	100	SW	NW	7	2N	15W

## 2.2 .1 Quality Control

A field duplicate sample was collected in conjunction with the sampling of the T. Anderson well. A matrix spike sample was collected in conjunction with the Nightengale well sample.

## 2.3 Exceptions

### 2.3.1 Soil Sampling

Samples were collected from the locations indicated in the *Technical Change to the Work Plan for the Remedial Investigation of the Salmon Site, Lamar County, Mississippi: Sampling and Analysis Plan, Background Soil and Groundwater Study* (April, 1998). Two locations were different from those locations depicted in the plan. OS-P2 was moved to the east side of Half Moon Creek because of access considerations. This change did not effect the objective of the sampling this point which was to gain information about the Half Moon Creek Alluvial Aquifer. The second exception was for location OP-P5. It was moved approximately 300 feet north of the location depicted in the plan because of heavy brush. The objectives of the sampling were still met.

### 2.3.2 Groundwater Sampling

Aside from not being able to use all of the wells proposed in the work plan, there were no exceptions to the sampling plan. Because of the configuration of the wells, no static water levels were collected. As the wells were sampled on Saturday, when water use is high, water quality parameters were not collected as the wells were assumed to have reached stability with respect to water quality parameters.

### 3.0 Data Presentation

Data was returned from the laboratory and underwent internal Tier I and Tier II data review.

#### 3.1 Soil Analytical Results

Analytical data as returned from the laboratory are attached to this memorandum. These data have been subjected to Tier I and Tier II and appropriate changes to the data qualifiers have been made. The results for Thorium-234 were derived using gamma spectroscopy, however because the particle energies from Th-234 are relatively low, the results of the gamma spectroscopy are understated by a factor of 1000. Re-evaluation of the data by the laboratory was performed and the results are attached.

#### 3.2 Groundwater Analytical Results

These data have been subjected to Tier I and Tier II and appropriate changes to the data qualifiers have been made. The results of the groundwater sampling are presented in Table 3-1.

Table 3-1: Groundwater Sampling Data

Sample No.	Location	Parameter	Result (mg/l)	MDL <sup>1</sup> (mg/l)	Qual. <sup>2</sup>	Dilution	CRDL <sup>3</sup> (mg/l)
SS-0563	Billy Hibely	Arsenic	13	0.54		1	2
SS-0564	David Parker	Arsenic	10	0.54		1	2
SS-0565	Mike Bilbo	Arsenic	11	0.54		1	2
SS-0566	T. Anderson	Arsenic	0.77	0.54	B	1	2
SS-0567	T. Anderson	Arsenic	nd	0.54	U	1	2
SS-0568	Nightengale	Arsenic	0.63	0.54	B	1	2

Notes: <sup>1</sup> Method Detection Limit; <sup>2</sup> Data Qualifier: U=undetected, B= indicates that analyte was above the instrument detection limit but below the MDL; <sup>3</sup> Contract Required Detected Limit

### 4.0 Data Evaluation

It is beyond the scope of this report to present an detailed analysis of the data collected. These data have been reviewed and will incorporated into the *Final Salmon Site Remedial Investigation Report*.

Plates are not available in electronic format.

Please e-mail [lm.records@lm.doe.gov](mailto:lm.records@lm.doe.gov) to request the appendix.