Five-Year Review Report

First Five-Year Review Report
FOR
Olin Corp. (McIntosh Plant) Superfund Site
Operable Unit One

Town of McIntosh
Washington County, Alabama

Prepared By:

United States Environmental Protection Agency
Region 4
Atlanta, Georgia

Approved by:

Beverly H. Banister

Beverly H. Banister
Acting Director
Waste Management Division
U.S. Environmental Protection Agency, Region 4

Date:

4/25/06

Table of Contents

List of Acronyms

ADEM	Alabama Department of Environmental Management
AOC	Administrative Order of Consent
ARAR	Applicable or Relevant and Appropriate Requirement
CAP	Corrective Action Program
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CPC	Crop Protection Chemicals
EPA	United States Environmental Protection Agency
CAE	Corrective Action Effectiveness
CFR	Code of Federal Regulations
GWPS	Groundwater Protection Standards
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NPDES	National Pollution Discharge Elimination System
O&M	Operation and Maintenance
OSWER	Office of Solid Waste and Emergency Response
OUs	Operable Units
PCNB	Pentachloronitrobenzene
POC	Point of Compliance
PRP	Potentially Responsible Party
RA	Remedial Action
RCRA	Resource Conservation Recovery Act
RD	Remedial Design

RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SARA	Superfund Amendments and Reauthorization Act of 1986
SER	Semiannual Effectiveness Report
SWMUs	Solid Waste Management Units
TCAN	Trichloroacetonitrile

Executive Summary

The Olin Corp. (McIntosh Plant) Superfund Site is located approximately one mile east-southeast of the town of McIntosh, in Washington County, Alabama (Attachment 1). The Olin McIntosh plant is an active chemical production facility. In September 1984, the site was placed on the National Priority List (NPL) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). As with many Superfund sites, the problems at the Olin Site are complex; therefore, the Environmental Protection Agency (EPA) has organized the work at this Site into the following operable units ("OUs"):

- OU-1 consists of the active production facility, Solid Waste Management Units (SWMUs), and the upland area of Olin property. The areas in OU-1 beyond the active production facilities include predominantly undeveloped areas to the north and northwest and the brine well field to the west. The most distinctive topographic feature is a steep bluff located approximately 4,000 feet east of the main plant area. This bluff defines the edge of the low-lying OU-2 floodplain area. The OU-1 Record of Decision (ROD) was issued on 12/16/1994.

- OU-2 consists of a basin, floodplain, and a wastewater ditch leading to the basin. The basin is a natural oxbow lake lying within the floodplain of the adjacent Tombigbee River. During the seasonal high water levels (approximately 4 to 6 months per year), the basin is inundated by surface water, and thus becomes contiguous with, the adjacent river. A remedy for OU-2 will be developed in a subsequent ROD.

The remedy chosen in the OU-1 ROD consists of the following components:

- installation of additional extraction wells and treatment of the contaminated groundwater;
- upgrading the existing cap over the old plant (CPC) landfill with a multimedia cap;
- extending the clay cap that exists over the former CPC plant to an area west of the former plant;
- conducting additional groundwater monitoring in the vicinity of the sanitary landfills;
- analyzing the long term effectiveness of the groundwater treatment in reducing containment migration; and
- Implementation of institutional controls for land use and groundwater use restrictions.

The assessment of this five-year review found that the OU-1 remedy was constructed in accordance with the requirements of the OU-1 Record of Decision. The OU-1 remedy at the Olin Site is expected to be or is protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. The RCRA Corrective Action Program (CAP) continues to be effective in containing and removing the groundwater contamination. The attainment of the Groundwater Protection Standards (GWPS) may take up to or over 10 years to achieve. All OU-1 threats have

been addressed through the implementation of the requirements in the ROD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. To restrict on-site land use and groundwater use, institutional controls in the form of a "Declaration of Restrictive Covenants" have been put in place at the site (Attachment 2).

Concurrent with this five-year review, ADEM and EPA conducted an effort to address community health concerns of mercury in the McIntosh community (Attachment 3). Environmental samples were collected from locations along Allen Barns road and other locations in the community. Working with ADPH, the sampling results were evaluated based on exposure pathways. The evaluation determined that while the sampling detected the presence of mercury, the mercury concentrations were not at levels that would indicate a significant human health risk in the community. The Agencies believe that there is no indication of danger to the citizens of McIntosh from contact with mercury in soils, air, surface water, or ground water in the community, including the roads in McIntosh and the brine well sand piles fenced within the Olin property. The community sampling did not call into question the protectiveness of the Olin remedy.

In response to Hurricane Katrina, EPA collected sediment, surface water and groundwater samples in the vicinity of nine National Priorities List (NPL) and two non-NPL Superfund sites located in Alabama and Mississippi to determine if storm-related releases had occurred or, in the case of sites with operating remedial systems, make determinations as to the functionality of these systems (Attachment 4). At Olin, EPA collected surface water and sediment samples from two storm water discharge points that receive runoff from the waste management areas of the site. Concentrations for site-related contaminants of concern detected in these samples are consistent with historical characterization data collected at these discharge points and no chemicals were found to exceed risk-based Preliminary Remediation Goals (PRGs). Thus, EPA does not believe the Olin site was impacted by Hurricane Katrina.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name : Olin Corp. (McIntosh Plant) Site		
EPA ID : ALD008188708		
Region: 4	**State:** AL	**City/County:** McIntosh/Washington
SITE STATUS		
NPL status: ☒ Final ☐ Deleted ☐ Other (specify)		
Remediation status (choose all that apply): ☐ Under Construction ☒ Operating ☒ Complete		
Multiple OUs? * ☒ YES ☐ NO	**Construction completion date:** 6 / 7 / 2001	
Has site been put into reuse? ☐ YES ☒ NO		
REVIEW STATUS		
Lead agency: ☒ EPA ☐ State ☐ Tribe ☐ Other Federal Agency _____		
Author name: Jonathan Vail		
Author title: Environmental Scientist	**Author affiliation:** U.S. EPA, Region 4	
Review period: 5 / 9 / 2005 to 11 /02 / 2005		
Date(s) of site inspection: 8 / 15 - 16 / 2005 & 11 /02 / 2005		
Type of review: ☒ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☒ 1 (first) ☐ 2 (second) ☐ 3 (third) ☐ Other (specify)		
Triggering action: ☐ Actual RA On-site Construction at OU # ☐ Actual RA Start at OU# ☒ Construction Completion ☐ Previous Five-Year Review Report ☐ Other (specify)		
Triggering action date : 2/14 / 2000		
Due date : 2 /14 / 2005		

* ["OU" refers to operable unit.]

** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

- Corrective Action (CA) well CA2 has decreased flow rate.
- Unexpected nozzle corrosion on several vessels in the treatment plant.

Recommendations and Follow-up Actions:

- Olin is evaluating options to rehabilitate well CA2 to increase yield. A schedule for completing this evaluation should be developed and submitted to EPA and ADEM by May 30, 2006.
- The cause for the nozzle corrosion was traced to a problem the material used to coat the nozzles. Action is being taken to re-line the treating vessels on a sequential schedule. Periodic reporting of progress in completing this action should be made to EPA and ADEM.

Protectiveness Statement(s):

The remedy at the Olin Site is expected to be or is protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. The RCRA Corrective Action Program continues to be effective in containing and removing the groundwater contamination. The attainment of the Groundwater Protection Standards (GWPS) may take up to or over 10 years to achieve. All threats at the site have been addressed through the implementation of the requirements in the ROD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. To restrict on-site land use and groundwater use, institutional controls in the form of a "Declaration of Restrictive Covenants" have been put in place at the site (Attachment 2).

Long-term Protectiveness:

Long-term protectiveness of the remedial action will be verified by obtaining additional groundwater samples to fully evaluate potential migration of the contaminant plume downgradient from the treatment area and towards the river. Current data indicate that the plume remains on site. Current monitoring data indicate that the remedy is functioning as required to achieve groundwater cleanup goals.

Other Comments:

Concurrent with this five-year review, ADEM and EPA conducted an effort to address community health concerns of mercury in the McIntosh community (Attachment 3). Environmental samples were collected from locations along Allen Barns road and other locations in the community. Working with ADPH, the sampling results were evaluated based on exposure pathways. The evaluation determined that while the sampling detected the presence of mercury, the mercury concentrations were not at levels that would indicate a significant human health risk in the community. The Agencies believe that there is no indication of danger to the citizens of McIntosh from contact with mercury in soils, air, surface water, or ground water in the community, including the roads in McIntosh and the brine well sand piles fenced within the Olin property. The community sampling did not call into question the protectiveness of the Olin remedy.

In response to Hurricane Katrina, EPA collected sediment, surface water and groundwater samples in the vicinity of nine National Priorities List (NPL) and two non-NPL Superfund sites located in Alabama and Mississippi to determine if storm-related releases had occurred or, in the case of sites with operating remedial systems, make determinations as to the functionality of these systems (Attachment 4). At Olin, EPA collected surface water and sediment samples from two storm water discharge points that receive runoff from the waste management areas of the site. Concentrations for site-related contaminants of concern detected in these samples are consistent with historical characterization data collected at these discharge points and no chemicals were found to exceed risk-based Preliminary Remediation Goals (PRGs). Thus, EPA does not believe the Olin site was impacted by Hurricane Katrina.

Olin Corp. (McIntosh Plant) Superfund Site
McIntosh, Alabama
First Five-Year Review Report

I. Introduction

The U.S. Environmental Protection Agency (EPA) has conducted a five-year review of the remedial actions implemented for Operable Unit One at the Olin Corp. (McIntosh Plant) Superfund Site in McIntosh, Alabama (Attachment 1). This review was conducted by the Environmental Scientist assigned for the site from May 2005 through December 2005 pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121(c) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) §300.400(f) (4) (ii), and the Office of Solid Waste and Emergency Response (OSWER) directive 9355.7-03B-P (June 2001). This report documents the results of the review. The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify deficiencies found during the review, if any, and identify recommendations to address them.

For Operable Unit Two (OU-2), EPA, ADEM, and State and Federal Environmental Trustees, and the Olin Corporation are preparing to evaluate Enhanced Natural Sedimentation (ENS). The ENS project will require that a berm, approximately 10 feet high, be constructed between the Tombigbee River and the Olin Basin. The idea behind ENS is that the berm will allow the River's floodwater to remain in the OU-2 area for a longer period of time, and sediments will drop out of the floodwater to form a natural cover over the contaminated sediments. The ENS project is not a final remedy, but it will allow all the parties involved to evaluate the movement of sediments and mercury in the OU-2 area. The information that will be gathered during the ENS project, especially information on the movement of the sediments and the mercury, is essential for the selection of a final remedy for OU-2.

Five-year reviews are conducted either to meet the statutory mandate under CERCLA §121(c) or as a matter of policy. The EPA is preparing this five-year review report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or*

[106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The EPA interprets this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) which states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

This is the first five-year review for the Olin Corp. (McIntosh Plant) Site, and it was conducted as required by statute due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure. These statutory reviews are only required for remedies signed on or after the effective date of SARA, October 17, 1986. The Record of Decision (ROD) was signed in December 16, 1994. The triggering action for this statutory review is the 2/14/2000 remedial action start date.

II. Site Chronology

Table 1 - Chronology of Site Events

Event	Date
Initial Discovery of problem or contamination	1979
Final listing on EPA National Priorities List	9/21/1984
RCRA post -closure permit activities - Demolition and removal of surface impoundments and waste pile material	1984 - 1986
Administrative Order on Consent for Olin to conduct Remedial Investigation/ Feasibility Study (RI/FS)	1989
Remedial Investigation/Feasibility Study (RI/FS) complete	2/23/1994
Proposed plan identifying EPA's preferred remedy presented to public; start of public comment period.	2/28/1994
ROD selecting the remedy is signed	12/16/1994
Consent Decree finalizing settlement for responsible party performance of remedy	6/29/1995
PRP Remedial Design	7/26/1996 - 9/291998
PRP Remedial Action	9/29/1998 - 2/19/2004
Remedial Action Report Final Approved	2/19/2004

III. Background

Physical Characteristics

The Olin Corp. (McIntosh Plant) Site is located approximately one mile east-southeast of the town of McIntosh, in Washington County, Alabama. The property is bounded on the east by the Tombigbee River, on the west by land not owned by Olin west of U.S. highway 43, on the north by the Ciba-Geigy Corporation plant site and on the south by River Road. The Olin McIntosh plant is an active chemical production facility. The main plant and associated properties cover approximately 1,500 acres, with active plant production areas occupying approximately 60 acres.

The McIntosh area is underlain by alternating beds of unconsolidated-to-consolidated sedimentary rocks that are collectively hundreds of feet thick. The McIntosh salt dome is the most distinctive structural feature of the area.

The groundwater in the vicinity of the Olin Site contains two major aquifers, a shallow Alluvial Aquifer (down to about 100 feet below grade) and a deeper Miocene Aquifer (below 180 feet), separated by a thick clay layer. The Alluvial aquifer in the main plant area varies in thickness from an average of about 55 feet to 80 feet. The Alluvial aquifer is generally unconfined throughout the area. The hydraulic conductivity has been estimated to be 296 ft/day based on slug tests and a pump test. Groundwater in the Alluvial aquifer generally enters the site from the north. The southerly flow is divided into southeast and southwest components by a groundwater divide oriented north-south through the center of the plant site. Flow to the east of this divide is to the east and southeast, discharging to the basin in the northern portion of the Site and farther south, flow continues in a southeasterly direction toward RCRA corrective action wells. In off-site areas southeast of the facility, groundwater from the Alluvial aquifer discharges to the Tombigbee River. On the western side of the groundwater divide, flow is south and southwest toward the groundwater recovery area created by RCRA corrective action wells (Attachment 1). A hydraulic mound farther to the west deflects westerly flow to the south in the brine field area. The groundwater flow patterns are affected by the seasonal rises in the Tombigbee River. During periods of high river stage, instead of groundwater discharging eastward, the basin and Tombigbee River become recharge areas and groundwater flow is to the west toward the active facility.

The Miocene confining unit (Tm1) consists of clays, sandy clays, or clayey sands. Boring logs from wells that penetrate the upper Miocene confining unit indicate that this unit is approximately 130 feet thick. The Miocene aquifer (Tm2) is composed primarily of thick-bedded coarse sand and gravel beds. The upper Miocene aquifer (Tm2) contains two main artesian sands that are separated by a clayey unit ranging from 10 to 20 feet thick. The sands are considered as one hydrogeologic unit due to a natural hydraulic-connection and the connection by gravel-packed wells. The combined transmissivity of the two sands is considered to be in excess of about 25,000 square feet per day. The regional gradient of the Miocene aquifer is to the east southeast, however, Olin continuously pumps two Miocene aquifer process water wells.

The effect of pumping process water wells is to cause groundwater flow in the Miocene aquifer to be toward the process water wells across the plant area.

The active production areas of the plant are relatively flat. A topographic high of greater than 50 feet (above mean sea level) extends from the northern to the southern extent of Olin's property, west of the production facility and east of the brine well field. This topographic high creates a drainage divide that defines the two major surface water drainage pathways. The steep bluff, located approximately 4,000 feet east of the main plant area, defines the edge of the low-lying floodplain area, which is about 25 feet lower in elevation than the upland areas immediately to the west. Runoff from the northern portions of the site located east of the drainage divide flows eastward to a low-lying area between the plant area and the basin. There is also a small east-west drainage divide in the northeast corner of the Olin property. Flow to the north of this divide is to the Ciba-Geigy property. The watershed for the basin lies within the floodplain of the Tombigbee River.

As with many Superfund sites, the problems at the Olin Site are complex; therefore, EPA has organized the work at this Site into the following operable units ("OUs"):

- OU-1 consists of the active production facility, Solid Waste Management Units (SWMUs), and the upland area of Olin property. The areas in OU-1 beyond the active production facilities include predominantly undeveloped areas to the north and northwest and the brine well field to the west. The most distinctive topographic feature is a steep bluff located approximately 4,000 feet east of the main plant area. This bluff defines the edge of the low-lying OU-2 floodplain area. The OU-1 Record of Decision (ROD) was issued on 12/16/1994.

- OU-2 consists of a basin, floodplain, and a wastewater ditch leading to the basin. The basin is a natural oxbow lake lying within the floodplain of the adjacent Tombigbee River. During the seasonal high water levels (approximately 4 to 6 months per year), the basin is inundated by surface water, and thus becomes contiguous with, the adjacent river. A remedy for OU-2 will be developed in a subsequent ROD.

Land and Resource Use

Olin operated a mercury cell chlor-alkali plant on a portion of the Site from 1952 through December 1982. In 1952, Alabama Chemical Company began operation of a chlorinated organics plant on property immediately south of the Olin plant. In 1954, Olin acquired Alabama Chemical and in 1955 began construction of a pentachloronitrobenzene (PCNB) plant on the property. PCNB production started in 1956. The McIntosh plant was expanded in 1973 to produce trichloroacetonitrile (TCAN) and 5-ethoxy-3trichloromethyl-1,2,4-thiadiazole (Terrazole). The PCNB, TCAN and Terrazole manufacturing areas were collectively referred to as the Crop Protection Chemicals (CPC) plant. In 1978, Olin began operation of a diaphragm cell caustic soda/chlorine plant, which is still in operation. Olin shut down the CPC and mercury

cell chlor-alkali plants between 1982 and 1986. The CPC plant was decommissioned and dismantled and the site was capped.

The McIntosh plant today produces chlorine, caustic soda, sodium hypochlorite and sodium chloride and blends and stores hydrazine compounds.

History of Contamination

The Olin McIntosh plant currently monitors and reports on numerous facilities within the plant that are permitted through the EPA and the Alabama Department of Environmental Management (ADEM). These include water and air permits as well as a Resource Conservation and Recovery Act (RCRA) post-closure permit (ALD 008 188 708). The RCRA post-closure permit requires groundwater monitoring for closed RCRA units, including the weak brine pond, the stormwater pond and the brine filter backwash pond. The post-closure permit also requires corrective action for releases of 40 CFR 261 Appendix VIII constituents from any solid waste management units (SWMUs) at the facility. There are no active RCRA units at the facility. Olin also has permits for three injection wells for mining salt and a neutralization/percolation field.

In September 1984, Olin's McIntosh plant site was placed on the National Priority List (NPL) of CERCLA or "Superfund." Groundwater contamination at the site has been established based on the results of various investigations. Mercury and chloroform are the principal contaminants identified at the site. Mercury contamination was evidently caused by the operation of the mercury cell chlor-alkali plant during the period 1952 to 1982. The chloroform contamination is probably a degradation product from the operation of the TCAN plant from 1973 to 1982.

Investigations have also indicated contamination in a 65-acre natural basin, which is located on the Olin property east of the active plant facilities. The plant wastewater ditch currently carries the National Pollutant Discharge Elimination System (NPDES) discharge and storm water runoff from the manufacturing areas, as well as from some of the west, east and southeast manufacturing areas of Olin property to the Tombigbee River. From 1952 to 1974, plant wastewater discharge was routed through the basin and then to the Tombigbee River. In 1974, a discharge ditch was constructed to reroute the wastewater directly to the Tombigbee River.

Initial Response

In September 1984, Olin's McIntosh plant site was placed on the National Priority List (NPL) of CERCLA. Mercury and Chloroform were the principal contaminants in groundwater identified at the site. During the period 1952 to 1982, mercury contamination was evidently caused by the operation of the mercury cell chlor-alkali plant. The chloroform contamination is probably a degradation product from the operation of the TCAN plant from 1973 to 1982.

From 1984 through 1985, Olin closed or clean-closed ten designated SWMUs. Each closure plan was reviewed and approved by EPA and/or ADEM. Closures were certified at completion and

releases from maintaining financial assurance for closure under RCRA were obtained. In 1987, with EPA/ADEM approval, Olin initiated a RCRA Corrective Action Program (CAP), consisting of five groundwater pumping wells in the Alluvial Aquifer, with treatment systems located centrally or at the well. Since implementation of the CAP, groundwater contamination has been observed to decrease at the RCRA compliance boundaries.

During 1988 Olin closed four of six former mercury cell brine wells under Olin's underground injection control (UIC) permit. The other two mercury cell brine wells (Brine Well No. 1 and Brine Well No. 2) had been previously plugged in 1972 and 1985, respectively. Plugging of these wells was also approved under the UIC permit. The closed wells were all associated with the former mercury-cell chlor-alkali plant, and the cavities contain brine with a low concentration of mercury. In 1989, EPA and Olin entered into an Administrative Order on Consent ("AOC") for Olin to conduct a remedial investigation/feasibility study ("RI/FS") under EPA oversight.

Basis for Taking Action

Table 2 - Contaminants of Concern

Hazardous substances that have been identified as Contaminants of Concern (COCs) at the site in each media include:

Groundwater	Soil
1,2,4-Trichlorobenzene	1,2,4-Trichlorobenzene
1,2-Dichlorobenzene	1,2-Dichlorobenzene
1,3-Dichlorobenzene	1,3-Dichlorobenzene
1,4-Dichlorobenzene	1,4-Dichlorobenzene
Alpha-BHC	Benzene
Arsenic	Chlorobenzene
Benzene	Mercury
Beryllium	
Bromodichloromethane	
Cadmium	
Carbon Tetrachloride	
Chlorobenzene	
Chloroform	
Chromium (hexavalent)	
Copper	
Cyanide	
Lead	
Mercury	
Nickel	
Pentachlorobenzene	
Pentachloronitrobenzene	

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in the ROD, may present an eminent and substantial endangerment to public health, welfare, or the environment.

IV. Remedial Actions

Remedy Selection

The ROD for the Olin Corp. (McIntosh Plant) Site was signed on December 16, 1994. Remedial action alternatives were developed and screened as a result of data collected during the Remedial Investigation for consideration for the ROD.

Based upon consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives and public and state comments, EPA has selected a source control and groundwater remedy for OU #1 of the Site. The remedy consists of the following:

- Old Plant (CPC) Landfill - Containment (Improve Capping with additional Groundwater Monitoring).

- Area West of Former CPC Plant - Containment which will include extension of the cap which exist in the area of the CPC plant, monitoring, and maintenance.

- Sanitary Landfills, Lime Ponds, Strong Brine Pond, Mercury CELL Plant, and Well Sand Residue Area - Containment area Inspection/ maintenance, additional groundwater monitoring in areas not encompassed by the RCRA compliance monitoring, e.g., the sanitary landfill areas.

- Groundwater - Extraction (Additional Vertical and Horizontal Wells)/Treatment/Discharge.

The selected remedy provides for the following:

- Extracting contaminated groundwater from horizontal and vertical wells and treatment of the extracted groundwater;
- Upgrading the existing cap over the old plant (CPC) landfill with a multimedia cap and performing additional groundwater monitoring in the vicinity of the landfill. The CPC landfill cap will be extended to encompass the former drainage ditch area;
- Extending the clay cap that exists over the former CPC plant to the west, capping the contaminated soils;
- Additional groundwater monitoring in the vicinity of the sanitary landfills. In the event that monitoring indicates releases from this area, additional corrective action measures will be required;
- Quarterly monitoring and maintenance of the existing clay caps over the sanitary

landfills, the lime ponds, and the strong brine pond, the asphalt cover over the mercury cell plant, and the fencing around the well sand residue area. The findings of the inspections will be documented. If an inspection noted problem areas such as erosional areas, cracks in the asphalt, or insufficient cap depth, maintenance or corrective measures will be required. Maintenance and corrective measures will also be documented;

- Monitoring to determine the effectiveness of the groundwater treatment in reducing the contaminant migration; and
- Institutional controls for land use and groundwater use restrictions

Source Control

Source control remediation addresses active remediation of the Old Plant (CPC) Landfill (including the drainage ditch), and the Area West of the Former CPC Plant. It also includes additional groundwater monitoring in the vicinity of the sanitary landfills and institutional actions for the other SWMUs, i.e., the sanitary landfills, the lime ponds, and the strong brine pond, the mercury cell plant, and the well sand residue area.

The major components of source control implemented includes: Upgrading and extending the existing cap over the old plant (CPC) landfill with a multimedia cap and performing additional groundwater monitoring in the vicinity of the landfill. The CPC landfill cap was extended to encompass the former drainage ditch area. The clay cap that exists over the former CPC plant was extended to the west, capping the contaminated soils. Quarterly monitoring and maintenance of the existing clay caps over the sanitary landfills, the lime ponds, and the strong brine pond, the asphalt cover over the mercury cell plant, and the fencing around the well sand residue area will be established. The findings of the inspections will be documented. If an inspection noted problem areas such as erosional areas, cracks in the asphalt, or insufficient cap depth, maintenance or corrective measures will be required. Maintenance and corrective measures will also be documented. Additional groundwater monitoring in the vicinity of the sanitary landfills will be implemented. In the event that monitoring indicates releases from the sanitary landfills, additional corrective action measures will be required.

Management of Migration Response Objectives

The major components of the groundwater remediation include the following:

- Groundwater remediation with extraction of contaminated groundwater from horizontal and vertical wells;
- Prevent further migration of groundwater contamination beyond its current extent; and
- Institutional controls, such as deed and land-use restrictions.

The horizontal extraction wells are designed to capture the area of dense brine accumulation. The vertical extraction wells were designed to accelerate removal of organics from the area of the

old plant (CPC) landfill. Additional monitor wells were installed in the vicinity of the old plant (CPC) landfill to monitor the effectiveness of the system.

Institutional controls have been implemented at the Olin site in the form of restrictive covenants. The purpose for these restrictions is to protect the future integrity of the caps covering the closed waste management units at the site.

Remedy Implementation

The CERCLA remedial action at the Olin property was implemented during 1999 and 2000. However, Olin's RCRA Corrective Action Program started in 1987 to hydraulically contain the contaminated groundwater within the facility boundaries, and extract and treat the groundwater to Groundwater Protection Standards (GWPSs). The remedy has shown that groundwater contamination is being contained has been observed to decrease at the RCRA compliance boundaries. Five corrective action wells (CA1 - CA5) were part of the original groundwater remediation system. The five vertical wells were constructed of 10-inch diameter PVC casing and screen. Two newer wells, one vertical, CA6, with 8-inch diameter PVC casing and screen and the other horizontal well, CA7, constructed with HDPE approximately 1,400 feet long with a 500-foot screen, were installed in 2001. Currently, the contaminated groundwater is pumped from each well to centralized treatment system which consists of pH neutralization, clarification to remove iron and aluminum hydroxides, air stripping to remove volatile organic compounds, and activated carbon to remove mercury. The centralized system began operating on May 2, 2001 and groundwater extraction from the two new wells, CA6 and CA7, started on June 7, 2001.

Fate and transport analysis provided an evaluation of the potential effects on groundwater from the SWMUs. The analysis was conducted by assuming that the source concentration was the maximum concentration detected in the soils. In cases where site-specific Toxic Characteristic Leaching Program (TCLP) test data were available, the maximum concentration from the TCLP extract was assumed to be the leachate concentration at the source. Cleanup levels were developed for the groundwater, the old plant landfill drainage ditch, the old CPC plant landfill, and for the area west of the former CPC plant. These cleanup levels for groundwater are based on GWPS or health-based calculations. Cleanup levels for the area west of the former CPC plant were based on protection of groundwater for domestic use from contaminants which may migrate from the soils to the groundwater.

The cleanup levels for subsurface soil were based on protection of groundwater for domestic use from leachable chemicals. Cleanup levels for soils were developed for the protection of groundwater at the groundwater cleanup level. The ROD states that groundwater shall be treated until the following maximum concentration levels are attained at the wells designated by EPA as compliance points.

Tables from 1994 ROD

Table 3. Cleanup Performance Standards for Groundwater	
Constituent Cleanup Goal	(ug/l)
Alpha-BHC	0.013
Benzene	5
Chlorobenzene	100
1,2,4-Trichlorobenzene	70
1,2-Dichlorobenzene	600
1,3-Dichlorobenzene	75
1,4-Dichlorobenzene	75
Mercury	2
Pentachlorobenzene	29
Pentachloronitrobenzene	0.29

Table 4. Cleanup Performance Standards for Soil	
Constituent Cleanup Goal	(mg/kg)
Benzene	5
Chlorobenzene	79
1,2-Dichlorobenzene	1,645
1,3-Dichlorobenzene	140
1,4-Dichlorobenzene	140
1,2,4-Trichlorobenzene	1,000
Mercury	55

Mercury and the organic constituents (chloroform and 1,4-dichlorobenzene) have been determined to be the primary groundwater tracking constituents of the corrective action program. These were evaluated separately for the source evaluation because these compounds were handled in different process areas. Mercury was handled at the facilities associated with the former mercury cell plant and the organics were handled at the facilities associated with the former CPC plant. Olin's monitor wells are screened in either the upper or lower zones of the Alluvial aquifer and the deeper Miocene aquifer. Generally, the wells screened in the upper zone

are less than 50 feet deep, and those screened in the lower zone are greater than 50 feet deep. Intercepted groundwater from these two zones is treated to remove contamination. After treatment, groundwater is reused in the production processes at the Olin plant or discharged to the Tombigbee River under the plant's NPDES permit.

The Remedial Action Report achieved final approval on February 19, 2004. EPA and the State have determined that all RA construction activities, including the implementation of institutional controls, were performed according to specifications. It is expected that the groundwater extraction and treatment system will be required to continue to operate possibly indefinitely until GWPS cleanup levels for all groundwater contaminants have been reached. If GWPS cleanup levels have been met, EPA will issue a Final Closeout Report.

System Operation/Operation and Maintenance

Olin is conducting long-term monitoring and the operation and maintenance activities according to the CAP and is pursuant to the RCRA Post Closure Permit (ALD 008 188 708). The primary activities associated with O&M include the following:

- Maintain a monitor well network of over 100 wells, an extraction well network for the treatment of the extracted groundwater, and the treatment system for treating the contaminated groundwater. Conduct monitoring to determine the effectiveness of the groundwater treatment in reducing the contaminant migration. Continue groundwater monitoring in the vicinity of the sanitary landfills. In the event that monitoring indicates releases from this area, additional corrective action measures will be required;

- Maintain the cap over the old plant (CPC) landfill. Quarterly monitoring and maintenance of the existing clay caps over the sanitary landfills, the lime ponds, and the strong brine pond, the asphalt cover over the mercury cell plant, and the fencing around the well sand residue area. The findings of the inspections will be documented. If an inspection noted problem areas such as erosional areas, cracks in the asphalt, or insufficient cap depth, maintenance or corrective measures will be required. Maintenance and corrective measures will also be documented.

Table 5 - Annual System Operations/O&M Costs

Dates		Total Cost rounded to nearest $1,000
From	To	
05/2001	12/2001	$450,000,000.00
01/2002	12/2002	$395,000,000.00
01/2003	12/2003	$480,000,000.00
01/2004	12//2004	$550,000,000.00

Dates		Total Cost rounded to nearest $1,000
From	To	
01/2005	07/2005	$300,000,000.00

V. Progress Since The Last Five-Year Review

This was the first five-year review for the site.

VI. Five-Year Review Process

Administrative Components

Olin managers and ADEM were notified of the initiation of the five-year review in June, 2005. The Olin Five-Year Review team was led by Jonathan Vail of EPA, Environmental Scientist for the Olin Site, and included Michael Arnett, Remedial Project Manager (RPM). Sonja Favors of the ADEM assisted in the review as the representative for the support agency.

Document Review

This five-year review consisted of a review of relevant documents including the Remedial Investigation Report (RI Report), the 1994 Record of Decision (ROD), and monitoring data contained in the Semiannual Effectiveness Report (SER) First Semiannual Reporting Period 2005.

Data Review

The SER presents concentration versus time graphs of the tracking constituents (mercury, chloroform, and 1,4-dichlorobenzene) from 1988 to present for the monitor wells designated as Point of Compliance (POC) wells and Corrective Action Effectiveness (CAE) wells. The graphs are presented in Attachment 5. The 12 POC wells (BR10, BR4R, BR7, DH2, BR7D, BR8, BR8D, E6, MP14, MP15, MP8, and MP9) are located in the central portion of the facility, within the impacted groundwater. The 27 CAE wells (E3, E4, E5, FP2R, LP3, MP2, MP3, MP12, MP16, PE3, PE3D, PE7, PE10, PH1, PH2, PH2D, PH3D, SL5, SL6, WE2, WE3, WP10A, WP3, WP4, WP5, and WP6A) are located between the POC well and the boundary wells.

The concentration trends for the POC wells are as follows, according to the SER.

Mercury: The concentration of mercury has decreased in most POC wells over time. Wells E6, MP14 and MP15 have shown significant mercury concentration decreases during recent sampling events. Wells BR4R and BRIO have shown slight upward trends in mercury concentrations. MP9 and BR8 have showed higher concentrations the last few sampling events.

Additional semiannual sampling data are required to determine whether this represents a trend.

Chloroform: Decreasing trends in chloroform concentrations have been observed in most of the POC wells. Monitor wells BR8D and E6 have shown gradual or no apparent trends. Increasing trends are indicated by the regression lines for BR4R, BR8, and MP9; however, significant decreases in BR8 have been observed during the recent sampling events.

1,4-Dichlorobenzene: Decreasing concentration trends for 1,4-dichlorobenzene have been observed in most of the POC wells, with a few exceptions. MP9 has shown an overall upward trend, but concentrations have decreased during the recent events.

According to the SER, the following are the current mercury results for the first semiannual 2005 sampling event:

- Mercury was detected at 1.2 ug/L in the upgradient well PEIM.
- Mercury concentrations in the Alluvial aquifer POC wells ranged from not detected in MP8 to 70.2 ug/L in BR7D. These concentrations are similar to previous sampling events and indicate that mercury exceeds the GWPS of 2 ug/L at the point of compliance.
- Mercury was not detected in the POC well at the Alluvial/Miocene boundary (DH2).
- Mercury was detected in PE5 and PE11 at concentrations below the GWPS. Mercury was not detected in the other boundary wells.
- Mercury was not detected in the Miocene aquifer boundary wells DHI and DH3.

The mercury distribution for this event is similar to previous events. The highest concentrations of mercury are centered near BR7D, BR8/8D, BR10, and MP9 (adjacent to CA7), MP16 (near CA6), WE3 (near CA1), and WP3 (near CA2) with the extent hydraulically contained and within the capture zone of the corrective action pumping wells.

According to the SER, the following are the current chloroform results for the first semiannual 2005 sampling event:

- Chloroform was not detected in the upgradient well PEIM.
- Chloroform concentrations in the Alluvial aquifer POC wells ranged from 25 ug/L in BR4R to 2,000 [ug/L in MP9. These concentrations are similar to previous sampling events and indicate that chloroform exceeds the GWPS of 100 ug/L at the point of compliance.
- Chloroform was not detected in the POC well at the Alluvial/Miocene boundary (DH2).
- Chloroform was not detected in any of the Alluvial aquifer boundary wells.
- Chloroform was not detected in the Miocene aquifer boundary wells DHI and DH3.

Generally the chloroform distribution for this event is similar to previous events with some slight

variations due to fluctuations caused by the pumping, and the different distribution of wells that were sampled as compared to previous events. The chloroform plume is hydraulically contained and within the capture zone of the corrective action pumping wells.

According to the SER, the following are the current 1,4-dichlorobenzene results for the first semiannual 2005 sampling event:

- 1,4-Dichlorobenzene was not detected in the upgradient well PEIM.
- 1,4-Dichlorobenzene concentrations in the Alluvial aquifer POC wells ranged from below the detection limit (<5 [ug/L) in BR4R, BR7D, and BRIO to 3,300 ug/L at MP9. These concentrations are similar to previous sampling events and indicate that 1,4-dichlorobenzene exceeds the GWPS of 75 ug/L at the point of compliance.
- 1,4-Dichlorobenzene was not detected in the POC well at the Alluvial/Miocene boundary (DH2).
- 1,4-Dichlorobenzene was detected at 7.9 ug/L (well below the 75 [u/L GWPS) in PEI 1. 1,4-Dichlorobenzene was not detected in any of the other Alluvial aquifer boundary wells.
- 1,4-Dichlorobenzene was detected at 22 ug/L (below the 75 ug/L GWPS) in Miocene aquifer boundary well DHl and was not detected in Miocene aquifer boundary well DH3.

In general the tracking constituent concentrations are decreasing or steady in most of the POC wells. Wells that have shown increasing trends are near the old plant (CPC) landfill and near the brine ponds where additional corrective action pumping wells have been installed and became operational in the third quarter of 2001.

The concentration trends for the CAE wells are as follows, according to the SER.

Mercury: The concentrations of mercury are decreasing or are stable near the GWPS in most of the CAE wells. Mercury in MP16 and WP3 has been stable in the 50 ug/L range. There have been recent fluctuations in mercury concentrations in WE3 varying from near the GWPS to the 45 ug/L range.

Chloroform: Most CAE wells have shown long-term trends of decreasing concentrations of chloroform. There is an apparent increasing to steady trend in PE10, WE3, and WP3. FP2R shows an apparent upward trend (primarily due to the last sampling event). There is no apparent trend in MP16 and WP6A.

1,4-Dichlorobenzene: Most CAE wells have shown long-term trends of decreasing concentrations for 1,4-dichlorobenzene. MP16 has shown an increasing trend. There have been elevated concentrations during the last two events in WE3, although it is not evident whether this represents a trend since the March 2005 sampling result was lower than the results from the previous sampling. The 1,4-dichlorobenzene concentrations observed in E5 have shown an

overall steady to upward trend.

In general the tracking constituent concentrations are decreasing or steady in most of the CAE wells. Wells that have shown increasing trends are within the influence of one or more of the corrective action pumping wells and probably reflect the movement of the plume from areas of higher concentrations toward the pumping wells. Decreasing trends were generally observed in the CAE wells near the outer edge of the plume.

Site Inspection

Inspections at the site were conducted on August 16, 2005 and November 2, 2005, by the Environmental Scientist and the RPM. The purpose of the inspections was to assess the protectiveness of the remedy, including the monitor well network, treatment system, on-site laboratory for mercury, the integrity of the cap and the overall site conditions. No significant issues were identified at any time regarding remedy.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The review of documents, ARARs, risk assumptions, and the results of the site inspection indicate that the remedy is functioning as intended by the ROD and the RCRA CAP and Post Closure Permit (ALD 008 188 708). The effective implementation of institutional controls has prevented exposure to, or ingestion of, contaminated groundwater.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes in Standards and To Be Considered

There have been no changes in these ARARs and no new standards or TBCs affecting the protectiveness of the remedy.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

The exposure assumptions used to develop the Human Health Risk Assessment included both current exposures (older child trespasser, adult trespasser) and potential future exposures (young and older future child resident, future adult resident and future adult worker). There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment. These assumptions are considered to be conservative and reasonable in

evaluating risk and developing risk-based cleanup levels. No change to these assumptions or the cleanup levels developed from them is warranted. There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Community Sampling

Concurrent with this five-year review, ADEM and EPA conducted an effort to address community health concerns of mercury in the McIntosh community (Attachment 3). Environmental samples were collected from locations along Allen Barns road and other locations in the community. Working with ADPH, the sampling results were evaluated based on exposure pathways. The evaluation determined that while the sampling detected the presence of mercury, the mercury concentrations were not at levels that would indicate a significant human health risk in the community. The Agencies believe that there is no indication of danger to the citizens of McIntosh from contact with mercury in soils, air, surface water, or ground water in the community, including the roads in McIntosh and the brine well sand piles fenced within the Olin property. The community sampling did not call into question the protectiveness of the remedy.

Post-Katrina NPL and Non-NPL Superfund Site Evaluation Report

On August 29, 2005, Hurricane Katrina made landfall along the Gulf coast of the southeastern United States, causing unprecedented damage from eastern Louisiana to near Mobile, Alabama, due to the high winds and storm surge. During the period from October 12 through October 14, 2005, personnel from the USEPA Region 4, Science and Ecosystem Support Division (SESD) collected sediment, surface water and groundwater samples in the vicinity of nine National Priorities List (NPL) and two non-NPL Superfund sites in the potentially affected region to determine if storm-related releases occurred or, in the case of sites with operating remedial systems, make determinations as to the functionality of these systems (Attachment 4). The investigation was conducted according to the Quality Assurance Project Plan, Post-Katrina Site Evaluations, Southern and Coastal Alabama and Mississippi, October 2005 and was requested by the Alabama Department of Environmental Management (ADEM), the Mississippi Department of Environmental Quality (MDEQ) and the USEPA, Region 4, Waste Management Division.

At Olin, SESD collected surface water and sediment samples from two storm water discharge points that receive runoff from the waste management areas of the site. Concentrations for site-related contaminants of concern detected in these samples are consistent with historical characterization data collected at these discharge points and no chemicals were found to exceed risk-based Preliminary Remediation Goals (PRGs). Thus, EPA does not believe the site was impacted by Hurricane Katrina.

Technical Assessment Summary

According to the data reviewed (including the community sampling and the Post-Katrina sampling), the many years of groundwater sampling events, and the site inspection, the remedy is functioning as intended by the ROD, and the RCRA CAP and Post Closure Permit (ALD 008 188 708). There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment, and there have been no changes to the risk assessment methodology that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

VIII. Issues

Table 6 - Issues

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Corrective Action (CA) well CA2 has decreased flow rate.	N	N
Unexpected nozzle corrosion on several vessels in treatment plant.	N	N

IX. Recommendations and Follow-Up Actions

Table 7 - Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
Corrective Action (CA) well CA2 has decreased flow rate.	Olin is evaluating options to rehabilitate well CA2 to increase yield.	Olin	EPA / ADEM	July 2006	N	N

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
Unexpected nozzle corrosion on several vessels in treatment plant.	Traced to poor coating. Vessels are being re-lined on sequential schedule.	Olin	EPA/ ADEM	July 2007	N	N

X. Protectiveness Statement

The remedy at the Olin Site is expected to be or is protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. The RCRA Corrective Action Program continues to be effective in containing and removing the groundwater contamination. The attainment of the GWPS may take up to or over 10 years to achieve. All threats at the site have been addressed through the implementation of the requirements in the ROD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. To restrict on-site land use and groundwater use, institutional controls in the form of a "Declaration of Restrictive Covenants" have been put in place at the site (Attachment 2).

Long-term protectiveness of the remedial action will be verified by obtaining additional groundwater samples to fully evaluate potential migration of the contaminant plume down gradient from the treatment area and towards the river. Current data indicate that the plume remains on site. Current monitoring data indicate that the remedy is functioning as required to achieve groundwater cleanup goals.

XI. Next Review

The next five-year review for the Olin Corp. (McIntosh Plant) Superfund Site is required to be approved within five years of the signature date of this review.

ATTACHMENT 1: Figures

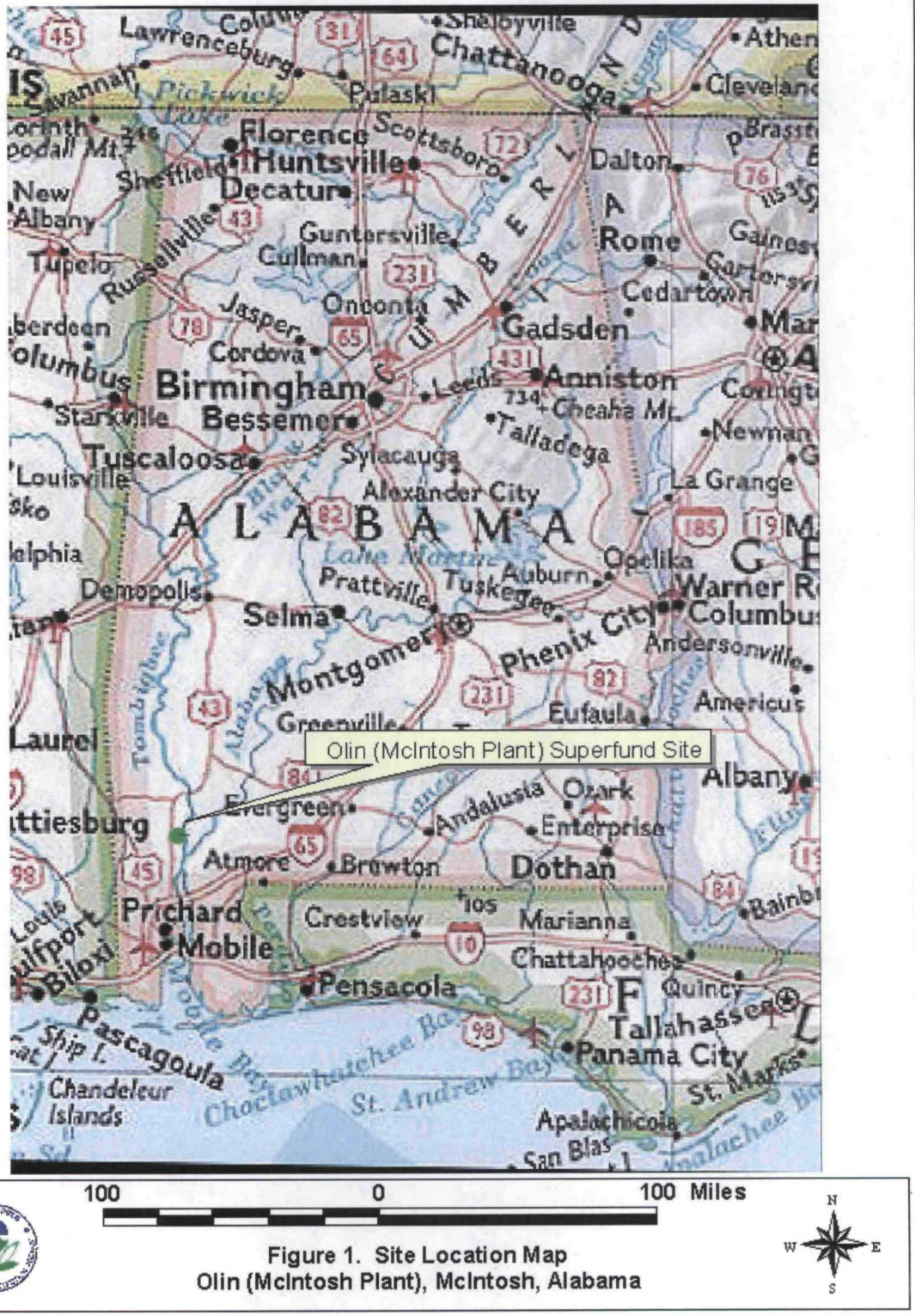


Figure 1. Site Location Map
Olin (McIntosh Plant), McIntosh, Alabama

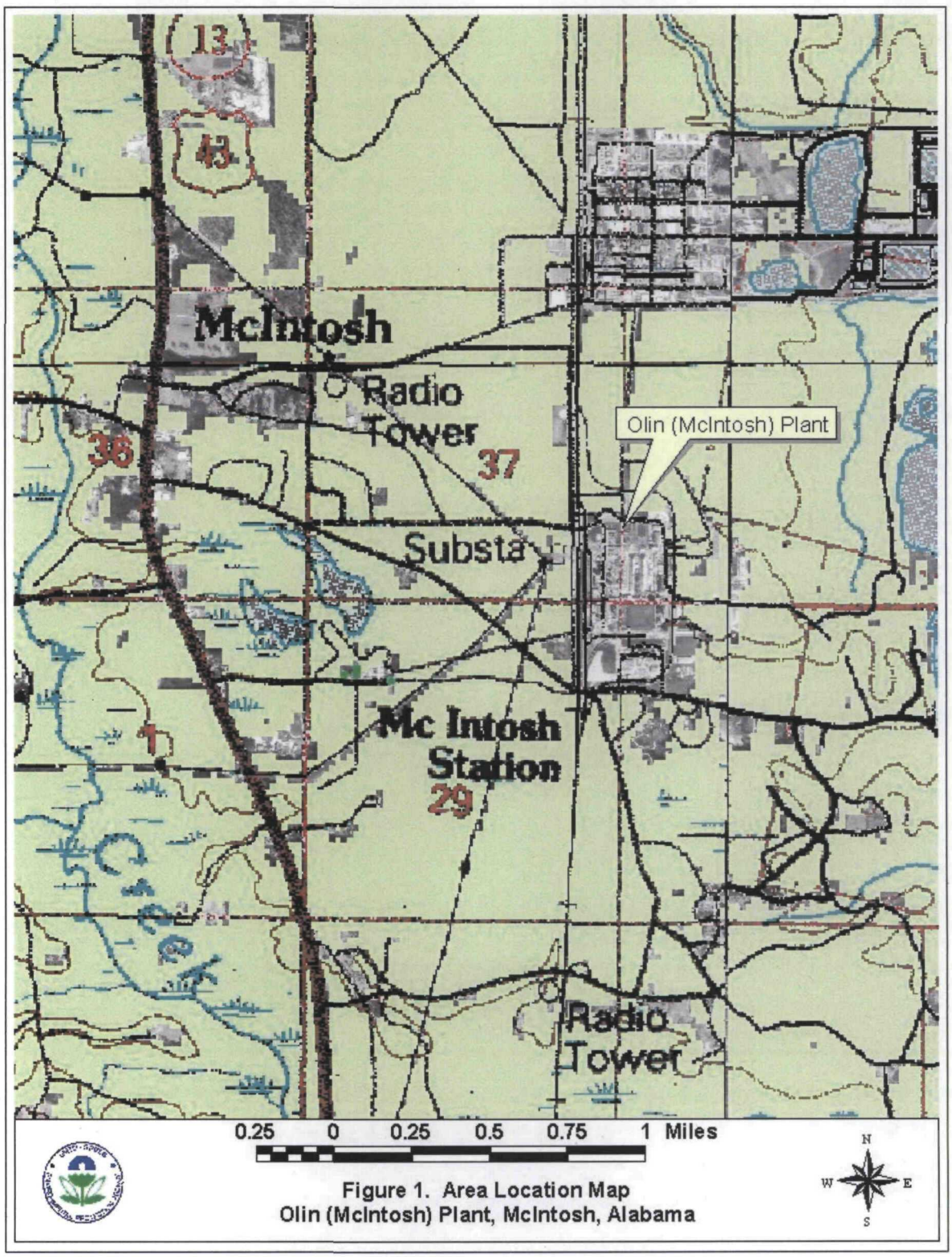
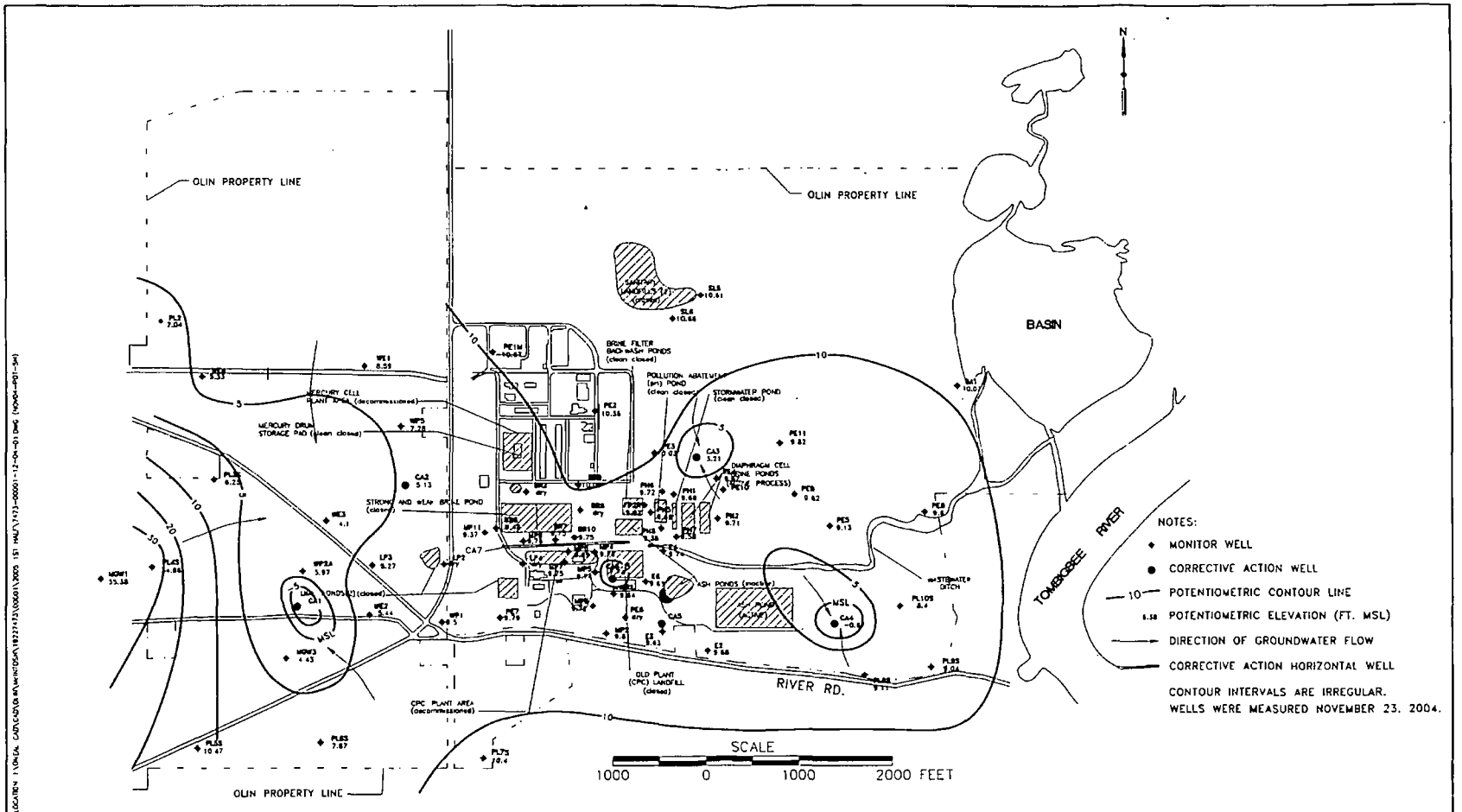


Figure 1. Area Location Map
Olin (McIntosh) Plant, McIntosh, Alabama



REV.	DESCRIPTION OF REVISION	BY	DATE
△			
△			
△			
△			
△			
△			

Olin
McIntosh, Alabama

URS
7389 Florida Blvd., Suite 300
Baton Rouge, Louisiana 70806
225/922-5700

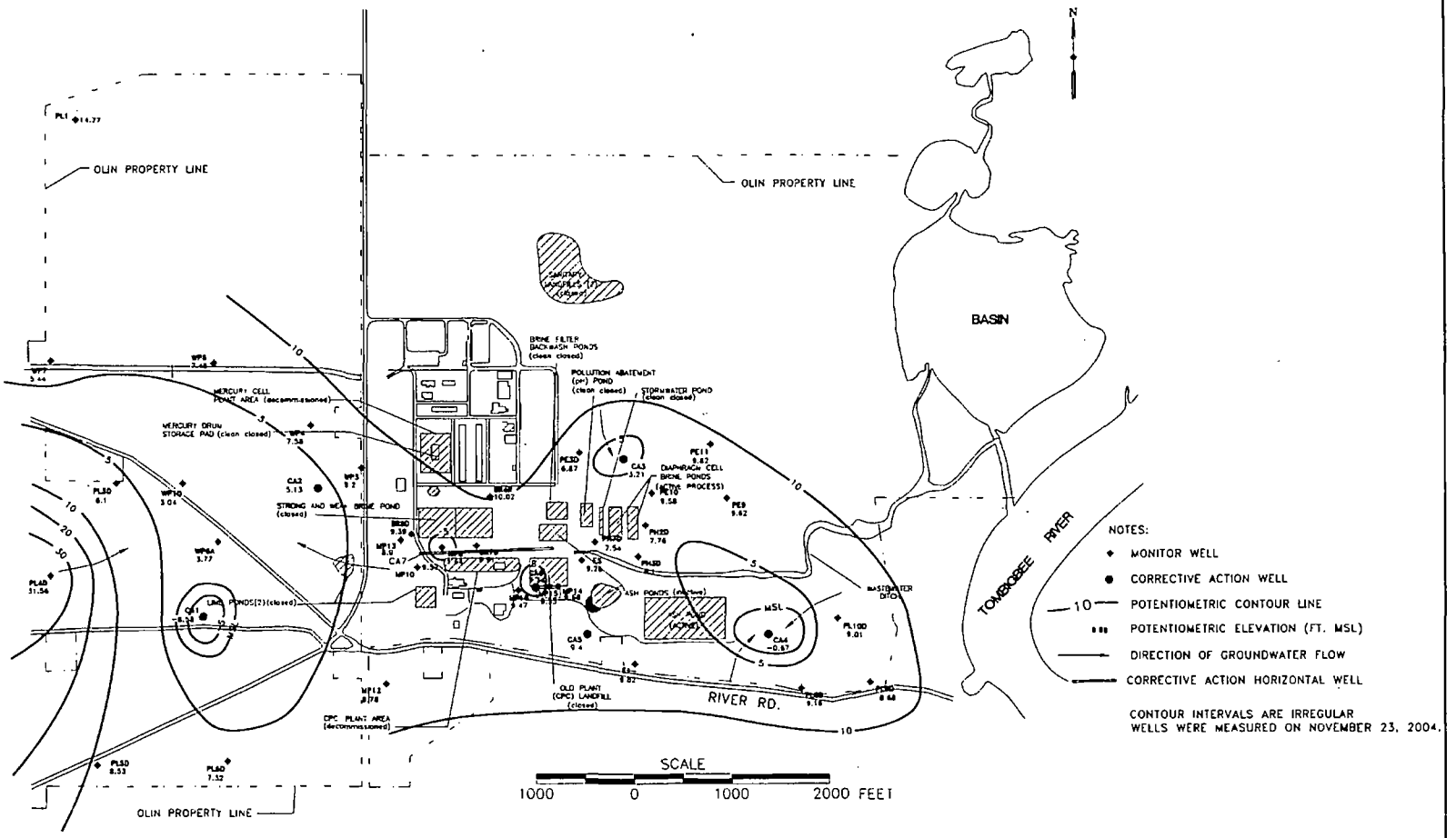
REFERENCE DRAWINGS

SCALE: 1" = 1000'
DESIGNED:
DRAWN: CAT
CHECKED:
PEER REVIEWED:
DATE: 01/11/05

SEMIANNUAL EFFECTIVENESS REPORT

SHALLOW PORTION OF ALLUVIAL AQUIFER
POTENTIOMETRIC SURFACE MAP
NOVEMBER 2004

REVISION: △
PROJECT: 19225454
FIGURE: 3



REV	DESCRIPTION OF REVISION	BY	DATE
△			
△			
△			
△			
△			
△			

Olin
McIntosh, Alabama

URS
7389 Florida Blvd., Suite 300
Baton Rouge, Louisiana 70806
225/922-5700

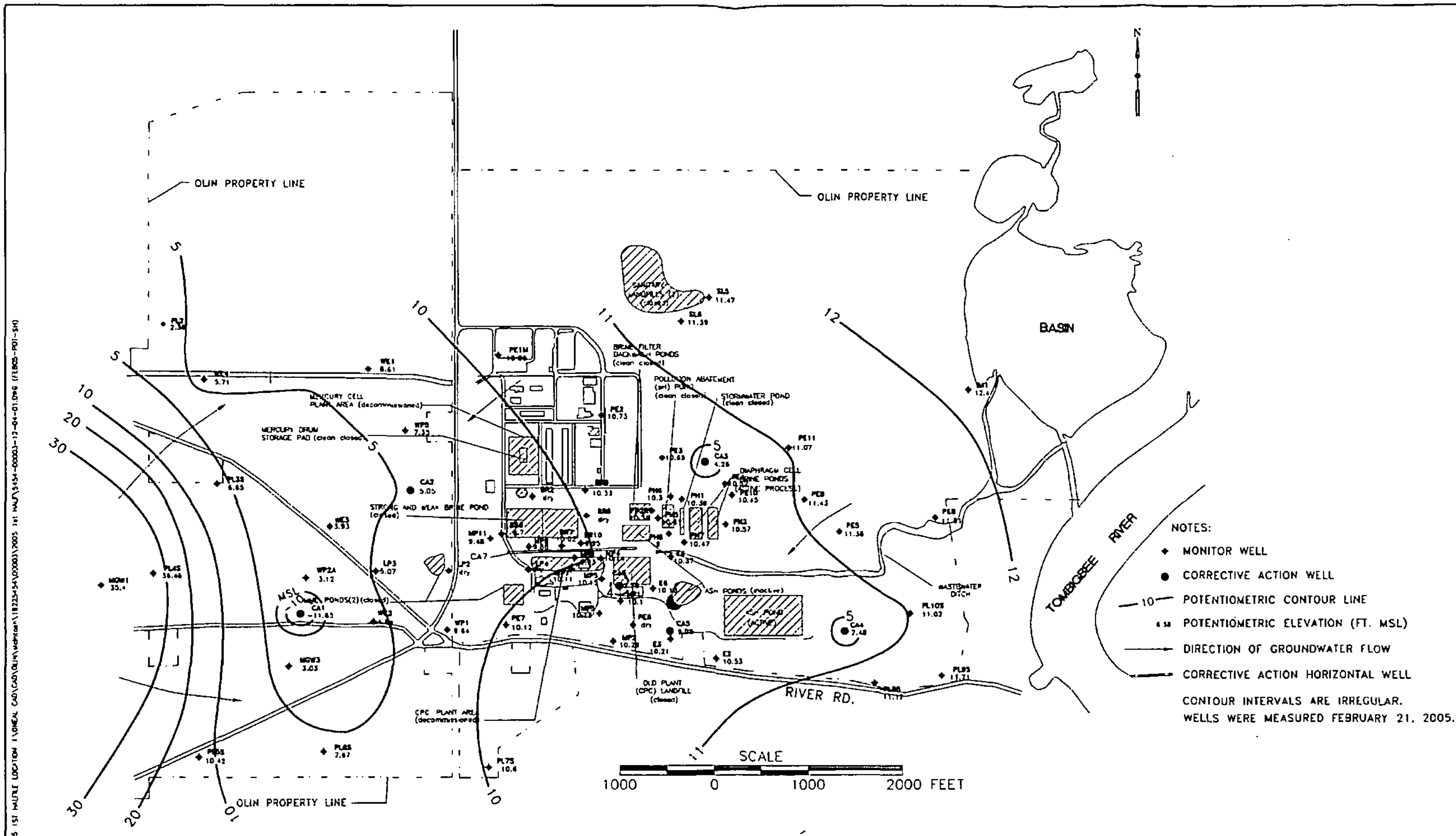
REFERENCE DRAWING(S)

SCALE: 1" = 1000'
DESIGNED:
DRAWN: GAT
CHECKED: CH
DEEP ASSESSMENT WAR
DATE: 01/11/05

SEMIANNUAL EFFECTIVENESS REPORT

DEEP PORTION OF ALLUVIAL AQUIFER
POTENTIOMETRIC SURFACE MAP
NOVEMBER 2004

REVISION: △
PROJECT: 19227473
FIGURE: 4



REV	DESCRIPTION OF REVISION	BY	DATE

Olin
McIntosh, Alabama

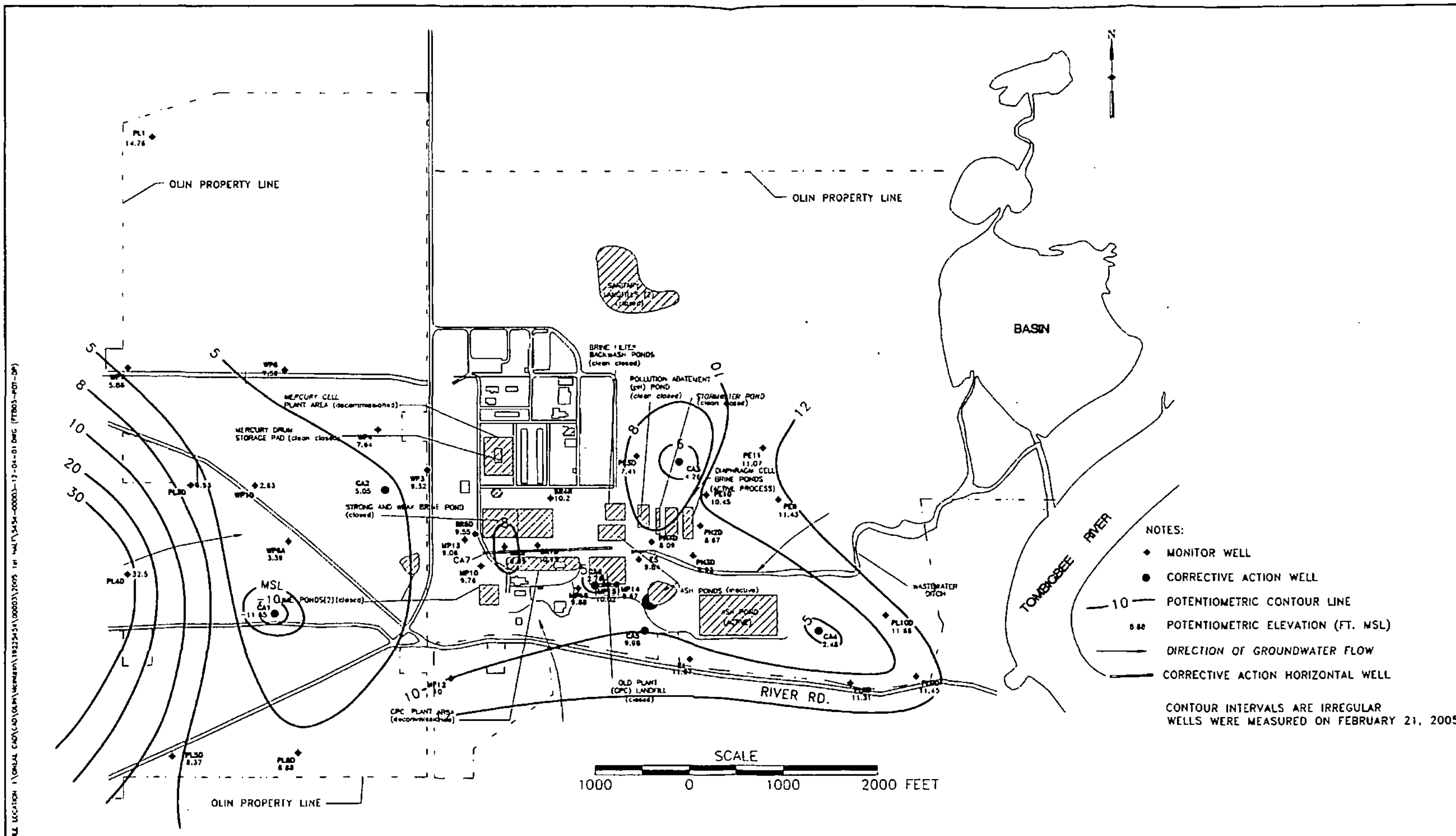
URS
7389 Florida Blvd., Suite 300
Baton Rouge, Louisiana 70806
225/922-5700

SCALE: 1" = 1000'
DATE: 04/07/05

SEMIANNUAL EFFECTIVENESS REPORT

SHALLOW PORTION OF ALLUVIAL AQUIFER
POTENTIOMETRIC SURFACE MAP
FEBRUARY 2005

PROJECT: 19225454
FIGURE: 5



REV	DESCRIPTION OF REVISION	BY	DATE

Olin
McIntosh, Alabama

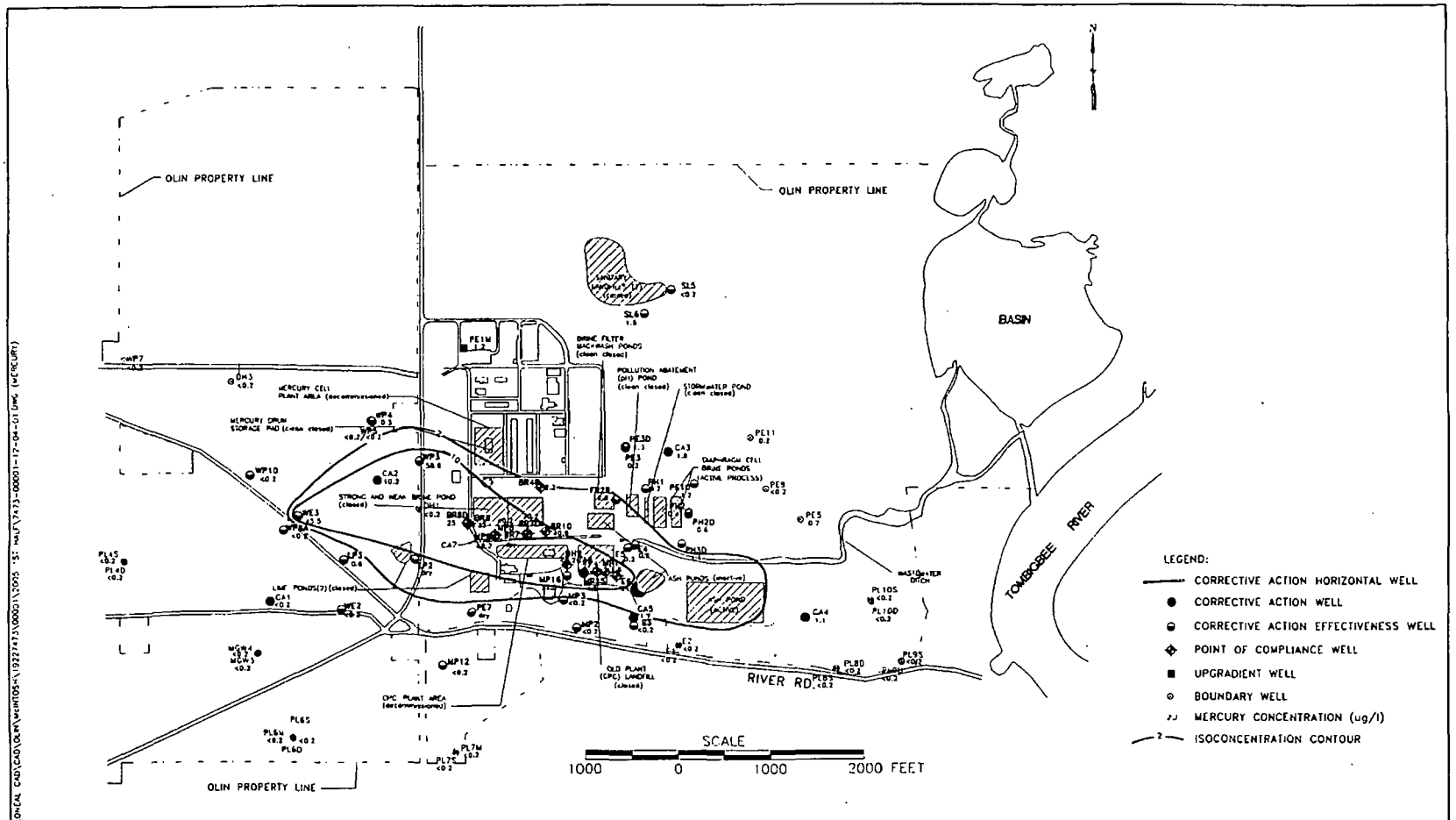
URS
7389 Florida Blvd., Suite 300
Baton Rouge, Louisiana 70806
225/922-5700

SCALE: 1" = 1000'
DRAWN: CAT
DATE: 04/06/05

SEMIANNUAL EFFECTIVENESS REPORT

DEEP PORTION OF ALLUVIAL AQUIFER
POTENTIOMETRIC SURFACE MAP
FEBRUARY 2005

PROJECT: 19225454
FIGURE: 6



REV.	DESCRIPTION OF REVISION	BY	DATE
△			
△			
△			
△			
△			
△			

Olin
Mcintosh, Alabama

URS
7389 Florida Blvd., Suite 300
Baton Rouge, Louisiana 70806
225/922-5700

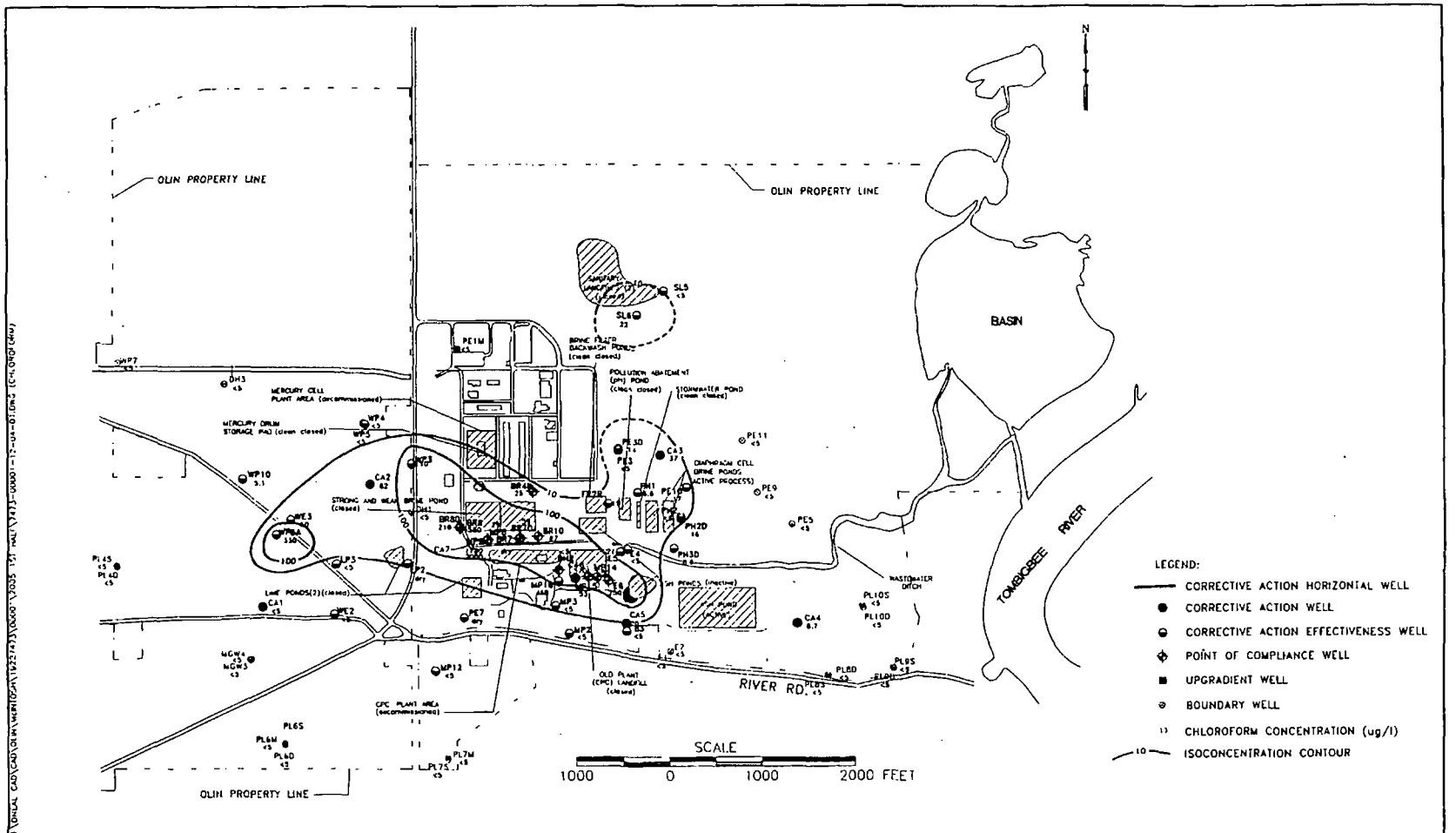
REFERENCE DRAWINGS

SCALE: 1" = 1000'
DRAWN: CAI
CHECKED: FH
APPROVED: MAI
DATE: 05/12/05

SEMIANNUAL EFFECTIVENESS REPORT

MERCURY ISOCONCENTRATION MAP
MARCH 2005

REVISION: △
PROJECT: 19227473
FIGURE: 7



REV	DESCRIPTION OF REVISION	BY	DATE

Olin
Mcintosh, Alabama

URS
7389 Florida Blvd., Suite 300
Baton Rouge, Louisiana 70806
225/922-5700

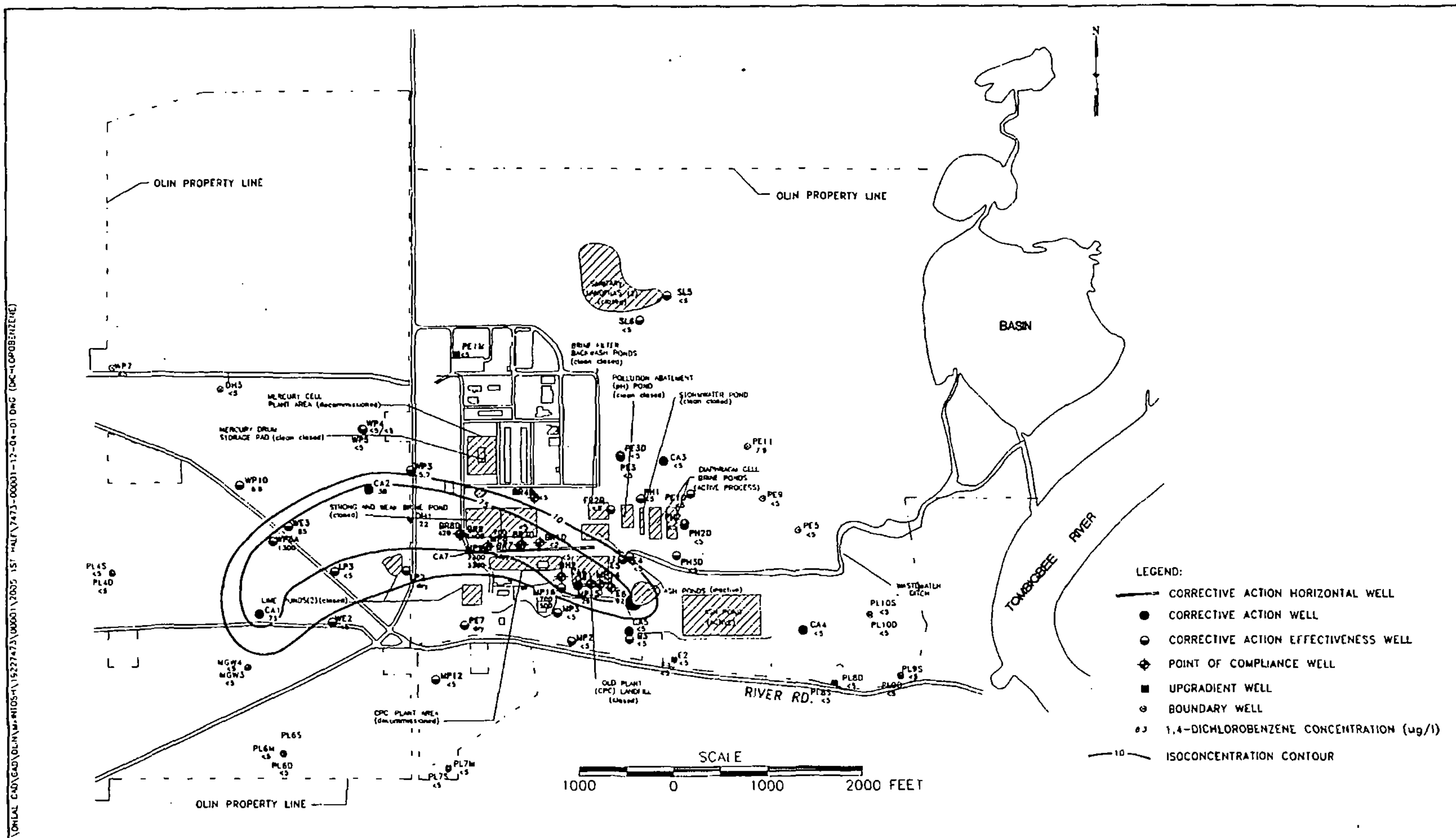
REFERENCE DRAWINGS

SCALE: 1" = 1000'
DESIGNED
DRAWN: GAI
CHECKED: CW
APPROVED
DATE: 05/17/05

SEMIANNUAL EFFECTIVENESS REPORT

CHLOROFORM ISOCONCENTRATION MAP
MARCH 2005

PROJECT: 19227473
FIGURE: 8



REV	DESCRIPTION OF REVISION	BY / DATE

Olin
McIntosh, Alabama

URS
7389 Florida Blvd., Suite 300
Baton Rouge, Louisiana 70806
225/922-5700

SCALE: 1" = 1000'

SEMIANNUAL EFFECTIVENESS REPORT

1,4-DICHLOROBENZENE ISOCONCENTRATION MAP
MARCH 2005

PROJECT: 19227473

FIGURE: 9

ATTACHMENT2: Declaration Of Restrictive Covenants

OLIN Corp
119
V 6

Washington Co., AL I CERTIFY THIS INSTRUMENT WAS FILED 10/09/2001 03:57:00
MISCELLANEOUS. #132 Page 65 Entry#: 45567

Judge of Probate

STATE OF ALABAMA

COUNTY OF WASHINGTON

DECLARATION OF RESTRICTIVE COVENANTS
BY OLIN CORPORATION

This Declaration of Restrictive Covenants is hereby made, adopted, published and declared on this the 9th day of August, 2001, by Olin Corporation ("Olin"), relative to a portion of its property in McIntosh, Alabama, for the reasons hereinafter stated.

WITNESSETH

WHEREAS, a Consent Decree dated June 3, 1997, was entered by the United States District Court for the Southern District of Alabama, Southern Division, in that certain action captioned United States of America v. Olin Corporation bearing Civil Action Number 95-0526-BH-S which is recorded in Miscellaneous Record Book 113 at Page 001-159 in the Office of the Judge of Probate of Washington County, Alabama; and,

WHEREAS, a Declaration of the Record of Decision presenting the selected remedial action for "Operable Unit One" was attached as Appendix "A" to the aforesaid Consent Decree containing certain institutional controls for land and groundwater use for the remediated portion of Olin's property that require the preparation and recording of restrictive covenants (i) prohibiting the use of the remediated surface area for any purpose other than industrial use and, (ii) prohibiting the use of water from the remediated portion of the alluvial aquifer as a source of potable water; and,

WHEREAS, the surface and subsurface (aquifer) areas to be remediated under the Consent Decree were generally depicted in Figures 2 and 3 of the Record of Decision attached to the Consent Decree as recorded in Miscellaneous Record Book 113 at Pages 86 and 96 respectively in the Office of the Judge of Probate of Washington County, Alabama, but not otherwise described with particularity within the Consent Decree or any of its attached Appendices; and,

WHEREAS, to accomplish the intention of the aforesaid Consent Decree and its attached Appendices, it is necessary that this Declaration be filed with a particular description of the surface and subsurface areas of the property to which the restrictive covenants are to be made, adopted, published and declared so as to properly encumber the remediated areas which are the subject of the Consent Decree; and,

WHEREAS, Olin has obtained surveys of the remediated areas depicted in Figures 2 and 3 of the Record of Decision attached to the Consent Decree performed by a Registered Land Surveyor which provide the metes and bounds descriptions of the property depicted in the Consent Decree which is to be subjected to the restrictive covenants hereinafter declared.

NOW, THEREFORE, Olin does hereby make, adopt, publish and declare this Declaration of Restrictive Covenants:

(a) Industrial Use Restrictive Covenant (Remediated Surface Areas)

The use of the remediated surface areas hereafter described which are also depicted and described by the five (5) parcel boundary surveys of Olin Corporation, McIntosh, Alabama, by W. L. Lawler, Registered Land Surveyor, all dated August 30, 2001 and attached hereto as Exhibit "A", is hereby restricted to industrial purposes only:

AREA ADJACENT TO CPC PLANT

Commencing at the Northeast corner of Section 29, Township 3 North, Range 1 East, Washington County, Alabama; Thence South for 594.89 feet to the Point of Beginning; Thence N-89°-23'-19"-E for 95.08 feet; Southwesterly around a curve to the left having a radius of 23.68 feet and a delta angle of 61°-02'-52", the chord of which bears S-28°-51'-12"-W for 24.05 feet, for an arc distance of 25.73 feet; thence S-01°-39'-14"-E for 110.32 feet; Thence Northwesterly around a curve to the left having a radius of 106.96 feet and a delta angle of 43°-04'58", the chord of which bears N-42°-29'-07"-W for 78.52 feet, for an arc distance of 80.40 feet; Thence N-64°-01'-36"-W for 69.21 feet; Thence Northwesterly around a curve to the right having a radius of 75.64 feet and a delta angle of 43°-13'-07", the chord of which bears N-42°-25'-03"W for 55.71 feet, for an arc distance of 57.05 feet; Thence N-89°-23'-19"-E for 66.73 feet to the Point of Beginning. Said parcel lying and being in Section 28 and Section 29, Township 3 North, Range 1 East, Washington County, Alabama, and containing 0.216 acres, more or less.

CPC LANDFILL AREA

Commencing at the Northwest corner of Section 28, Township 3 North, Range 1 East, Washington County, Alabama; Thence South for 563.31 feet;

Thence East for 928.70 feet to the Point of Beginning; Thence S-89°-56'-10"-E for 409.56 feet; Thence S-06°-37'-58"-W for 303.01 feet; Thence S-89°-26'-36"-W for 372.92 feet; Thence N-00°-18'-40"-W for 305.07 feet to the Point of Beginning. Said parcel lying and being in Section 28, Township 3 North, Range 1 East, Washington County, Alabama, and containing 2.721 acres, more or less.

WELL SAND RESIDUE AREA

Commencing at the Southeast corner of the Northwest quarter of the Northwest quarter of Section 29, Township 3 North, Range 1 East, Washington County, Alabama; Thence West for 359.81 feet; Thence North for 3.50 feet to the Point of Beginning; Thence S-89°-50'-28"-W for 378.51 feet; Thence N-06°-35'-07"-E for 418.90 feet; Thence S-87°-29'-15"-E for 37.64 feet; Thence S-61°-40'-54"-E for 229.79 feet; Thence S-73°-30'-26"-E for 93.65 feet; Thence S-00°-09'-32"-E for 277.85 feet to the Point of Beginning. Said parcel lying and being in the Northwest quarter of the Northwest quarter of Section 29, Township 3 North, Range 1 East, Washington County, Alabama, and containing 2.860 acres, more or less.

EAST LIME POND AREA

Commencing at the Northeast corner of Section 29, Township 3 North, Range 1 East, Washington County, Alabama; Thence South for 809.04 feet; Thence West for 16.75 feet to the Point of Beginning; Thence S-01°-20'-50"-W for 358.68 feet; Thence S-72°-44'-22"-W for 52.19 feet; Thence N-84°-34'-24"-W for 167.59 feet; Thence N-05°-00'-03"-W for 225.74 feet; Thence N-19°-45'-46"-E for 136.28 feet; Thence N-88°-32'-01"-E for 198.78 feet to the Point of Beginning. Said parcel lying and being in Section 29, Township 3 North, Range 1 East, Washington County, Alabama, and containing 1.882 acres, more or less.

WEST LIME POND AREA

Commencing at the Northeast corner of Section 29, Township 3 North, Range 1 East, Washington County, Alabama; Thence South for 919.58 feet; Thence West for 880.56 feet to the Point of Beginning; Thence N-60°-24'-35"-W for 210.63 feet; Thence N-13°-42'-52"-E for 125.07 feet; Thence N-41°-10'-41"-W for 37.54 feet; Thence S-88°-16'-37"-W for 54.78 feet; Thence N-09°-34'-44"-W for 27.21 feet; Thence N-73°-23'-17"-E for 315.56 feet; Thence S-02°-26'-04"-E for 212.69 feet; Thence S-10°-53'-32"-W for 124.73 feet; Thence S-55°-49'-44"-W for 60.86 feet to the Point of Beginning. Said parcel lying and being in Section 29, Township 3 North, Range 1 East, Washington County, Alabama, and containing 1.645 acres, more or less.

(b) Potable Water Restrictive Covenant (Remediated Aquifer Area).

The use of any groundwater from the remediated aquifer area hereafter described which is also depicted and described by that certain special purpose survey by W. J. Lawler, III, Registered Land Surveyor, dated September 11, 2001 and attached hereto as Exhibit "B" as a source of potable water is hereby prohibited:

COMPOSITE AQUIFER CONTOUR

Commencing at the Southeast corner of Section 37, Township 4 North, Range 1 East, Washington County, Alabama; Thence West for 354.80 feet; Thence North for 501.28 feet to the Point of Beginning; Thence S-58°-38'-48"-E for 1044.20 feet; Thence Northwesterly around a curve to the left having a radius of 1279.43 feet and a delta angle of 47°-04'-09", the chord of which bears N-49°-06'-39"-E for 1021.76 feet, for an arc distance of 1051.07 feet; Thence Southeasterly around a curve to the right having a radius of 454.08 feet and a delta angle of 176°-49'-32" for an arc distance of 1401.35 feet; Thence Southeasterly around a curve to the left having a radius of 585.10 feet and a delta angle of 86°-48'-44" for an arc distance of 886.52 feet; Thence S-64°-24'-38"-E for 1489.13 feet; Thence Southwesterly around a curve to the right having a radius of 262.27 feet and a delta angle of 154°-49'-45" for an arc distance of 311.58 feet; Thence N-89°-34'-53"-W for 2234.28 feet; Thence N-69°-34'-11"-W for 977.22 feet; Thence N-88°-25'-14"-W for 875.47 feet; Thence N-71°-31'-43"-W for 615.17 feet; Thence S-86°-20'-21"-W for 511.53 feet; Thence S-54°-30'-18"-W for 784.64 feet; Thence Northwesterly around a curve to the right having a radius of 402.85 feet and a delta angle of 107°-44'-23" for an arc distance of 757.52 feet; Thence Northeasterly around a curve to the right having a radius of 1162.63 feet and a delta angle of 55°-38'-16" for an arc distance of 1210.15 feet; Thence N-41°-52'-58"-E for 617.75 feet; thence Southeasterly around a curve to the right having a radius of 1353.35 feet and a delta angle of 79°-28'-15" for an arc distance of 1877.12 feet to the Point of Beginning. Said parcel lying and being in Section 28, 29, 37 and 38, Township 4 North, Range 1 East and containing 232.14 acres, more or less.

(c) Intention of Declaration.

It is the intention of Olin by this Declaration to establish each and every restrictive covenant required by the aforesaid Consent Decree and its Appendices in precisely the form and content and for the term as therein provided and to do no more. It is the intention of Olin by this Declaration to accurately describe the surface areas and the composite aquifer contour, which are the subject of remediation under the Consent Decree, and to which these Restrictive Covenants apply. To the extent that there is any variation between the language of this Declaration and the applicable portions of the Consent Decree, the Consent Decree shall govern. The Consent Decree, together with the Appendices thereto are incorporated by reference and made a part hereof for all purposes.

(d) Term of Restrictive Covenants:

It is the intention of Olin that the restrictive covenants created by this Declaration should exist and encumber the property heretofore described until the remedial action has

been performed in accordance with the Consent Decree and the performance standards have been achieved as reflected by a Certification of Completion of the remedial action by the EPA and for no longer. Therefore, upon the Certification of Completion of the remedial action under the Consent Decree, Olin may terminate, release and/or remove the restrictive covenants created by this Declaration. No such termination, release and/or removal of these restrictive covenants contrary to the Consent Decree shall be valid.

IN WITNESS WHEREOF, Olin Corporation has caused this instrument to be executed in its name and on its behalf by its officer thereunto duly authorized on this the 9th day of October, 2001.

OLIN CORPORATION

By: J J McFalls

Its: Plant Manager

STATE OF Alabama

COUNTY Washington

I, Jan H. Beech, a Notary Public in and for said County in said State, hereby certify that J. J McFalls, whose name as Plant Manager of Olin Corporation, a corporation organized and existing under the laws of the Commonwealth of Virginia, is signed to the foregoing Declaration and who is known to me, acknowledged before me on this day that, being informed of the contents of said Declaration, he, as such officer and with full authority, executed the same voluntarily for and as the act of said corporation.

Given under my hand the 9th day of October, 2001.

[Notary Seal]

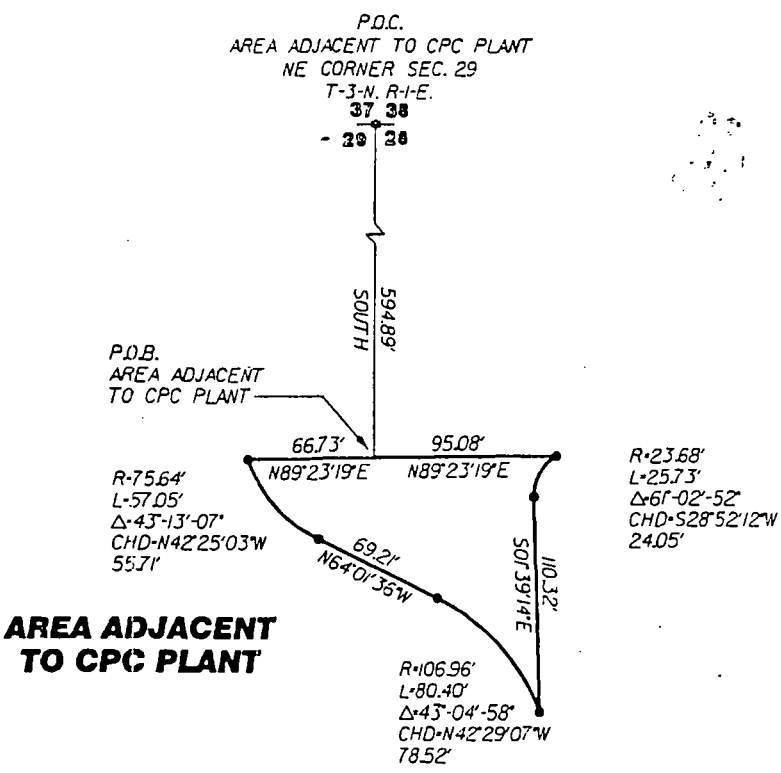
Jan H. Beech

Notary Public

My Commission Expires: 10/23/02

THIS INSTRUMENT PREPARED BY:

DAVID MICHAEL HUGGINS, ESQ.
TURNER, ONDERDONK, KIMBROUGH
& HOWELL, P.A.
POST OFFICE DRAWER 1389
CHATOM, AL 36518
(251) 847-2237



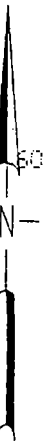


EXHIBIT "A" 1 of 5

1. BEARINGS REFER TO GRID NORTH BASED ON ALABAMA STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD 83
2. PK NAIL & BRASS DISK (No. CA-0328) AT ALL CORNERS
3. FIELD SURVEY PERFORMED IN AUGUST, 2001

LEGEND	
SUBJECT PROPERTY	———
FENCES	—x—x—x—x—x—x—
TIE LINES	———
TOE OF DISPOSAL AREA	·—·—·—·—·—
PK NAIL & BRASS DISK (No. CA-0328)	•
POC-POINT OF COMMENCMENT	
POB-POINT OF BEGINNING	

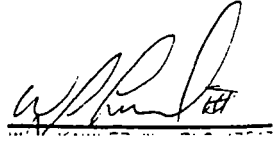
LEGAL DESCRIPTION
AREA ADJACENT TO CPC PLANT

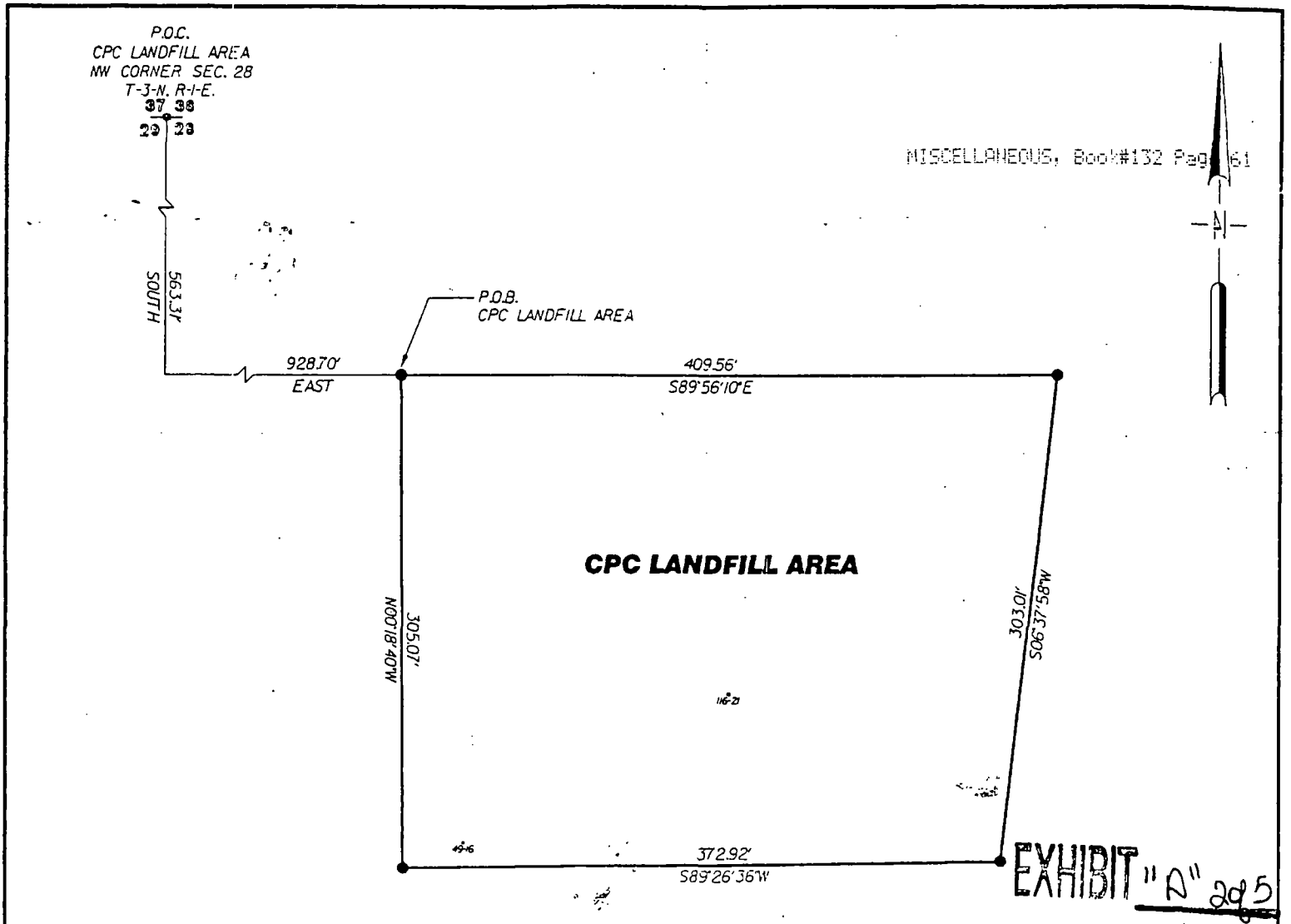
Commencing at the Northeast corner of Section 29, Township 3 North, Range 1 East, Washington County, Alabama; Thence South for 594.89 feet to the Point of Beginning; Thence N-89°-23'-19"-E for 95.08 feet; Southwesterly around a curve to the left having a radius of 23.68 feet and a delta angle of 61°-02'-52", the chord of which bears S-28°-51'-12"-W for 24.05 feet, for an arc distance of 25.73 feet; Thence S-01°-39'-14"-E for 110.32 feet; Thence Northwesterly around a curve to the left having a radius of 106.96 feet and a delta angle of 43°-04'-58", the chord of which bears N-42°-29'-07"-W for 78.52 feet, for an arc distance of 80.40 feet; Thence N-64°-01'-36"-W for 69.21 feet; Thence Northwesterly around a curve to the right having a radius of 75.64 feet and a delta angle of 43°-13'-07", the chord of which bears N-42°-25'-03"-W for 55.71 feet, for an arc distance of 57.05 feet; Thence N-89°-23'-19"-E for 66.73 feet to the Point of Beginning. Said parcel lying and being in Section 28 and Section 29, Township 3 North, Range 1 East, Washington County, Alabama, and containing 0.216 acres, more or less.

PARCEL BOUNDARY SURVEY OF
OLIN CORPORATION, McINTOSH, ALABAMA
AREA ADJACENT TO CPC PLANT

DATE: 30 AUG., 2001	SCALE: 1"=100'	DWG. No. 01-116-5

I, W. J. LAWLER, III A REGISTERED LAND SURVEYOR IN THE STATE OF ALABAMA HEREBY CERTIFY THAT ALL PARTS OF THIS SURVEY AND DRAWING HAVE BEEN COMPLETED IN ACCORDANCE WITH THE REQUIREMENTS OF THE MINIMUM TECHNICAL STANDARDS FOR THE PRACTICE OF LAND SURVEYING IN THE STATE OF ALABAMA.





1. BEARINGS REFER TO GRID NORTH BASED ON ALABAMA STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD 83
2. LAWLER REBAR & CAP SET AT PARCEL CORNERS
3. FIELD SURVEY PERFORMED IN AUGUST, 2001

LEGEND	
SUBJECT PROPERTY	———
FENCES	—x—x—x—x—x—x—
TIE LINES	———
TOE OF DISPOSAL AREA	·—·—·—·—·—
LAWLER CAPPED IRON ROD	•
POC-POINT OF COMMENCMENT	
POB-POINT OF BEGINNING	

LEGAL DESCRIPTION
CPC LANDFILL AREA

Commencing at the Northwest corner of Section 28, Township 3 North, Range 1 East, Washington County, Alabama; Thence South for 563.31 feet; Thence East for 928.70 feet to the Point of Beginning; Thence S-89°-56'-10"-E for 409.56 feet; Thence S-06°-37'-58"-W for 303.01 feet; Thence S-89°-26'-36"-W for 372.92 feet; Thence N-00°-18'-40"-W for 305.07 feet to the Point of Beginning. Said parcel lying and being in Section 28, Township 3 North, Range 1 East, Washington County, Alabama, and containing 2.721 acres, more or less.

PARCEL BOUNDARY SURVEY OF
OLIN CORPORATION, McINTOSH, ALABAMA
CPC LANDFILL AREA

DATE: 30 AUG., 2001	SCALE: 1"-100'	DWG. No. 01-116-4

LAWLER AND COMPANY

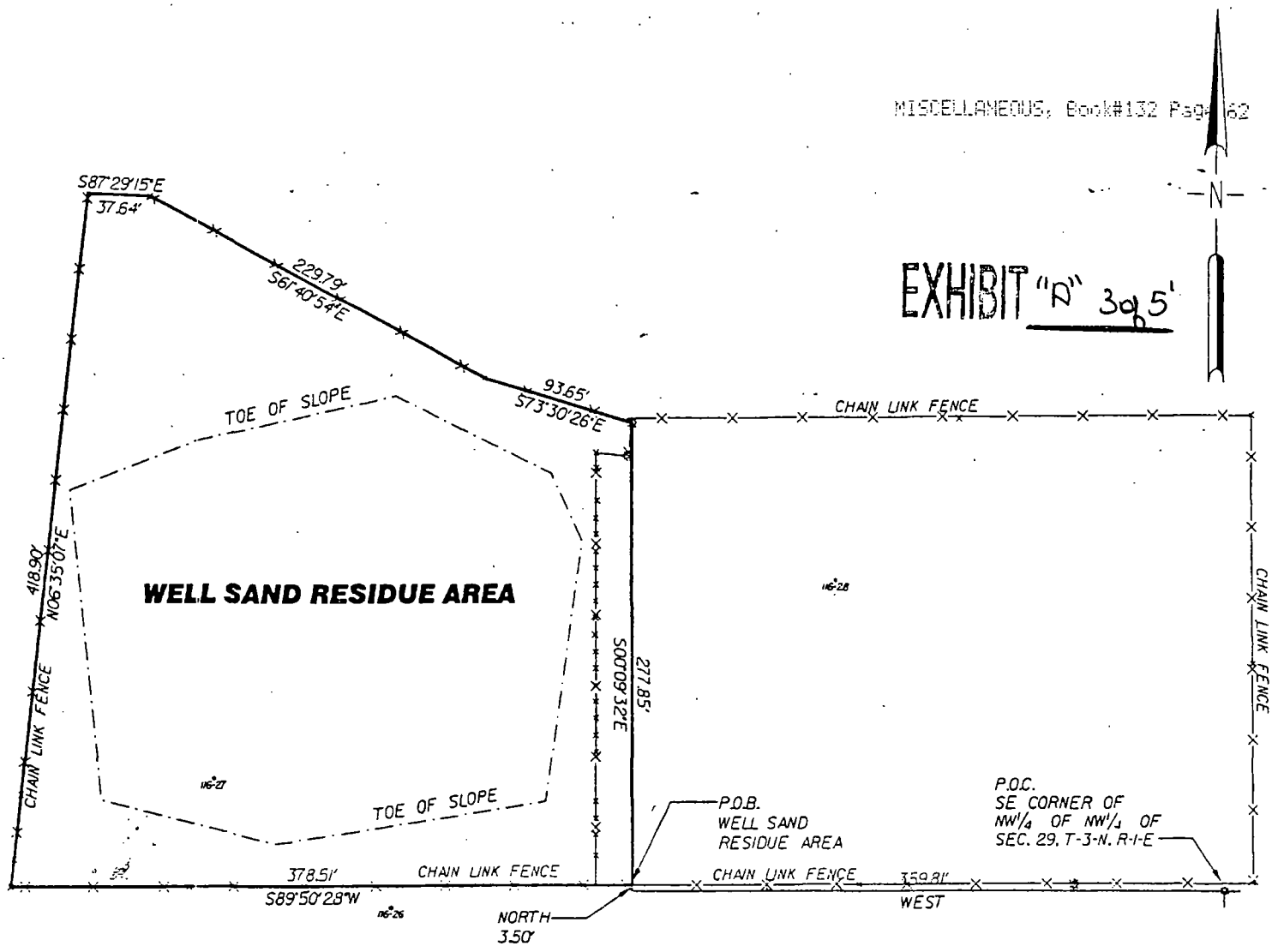
I, W. J. LAWLER, III, REGISTERED LAND SURVEYOR IN THE STATE OF ALABAMA HEREBY CERTIFY THAT THE PARTS OF THIS SURVEY AND DRAWING HAVE BEEN COMPUTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE MINIMUM TECHNICAL STANDARDS FOR THE PRACTICE OF LAND SURVEYING IN THE STATE OF ALABAMA.

ALABAMA No. 17513 PROFESSIONAL LAND SURVEYOR W. J. LAWLER III

W. J. LAWLER, III, PLS 17513

MISCELLANEOUS, Book#132 Page 62

EXHIBIT "B" 3 of 5



1. BEARINGS REFER TO GRID NORTH BASED ON ALABAMA STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD 83
2. BOUNDARY RUNS ALONG EXISTING FENCE.
3. PARCEL CORNERS ARE EXISTING METAL FENCE CORNERS
4. FIELD SURVEY PERFORMED IN AUGUST, 2001

LEGEND	
SUBJECT PROPERTY	———
FENCES	—×—×—×—×—×—
TIE LINES	———
TOE OF DISPOSAL AREA	·—·—·—·—
LAWLER CAPPED IRON ROD	•
POC=POINT OF COMMENCMENT	
POB=POINT OF BEGINNING	

LEGAL DESCRIPTION
WELL SAND RESIDUE AREA

Commencing at the Southeast corner of the Northwest quarter of the Northwest quarter of Section 29, Township 3 North, Range 1 East, Washington County, Alabama; Thence West for 359.81 feet; Thence North for 3.50 feet to the Point of Beginning; Thence S-89°-50'-28"-W for 378.51 feet; Thence N-06°-35'-07"-E for 418.90 feet; Thence S-87°-29'-15"-E for 37.64 feet; Thence S-61°-40'-54"-E for 229.79 feet; Thence S-73°-30'-26"-E for 93.65 feet; Thence S-00°-09'-32"-E for 277.85 feet to the Point of Beginning. Said parcel lying and being in the Northwest quarter of the Northwest quarter of Section 29, Township 3 North, Range 1 East, Washington County, Alabama, and containing 2.860 acres, more or less.

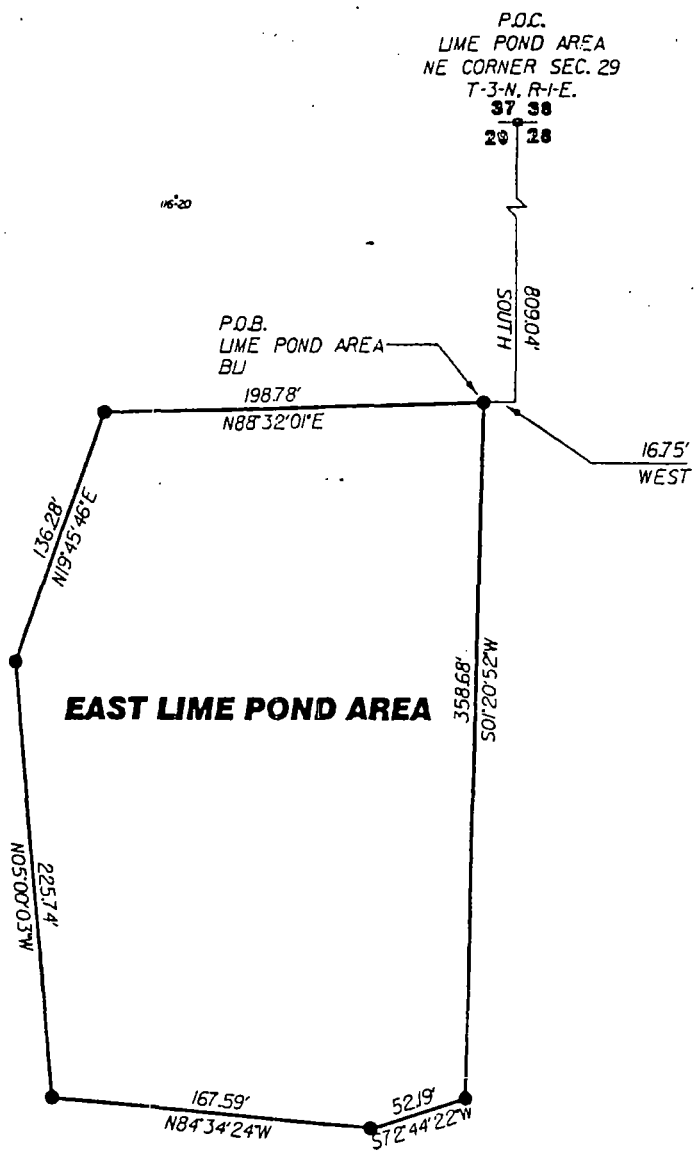
PARCEL BOUNDARY SURVEY OF
OLIN CORPORATION, McINTOSH, ALABAMA
WELL SAND RESIDUE AREA

DATE: 30 AUG., 2001	SCALE: 1"=100'	DWG. No. 01-116-1

I, W. J. LAWLER, III A REGISTERED LAND SURVEYOR IN THE STATE OF ALABAMA HEREBY CERTIFY THAT ALL PARTS OF THIS SURVEY AND DRAWING HAVE BEEN COMPLETED IN ACCORDANCE WITH THE REQUIREMENTS OF THE MINIMUM TECHNICAL STANDARDS FOR THE PRACTICE OF LAND SURVEYING IN THE STATE OF ALABAMA.

W. J. LAWLER III PLS 17513

LAWLER AND COMPANY



MISCELLANEOUS, Book#132 Page 63

N

EXHIBIT "A" 4 of 5

1. BEARINGS REFER TO GRID NORTH BASED ON ALABAMA STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD 83
2. LAWLER REBAR & CAP SET AT PARCEL CORNERS
3. FIELD SURVEY PERFORMED IN AUGUST, 2001

LEGEND
SUBJECT PROPERTY
FENCES —x—x—x—x—x—x
TIE LINES
TOE OF DISPOSAL AREA
LAWLER CAPPED IRON ROD •
POC-POINT OF COMMENCMENT
POB-POINT OF BEGINNING

LEGAL DESCRIPTION
EAST LIME POND AREA

Commencing at the Northeast corner of Section 29, Township 3 North, Range 1 East, Washington County, Alabama; Thence South for 809.04 feet; Thence West for 16.75 feet to the Point of Beginning; Thence S-01°-20'-50"-W for 358.68 feet; Thence S-72°-44'-22"-W for 52.19 feet; Thence N-84°-34'-24"-W for 167.59 feet; Thence N-05°-00'-03"-W for 225.74 feet; Thence N-19°-45'-46"-E for 136.28 feet; Thence N-88°-32'-01"-E for 198.78 feet to the Point of Beginning. Said parcel lying and being in Section 29, Township 3 North, Range 1 East, Washington County, Alabama, and containing 1.882 acres, more or less.

PARCEL BOUNDARY SURVEY OF
OLIN CORPORATION, McINTOSH, ALABAMA
EAST LIME POND AREA

DATE: 30 AUG., 2001	SCALE: 1"=100'	DWG. No. 01-116-3

I, W. J. LAWLER, III A REGISTERED LAND SURVEYOR IN THE STATE OF ALABAMA HEREBY CERTIFY THAT ALL PARTS OF THIS SURVEY AND DRAWING HAVE BEEN COMPLETED IN ACCORDANCE WITH THE REQUIREMENTS OF THE MINIMUM TECHNICAL STANDARDS FOR THE PRACTICE OF LAND SURVEYING IN THE STATE OF ALABAMA.

W. J. LAWLER III, P.L.S. 17513

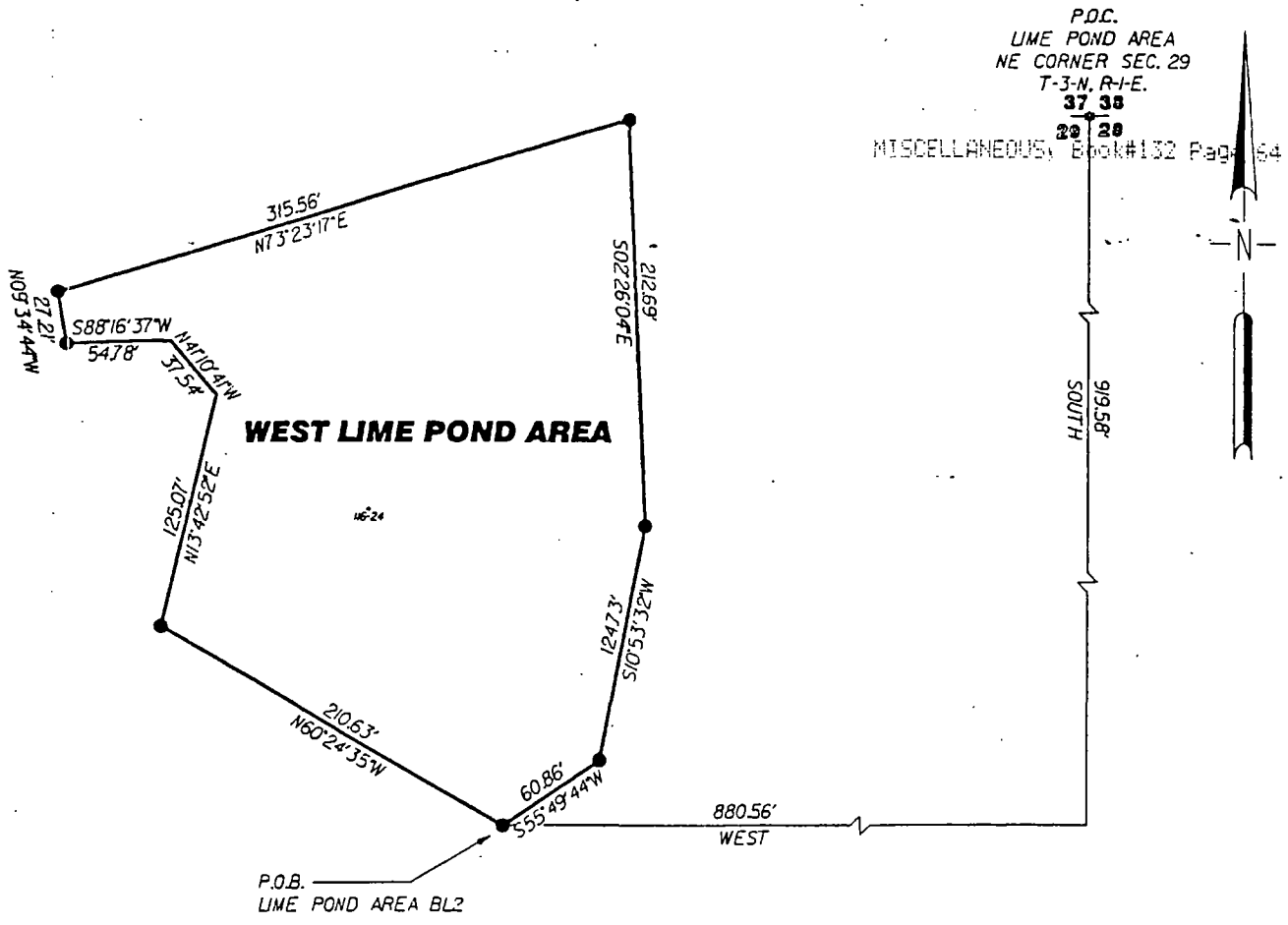


EXHIBIT "A" 5 of 5

1. BEARINGS REFER TO GRID NORTH BASED ON ALABAMA STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD 83
2. LAWLER REBAR & CAP SET AT PARCEL CORNERS
3. FIELD SURVEY PERFORMED IN AUGUST, 2001

LEGEND	
SUBJECT PROPERTY	———
FENCES	—x—x—x—x—x—x—
TIE LINES	———
TOE OF DISPOSAL AREA	·—·—·—·—·—
LAWLER CAPPED IRON ROD	●
POC-POINT OF COMMENCMENT	
POB-POINT OF BEGINNING	

LEGAL DESCRIPTION
WEST LIME POND AREA

Commencing at the Northeast corner of Section 29, Township 3 North, Range 1 East, Washington County, Alabama; Thence South for 919.58 feet; Thence West for 880.56 feet to the Point of Beginning; Thence N-60°-24'-35"-W for 210.63 feet; Thence N-13°-42'-52'-E for 125.07 feet; Thence N-41°-10'-41"-W for 37.54 feet; Thence S-88°-16'-37"-W for 54.78 feet; Thence N-09°-34'-44"-W for 27.21 feet; Thence N-73°-23'-17"-E for 315.56 feet; Thence S-02°-26'-04"-E for 212.69 feet; Thence S-10°-53'-32"-W for 124.73 feet; Thence S-55°-49'-44"-W for 60.86 feet to the Point of Beginning. Said parcel lying and being in Section 29, Township 3 North, Range 1 East, Washington County, Alabama, and containing 1.645 acres, more or less.

PARCEL BOUNDARY SURVEY OF
OLIN CORPORATION, McINTOSH, ALABAMA
WEST LIME POND AREA

DATE: 30 AUG., 2001	SCALE: 1"=100'	DWG. No. 01-116-2

LAWLER AND COMPANY

I, W. J. LAWLER, III A REGISTERED LAND SURVEYOR IN THE STATE OF ALABAMA HEREBY CERTIFY THAT ALL PARTS OF THIS SURVEY AND DRAWING HAVE BEEN COMPLETED IN ACCORDANCE WITH THE REQUIREMENTS OF THE MINIMUM TECHNICAL STANDARDS FOR THE PRACTICE OF LAND SURVEYING IN THE STATE OF ALABAMA.

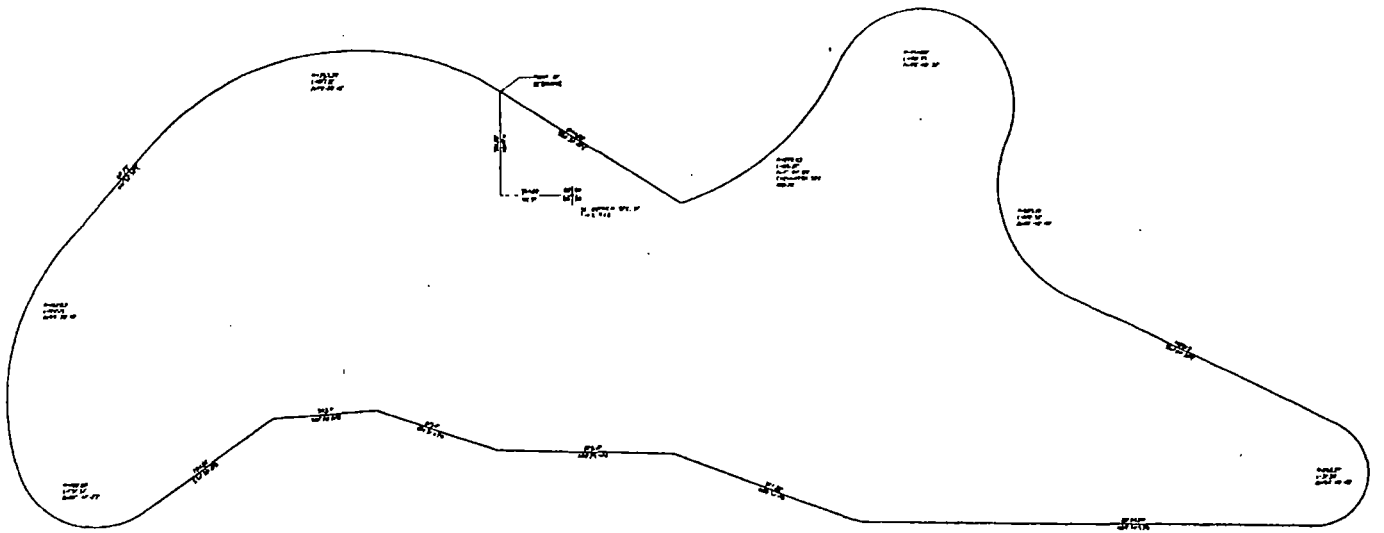
W. J. LAWLER, III, PLS 17513

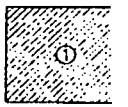
EXHIBIT "B"

MISCELLANEOUS, Book#132 Page 65

RECORDING FEES 30.00
SUBTL 36.00
TOTAL 36.00
CHECK 0.00
CHANGE

ITEM 1
LESA
10-09-2001 #1
7757 15:57TH





INDEX TO SHE

LAWLER AND COMPANY

OLIN CHLOR-ALKALI

ATTACHMENT 3: Community Environmental Information Fact Sheet

Environmental Information for the Community of McIntosh, Alabama

Community Health Concerns

The recent filing of a civil legal action against a local chemical plant and media coverage the action has received has raised health concerns in the McIntosh community. More specifically, allegations of mercury contamination within the community have made the citizens uneasy about their health and the quality of the local environment. For more than 20 years, the Alabama Department of Environmental Management (ADEM) and the U.S. Environmental Protection Agency (EPA), with the support of the Alabama Department of Public Health (ADPH), have regulated environmental protection activities at chemical plants in McIntosh, Alabama. During this time, significant cleanup actions have been completed at the Ciba Geigy and Olin plant properties. Monitoring of the effectiveness of these actions is ongoing. EPA, ADEM and ADPH are issuing this fact sheet to inform the community about ongoing efforts to protect human health and the environment in McIntosh.

Our Roles

ADEM

ADEM is authorized to oversee all regulatory issues (air, water, soil, etc.) concerning the Olin and Ciba facilities. ADEM is responsible for ensuring compliance with both state and federal regulations. Permits issued to Ciba and Olin by ADEM place limitations and controls upon facility operations designed to protect human health and the environment from dangerous releases of hazardous contaminants to the environment.

Wastewater and storm water discharges from Olin Chemical (Olin) and Ciba Specialty Chemicals (Ciba) are regulated by permits issued by the State of Alabama. The terms and conditions of these permits were developed by the Department in accordance with applicable federally approved Alabama National Pollution Discharge Elimination System regulations and water quality standards.

The treatment, storage, or disposal of hazardous wastes is regulated by permits issued under Alabama's Hazardous Waste Program. ADEM is authorized by the federal government to administer this program. These permits also require corrective action of any release of hazardous chemicals to the environment from any past solid waste activity.

ADPH

The ADPH addresses public health concerns as well as assists with the evaluation of environmental sampling data developed by EPA and ADEM. The data is monitored to determine whether levels of various forms of mercury found in samples have the potential to cause a health effect in individuals who may come in contact with these materials. ADPH also works with ADEM in monitoring fish tissue for mercury content, as well as other contaminants, to determine whether modifications to existing fish consumption advisories are warranted.

EPA

EPA's Superfund cleanup role at the Olin plant is limited in scope and addresses eight areas of the production facility. The Superfund cleanup process began at the Olin plant in the early 1980's prior to ADEM receiving federal authorization for its own remediation program.

As part of the Superfund process, the Olin property has been divided into two Operable Units. Operable Unit 1 (OU-1) includes the 60 acre production facility, and Operable Unit Two (OU-2) includes the former wastewater ditch and the flood plain area, approximately 220 acres, adjacent to the Tombigbee River.

EPA has overseen cleanup activities of OU-1 at Olin (ground water pump and treat and landfill

capping). It is EPA's responsibility to ensure that the OU-1 cleanup continues to be protective of public health and the environment. As part of this continuing responsibility, EPA is conducting a mandatory Five Year Review of the OU-1 cleanup remedy. Five-Year Reviews are required at all Superfund sites where waste is left on-site after the conclusion of cleanup activities. This enables EPA to ensure that the implemented cleanup at a site continues to be protective of human health and the environment. EPA is also evaluating the appropriateness of an active cleanup of OU-2.

The Ciba-Geigy Site is divided into four Operable Units as identified in the ROD issued for Operable Unit 2 in September 1991. All Operable Unit remedies have been implemented. The Five Year Review of OU-3 is currently being conducted.

Recent Sampling

In an effort to address recent community health concerns, ADEM and EPA have collected environmental samples from locations along Allen Barns road and other locations in the community. Working with ADPH, the sampling results were then evaluated based on exposure pathways. The evaluation determined that while the sampling detected the presence of mercury, the mercury concentrations were not at levels that would indicate a significant human health risk in the community.

Mercury exists in different forms in the environment, however, some forms are considered more hazardous because they are more bioavailable (i.e., can be more easily absorbed by the body through inhalation or ingestion). Thus, air samples collected by EPA and ADEM were analyzed for mercury vapor because it is the most bioavailable form of mercury in air. Likewise, soil samples were analyzed for "total mercury," while several samples were also analyzed for the different types of mercury, or "speciated," to measure the levels of mercury's more bioavailable forms.

EPA and ADEM evaluated the potential risk posed by chemicals in the environment by comparing sample results to conservative, risk-based "screening" levels. Screening levels are not cleanup standards, but instead, are conservative, health risk-based levels that assume all of the contaminant in a sample is bioavailable. Thus, if the results of the samples are below the conservative screening levels and have a large margin of safety built into the value, EPA and ADEM believe that no further action or investigation is needed.

The levels of mercury detected in air and soil samples from McIntosh were compared to EPA's screening levels for air and soil. In McIntosh, the average level of mercury vapor detected at the High School during the month of August was 7.9 nanograms per cubic meter of air (ng/cu.m.), which is approximately 40 times less than EPA's screening level of 300 ng/cu.m. With regard to soil, only three of the 18 off-site soil samples contained measurable levels of total mercury, and none of the samples had levels of the more bioavailable forms of mercury that could cause harm to adults or children. The highest level of total mercury detected in off-site soil (10.9 parts per million (ppm)) is less than EPA's residential soil screening level of 23 ppm.

ADEM and EPA also conducted tests and air monitoring on aggregate material collected from the brine well sand piles and along Allen Barns Road to see if harmful levels of mercury could be released into the air and water. All of the measurements were well below EPA's screening level of 300 ng/cu.m. To see if mercury in the aggregate could dissolve and subsequently be released into surface water or ground water, a leach test was performed where samples of the aggregate were drenched in a strong acid. The test results indicate that the mercury is tightly bound to other components in the aggregate and harmful levels of mercury are not being released. The results of the leach test are further supported by the fact that mercury in the ground water wells in the area of the brine well piles does not exceed cleanup standards.

Olin reported mercury detections (total recoverable) via Discharge Monitoring Reports (DMR's), as required by their NPDES permit, from January 2003 through June 2005, collected at the storm water runoff monitoring locations, DSN002 and DSN003, at levels at or below the detection level of 0.2 parts-per-billion (ppb). This detection level is below Alabama's dissolved mercury freshwater acute water quality standard of 2.4 ppb. Assuming no additional dilution from flow naturally occurring in the receiving stream, the concentration of mercury reported in Olin's storm runoff has been well

below the safe in-stream level based on EPA-approved standards for Alabama.

Based on the recent samples collected, the Agencies believe that there is **no** indication of danger to the citizens of McIntosh from contact with mercury in soils, air, surface water, or ground water in the community, including the roads in McIntosh and the brine well sand piles fenced within the Olin property. The continuing cleanup of contamination on the Olin and Ciba facilities is being monitored and evaluated by EPA and ADEM.

ADPH is considering adopting more protective standards for mercury levels in freshwater fish. Discussion is ongoing on what the standards for fish will be; however, the result is likely that additional surface waters may be included under Alabama's fish consumption advisory program. Due to reductions in methyl mercury levels in fish, the fish consumption advisory for the Tombigbee River was lifted in 2004; however, as additional fish tissue data become available and the state's advisory program is evaluated, the consumption advisories on the surface water bodies in the McIntosh area may change. Statewide fish sampling is currently underway. ADPH plans to issue the next round of advisories in spring 2006 after the sampling data is evaluated. Information on fish consumption advisories and ways to limit exposure and health risks from contaminants in fish is available by calling (334) 206-5973 or visiting the ADPH website: http://www.adph.org/risk/default.asp?templatenbr=0&deptid=145&templateid=1349 .

Ongoing Cleanup Actions

ADEM will continue to acquire environmental data to ensure protection to public health and the environment. On August 16, 2005, ADEM began an extensive stream monitoring study for the Bilbo Creek Watershed. The main focus of this study is to quantify the concentrations of mercury in the surface waters of the Bilbo Creek watershed surrounding McIntosh area during both wet- and dry-weather conditions. Sampling is expected to continue throughout fall 2005. In addition, monitoring of groundwater, surface water, air, and other media will continue through the companies' various permits with ADEM.

Five Year Review at Olin OU-1

EPA is currently conducting a mandatory Five Year Review of the OU-1 cleanup remedy. This review will address whether the OU-1 remedy remains protective of human health and the environment. A report on the review is scheduled to be released in early 2006.

Future Plans at Olin OU-2

For OU-2, EPA, ADEM, and State and Federal Environmental Trustees, and the Olin Corporation are preparing to evaluate Enhanced Natural Sedimentation (ENS). The ENS project will require that a berm, approximately 10 feet high, be constructed between the Tombigbee River and the Olin Basin (OU-2). The idea behind ENS is that the berm will allow the River's floodwater to remain in the OU-2 area for a longer period of time, and sediments will drop out of the floodwater to form a natural cover over the contaminated sediments. The ENS project is not a final remedy, but it will allow all the parties involved to evaluate the movement of sediments and mercury in the OU-2 area. The information that will be gathered during the ENS project, especially information on the movement of the sediments and the mercury, is essential for the selection of a final remedy for OU-2.

Five Year Review at Ciba OU-3

EPA is currently conducting a Five Year Review of the OU-3 cleanup remedy. This review will determine whether the OU-3 remedy remains protective of human health and the environment. The review is expected to recommend additional sampling of soil, sediment and surface water. The review may recommend that additional remedial options be considered to address contamination left in ecologically sensitive areas of the flood plain during the initial cleanup. The Five Year Review is expected to be completed for Ciba-Geigy in early 2006.

Contact Information

ADEM:

ADEM: 1(800)533-2336

Ken Barrett
Chief of the Planning Branch
Air Division
(334) 271-7870

Phillip Davis
Chief of the Industrial Hazardous Waste Branch
Land Division
(334) 271-7755

Glenda Dean
Deputy Chief of the Water Division
(334) 270-5602

ADPH:

Dr. Neil Sass
State Toxicologist
Alabama Department of Public Health
(334) 206-5973

EPA:

Michael Arnett
Remedial Project Manager for Olin OU-1
1-800-435-9234

Humberto Guzman
Remedial Project Manager for Olin OU-2
1-800-435-9234

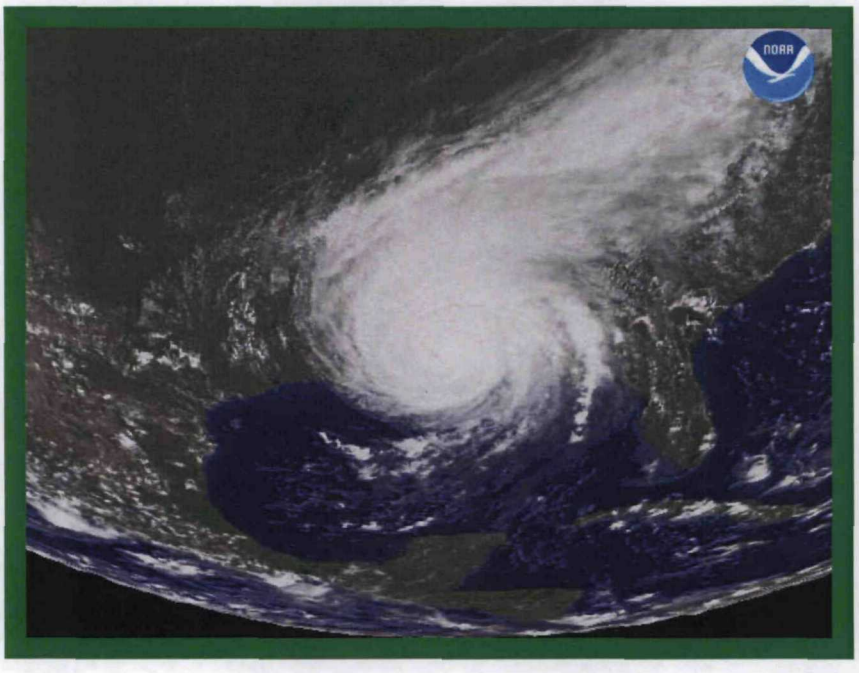
Charles King
Remedial Project Manager for Ciba
1-800-435-9234

Eddie L. Wright
Community Involvement Coordinator
1-800-564-7577

ADEM, ADPH, and EPA have been working with the Ciba Geigy and the Olin Plants for over 20 years and will continue to do so to provide a safe environment for the citizens of McIntosh, Alabama.

ATTACHMENT 4: Post-Katrina NPL and Non - NPL Superfund Site Evaluations Report

United States Environmental Protection Agency, Region 4



Report
Post-Katrina NPL and Non-NPL Superfund Site Evaluations
Southern and Coastal Alabama and Mississippi
October 2005

Science and Ecosystem Support Division
980 College Station Road
Athens, GA 30605

Mississippi Department of Environmental Quality
2380 Highway 80 West
Jackson, Mississippi 39204

Alabama Department of Environmental Management
1400 Coliseum Boulevard
Montgomery, Alabama 36110

TITLE AND APPROVAL SHEET

Title: Report, Post-Katrina NPL and Non-NPL Superfund Site Evaluations, Southern and Coastal Alabama and Mississippi, October 2005

The field investigation, sample collection and sample analysis reported herein is based on the Quality Assurance Project Plan, Post-Katrina NPL Site Evaluations, Southern and Coastal Alabama and Mississippi, October 2005, prepared according to:

EPA Requirements for Quality Assurance Project Plans (EPA QA/R5 EPA/240/B-01/003, U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC, March 2001 (USEPA, 2001).

Management Approvals:

12/14/05

Don Hunter Date
Project Leader
Environmental Investigations Branch

12/20/05

Scott Sudweeks Date
Chief
Technical Support Section
Superfund Remedial and Technical Services Branch

12/22/05

Randall Chaffins Date
Acting Chief
Superfund Remedial and Technical Services Branch

12/14/05

Antonio Quinones, Chief Date
Environmental Investigations Branch

ACRONYMS

ADEM	Alabama Department of Environmental Management
ASB	Analytical Support Branch
ASBLOQAM	Analytical Support Branch Laboratory Operations and Quality Assurance Manual
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLP	Contract Laboratory Program
COC	Contaminant of Concern
DQO	Data Quality Objective
EISOPQAM	Environmental Investigations Standard Operating Procedures and Quality Assurance Manual
GPS	Global Positioning System
HSO	Health and Safety Officer
HWSA	Hazardous and Solid Waste Amendments
IDW	Investigation Derived Waste
MDEQ	Mississippi Department of Environmental Quality
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
OSWER	Office of Solid Waste and Emergency Response
PCB	Polychlorinated Biphenyls
PRG	Preliminary Remediation Goal (Region 9, EPA)
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RPM	Remedial Project Manager
SAS	Special Analytical Services
SESD	Science and Ecosystem Support Division
SOW	Statement of Work
TIC	Tentatively Identified Compound
TSS	Technical Services Section, Region 4 Waste Management Division
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

TABLE OF CONTENTS

EXECUTIVE SUMMARY

On August 29, 2005, Hurricane Katrina made landfall along the Gulf coast of the southeastern United States, causing unprecedented damage from eastern Louisiana to near Mobile, Alabama. During the period from October 12 through October 14, 2005, personnel from the USEPA Region 4, Science and Ecosystem Support Division (SESD), Athens, Georgia, collected sediment, surface water and groundwater samples in the vicinity of nine National Priorities List (NPL) and two non-NPL Superfund sites in the potentially affected region to determine if storm-related releases occurred or, in the case of sites with operating remedial systems, make determinations as to the functionality of these systems. The locations of these sites are shown and identified in Figures 1 and 2 in Appendix A of this report. Actual sample locations are shown in Figures 3 through 12, also included in Appendix A. The analytical data are presented in Section 6 of this report.

EPA's conclusions regarding the potential impact of the hurricane on these sites are based on a comparison of post-hurricane data to existing soil and sediment clean-up values defined for the site, or available past sample data collected during remedial investigations or routine monitoring activities. In addition, the results were compared to EPA Region 9 Preliminary Remediation Goals (PRGs) and the Office of Water's 2004 National Recommended Water Quality Criteria (NRWQC) to determine if conditions at the sites might represent previously unrecognized risks to human health and the environment. EPA Region 9 PRGs (available at: http://www.epa.gov/region9/waste/sfund/prg/index.html) are risk-based concentrations based on long-term (i.e., 30-year) exposures to children and adults in a residential setting. The PRGs are intended to assist risk assessors and others in initial screening-level evaluations of environmental measurements. EPA Office of Water's 2004 NRWQC (available at: http://www.epa.gov/waterscience/criteria/wqcriteria.html) are a compilation of surface water quality criteria for the protection of aquatic life and human health for approximately 150 pollutants. The impact evaluations are presented in Section 7 of this report.

The scope of the investigations at each site and the conclusions that were reached regarding releases or impacts from Hurricane Katrina are presented in the following site summaries. The NPL status is provided in the summary heading.

Olin-McIntosh Plant (NPL) (Figure 3, Appendix A)

The Olin-McIntosh plant is an active chemical facility that previously used mercury in its processes. Surface water and sediment samples were collected at two locations at the Olin-McIntosh plant and were analyzed for mercury and volatile organic compounds (VOCs).

Total mercury was detected in one sediment sample at 0.58 mg/kg, which is consistent with results obtained from the 1991-1992 sampling for the remedial investigation conducted at the site. 1,3-Dichlorobenzene was detected in the same sediment sample at 4 ug/kg. This level is well below the 140 mg/kg cleanup level set for the site and the risk-based Preliminary Remediation Goal (PRG) of 530 mg/kg. Mercury was detected in one surface water sample at a concentration of 0.21 ug/l. The detected concentration is below the National Recommended Water Quality Criteria (NRWQC) value of 0.77 ug/l, but above the State of Alabama standard

for protection of aquatic life of 0.012 ug/l. This sample, however, was not taken in a permanent body of water capable of sustaining aquatic life. Furthermore, the reported concentration is less than concentrations of mercury previously detected in surface water samples at the site.

Reported concentrations of site-related contaminants of concern are consistent with historical characterization data and no chemicals were found to exceed risk-based PRGs. Thus, EPA does not believe the site was impacted by Hurricane Katrina.

Ciba Geigy (NPL) (Figure 4, Appendix A)

Ciba-Geigy is an active chemical facility which, in the past, produced the pesticide, dichlorodiphenyl-trichloroethane (DDT). Sediment and surface water was sampled in the vicinity of the Ciba-Geigy facility's permitted National Pollutant Discharge Elimination System (NPDES) outfall. Additionally, a sample of the on-site permitted wastewater effluent was also collected. All samples were analyzed for diazinon and pesticide/PCB compounds.

The pesticide DDT, and its metabolites (i.e., breakdown products) DDD and DDE were detected in the sediment sample at 3.3 ug/kg, 4.4 ug/kg, and 7.1 ug/kg, respectively. None of the detected levels of DDT, DDD and DDE exceeded residential Preliminary Remediation Goals (PRGs). Likewise, the reported levels for diazinon were below its residential PRG of 55,000 ug/kg.

Based on these sampling results, EPA does not believe the site was impacted by Hurricane Katrina.

Stauffer-Cold Creek (NPL) (Figure 5, Appendix A)

The Stauffer-Cold Creek plant is an active chemical production facility, now owned and operated by Syngenta Crop Protection, Inc. Syngenta produces agricultural pesticide and herbicides, including thiocarbamates; thus, samples were analyzed for a suite of thiocarbamate herbicides, including Butylate (Sutan™), Molinate (Ordram™), Cycloate (Ro-Neet™), EPTC (Eptam™), Pebulate (Tillam™) and Vernolate (Vernam™). Four sediment samples were collected near the facility's National Pollutant Discharge Elimination System (NPDES) outfalls and were analyzed for six targeted thiocarbamate herbicides.

Five of the thiocarbamate herbicides were detected in three of the four samples. Detected concentrations of the thiocarbamate herbicides were below available residential Preliminary Remediation Goals (PRGs).

Based on these sampling results, EPA does not believe the site was impacted by Hurricane Katrina.

Stauffer-LeMoyne (NPL) (Figure 5, Appendix A)

The Stauffer-LeMoyne plant is an active chemical production facility. Past production at the plant included carbon tetrachloride, chlorine and caustic soda (sodium hydroxide). Two sediment samples were collected near the facility's National Pollutant Discharge Elimination System (NPDES) outfalls.

The samples were analyzed for total mercury, cyanide and volatile organic compounds (VOCs). Total mercury was detected at 0.87 mg/kg, which is below the residential Preliminary Remediation Goals (PRGs) for both total mercury (33 mg/kg) and methyl mercury (6.1 mg/kg).

Based on these sampling results, EPA does not believe the site was impacted by Hurricane Katrina.

Perdido Groundwater Contamination (NPL) (Figure 6, Appendix A)

The Perdido Groundwater Contamination Site is a 15-acre site with benzene contaminated groundwater caused by a 1965 train derailment. The remedy for the site includes a groundwater extraction and treatment system.

Two water samples, one of untreated groundwater and one of treated groundwater, were collected from the groundwater treatment system at the site. Both samples were analyzed for volatile organic compounds (VOCs). No VOCs were detected in either sample.

Based on these sampling results, EPA does not believe the site was impacted by Hurricane Katrina.

Redwing Carriers (Saraland Apartments) (NPL) (Figure 7, Appendix A)

From 1961 to 1971, Redwing Carriers, Inc., a trucking company, owned and operated the Saraland site as a terminal for cleaning, repairing and parking its fleet of trucks. The chemicals of concern for the site are polynuclear aromatic hydrocarbon compounds (PAHs), pesticides, herbicides and volatile organic compounds (VOCs). Two sediment samples were collected from ditches adjacent to and down gradient of the site.

Seven different PAHs were detected in the samples. The level of benzo[a]pyrene in one sample (150 ug/kg) exceeded the residential Preliminary Remediation Goal (PRG), but fell within a risk range of 1 in 1,000,000 to 1 in 10,000 risk of an individual developing cancer over a lifetime from exposure to those concentrations, which USEPA has found acceptable in other contexts. The levels of the other PAHs detected, as well as the levels of Dieldrin and DDE, were below residential PRGs.

Based on these sampling results, EPA does not believe the site was impacted by Hurricane Katrina.

American Creosote Works (NPL) (Figure 8, Appendix A)

The American Creosote Works site is a former wood treating facility that operated from 1912 until the late 1990s. Surface water and sediment samples were collected from two locations downstream of the site.

Numerous polynuclear aromatic hydrocarbon compounds (PAHs), were detected in the two sediment samples. The results are consistent with the results of previous samples collected at the site. Five site-related PAH compounds were also detected in the surface water samples, but all levels were less than 10 ug/l and below National Recommended Water Quality Criteria (NRWQC).

Based on the site history and the Remedial Project Manager's direct observations, the contamination observed and documented by this evaluation existed prior to Hurricane Katrina. There is, therefore, no indication that Hurricane Katrina had any adverse impact at the site.

Sonford Products (Non-NPL) (Figure 9, Appendix A)

From 1972 to 1975, Sonford Products and Sonford International operated at the site producing liquid formulations from solid pentachlorophenol. Contaminants of concern include pentachlorophenol, dioxin, arsenic, lead, toxaphene and lindane. This site is currently in progress for NPL listing, and contamination will addressed through the remedial process.

Three sediment samples were collected and analyzed for metals, extractable organic compounds, pesticide/PCBs and dioxins. Detections of lead in sediment samples were below residential screening values, however arsenic and benzo(a)pyrene exceeded residential PRGs but fell within a risk range of 1 in 1,000,000 to 1 in 10,000 risk over background of an individual developing cancer over a lifetime from exposure to those concentrations, which EPA has found acceptable in other contexts.

The dioxin/furan analyses for these three sediment samples showed that detected concentrations were well within the range of reported levels from pre-hurricane sampling. Levels of pentachlorophenol were below residential PRGs.

Based on these sampling results, EPA does not believe the site was impacted by Hurricane Katrina.

Davis Timber (NPL) (Figure 10, Appendix A)

The Davis Timber Company site is a former timber processing and wood preserving facility operated by the Davis Timber Company from 1972 to the late 1980's. Sediment samples were collected at two locations downstream of the site and analyzed for semi-volatile organic compounds (SVOCs), dioxins and furans.

Low levels of polynuclear aromatic hydrocarbon compounds (PAHs), dioxins/furans and pentachlorophenol (PCP) were detected. The results are consistent with the results of previous samples collected at the site in 2004.

Since there does not appear to be any significant change in concentrations of site-related chemicals at the sampled locations, EPA does not believe the site was impacted by Hurricane Katrina.

Chemfax, Inc. (Non-NPL) (Figure 11, Appendix A)

Chemfax, Inc. operated from 1955 to 1995 and produced synthetic hydrocarbon resins and waxes from petroleum products.

Four sediment samples were collected across four transects of the Bernard Bayou at locations likely to have been impacted by a release from site. Acetophenone was the only extractable organic compound detected and was reported at a concentration of 96 ug/kg in one sample. This concentration is well below residential PRG soil screening values. Acetone was the only volatile organic compound identified in the four samples and was present at concentrations less than 20 ug/kg. Detected concentrations were below residential PRGs.

There is no indication of an adverse impact due to a release from the Chemfax, Inc. site associated with Hurricane Katrina. Reported concentrations are all below available risk-based soil screening levels for these analytes.

Picayune Wood Treating (NPL) (Figure 12, Appendix A)

The Picayune Wood Treating site had been used as a wood treating operation from approximately 1946 to 1999. Three sediment samples and one surface water sample were collected in the vicinity of the site and analyzed for semi-volatile organic compounds (SVOCs) including polynuclear aromatic hydrocarbons (PAHs).

PAHs were detected in sediment samples but not in surface water. The levels of PAHs detected in the sediment exceeded residential Preliminary Remediation Goals (PRGs) but fell within a risk range of 1 in 1,000,000 to 1 in 10,000 risk of an individual developing cancer over a lifetime from exposure to those concentrations, which EPA has found acceptable in other contexts.

Based on these sampling results, EPA does not believe the site was impacted by Hurricane Katrina.

1.0 INTRODUCTION

On August 29, 2005, Hurricane Katrina made landfall along the Gulf coast of the southeastern United States, causing unprecedented damage from eastern Louisiana to near Mobile, Alabama, due to the high winds and storm surge. During the period from October 12 through October 14, 2005, personnel from the USEPA Region 4, Science and Ecosystem Support Division (SESD) collected sediment, surface water and groundwater samples in the vicinity of nine National Priorities List (NPL) and two non-NPL Superfund sites in the potentially affected region to determine if storm-related releases occurred or, in the case of sites with operating remedial systems, make determinations as to the functionality of these systems. The investigation was conducted according to the Quality Assurance Project Plan, Post-Katrina Site Evaluations, Southern and Coastal Alabama and Mississippi, October 2005 and was requested by the Alabama Department of Environmental Management (ADEM), the Mississippi Department of Environmental Quality (MDEQ) and the USEPA, Region 4, Waste Management Division.

The Quality Assurance Project Plan (QAPP) for the investigation was developed by the United States Environmental Protection Agency (EPA), Region 4, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA), of 1986 (EPA 1986). The EPA Guidance for Quality Assurance Project Plans (EPA QA/G-5, 1998) was followed during the development of this QAPP.

1.1 Background/Site Location

The locations of the eleven sites that were evaluated for this study are shown in **Figures 1 and 2**. **Figure 1** shows the locations of the south Alabama sites and **Figure 2** shows the locations of the sites in Mississippi.

1.2 Site Histories\Status Post Katrina

These facilities were selected because they are either located in areas where significant widespread damage occurred or are located in areas further inland where there is a degree of uncertainty regarding possible redistribution of known existing contamination in streams or where possible damage to operational aspects of the sites may have occurred. The following site histories and post-Katrina assessments have been provided by the responsible remedial project managers (RPMs) from the Region 4 Waste Management Division. The NPL status is provided in the heading of each site history.

Olin - McIntosh Plant, McIntosh, Alabama (NPL) (See Figure 3)

The Olin Corporation (McIntosh Plant) NPL Site is located approximately one mile east southeast of the town of McIntosh. McIntosh is located approximately 40 miles north of Mobile, Alabama. The McIntosh plant is an active chemical production facility. Olin produces chlorine, caustic soda, sodium hypochlorite and blends and stores hydrazide compounds at the facility. The plant occupies approximately 60 acres of the 1500 acres site.

Ciba Geigy, McIntosh, Alabama (NPL) (see Figure 4)

The Ciba-Geigy Corporation NPL Site is an active chemical facility that is located two miles northeast of McIntosh, Alabama, and encompasses approximately 1,500 acres. The facility, formerly owned by Geigy Chemical Corporation, began operations in October 1952, with the manufacture of one product, dichlorodiphenyl-trichloroethane (DDT). Ciba-Geigy expanded its McIntosh facilities by adding the production of fluorescent brighteners used in laundry products; herbicides; insecticides; and agricultural chelating agents for industry.

Stauffer Chemical - Cold Creek Plant (Syngenta), LeMoyne, Alabama (NPL) (see Figure 5)

The Stauffer Chemical (Cold Creek Plant) NPL Site is located approximately 25 miles north of Mobile, Alabama. The site is located adjacent to the Stauffer Chemical (LeMoyne Plant) NPL Site and shares two common operable units with that site. The Cold Creek plant is an active chemical production facility, now owned and operated by Syngenta Crop Protection, Inc. Syngenta produces agricultural pesticide and herbicides, including thiocarbamates at the site.

Stauffer Chemical - LeMoyne Plant (Akzo Nobel), LeMoyne, Alabama (NPL) (see Figure5)

The Stauffer Chemical (LeMoyne Plant) NPL Site is located approximately 25 miles north of Mobile, Alabama. The LeMoyne plant is an active chemical production facility owned by Akzo Nobel. Akzo Nobel produces multi-product organic and inorganic chemicals including carbon disulfide, sulfuric acid and Crystex®, a proprietary sulfur compound. Past production at the plant included carbon tetrachloride, chlorine and caustic soda (sodium hydroxide).

Perdido Groundwater Contamination, Perdido, Alabama (NPL) (see Figure 6)

The Perdido Groundwater Contamination NPL Site is a 15-acre site in the unincorporated community of Perdido, Baldwin County, Alabama. Perdido is located approximately 45 miles northeast of Mobile, Alabama. The site consists of a groundwater extraction and treatment system constructed to remediate a benzene groundwater contamination plume caused by a 1965 train derailment.

Redwing Carriers (Saraland Apartments), Saraland, Alabama (NPL) (see Figure 7)

The Redwing Carriers, Inc. (Saraland) NPL Site is located in Saraland, Mobile County, Alabama. Saraland is located approximately 12 miles north of Mobile, Alabama. The site is a 5.1 acre grass covered vacant lot. From 1961 to 1971, Redwing Carriers, Inc., a trucking company, owned and operated the site as a terminal for cleaning, repairing and parking its fleet of trucks. The firm transported a variety of substances, including asphalt, diesel fuel, chemicals and pesticides from local plants. During cleaning, untreated hazardous substances were released to the ground creating a tar-like sludge and contaminating site soils. The tar-like sludge is

composed predominately of polynuclear aromatic hydrocarbon compounds together with lesser amounts of pesticides, herbicides and volatile organic compounds.

American Creosote Works, Louisville, Mississippi (NPL) (see Figure 8)

The American Creosote Works NPL Site is a former wood treating facility located in Louisville, Mississippi. The site operated from 1912 until the late 1990s. The site is approximately 120 acres in size and is located in an industrial/commercial/residential area. South Railroad Avenue borders the Site to the east. Hughes Creek borders the Site to the west. Railroad Lake approximately 6.5 to 7.0 acres in area is located on the northern portion of the Site. A residential neighborhood borders Railroad Lake to the west and north.

Sonford Products, Flowood, Mississippi (Non-NPL) (see Figure 9)

Sonford Products is a 6 acre facility located at 3506 Payne Drive, Flowood, Rankin County, MS. From 1972 to 1975, Sonford Products and Sonford International operated at the site producing liquid formulations from solid pentachlorophenol. Various solvents and lindane were utilized. There is currently a small multi-family housing unit on-site with approximately 5 residents, including 2 children. Lacey's Digging Service also leases the site. Three Lacey employees work on-site fabricating concrete and fiberglass septic system. Extensive EPA sampling has shown high levels of contamination in soil, groundwater, surface water and sediments. Contaminants include: pentachlorophenol, dioxins, arsenic, lead, toxaphene and lindane.

Davis Timber, Hattiesburg, Mississippi (NPL) (see Figure 10)

The Davis Timber Company NPL Site is located on Jackson Road, approximately 6 miles northwest of Hattiesburg, Lamar County, Mississippi. The Site is a former timber processing and wood preserving facility, and was operated by the Davis Timber Company from 1972 to the late 1980's. Although it is located in a rural area, residential areas are located near the Site.

Chemfax, Inc., Gulfport, Mississippi (Non-NPL) (see Figure 11)

The Chemfax, Inc. Site is located in Gulfport, Harrison County, Mississippi. It occupies 11 acres and is bordered by Three Rivers Road to the east and by Creosote Road to the south. Located to the north is Bernard Bayou. The site is located within the southeast quadrant of the interchange where Highway 49 meets Interstate 10. Chemfax, Inc. was established in March, 1955 and produced synthetic hydrocarbon resins and waxes from petroleum products. The primary operation at the time business ceased in 1995 was a paraffin blending process in which different grades of paraffin wax were heated together to a liquid state, then blended.

Picayune Wood Treating, Picayune, Mississippi (NPL) (see Figure 12)

The Picayune Wood Treating Site is located at 403 Davis Street on a 31.5-acre parcel of land in Picayune, Pearl River County, Mississippi. Timber and lumber related operations began

in the early 1900's, but the wood treating operation most likely began around 1946. The Crosby Products Company pressure-treated yellow southern pine wood with preservative chemicals (creosote). In 1973, Wood Treating, Inc. purchased the facility and continued to pressure-treat wood until 1999. Residential, commercial, and industrial areas surround the Site.

2.0 SAMPLING/DATA QUALITY OBJECTIVES

2.1 Data Quality Objectives

The Data Quality Objectives (DQO) process for Superfund, in accordance with the Guidance for the DQO Process (EPA QA/G-4, 2000), was implemented in developing the QAPP for this investigation. DQOs are useful in identifying the study objectives and decisions to be made and the criteria by which the data will be assessed. These data are then used for decision making.

DQOs are established prior to data collection and integrated with the project planning process so that sufficient data of known quality are collected to support sound decision making. The seven steps in the DQO process are:

- Problem statement
- Identify the decisions
- Identify the inputs into the decision
- Define the boundaries of the study
- Develop decision rules
- Specify tolerable limits on decision errors
- Optimize the design for obtaining data

2.1.1 Problem Statement

The initial step in the DQO process is to clearly define the problem so that the focus of the investigation will be clear. During the landfall of Hurricane Katrina, a massive storm surge flooded extensive portions of Hancock, Harrison and Jackson Counties in the Gulf Coast of Mississippi. In addition to the storm surge flooding and wind damage in the landfall area of coastal Mississippi, additional flooding, due primarily to heavy rains, and lesser wind damage occurred along the coastal areas of Alabama and in further inland areas of both states. Within this potentially affected area are located the NPL and other Superfund sites in Section 1.2. Site visits by Region 4 RPMs indicated that many of the sites, particularly those located further inland, received little or no apparent damage. Although it is not thought that there were releases from these sites, confirmatory sampling was conducted to determine if there were any significant post-Katrina impacts, either from releases, re-distribution of contaminants or loss of functionality of operating remedial systems. The problem is identifying whether or not releases have occurred from the candidate sites, identifying whether existing, known environmental contamination associated with the sites has been re-distributed and, where operating remedial systems are present, determining that these systems are performing as designed and constructed.

2.1.2 Identify the Decision(s)

The purpose of this DQO step is to identify the decisions that must be supported with the collected data. They will help define the objectives of the field investigation. The first decision is to determine if environmental conditions, with respect to established lists of COCs for each site or facility, are significantly changed from historically established levels, due to either releases or re-distribution of contaminants, warranting additional characterization and assessment. Another decision is to determine if operating remedial systems require repair or maintenance to restore them to design specifications and performance. To provide the supporting data for this decision, SESD collected samples and photographed prescribed locations at each facility/site. The analytical results for the samples collected for this investigation and the observations made by each sample team are included in this report.

2.1.3 Decision Inputs

This step is used to identify the information needed to support the decisions. The primary inputs needed to support the decision are sediment, surface water and groundwater samples. All media were not sampled at each facility. Analytical results used in the decision making process are definitive laboratory data, obtained from analysis by a contract laboratory obtained through the EPA's Contract Laboratory Program (CLP lab) or a Special Analytical Services (SAS) procurement. Samples from each facility or site were analyzed for a tailored list of analytes based on the list of COCs provided by the RPM. **Table 1** contains a list of the facilities that were sampled, a description of the samples that were collected, the rationale supporting selection of the sample and the analytes of concern for each sample.

Sediment and surface water samples were collected from ditches, streams or other surface water conveyances in the vicinity of previously sampled locations for which there is historical data, if available. Groundwater samples were collected directly from the groundwater treatment system influent and effluent points at the Perdido Groundwater Contamination site. **Figures 3 – 12, Appendix A** show the locations that were sampled for this evaluation.

2.1.4 Study Boundaries

The purpose of this step is to identify the boundaries of the study. The primary media of interest are sediments and surface water on or near the candidate facilities or sites. Groundwater samples were collected at the Perdido Groundwater site only. The study boundaries are defined below.

Study Area – The study area is the portions of coastal and southern Alabama and Mississippi impacted by flooding and wind damage associated with Hurricane Katrina. Within the larger study area are the selected facilities and sites. For each of the identified sites, the area that was investigated consisted of sediments and surface water, if present, on or near the sites, including ditches or storm water conveyances that may be present. For the operating facilities (Olin, Ciba Geigy, Stauffer-Cold Creek and Stauffer-LeMoyne), NPDES compliance points have

been designated by the RPM as sample locations for this evaluation. The exception to this study area designation was the Perdido Groundwater Contamination site.

Sample Depth – Sediment samples were collected with a stainless steel scoop affixed to a length of conduit or, if conditions allowed, stainless steel spoons. Samples collected with these methods were generally comprised of sediment from the interval from the sediment surface to a depth of about six inches. Surface water samples were collected by either collecting the sample directly into the container while wading or by using a stainless steel scoop affixed to a length of conduit, where wading was not possible. The surface water samples were generally comprised of water within the top one foot of water column in the stream or conveyance.

Temporal Boundaries – The field investigation was conducted during the period of October 12 through October 14, 2005. Seven day turnaround on the analytical results was requested to expedite decision making.

2.1.5 Decision Rule

This report incorporates final released data. The Technical Services Section, in consultation with the appropriate Waste Management Division personnel, has reviewed this data, included in Section 6 of the report. Using this data and historical data and observations provided by the RPMS, determinations were made for each site or facility as to whether or not there appear to be significant changes in observed COC concentrations at the sampled locations.

2.1.6 Error Limits

Because of inherent variability introduced through sample collection, mixing, storage, transportation, and analysis, it is important to specify the acceptable decision error rates. Decision errors were reduced by using standard, published protocols for sampling and analytical procedures. Sampling protocols followed the Region 4 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, November 2001 (EISOPQAM) while analytical procedures followed the current CLP SOW, the regional Special Analytical Services SOW's for dioxins and, for the herbicide analyses, regionally approved methods.

2.1.7 Optimize Sampling Design

The final step in the DQO process is the development of a sampling design that takes into account data needs, key decisions, and environmental variables, such as physical and site constraints, and how the spatial and temporal boundaries of the contamination are identified. The QAPP by which the investigation was conducted was developed based on input from site RPMs. Each site was visited as soon as conditions allowed for travel in the affected areas. Based on observations at each site, the responsible RPM has made recommendations as to the scope of work needed to meet the investigation objectives.

Samples were collected on an authoritative basis from locations in drainage pathways, such as NPDES outfalls, ditches, creeks and streams. Sample locations are presented in **Table 1** and **Figures 3 through 12, Appendix A.**

Table 1
Sample Location, Description, Rationale and Analytes
Post-Katrina NPL and Non-NPL Superfund Site Evaluations
Southern and Gulf Coastal Alabama and Mississippi

Site	Sample ID	Location/Description	Type[1]	Rationale	Analytes[2]
Olin-McIntosh	OM01SW	Surface water sample from discharge point DSN003	G	Compare to historical data for impact evaluation	A; D
	OM01SD	Sediment sample from discharge point DSN003	G	Compare to historical data for impact evaluation	A; D
	OM02SW	Surface water sample from discharge point DSN004	G	Compare to historical data for impact evaluation	A; D
	OM02SD	Sediment sample from discharge point DSN004	G	Compare to historical data for impact evaluation	A; D
Stauffer-Lemoyne (Akzo Nobel)	SL01SD	Sediment sample from discharge point DSN004	G	Compare to historical data for impact evaluation	A; D; E
	SL02SD	Sediment sample from discharge point DSN012	G	Compare to historical data for impact evaluation	A; D; E
Stauffer-Cold Creek (Syngenta)	SC01SD	Sediment sample from discharge point DSN002	G	Compare to historical data for impact evaluation	G
	SC02SD	Sediment sample from discharge point DSN003	G	Compare to historical data for impact evaluation	G
	SC03SD	Sediment sample from discharge point DSN004	G	Compare to historical data for impact evaluation	G
	SC04SD	Sediment sample from discharge point DSN005	G	Compare to historical data for impact evaluation	G
Redwing Carriers	RC01SD	Sediment sample from ditch upstream (west) of southern border of site	G	Compare to historical data for impact evaluation	B; C; H
	RC02SD	Sediment sample from ditch on south side of drive from Hwy 43 back to site (north of Rambo's Skateland)	G	Compare to historical data for impact evaluation	B; C; H

Perdido GW	PG01GW	Influent to air stripper	G	Sample of groundwater, pre-treatment	A
	PG02GW	Effluent from air stripper	G	Sample will be used to determine if air stripper is functioning as designed	A
Picayune Wood Treating	PW01SD	Sediment sample from Mill Creek downstream of site (01SD)	G	Compare to historical data for impact evaluation	B
	PW02SD	Sediment sample from site boundary, Mill Creek (02SD)	G	Compare to historical data for impact evaluation	B
	PW02SW	Surface water sample from site boundary, Mill Creek (02SW)	G	Compare to historical data for impact evaluation	B
	PW03SD	Sediment sample, southwest corner of site, Mill Creek (03SD)	G	Compare to historical data for impact evaluation	B
Davis Timber	DT01SD	Sediment sample from stream, downstream and east of site (T02)	C	Compare to historical data for impact evaluation	B; F
	DT02SD	Far downstream sediment sample from stream, west of residential area and golf course (SD11)	C	Compare to historical data for impact evaluation	B; F

American Creosote	AC01SW	Surface water sample immediately upstream of Baremore St.(SD07)	G	Compare to historical data for impact evaluation	B
	AC01SD	Sediment sample immediately upstream of Baremore St.(SD07)	G	Compare to historical data for impact evaluation	B
	AC02SW	Surface water sample immediately upstream of Hwy 15(SD09)	G	Compare to historical data for impact evaluation	B
	AC02SD	Surface water sample immediately upstream of Hwy 15(SD09)	G	Compare to historical data for impact evaluation	B
Ciba Geigy	CG01SW	Surface water sample at NPDES outfall at river	G	Compare to historical data for impact evaluation	B
	CG01SD	Sediment sample at NPDES outfall at river	G	Compare to historical data for impact evaluation	B
	CG02SW	Wastewater sample from permitted wastewater discharge before pipe to river outfall	G	Compare to historical data for impact evaluation	B
Chemfax, Inc.	CF01SD	Bernard Bayou, 100 ft upstream of railroad trestle; three point composite across channel (RI station number 222)	C	Control sample; Bernard Bayou is an industrial channel; needed to properly evaluate CF02SD, CF03SD and CF04SD; Compare to historical data for impact evaluation	A; B
	CF02SD	Bernard Bayou, immediately below railroad trestle (RI station number 223)	C	Compare to historical data for impact evaluation	A; B

	CF03SD	Bernard Bayou, immediately below Three Rivers Road bridge (RI station number224)	C	Compare to historical data for impact evaluation	A; B
	CF04SD	Bernard Bayou, 150 feet below Three Rivers Road bridge (RI station number 225)	C	Compare to historical data for impact evaluation	A; B
Sonford Products	SP01SW	Surface water sample, ditch downstream from site (04SW)	G	Compare to historical data for impact evaluation	B; D
	SP01SD	Sediment sample, ditch downstream from site (04SD)	G	Compare to historical data for impact evaluation	B; D, F
	SP02SD	Sediment sample downstream from SP01	G	Compare to SP01SD to evaluate impact	B; D, F
	SP03SD	Sediment sample downstream from SP02	G	Compare to SP01SD to evaluate impact	B; D, F

Notes:

1 – C is composite sample; G is grab sample

2 – Analytes: A – Volatile Organic Compounds
B – Extractable Organic Compounds
C – Pesticides/PCBs
D – Metals
E – Cyanide
F – Dioxin
G – Carbamate herbicides
H – Herbicides

3.0 INVESTIGATION MANAGEMENT PLAN

3.1 Field Project Responsibilities

The overall project lead was the responsibility of Don Hunter, SESD. Athens, Georgia. Mr. Hunter was responsible for the following field activities:

- Ensuring that all field activities were conducted in accordance with the project QAPP.
- Monitoring overall field project quality control.
- Coordinating field scheduling of work with other Section and Division activities.
- Overseeing and managing field technical resources including non-sampling field activities.
- Coordinating sample analyses with the laboratories.

The site Health and Safety Officer (HSO), Art Masters, was responsible for monitoring the health and safety of the sampling/investigative personnel.

The following is a list of the personnel that were involved in the field operations for the Katrina Response NPL Site evaluations and their responsibilities:

- Stacey Box, Field Team Leader, Sampler
- Art Masters, HSO, Field Team Leader, Sampler
- Brian Striggow, Field Team Leader, Sampler
- Marty Allen, Sampler
- Mike Crowe, ESAT Contract Support for Sample Processing and Shipment
- Brian Herndon, ESAT Contract Support for Sample Processing and Shipment

All field investigators had the required 40 hours of hazardous waste site safety training, and specific knowledge and expertise of sample collection and safety techniques in accordance with the Region 4 EISOPQAM.

3.2 Site Control and Access

Access for Olin, Stauffer-Lemoyne, Stauffer-Cold Creek, Perdido Groundwater Contamination, Redwing Carriers and Ciba Geigy were arranged by the RPM for each of the sites. All other sites were either public access or were EPA Fund-Lead sites and formal access was not required.

3.3 Sample Collection and Handling Procedures

All samples were collected, containerized, preserved, handled, and documented in accordance with the Region 4 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, November 2001 (EISOPQAM). All deviations from the QAPP,

with respect to sample collection and handling, were discussed with the Project Leader and were documented in the field records for the investigation.

Sediment samples were collected at the selected locations using stainless steel scoops and/or stainless steel spoons. The sampled depths varied between several inches to up to 6 to 8 inches. Sediment samples were collected as grab samples except for two sites, the Chemfax and Davis Timber site, where composite samples were collected. Three-point composites, at quarter-points across the Bernard Bayou, were collected at the Chemfax, Inc. site. At the Davis Timber site, three-point composites were collected at the accessible locations from the bank.

Sediment samples were collected, as described in **Section 2.1.3 and Section 2.1.4**. Where composite samples were collected, the aliquots were thoroughly mixed in glass pans. Samples for volatile organic compound analyses, where targeted, were collected prior to mixing, with minimum disturbance, from the central aliquot in Encore® sample containers using EPA Method 5035. After mixing, the samples were placed in the appropriate containers and placed on ice, as specified in Appendix A of the Region 4 EISOPQAM.

Surface water samples were collected either directly into the sample containers from the bank or while wading or were collected in stainless steel scoops and transferred to the sample containers.

3.4 Sample Analysis and Validation

Samples from each site were analyzed for the analytes or constituents listed in Table 1. One hundred percent completion was achieved with respect to analysis of samples collected for this investigation. Using sampling and analytical procedures as outlined in the Region 4 EISOPQAM and the Region 4 ASBLOQAM, errors introduced in the decision making process were minimized.

3.5 Chain of Custody

All chain-of-custody and record keeping procedures were in accordance with the EISOPQAM. Chain-of-custody procedures are comprised of the following elements; 1) maintaining sample custody and 2) documentation of samples for evidence.

As defined in the EISOPQAM, a sample or other physical evidence is in custody if:

- it is in the actual possession of an investigator;
- it is in the view of an investigator, after being in their physical possession;
- it was in the physical possession of an investigator and then it was secured to prevent tampering; and/or
- it is placed in a designated secure area.

3.5.1 Sample Labels

Sample labels were prepared and affixed to each sample container. The labels were prepared using waterproof, non-erasable ink as specified in Section 3 of the EISOPQAM.

3.5.2 Sample Custody Seals

The samples were sealed as soon as possible following collection as specified in the EISOPQAM. The custody seals were dated and initialed by the sample custodian.

3.5.3 Chain-of-Custody Record

A field Chain-Of-Custody Record was used to record the collection and custody of all samples collected for this investigation. These records accompanied the samples during their shipment to the laboratories, allowing transfer of custody of samples from the sampler/sample custodian to the designated sample custodian at each laboratory.

3.6 Station and Sample Identification

Sample identification numbers were assigned using the following format:

XX##YYZ, where:

- XX is a unique identifier for the facility or site (see Table 1);
- ## indicates a sequential number assigned to each site;
- YY indicates the media being sampled: "SD" is sediment, "SW" is surface water and "GW" is groundwater;
- Z identifies splits: "S" is split;

A split sample is a sample comprised of two samples, the primary sample and the designated split sample, that are collected from the same sample material that has been homogenized in a glass pan prior to filling of the sample containers. Assuming a well mixed sample, a split helps evaluate both the field and laboratory procedures.

3.7 Site Mapping

The locations of all samples were logged using a GPS capable of one meter accuracy. For composite sample locations, only the center aliquot was located. Shape files for these locations were used to generate the sample location figures included in Appendix A.

3.8 Investigation Derived Waste (IDW)

The following identifies types of investigation derived waste (IDW) that was generated during the investigation and their disposition:

- Gloves, paper towels, aluminum foil and plastic wrapping from the sampling equipment and other miscellaneous trash generated during the investigation was bagged and placed in a dumpster for disposal at a Class D landfill

3.9 Sample Containers

Sample containers for samples were obtained from the SESD Field Equipment Center in Athens, Georgia. These containers comply with the requirements specified in Appendix A of the EISOPQAM. Tables 2 and 3 lists the container types and numbers used for each analyte group, by media. Containers listed in split column are in addition to the containers comprising the regular sample. Containers listed in the MS/MSD column are total containers for the regular sample designated as the MS/MSD sample.

Table 2, Sample Containers, Sediment Samples

Analytes	Containers	Splits	MS/MSD	Holding Times
Metals/Cyanide	1 8oz. glass	1 8oz. glass	2 8oz. glass	180 days
VOCs	3 EnCore™	3 EnCore™	9 EnCore™	48 hours
Semi-Volatiles, Pesticides/PCBs	1 8oz. glass	1 8oz. glass	2 8 oz. glass	14 days
Herbicides	1 8oz. glass	1 8oz. glass	1 8oz. glass	14 days
Dioxins	1 8oz. glass	1 8oz. glass	N/A	30 days

Table 3, Sample Containers, Surface Water and Groundwater Samples

Analytes	Containers	Splits	MS/MSD	Holding Times
Metals	1 1-liter plastic	1 1-liter plastic	2 1-liter plastic	180 days
Cyanide	1 1-liter plastic	1 1-liter plastic	2 1-liter plastic	28 days
VOCs	2 40-mil VOA vials	2 40-mil VOA vials	6 40-mil VOA vials	14 days
Semi-Volatiles, Pesticides/PCBs	4 1-liter amber	4 1-liter amber	8 1-liter amber	14 days
Herbicides	2 1-liter amber	2 1-liter amber	6 1-liter amber	14 days

4.0 SAMPLING DESIGN AND RATIONALE

Sediment, surface water and groundwater samples were collected during this field investigation. Analysis of these samples will aid in determining if site conditions have changed from what has been historically determined (see **Section 2.1.5**). Additionally, sample results were used to determine if the groundwater treatment system at the Perdido Groundwater Contamination site is operating as designed.

4.1 Sampling Design

Eleven Superfund sites, nine NPL and two non-NPL, were targeted for this evaluation. The scope of work varied for each site and is based on an assessment of site conditions determined by the RPM for each site during immediate post-Katrina site visits. Except for the Perdido Groundwater Contamination site, where only groundwater samples from the treatment system were collected, the scope of work at each site generally consisted of the collection of two to four sediment and surface water samples (where surface water was present) from existing monitoring locations, including permitted NPDES discharge points. To the extent possible, these samples were collected from locations previously sampled during remedial investigations or other characterization activities.

4.2 Data Validation/Usability

The data generated from the split and duplicate samples was validated in accordance with the Region 4 Analytical Support Branch Laboratory Operations and Quality Assurance Manual, November 2004 (ASBLOQAM).

Analyses for metals, cyanide, VOCs, semi-volatiles, pesticides and PCBs were performed by CLP laboratories. This data was validated according to the National Functional Guidelines for Organic Data Review, OSWER 9240.1-05-A-P (October 1999), the National Functional Guidelines for Inorganic Data Review, OSWER 9240.1-45 (October 2004) and Region 4's Data Validation Standard Operating Procedures for Contract Laboratory Program Routine Analytical Services, Revision 2.0 (January 1999).

The dioxin/furan, herbicide and carbamate analysis were performed by laboratories contracted by EPA. Validation of the dioxin data was performed by ESAT using the National Functional Guidelines for Dioxin Data Review, OSWER540-R-02-003 (August 2002) and Region 4's Data Validation Standard Operating Procedures for Dioxin Data Version 3.0 (May 2002) documents. The dioxin data will consist of a Level 4 - CLP type data package that contains the C-O-Cs, instrument raw data, initial and/or continuing calibration data/curves, bench sheets/sample preparation information, QA/QC data/information, and case narrative detailing any problems associated with this data.

Data for herbicides and thiocarbamate herbicides was reviewed and validated against the standard operating procedures and quality management plan requirements of the performing laboratory. Data qualification decisions were made in accordance with the National Functional Guidelines for Organic Data Review.

5.0 QUALITY ASSURANCE

Quality assurance (QA) procedures must begin in the planning stage and continue through sample collection, analyses, reporting and final review. The methods that were used to ensure data quality are discussed below.

5.1 Organization and Responsibilities

The project leader has overall responsibility for field QA. Off-site laboratory analyses for samples collected during the investigation were conducted by the CLP laboratories under the current CLP Statement of Work. The precision, comparability and accuracy of sample analyses were determined in accordance with the ASBLOQAM.

5.2 Field QA/QC Samples

5.2.1 Matrix Spike/Matrix Spike Duplicate

Samples for laboratory quality control analyses (matrix spike/matrix spike duplicate, or MS/MSD) were designated as specified in the EISOPQAM. Because each site was booked separately for analyses, one MS/MSD sample was designated for each site

5.2.2 Population Variability - Duplicate Samples

Because of the small number of samples to be collected at each site, the media that are being collected and the nature of the investigation, variability duplicates were deemed as not appropriate or warranted for this investigation. No duplicates, therefore, were collected for this investigation.

5.2.3 Sample Handling - On-Site Splits

Four splits were collected, one each at four of the eleven sites/facilities sampled for this investigation. These samples, collected at fifteen percent of the sample locations, were used to assess sample handling variability. This number exceeds the 10 percent specified in the QAPP. The split sample results for the four split samples are included in the data presentation in Section 6 and are included as part of the data in the complete data appended to this report. The split sample results were generally consistent at each of the split sample locations and were within anticipated limits for the media sampled.

6.0 INVESTIGATION RESULTS

The following sections summarize the results of analysis of samples collected at the eleven facilities or sites selected for the Post-Katrina NPL and Non-NPL Superfund site evaluations. Figures 3 through 12, contained in Appendix A of this document, show the locations of these samples. Analytical data summaries, based on a summary of detected analytes or compounds, are provided below and at the end of this section for each facility. The complete data, included in Appendix B of this report, contain the detected compounds as well as those analyzed for but not detected, with the minimum quantitation limits, i.e., reporting limits, for the undetected compounds and analytes.

The following is a list of data qualifiers used in the analytical data summaries accompanying the presentation of the investigation results.

J	*Identification of analyte is acceptable: reported value is an estimate.*
N	*Presumptive evidence analyte is present; analyte reported as tentative identification.*
NJ	*Presumptive evidence analyte is present; analyte reported as tentative identification. Reported value is an estimate.*
C	*Confirmed by GC/MS*
A	*Analyte analyzed in replicate. Reported value is "average" of replicates*
U	*Analyte not detected at or above reporting limit.*
UJ	*Analyte not detected at or above reporting limit. Reporting limit is an estimate.*
R	*Presence or absence of analyte can not be determined from data due to severe quality control problems. Data are rejected and considered unusable.*
NR	*Not reported.*

6.1 Olin-McIntosh Plant (NPL)

Sediment and surface water samples were collected at two locations, OM01 and OM02, shown on Figure 3, and were analyzed for volatile organic compounds and mercury. The results are summarized below.

Mercury, Sediments:

Analyte	*Units*	*OM01SD*	*OM02SD*
Mercury	mg/kg	*0.82 U*	0.58

Mercury, Surface Water:

Analyte	*Units*	*OM01SW*	*OM02SW*
Mercury	ug/l	*0.20 U*	0.21

Volatile Organic Compounds, Sediment:

Analyte	*Units*	*OM01SD*	*OM02SD*
1,3-dichlorobenzene	ug/kg	*16 U*	4 J
Petroleum Product	ug/kg	N	*NR*
Unknown	ug/kg	13 J	*NR*

Volatile Organic Compounds, Surface Water: No volatile organic compounds were detected in either of the surface water samples collected for the Olin-McIntosh Plant evaluation.

6.2 Ciba Geigy (NPL)

A sediment and surface water sample was collected at location CG01, shown on Figure 4. In addition, a sample of the facility's permitted wastewater discharge was collected from a point within the plant boundaries. This point, identified as CG02SW, is also shown on Figure 4. Samples from both locations were analyzed for pesticides/PCBs and diazinon. Samples CG01SDS and CG01SWS are the split samples from station CG01. The results are summarized below:

Diazinon, Sediment:

Analyte	*Units*	*CG01SD*	*CG01SDS*
Diazinon	ug/kg	*1300 UR*	*1300 UR*

Diazinon, Surface Water (01SW) and Wastewater (02SW):

Analyte	*Units*	*CG01SW*	*CG01SWS*	*CG02SW*
Diazinon	ug/l	*0.62 UR*	*0.62 UR*	4.2 NJ

Pesticide/PCB Compounds, Sediment:

Analyte	*Units*	*CG01SD*	*CG01SDS*
4,4,4'-DDD	ug/kg	4.4 J	5.0
4,4,4'-DDE	ug/kg	7.1	6.8
4,4,4-DDT	ug/kg	3.3 J	20

Pesticide/PCB Compounds, Surface Water (01SW) and Wastewater (02SW):

Analyte	*Units*	*CG01SW*	*CG01SWS*	*CG02SW*
Delta-BHC	ug/l	*0.050 U*	*0.050 U*	0.045 J
Aldrin	ug/l	*0.050 U*	*0.050 U*	1.0

6.3 Stauffer-Cold Creek (Syngenta) (NPL)

Four sediment samples were collected at the locations shown on Figure 5. Because no water was present at the time of sampling, surface water samples, which were planned at these locations, were not collected. All samples were analyzed for a suite of thiocarbamate herbicides, including Butylate (Sutan™), Molinate (Ordram™), Cycloate (Ro-Neet™), EPTC (Eptam™), Pebulate (Tillam™) and Vernolate (Vernam™).

The following is an analytical data summary of the thiocarbamate herbicides detected in the four samples:

Thiocarbamate Herbicides, Sediment:

Analyte	*Units*	*SC01SD*	*SC02SD*	*SC03SD*	*SC04SD*
Vernolate	ug/kg	*1000 UR*	650 CJ	670 CJ	*630 UR*
EPTC	ug/kg	*1000 U*	1500 C	1300 C	300 CJA
Cycloate	ug/kg	*1000 U*	1300 C	630 CJ	*1000 U*
Butylate	ug/kg	*1000 U*	2600 C	6800 C	1400 CJA
Pebulate	ug/kg	*1000U*	340 CJ	290 CJ	*1000 U*
Molinate	ug/kg	*R*	*R*	*R*	*R*

6.4 Stauffer-LeMoyne (Akzo Nobel) (NPL)

Sediment samples were collected from two locations, SL01 and SL02, shown on Figure 5. Because no water was present at the time of sampling, surface water samples, which were planned at these locations, were not collected. The samples were analyzed for total mercury, cyanide and volatile organic compounds. The results are summarized below.

Mercury and Cyanide, Sediment:

Analyte	*Units*	*SL01SD*	*SL02SD*
Total Mercury	mg/kg	0.87 J	*0.60 UJ*
Cyanide	mg/kg	*1.6 U*	*1.5 U*

Volatile Organic Compounds, Sediment:

Analyte	*Units*	*SL01SD*	*SL02SD*
Acetone	ug/kg	*12 U*	47 J
Toluene	ug/kg	*12 U*	20
Dimethyl sulfide	ug/kg	*12 U*	12 NJ
Petroleum Product	ug/kg	N	N
Unknown	ug/kg	*NR*	7 J
3 Unknowns	ug/kg	38 J	*NR*

6.5 Perdido Groundwater Contamination (NPL)

Two water samples, PG01 and PG02, were collected from the groundwater treatment system influent and effluent lines, respectively, at the Perdido Groundwater Contamination groundwater treatment system, the location of which is shown on Figure 6. Both samples were analyzed for volatile organic compounds. No volatile organic compounds were detected in either of the samples.

6.6 Redwing Carriers (Saraland Apartments) (NPL)

Two sediment samples were collected from ditches adjacent to the Redwing Carriers site. The locations are shown on Figure 7. Because no water was present at the time of sampling, surface water samples, which were planned, were not collected at these locations. The samples were analyzed for extractable organic compounds, pesticides/PCBs and the herbicide Vernolate (Vernam™). The following are analytical data summaries of the extractable organic compound and pesticide/PCB compound analyses for these samples. No Vernalate was detected in either sample with reporting limits of 980UR ug/kg and 700UR ug/kg, for samples RC01SD and RC02SD, respectively.

Extractable Organic Compounds, Sediment:

Analyte	*Units*	*RC01SD*	*RC02SD*
Benzo(a)fluoranthene	ug/kg	150 J	*490 UR*
Benzo(b)fluoranthene	ug/kg	260 J	110
Benzo(k)fluoranthene	ug/kg	290 J	100
Benzo-a-pyrene	ug/kg	150 J	*490 U*
Chrysene	ug/kg	310 J	100 J
Fluoranthene	ug/kg	310 J	130 J
Pyrene	ug/kg	410 J	130 J

Pesticide/PCB Compounds, Sediment:

Analyte	*Units*	*RC01SD*	*RC02SD*
4,4,4'-DDE	ug/kg	2.3 J	*4.9 U*
Dieldrin	ug/kg	4.1 J	2.1 NJ
Gamma-chlordane /2	ug/kg	9.1	*2.5 U*

6.7 American Creosote Works (NPL)

Surface water and sediment samples were collected from two locations, AC01 and AC02, as shown on Figure 8, and were analyzed for extractable organic compounds. The extractable organic compound analytical data summary tables are included as Table 6.1 (sediment summary) and Table 6.2 (surface water summary) at the end of Section 6. Samples AC01SDS and AC01SWS are the split samples of sediment and surface water collected at location AC01. Numerous miscellaneous extractable organic compounds (TICs) were detected in these samples and the results are included with the complete data appended to this report.

6.8 Sonford Products (Non-NPL)

Sediment samples were collected at three locations, SP01, SP02 and SP03, as shown on Figure 9. In addition to the sediment sample collected at location SP01, a surface water sample was also collected at that location. All samples were analyzed for metals, extractable organic compounds, pesticide/PCBs and dioxins, except for the surface water sample, which was not

analyzed for dioxins. The metals results, for both sediment and surface water samples, are summarized below. Also summarized are the extractable organic compound and pesticide/PCB sediment results. Numerous miscellaneous extractable organic compounds (TICs) were reported and are included with the complete data appended to the report but are not summarized below. No pesticide/PCB compounds and only trace detections of miscellaneous extractable organic compounds (TICs) were reported for the surface water sample. These results are also included in the complete data appended to the report. The dioxin results are summarized in Table 6.3 at the end of Section 6.

Lead and Arsenic, Sediment:

Analyte	*Units*	*SP01SD*	*SP02SD*	*SP03SD*
Lead	mg/kg	20	150	62
Arsenic	mg/kg	1.4 J	4.1	2.9

Lead and Arsenic, Surface Water:

Analyte	*Units*	*SP01SW*
Lead	ug/l	9.3 J
Arsenic	ug/l	*10 U*

Extractable Organic Compounds, Sediment:

Analyte	*Units*	*SP01SD*	*SP02SD*	*SP03SD*
Benzo(b)fluoranthene	ug/kg	*490 U*	380 J	*490 U*
Benzo(k)fluoranthene	ug/kg	*490 U*	330 J	*490 U*
Benzo-a-pyrene	ug/kg	*490 U*	240 J	*490 U*
Bis(2-ethylhexyl)phthalate	ug/kg	*490 U*	340 J	*490 U*
Chrysene	ug/kg	*490 U*	310 J	*490 U*
Fluoranthene	ug/kg	*490 U*	350 J	*490 U*
Indeno(1,2,3-cd)pyrene	ug/kg	*490 U*	230 J	*490 U*
Pentachlorophenol	ug/kg	*1200 U*	*2600U*	*1200 U*
Pyrene	ug/kg	*490 U*	390 J	*490 U*

Pesticide/PCB Compounds, Sediment:

Analyte	*Units*	*SP01SD*	*SP02SD*	*SP03SD*
Beta-BHC	ug/kg	1.6 NJ	9.8	*2.5 U*
Delta-BHC	ug/kg	1.2 J	11	*2.5 U*
Gamma-BHC (Lindane)	ug/kg	*2.5 U*	3 NJ	*2.5 U*
Dieldrin	ug/kg	1.3 J	18	2.2 J
4,4,4'-DDE	ug/kg	*4.9 U*	10 J	1.2 NJ
Alpha-Chlordane /2	ug/kg	*2.5 U*	2.4 J	*2.5 U*

6.9 Davis Timber (NPL)

Sediment samples were collected at two locations, DT01 and DT02, as shown on Figure 10. Because of dry conditions, surface water samples, which were planned, were not collected at these locations. Both samples were analyzed for extractable organic compounds and dioxins. Sample DT01SDS is the split sample at station DT01SD. The extractable organic analytical results are summarized below. The miscellaneous extractable organic compound (TIC) data are not summarized but can be found in the complete data appended to this report. The dioxin results are summarized in Table 6.4 at the end of Section 6.

Extractable Organic Compounds, Sediment:

Analyte	*Units*	*DT01SD*	*DT01SDS*	*DT02SD*
Pentachlorophenol	ug/kg	880	450 J	*940 U*
Chrysene	ug/kg	84 J	75 J	*380 U*
Fluoranthene	ug/kg	80 J	*340 U*	*380 U*
Pyrene	ug/kg	78 J	76 J	*380 U*

6.10 Chemfax, Inc. (Non-NPL)

Sediment samples were collected at four locations in Bernard Bayou, as shown on Figure 11. All samples were analyzed for volatile and extractable organic compounds. Sample CF04SDS is the split of the sample collected at location CF04SD.

Extractable Organic Compounds, Sediment:

Acetophenone, detected at an estimated concentration of 96 ug/kg, in sample CF04SD, was the only extractable organic compound detected in the samples collected at this site. Several miscellaneous extractable compounds (TICs) and unknown compounds were detected at generally low concentrations in samples from each of the four stations. These results are included in the complete data appended to the report. The VOC results are summarized below.

Volatile Organic Compounds, Sediment:

Analyte	*Units*	*CF01SD*	*CF02SD*	*CF03SD*	*CF04SD*	*CF04SDS*
Acetone	ug/kg	19 J	12 J	*11 UJ*	10 J	11 J
Unknown	ug/kg	6 J	6 J	8 J	6 J	8 J

6.11 Picayune Wood Treating (NPL)

Sediment samples were collected at three locations, PW01, PW02 and PW03, as shown on Figure 12. In addition, a surface water sample was also collected at location PW02. All samples were analyzed for extractable organic compounds. The analytical results are

summarized below. No extractable organic compounds were detected in the water sample collected at station PW02.

Extractable Organic Compounds, Sediment:

Analyte	*Units*	*PW01SD*	*PW02SD*	*PW03SD*
Anthracene	ug/kg	*580 U*	280 J	140 J
Benzo(a)anthracene	ug/kg	280 J	420 J	130 J
Benzo(b)fluoranthene	ug/kg	600	1000	310 J
Benzo(k)fluoranthene	ug/kg	410 J	780	160 J
Benzo(ghi)perylene	ug/kg	380 J	470 J	180 J
Benzo-a-pyrene	ug/kg	410 J	660 J	170 J
Bis(2-ethylhexyl)phthalate	ug/kg	990	1600	460 J
Dibenzo(a,h)anthracene	ug/kg	*580 U*	180 J	*520 U*
Chrysene	ug/kg	520 J	890	270 J
Fluoranthene	ug/kg	870	1300	380 J
Indeno(1,2,3-cd)pyrene	ug/kg	430 J	580 J	190 J
Phenanthrene	ug/kg	290 J	390 J	120 J
Pyrene	ug/kg	650	1100	340 J

Table 6.1
Extractable Organic Data Summary, Sediment Samples
American Creosote Works
Post-Katrina NPL and Non-NPL Superfund Site
Evaluations

		AC01SD		AC01SDS		AC02SD	
1,1-Biphenyl	UG/KG	64000		64000		*1400*	*U*
2,4-Dimethylphenol	UG/KG	2500	J	2700	J	*1400*	*U*
2-Methylnaphthalene	UG/KG	350000		400000		*1400*	*U*
Acenaphthene	UG/KG	330000		380000		560	J
Acenaphthylene	UG/KG	22000		22000		4700	
Acetophenone	UG/KG	3400	J	4300	J	*1400*	*U*
Anthracene	UG/KG	140000		150000		3800	
Benzo(a)Anthracene	UG/KG	83000		86000		14000	
Benzo(b)Fluoranthene	UG/KG	36000		35000		15000	
Benzo(ghi)Perylene	UG/KG	11000	J	10000	J	4200	J
Benzo(k)Fluoranthene	UG/KG	33000		38000		17000	
Benzo-a-Pyrene	UG/KG	34000		35000		16000	
Carbazole	UG/KG	66000	J	63000	J	*1400*	*U*
Chrysene	UG/KG	77000		76000		17000	
Dibenzo(a,h)Anthracene	UG/KG	5900	J	5200	J	3600	
Dibenzofuran	UG/KG	270000		290000		380	J
Fluoranthene	UG/KG	440000		480000		16000	
Fluorene	UG/KG	340000		380000		760	J
Indeno (1,2,3-cd) Pyrene	UG/KG	15000		13000		11000	J
Naphthalene	UG/KG	1300000		1400000		380	J
Phenanthrene	UG/KG	960000		1000000		3600	
Pyrene	UG/KG	250000		280000		16000	

Data Qualifiers

U-Analyte not detected at or above reporting limit.
J-Identification of analyte is acceptable; reported value is an estimate.

Table 6.2
Extractable Organic Data Summary, Surface Water Samples
American Creosote Works
Post-Katrina NPL and Non-NPL Superfund
Site Evaluations

		AC01SW		AC01SWS		AC02SW	
2,4-Dimethylphenol	UG/L	3	J	7	J	*10*	*U*
Acenaphthene	UG/L	3	J	4	J	*10*	*U*
Chrysene	UG/L	*10*	*U*	*10*	*U*	3	J
Fluoranthene	UG/L	6	J	4	J	3	J
Pyrene	UG/L	3	J	2	J	*10*	*U*

Data Qualifiers

U-Analyte not detected at or above reporting limit.
J-Identification of analyte is acceptable; reported value is an estimate.

Table 6.3
Dioxin Analytical Data Summary, Sediments
Sonford Products Superfund Site
Post-Katrina NPL and Non-NPL Superfund Site Evaluations

		SP01SD		SP02SD		SP03SD	
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	NG/KG	15000		110000	J	29000	
1,2,3,4,6,7,8-Heptachlorodibenzofuran	NG/KG	3400		32000		8100	
1,2,3,4,7,8,9-Heptachlorodibenzofuran	NG/KG	380		3800		1600	
1,2,3,4,7,8-Hexachlorodibenzodioxin	NG/KG	330		3400		1000	
1,2,3,4,7,8-Hexachlorodibenzofuran	NG/KG	290		3100		1200	
1,2,3,6,7,8-Hexachlorodibenzodioxin	NG/KG	1000		11000		2600	
1,2,3,6,7,8-Hexachlorodibenzofuran	NG/KG	220		2200		860	
1,2,3,7,8,9-Hexachlorodibenzodioxin	NG/KG	650		6300		1200	
1,2,3,7,8,9-Hexachlorodibenzofuran	NG/KG	100		810		470	
1,2,3,7,8-Pentachlorodibenzodioxin	NG/KG	100		950		380	
1,2,3,7,8-Pentachlorodibenzofuran	NG/KG	39		420		170	
2,3,4,6,7,8-Hexachlorodibenzofuran	NG/KG	340		3800		1500	
2,3,4,7,8-Pentachlorodibenzofuran	NG/KG	74		770		350	
2,3,7,8-Tetrachlorodibenzodioxin	NG/KG	9		120		29	
2,3,7,8-Tetrachlorodibenzofuran	NG/KG	8		74		28	
Heptachlorodibenzodioxin (Total)	NG/KG	26000	J	170000	J	46000	J
Heptachlorodibenzofuran (Total)	NG/KG	9300	J	99000	J	24000	J
Hexachlorodibenzodioxin (Total)	NG/KG	6700	J	67000	J	13000	J
Hexachlorodibenzofuran (Total)	NG/KG	6900	J	73000	J	18000	J
Octachlorodibenzodioxin	NG/KG	220000	J	220000	J	120000	J
Octachlorodibenzofuran	NG/KG	6200	J	37000	J	11000	
Pentachlorodibenzodioxin (Total)	NG/KG	750	J	9500	J	3000	J
Pentachlorodibenzofuran (Total)	NG/KG	1500	J	18000	J	6600	J
Tetrachlorodibenzodioxin (Total)	NG/KG	120	J	2500	J	490	J
Tetrachlorodibenzofuran (Total)	NG/KG	200	J	3500	J	780	J
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	NG/KG	460		4400	J	1500	
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	NG/KG	500		4800	J	1700	
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	NG/KG	650		6000	J	1900	

Data Qualifiers

J-Identification of analyte is acceptable; reported value is an estimate.

Table 6.4
Dioxin Analytical Data Summary, Sediments
Davis Timber Superfund Site
Post-Katrina NPL and Non-NPL Superfund Site Evaluations

		DT01SD		DT01SDS		DT02SD	
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	NG/KG	13000		17000		1100	
1,2,3,4,6,7,8-Heptachlorodibenzofuran	NG/KG	2400		3200		190	
1,2,3,4,7,8,9-Heptachlorodibenzofuran	NG/KG	210		270		16	
1,2,3,4,7,8-Hexachlorodibenzodioxin	NG/KG	140		190		11	
1,2,3,4,7,8-Hexachlorodibenzofuran	NG/KG	93		120		7.6	
1,2,3,6,7,8-Hexachlorodibenzodioxin	NG/KG	560		710		50	
1,2,3,6,7,8-Hexachlorodibenzofuran	NG/KG	83		100		5.5	
1,2,3,7,8,9-Hexachlorodibenzodioxin	NG/KG	320		440		24	
1,2,3,7,8,9-Hexachlorodibenzofuran	NG/KG	33		41		2.7	
1,2,3,7,8-Pentachlorodibenzodioxin	NG/KG	45		60		2.9	
1,2,3,7,8-Pentachlorodibenzofuran	NG/KG	16		19		1.2	J
2,3,4,6,7,8-Hexachlorodibenzofuran	NG/KG	150		190		10	
2,3,4,7,8-Pentachlorodibenzofuran	NG/KG	35		43		3.2	
2,3,7,8-Tetrachlorodibenzodioxin	NG/KG	2.4		3.3		0.3	J
2,3,7,8-Tetrachlorodibenzofuran	NG/KG	3.4		4.5		*0.34*	*U*
Heptachlorodibenzodioxin (Total)	NG/KG	21000	J	27000	J	1800	J
Heptachlorodibenzofuran (Total)	NG/KG	7700	J	11000	J	610	J
Hexachlorodibenzodioxin (Total)	NG/KG	3300	J	4200	J	240	J
Hexachlorodibenzofuran (Total)	NG/KG	3200	J	4000	J	220	J
Octachlorodibenzodioxin	NG/KG	93000	J	92000	J	8600	J
Octachlorodibenzofuran	NG/KG	7700		9200		630	
Pentachlorodibenzodioxin (Total)	NG/KG	380	J	510	J	22	J
Pentachlorodibenzofuran (Total)	NG/KG	590	J	840	J	45	J
Tetrachlorodibenzodioxin (Total)	NG/KG	86	J	130	J	4.6	J
Tetrachlorodibenzofuran (Total)	NG/KG	100	J	140	J	5.7	J
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	NG/KG	220		280		17	
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	NG/KG	230		300		18	
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	NG/KG	370		480		30	

Data Qualifiers

U-Analyte not detected at or above reporting limit.
J-Identification of analyte is acceptable; reported value is an estimate.

7.0 IMPACT EVALUATION

The data presented in Section 6 was evaluated by the Region 4 Waste Management Division, Technical Services Section (TSS), in consultation with the RPM for each site, to determine if there were any observable or attributable Post-Katrina impacts at the NPL and Non-NPL sites selected for this investigation. Evaluating the sampling data to determine if there was an off-site impact from Hurricane Katrina posed a challenge at some sites, due to the scarcity of pre-existing sampling data and supporting information suitable for data interpretation. The NPL designations are provided in the section heading for each site.

Conclusions regarding the potential impact of the hurricane on these sites are based on a comparison of post-hurricane data to existing soil and sediment clean up values defined for the site, or available past sample data collected during remedial investigations or routine monitoring activities. In addition, the results were compared to EPA Region 9 Preliminary Remediation Goals (PRGs) and the Office of Water's 2004 National Recommended Water Quality Criteria (NRWQC) to determine if conditions at the sites might represent previously unrecognized risks to human health and the environment. EPA Region 9 PRGs (available at: http://www.epa.gov/region9/waste/sfund/prg/index.html) are risk-based concentrations based on long-term (i.e., 30-year) exposures to children and adults in a residential setting. The PRGs are intended to assist risk assessors and others in initial screening-level evaluations of environmental measurements. EPA Office of Water's 2004 NRWQC (available at: http://www.epa.gov/waterscience/criteria/wqcriteria.html) are a compilation of surface water quality criteria for the protection of aquatic life and human health for approximately 150 pollutants.

The results of these evaluations are presented in **Sections 7.1** through **7.11**.

7.1 Olin-McIntosh Plant, McIntosh, Alabama (NPL)

Sediment and surface water samples were collected at two locations and analyzed for volatile organic compounds and mercury.

Total mercury, a site-related contaminant of concern, was detected in sample OM02SD at 0.58 mg/kg, below the 55 mg/kg clean up level defined in the ROD and the residential PRG of 23 mg/kg. Historically, mercury concentrations in sediments at this location have ranged from non-detect to 10.4 mg/kg. The detection of 0.58 mg/kg, therefore, is consistent with results obtained from the 1991-1992 sampling for the remedial investigation conducted at the site.

1,3-Dichlorobenzene, the only VOC identified in site sediment, was detected in sample OM02SD at 4J ug/kg, below the 140 mg/kg clean up level defined in the ROD and the residential PRG of 530 mg/kg.

Mercury was detected in surface water sample OM01SW, located west of the facility near Highway 43, at a concentration of 0.21 ug/l. This location is near the well sand piles, known to contain mercury at concentrations exceeding 100 mg/kg. The detected concentration of 0.21 ug/l is below the national recommended water quality criteria (NRWQC) value of 0.77 ug/l, but above the State of Alabama standard for protection of aquatic life of 0.012 ug/l. This sample, however, was not taken in a permanent body of water capable of sustaining aquatic

life. Furthermore, the reported concentration is less than previously detected concentrations of mercury in surface water at the site.

There is no indication of an adverse impact due to a release from the Olin Corporation McIntosh Plant associated with Hurricane Katrina. Reported concentrations of site-related contaminants of concern (COC) are consistent with historical characterization data and no chemicals, COC or otherwise, were found to exceed any risk-based residential human health benchmarks. The Alabama Department of Environmental Management is aware of the ongoing runoff of mercury at the well sand residue area and is continuing to monitor potential impacts from this area.

7.2 Ciba Geigy, McIntosh, Alabama (NPL)

Sediment and surface water samples were collected and analyzed for pesticides and polychlorinated biphenyls (PCBs) from the National Pollutant Discharge Elimination System (NPDES) permitted outfall at the Tombigbee River. No site-related contaminants of concern (COC) were detected in the surface water sample.

Low levels of the pesticide 4,4'-DDT (p,p'-DDT) and its metabolites 4,4'-DDD (p,p'-DDD), and 4,4'-DDE (p,p'-DDE) were detected in sample CG01SD. No other pesticides or PCBs were detected. 4,4'-DDD was detected at 4.4 J ug/kg, 4,4'-DDE was detected at 7.1 ug/kg, and 4,4'-DDT was detected at 3.3 J ug/kg. In sample CG01SDS (a split sample from CG01SD) 4,4'-DDD was detected at 33 ug/kg, 4,4'-DDE was detected at 5.0 ug/kg, and 4,4'-DDT was detected at 20 ug/kg.

All of the concentrations of 4,4'-DDT and its metabolites detected following Hurricane Katrina were below the sediment cleanup level in the Record of Decision for the total of 4,4'-DDT, 4,4'-DDD, and 4,4'-DDE of 15 mg/kg. No detected concentrations of DDT, DDD or DDE exceeded residential PRG soil screening benchmarks. Moreover, it is unlikely for persons to become exposed to the sediments collected at the NPDES outfall at the Tombigbee River because the sediments are permanently covered by water. 4,4'-DDT, 4,4'-DDD, and 4,4'-DDE are pesticides which have been historically detected in the sediments in the vicinity of the Ciba Geigy facility.

The diazinon data for sediment sample CG01SD and surface water sample CG01SW were rejected by the standard quality assurance procedures used to evaluate laboratory data. The data could not be used to make a statement about the presence of absence of diazinon in the sediment. The reporting levels for the rejected data, however, were well below the corresponding residential PRG of 55,000 ug/kg.

There is no indication of an adverse impact due to a release from the Ciba Geigy Plant associated with Hurricane Katrina. Reported concentrations of site-related COCs are consistent with historical characterization data and no chemicals, COC or otherwise, were found to exceed any risk-based residential human health benchmarks.

7.3 Stauffer-Cold Creek (Syngenta), LeMoyne, Alabama (NPL)

Four sediment samples were collected. Because no water was present at the time of sampling, surface water samples, which were planned at these locations, were not collected. Sediment samples were analyzed for a suite of thiocarbamate herbicides, including Butylate (Sutan™), Cycloate (Ro-Neet™), EPTC (Eptam™), Pebulate (Tillam™) and Vernolate (Vernam™). Data validation for the herbicide Molinate (Ordram™) was rejected for all samples tested. No surface soil or sediment clean up criteria were defined in the RODs for the site. There was no historical sediment data for the NPDES outfalls to which the sampling results could be compared. Sampling data were compared to residential PRGs.

The reported concentrations for detected herbicides were all less than available residential PRGs. There were no available screening levels for Cycloate on the EPA Region 9 PRG table to screen the three detections, which ranged from 630 CJ ug/kg to 1300 C ug/kg. Upon search of the EPA Pesticides program website, an oral RfD was located [http://www.epa.gov/REDs/cycloate_red.pdf]. Using the RfD of 0.005 mg/kg-d, a screening level residential soil PRG can be generated (about 300 mg/kg) that is much higher than the reported concentrations.

There is no indication of an adverse impact due to a release from the Stauffer-Cold Creek Plant associated with Hurricane Katrina. Reported concentrations for this evaluation for detected thiocarbamate herbicides are below available residential PRGs.

7.4 Stauffer Chemical - LeMoyne Plant (Akzo Nobel), LeMoyne, Alabama (NPL)

Sediment samples were collected from two locations, SL01 and SL02. Because no water was present at the time of sampling, surface water samples, which were planned at these locations, were not collected. The samples were analyzed for total mercury, cyanide and volatile organic compounds. There was no historical sediment data for the NPDES outfalls to which the evaluation sampling results could be compared. No surface soil or sediment clean up criteria were defined in the RODs for the site. Sampling data were compared to residential risk-risk based screening levels.

The volatile organic compounds toluene and acetone were detected in samples from location SL02. Low levels of total mercury were detected at location SL01. The detected level of total mercury (0.87 mg/kg) is below the screening level for residential soil, even if the mercury is assumed to be in the more toxic methylated form (6.1 mg/kg). There is no indication of an adverse impact due to a release from the Stauffer-LeMoyne Plant associated with Hurricane Katrina. Reported concentrations for this evaluation are all below available residential risk-based human health screening values.

7.5 Perdido Groundwater Contamination, Perdido, Alabama (NPL)

Two water samples, PG01 and PG02, were collected from the groundwater treatment system influent and effluent lines, respectively, at the Perdido Groundwater Contamination groundwater treatment system. Both samples were analyzed for volatile organic compounds. No volatile organic compounds were detected in either of the samples. The results were non-

detect for all analyzed constituents. The reported quantitation limits ("U" values) all appear to achieve the targeted contract-required quantitation limits (CRQLs).

There does not appear to be any significant detrimental change in concentrations of site-related chemicals at the sampled groundwater locations. No analytes were detected in the current groundwater samples collected from the site. There is no indication of an adverse impact on the groundwater treatment system at the Perdido Groundwater Contamination site. The treatment system is still functioning as designed.

7.6 Redwing Carriers (Saraland Apartments), Saraland, Alabama (NPL)

Two sediment samples were collected from ditches adjacent to the Redwing Carriers site. Because no water was present at the time of sampling, surface water samples, which were planned, were not collected at these locations. The samples were analyzed for extractable organic compounds, pesticides/PCBs and the herbicide Vernolate (Vernam™). The results were low or non-detect for the analyzed pesticides and herbicides. The reported concentrations are all less than human health risk-based residential soil screening levels.

The ROD defined polyaromatic hydrocarbons (PAHs) as the primary contaminants of concern. Seven different PAH compounds were detected. Sample concentrations were compared to the 94.9 mg/kg cleanup level for benzo-a-pyrene, the 540 mg/kg cleanup level for benzo-b-fluoranthene, and the 362 mg/kg cleanup level for crysene that were set for the site. None of the samples collected from the site contained concentrations of the contaminants of concern above the cleanup levels established for the site. Only one detection of benzo[a]pyrene (150 ug/kg) was above a 1E-6 cancer risk-based residential soil level, but it was less than the 1E-5 risk level (620 ug/kg). The other PAH detections, as well as the Dieldrin and DDE detections, were below the 1E-6 cancer risk-based residential soil level. Many of the data points for these contaminants are "J" flagged, indicating uncertainty in the reported concentration. This uncertainty, however, is common and accepted in reported site data.

There is no indication of an adverse impact due to Hurricane Katrina at the sampled sediment locations. Detections were reported for two pesticides (DDE at 2.3 ug/kg and Dieldrin at 4.1 ug/kg) and for several PAH compounds. All sediment evaluation data are below residential soil screening levels (PRGs) for the listed chemicals.

7.7 American Creosote Works, Louisville, Mississippi (NPL)

Surface water and sediment samples were collected at two locations, AC01 and AC02, and were analyzed for extractable organic compounds, including the PAH compounds comprising the site contaminants of concern (COC). Numerous extractable organic compounds, primarily the polynuclear aromatic hydrocarbons (PAHs), were detected in the two sediment samples.

Samples taken post-Katrina exceed levels of several PAH compounds detected in sampling conducted in March 2005, however surficial and shallow sediment contamination is known to be non-uniform and highly variable at the site, and it is highly likely that the recent sampling encountered a hot spot of contamination present prior to the hurricane. Ongoing

releases of contamination to sediment have been documented and appear to fluctuate with seasonal rainfall events. Based on the site history and the RPM's direct observations, the contamination observed and documented by this evaluation is known to have been pre-existing and of similar magnitude and does not appear to be a direct result of a release due to Hurricane Katrina. However, there is uncertainty regarding whether there is a true impact or not due to the variability of sediment contamination.

Reported concentrations of COCs exceeded the Region 9 PRGs for the 1E-06 cancer risk for the residential exposure scenario. Benzo(a)anthracene (83,000 ug/kg) was above a 1E-4 cancer risk-based residential soil level (62000 ug/kg). Benzo(a)pyrene (34000 ug/kg) was above a 1E-4 cancer risk-based residential soil level (6200 ug/kg). Benzo(b)fluoranthene (36,000 ug/kg) exceeded the 1E-06 level (620 ug/kg) but did not exceed the 1E-04 level (62,000 ug/kg). Benzo(k)fluoranthene (33,000 ug/kg) was above the 1E-06 level (6,200 ug/kg) but below the 1E-05 risk level (62,000 ug/kg). Dibenz(a,h)anthracene (5,900 ug/kg) exceeded the 1E-06 risk level (62 ug/kg) but was below the 1E-04 risk level (6,200 ug/kg). Indeno(1,2,3-cd)pyrene (15,000 ug/kg) was above the 1E-06 risk level (620 ug/kg) but below the 1E-04 risk level (62,000 ug/kg).

It is important to note that sediments have been sampled previously during earlier site characterizations and were known to be adversely impacted by the site prior to Hurricane Katrina. Sediment contamination is being addressed in ongoing remedial actions at the site. Additionally, EPA Region 4 normally considers long-term human exposure to sediments that are under water, as are the sediments sampled for this evaluation, to be minimal due to infrequent opportunities for contact of significant duration. Five site-related PAH compounds were also detected in the surface water samples, but all detections were less than 10 ug/l and below national recommended water quality criteria.

7.8 Sonford Products, Flowood, Mississippi (Non-NPL)

Sediment samples were collected at three locations, SP01, SP02 and SP03. Sediment samples were analyzed for metals, extractable organic compounds, pesticide/PCBs and dioxins Site-specific COCs, from previous site evaluations, are pesticides, including PCP, lindane, DDT, dioxins/furans, and possibly lead and arsenic.

Sampling data were evaluated against existing environmental sampling results and were compared to available risk-based human health screening values. Detections of lead in sediment samples were below residential screening values, however arsenic (1.4 mg/kg, 4.1 mg/kg, 2.9 mg/kg) exceeded the 1E-06 residential risk level, however 2 of the three samples were below the 1E-05 risk level (4 mg/kg) with one slightly exceeding this level but still well below the 1E-04 risk level (40 mg/kg) and within the risk range. Benzo(a)pyrene (240 ug/kg) was above the 1E-06 risk level but below the 1E-05 risk level (620 ug/kg).

The dioxin/furan analyses for these three sediment samples reported Toxicity Equivalent (TEQ) levels of 0.65 ug/kg (SP01SD), 6.0 ug/kg (SP02SD), and 1.9 ug/kg (SP03SD). These post-hurricane levels are well within the range of reported TEQ levels from pre-hurricane (April 2005) sediment/soil samples from this site (range of 0.004 – 77.0 ug/kg). All are well below EPA's residential clean up criteria for dioxin of 1000 ug/kg.

The results were low or non-detect for the site COCs (pesticides). The results from analyses of the samples were all non-detect ("U") for pentachlorophenol (PCP); however, the U values (1200U, 2600U, 1200U ug/kg) appear to be somewhat elevated. This casts some doubt as to whether PCP may have been present in the samples at some level. Even if the PCP were hypothetically present at levels close to the U values (1200-2600 ug/kg), however, the site levels still would not be judged as significantly elevated relative to those levels reported from samples collected prior to hurricane Katrina or relative to risk-based levels (the residential soil screening PRG [1E-6 risk] for PCP is 3000 ug/kg). Many of the data points for these contaminants are "J" flagged, indicating uncertainty in the reported concentration. This uncertainty, however, is common and accepted in reported site data.

There does not appear to be any significant detrimental change in concentrations of site-related chemicals at the sampled locations. Analytical results for pentachlorophenol (PCP) in the current samples were all non-detect ("U").

7.9 Davis Timber, Hattiesburg, Mississippi (NPL)

Sediment samples were collected at two locations, DT01 and DT02, Because of dry conditions, surface water samples, which were planned, were not collected at these locations. Sediment samples were analyzed for dioxins and extractable organic compounds; site contaminants of concern (COCs) are dioxin and pentachlorophenol. The evaluation data were compared against previous site data and to risk-based values.

Many of the data points for these contaminants are "J" flagged, indicating uncertainty in the concentration. This uncertainty, however, is common in reported site data. There are no apparent site specific data uncertainties that cast significant doubt on the results or on the conclusions herein.

Reported concentrations of dioxins/furans and pentachlorophenol (PCP) are comparable to (or less than) reported levels from samples taken in 2004. Levels of 2,3,7,8-TCDD (8.6 E-05 mg/kg) exceeded the 1E-06 risk level (4E-06 mg/kg) but were below the 1E-4 risk level (4E-04 mg/kg) and EPA's residential clean up criteria of 1000 ug/kg. All other detected analytes are below residential soil screening levels at the 1E-06 risk level. There does not appear to be any significant detrimental change in concentrations of site-related chemicals at the sampled locations.

7.10 Chemfax, Inc., Gulfport, Mississippi (Non-NPL)

Four sediment samples were collected across four transects of the Bernard Bayou at locations likely to have been impacted by a release from the Chemfax, Inc. site. Acetophenone was the only extractable organic compound detected and was reported at a concentration of 96 ug/kg in one sample from location CF04SD. This concentration is well below residential PRG soil screening values. Acetone was the only volatile organic compound identified in the four samples and was present at concentrations less than 20 ug/kg. Acetone is a common laboratory contaminant and it is possible this detection resulted from the analysis. Detected concentrations were below residential PRGs.

There is no indication of an adverse impact due to a release from the Chemfax, Inc. site associated with Hurricane Katrina. Reported concentrations are all below available risk-based soil screening levels for these analytes.

7.11 Picayune Wood Treating, Picayune, Mississippi (NPL)

Sediment samples were collected at three locations, PW01, PW02 and PW03. In addition, a surface water sample was also collected at location PW02. All samples were analyzed for extractable organic compounds. Samples were collected from locations that were likely to have been impacted by a potential release, if it were to have occurred. Generally low levels of PAH compounds, the site-related COCs, were detected in the sediment samples collected at the site.

Since no ROD-derived clean up values were available, evaluation data was compared against established residential soil screening values. Benzo(a)pyrene (660 ug/kg) exceeded the 1E-06 risk level (62 ug/kg) but did not exceed the 1E-05 risk level (620 ug/kg). None of the other COCs exceeded established risk-based human health screening values (PRGs). No extractable organic compounds were detected in the surface water sample collected for the evaluation.

Based on this evaluation, there does not appear to be any indication of any adverse impact due to a release from the site associated with Hurricane Katrina. Reported concentrations for sediment and surface water were either below or within established risk-based soil/sediment screening levels for detected analytes.

8.0 REFERENCES

1. Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA).

2. U.S. EPA, EPAQA/G-4, Guidance for the Data Quality Objectives Process, EPA/600/R-96/055, August 2000.

3. U.S. EPA, EPAQA/G-5, EPA Guidance for Quality Assurance Project Plans, EPA/600/R-98/018, February 1998.

4. U.S. EPA, Region 4, Analytical Support Branch Operations and Quality Control Manual Revision 1, (ASBLOQAM). November 2004.

5. U.S. EPA, Region 4, Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM). November 2001. (http://www.epa.gov/region4/sesd/sesdpub_guidance.html).

6. USEPA Contract laboratory Program Statement of Work For Inorganic Analysis, ILM05.3 March 2004. http://www.epa.gov/superfund/programs/clp/inorg.htm

7. USEPA Contract laboratory Program Statement of Work For Inorganic Analysis, OLM04.2, May, 1999. http://www.epa.gov/superfund/programs/clp/organic.htm

Appendix A
Figures

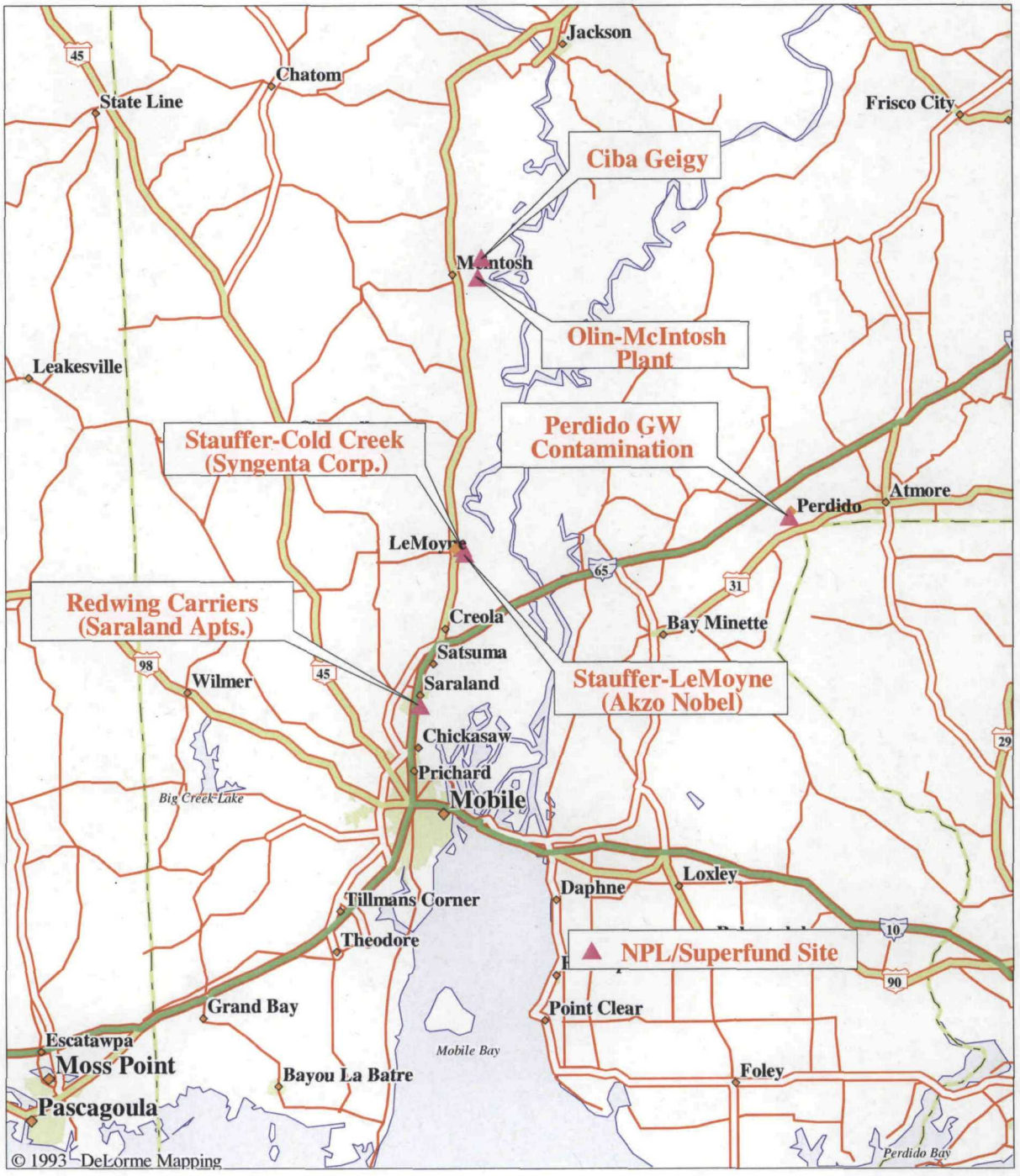


Figure 1
NPL Locations, Alabama
Post-Katrina Site Evaluations

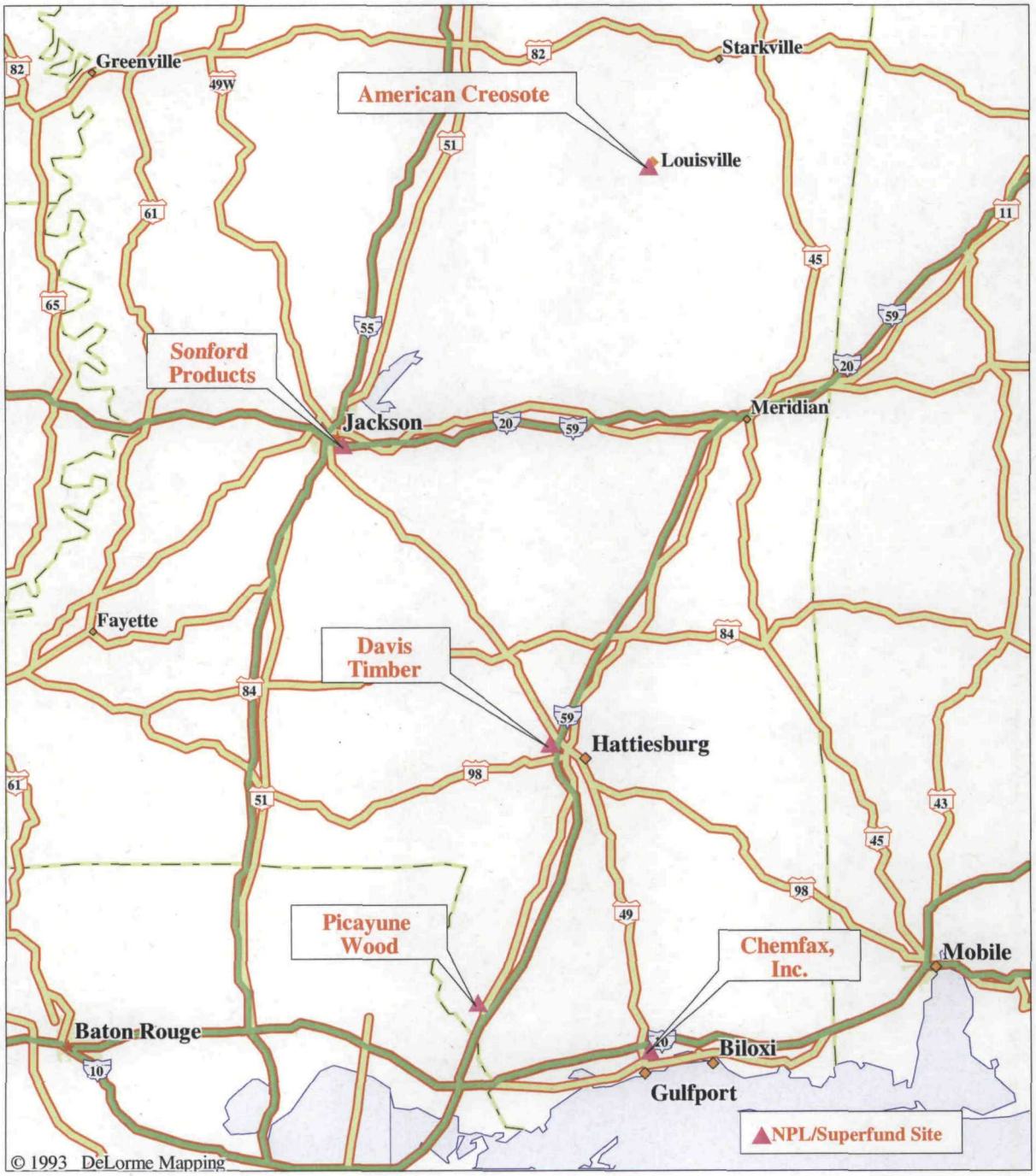


Figure 2
NPL Locations, Mississippi
Post-Katrina Site Evaluations

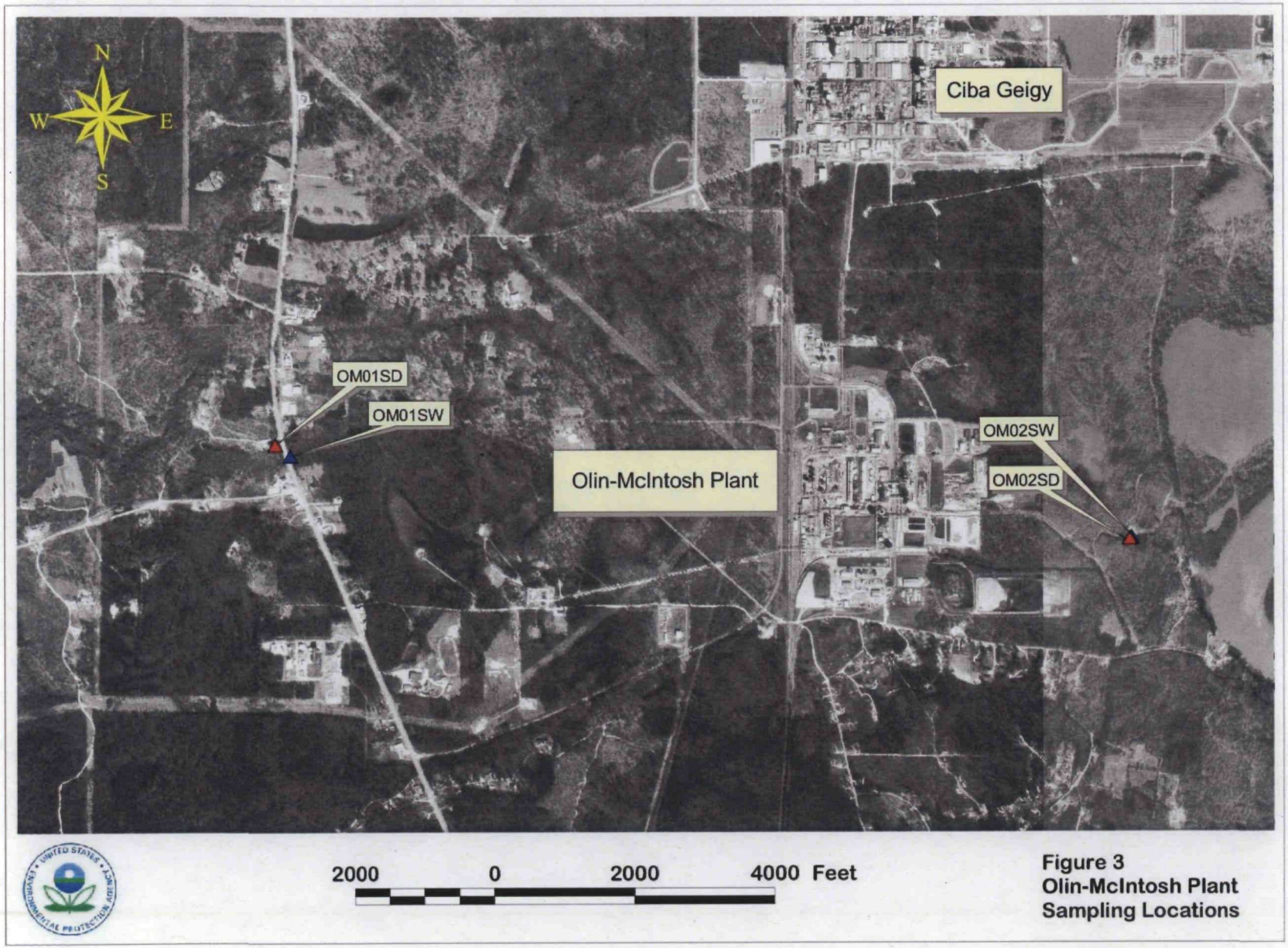


Figure 3
Olin-McIntosh Plant
Sampling Locations

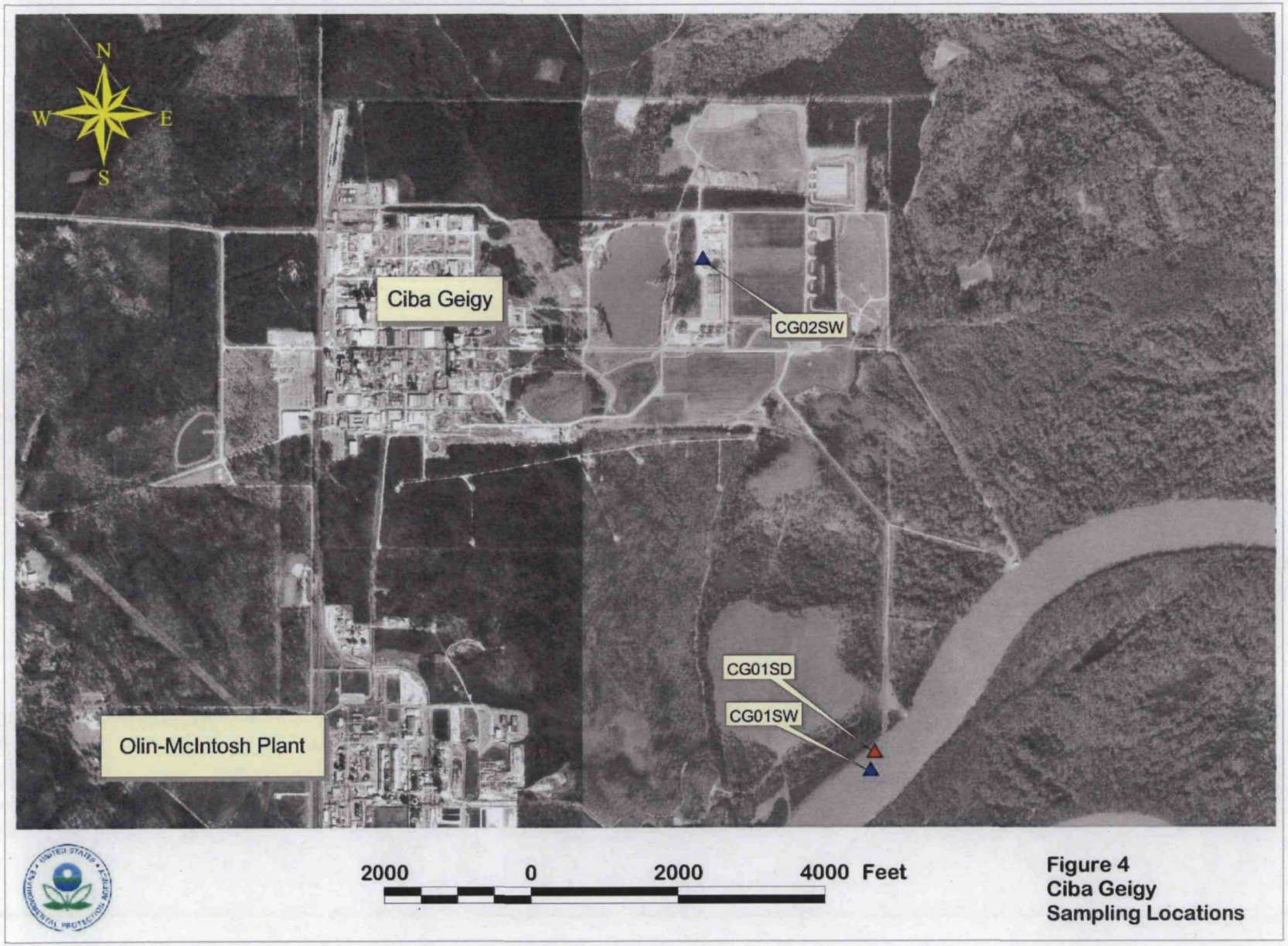


Figure 4
Ciba Geigy
Sampling Locations

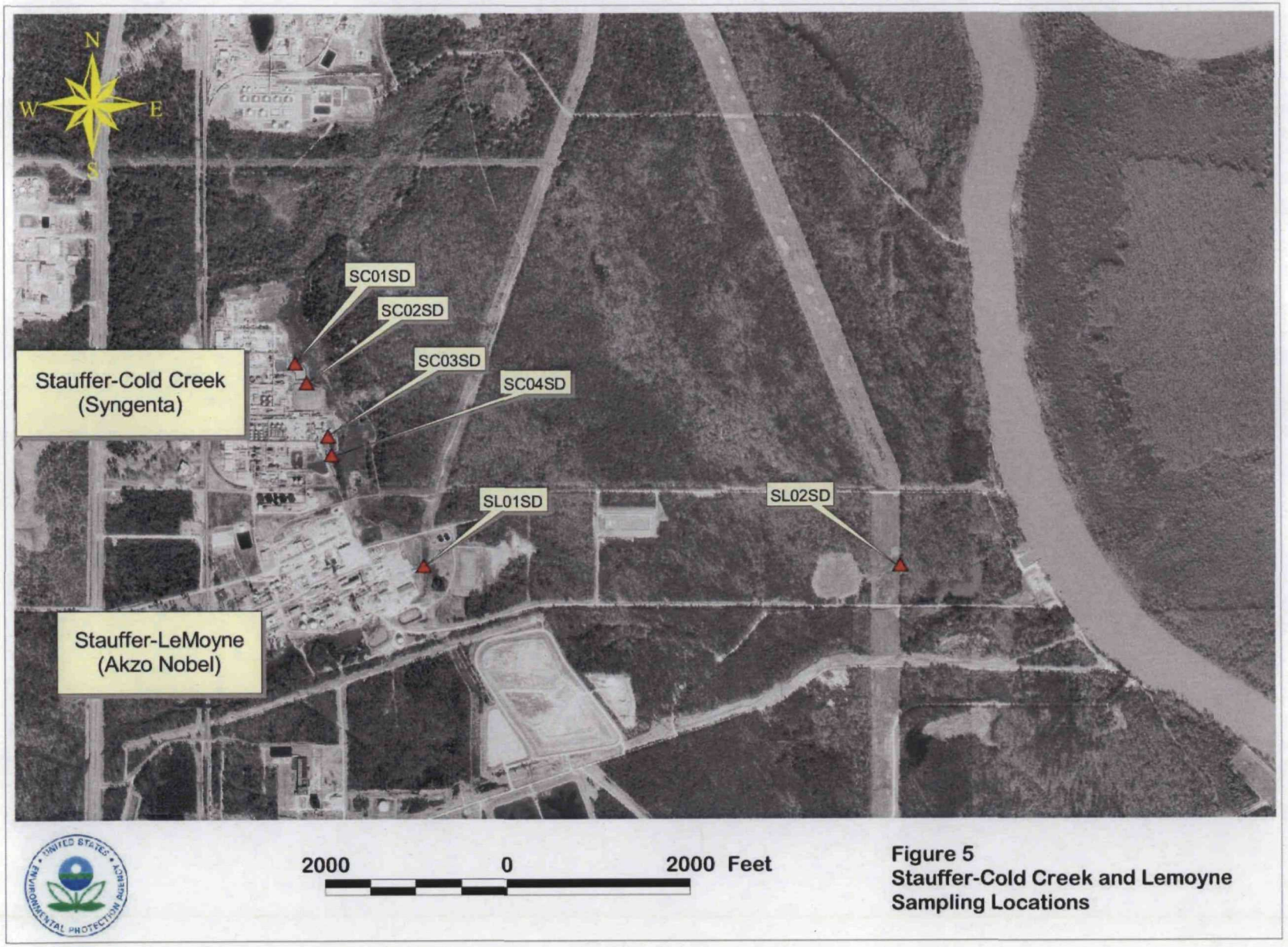


Figure 5
Stauffer-Cold Creek and Lemoyne Sampling Locations

Figure 6
Perdido Groundwater Contamination Sampling Locations

Figure 7
Redwing Carriers
Sampling Locations

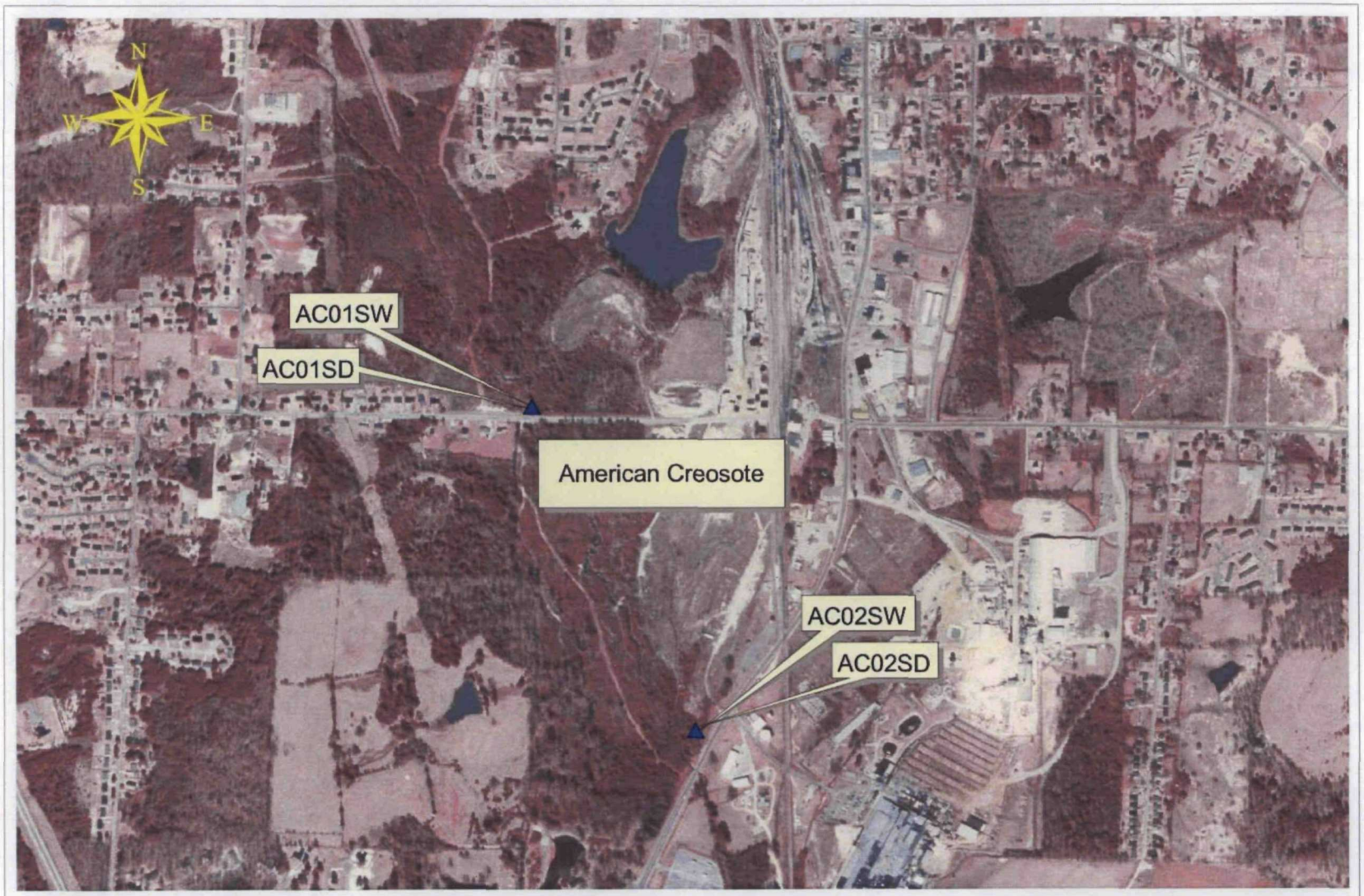


Figure 8
American Creosote Works, Inc.
Sampling Locations

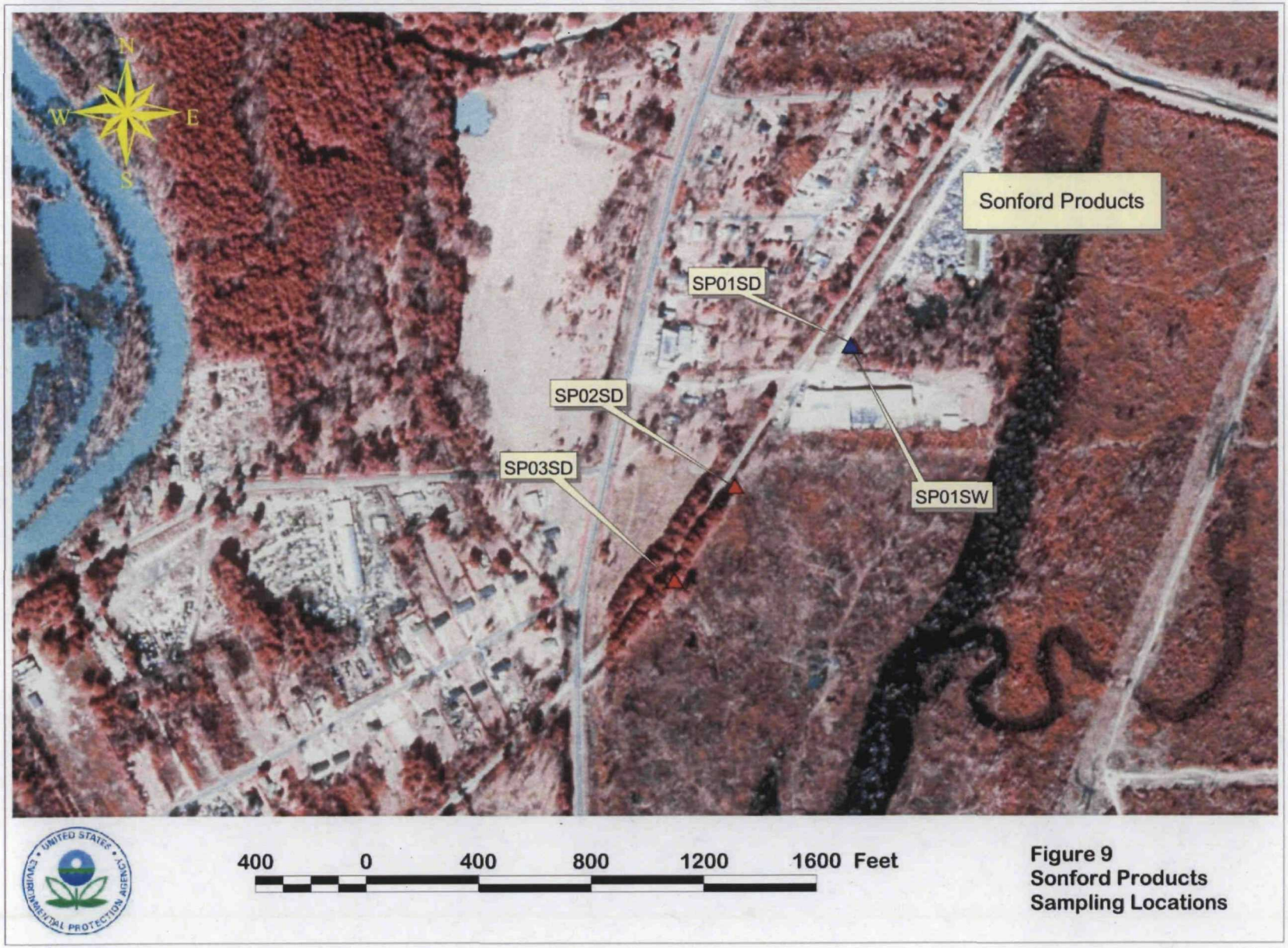


Figure 9
Sonford Products
Sampling Locations

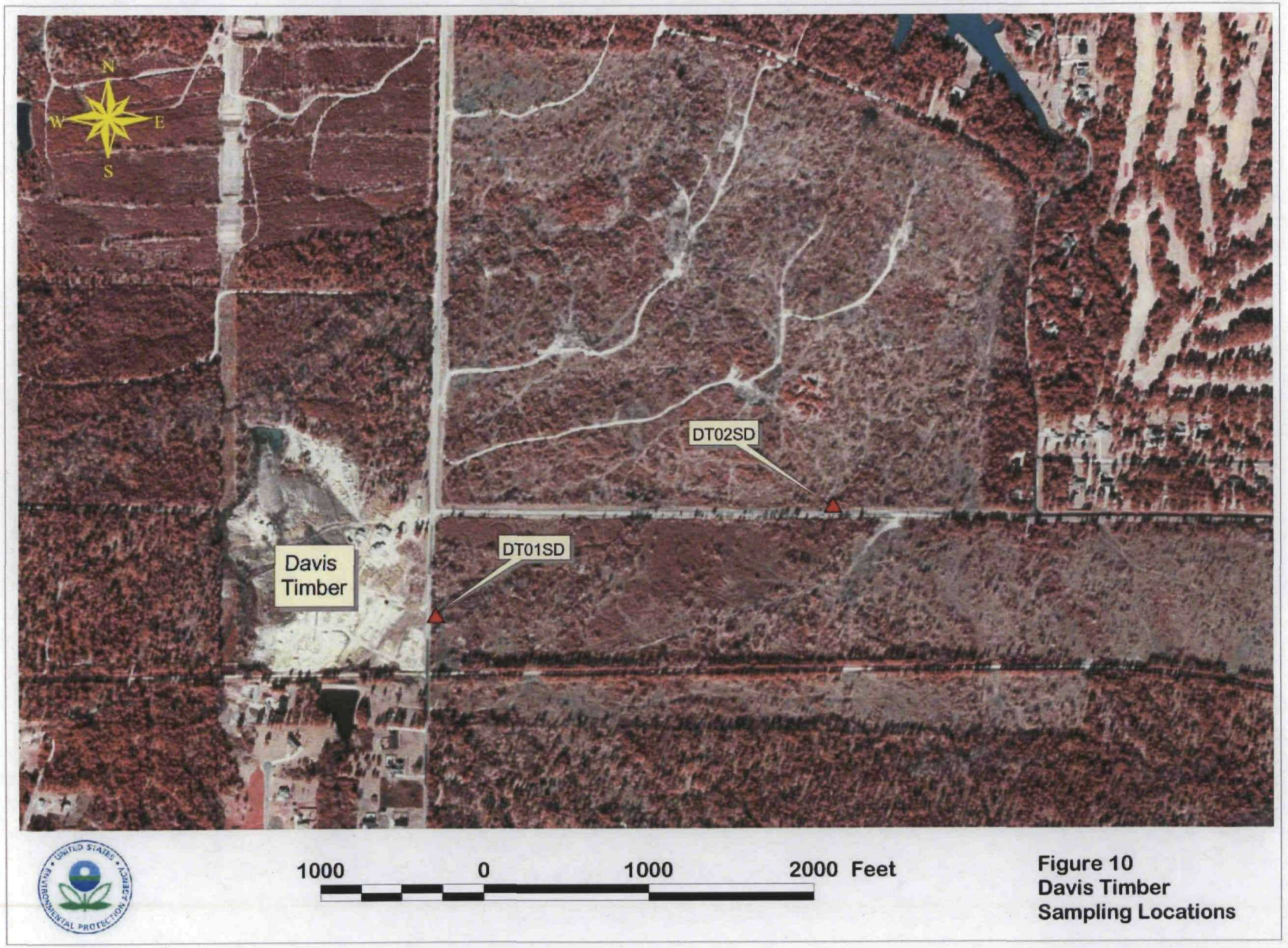


Figure 10
Davis Timber
Sampling Locations

Figure 11
Chemfax, Inc.
Sampling Locations

Figure 12
Picayune Wood Treating
Sampling Locations

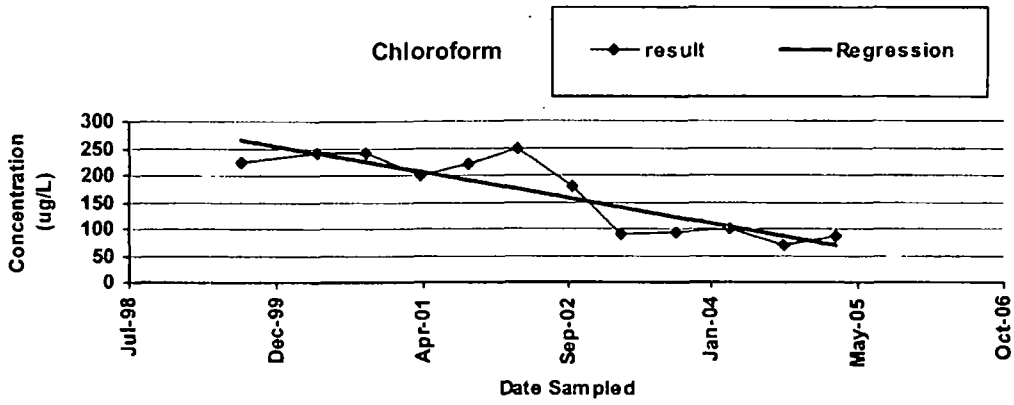
Appendix B
Complete Data

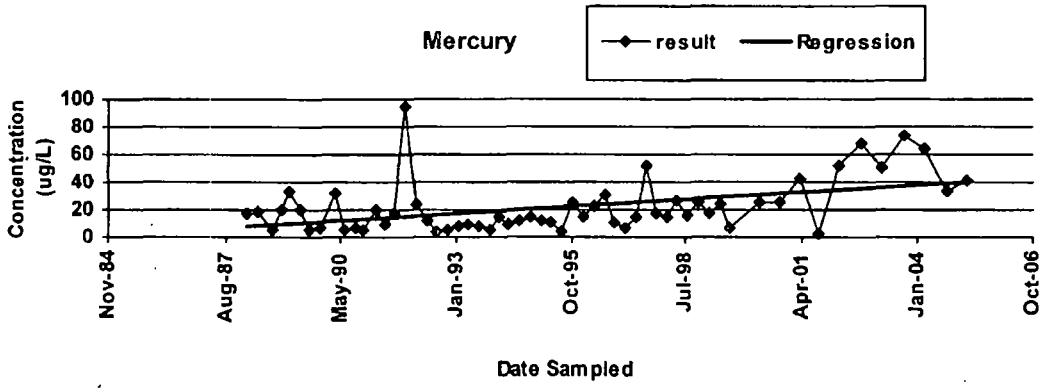
To see Data Sheets go to:

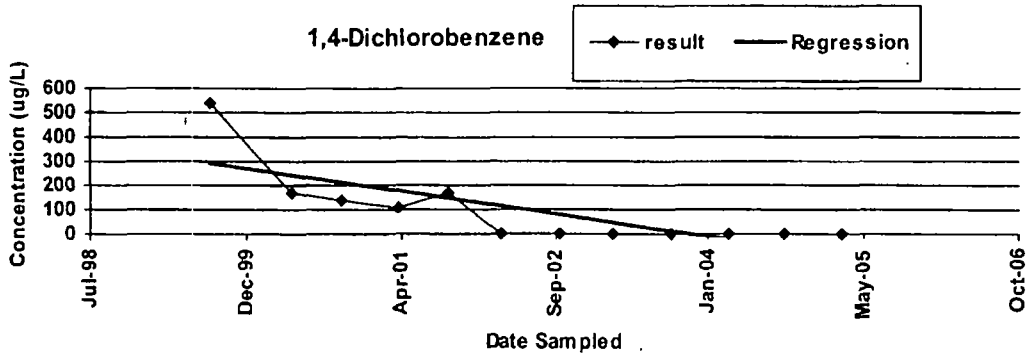
http://www.epa.gov/region4/sesd/reports/2006-0139.html

ATTACHMENT 5: POC and CAE Well Graphs

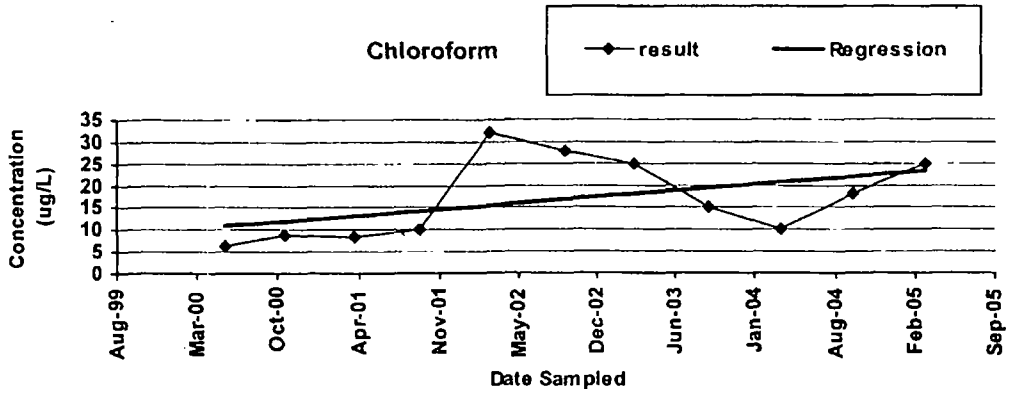
Constituent Concentration Versus Time for BR10

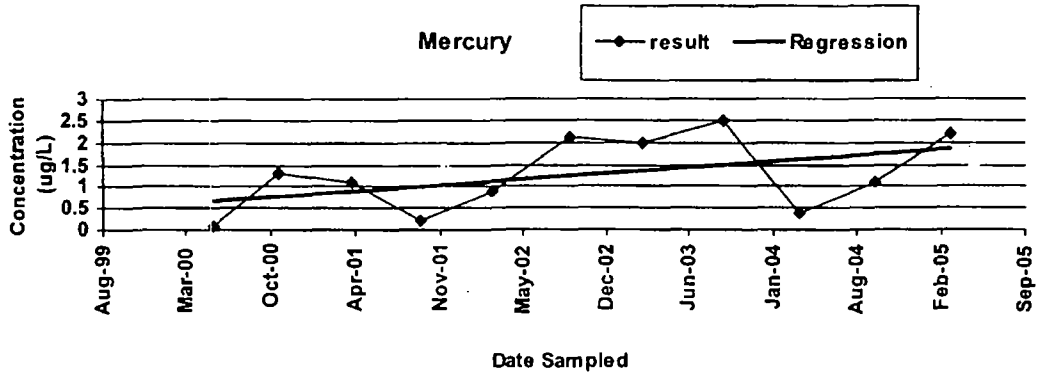


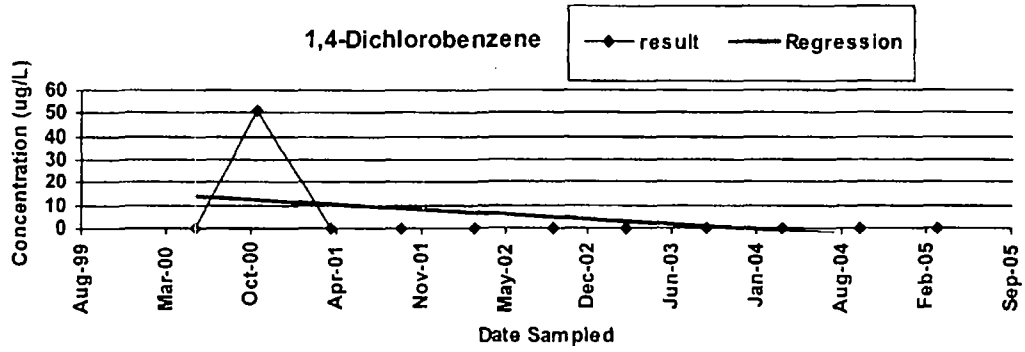




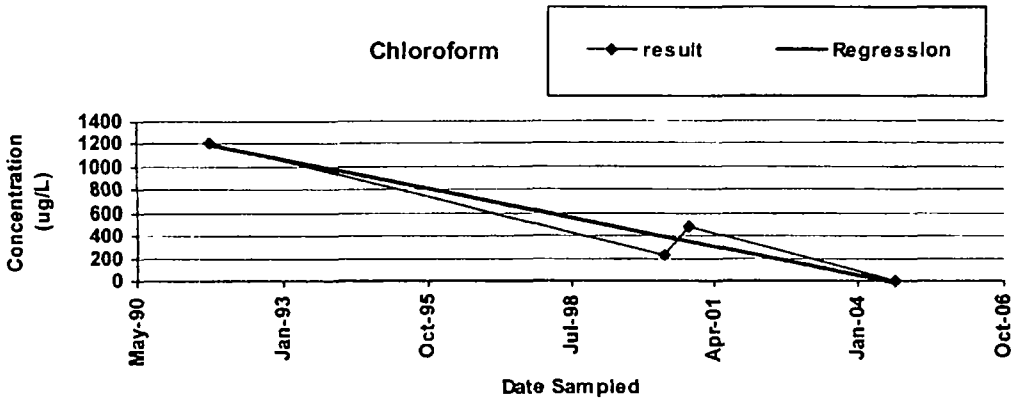
Constituent Concentration Versus Time for BR4R

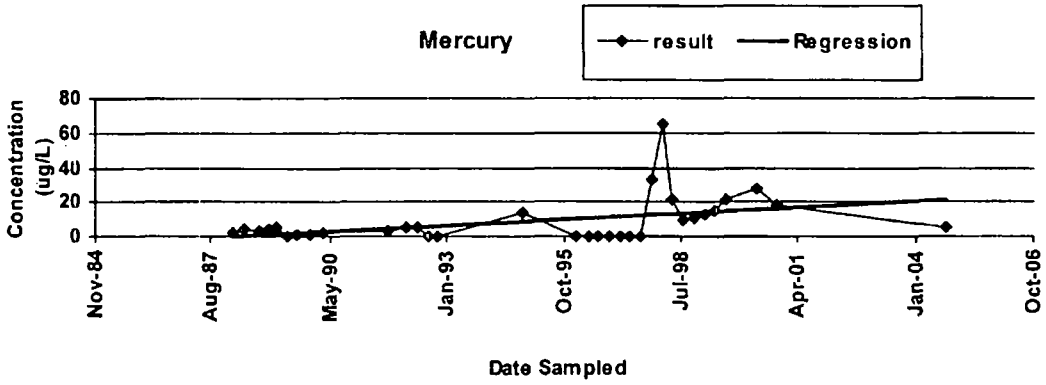


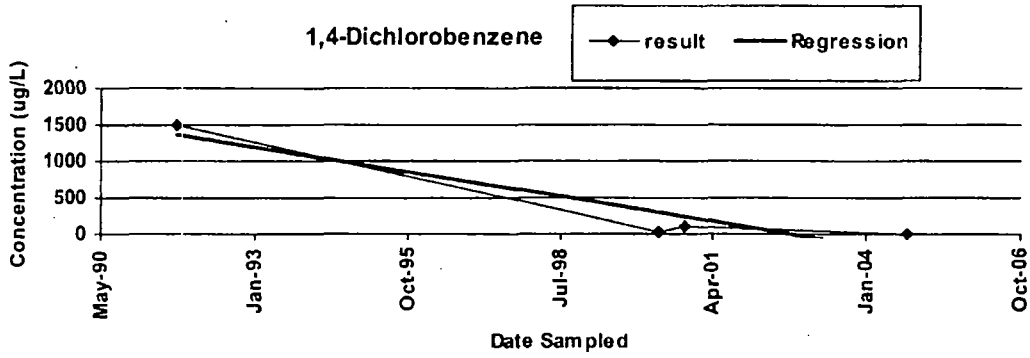




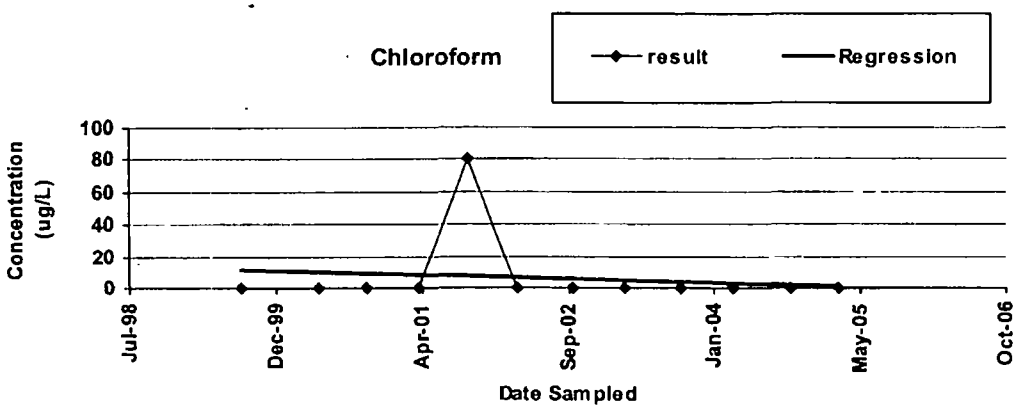
Constituent Concentration Versus Time for BR7

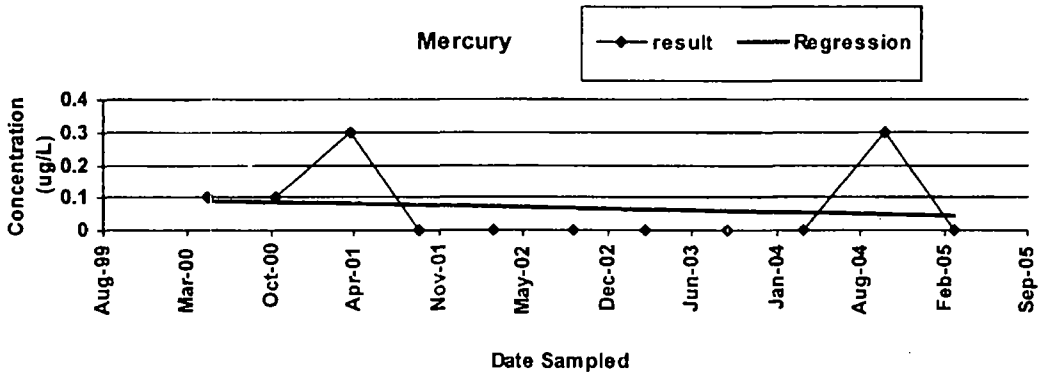


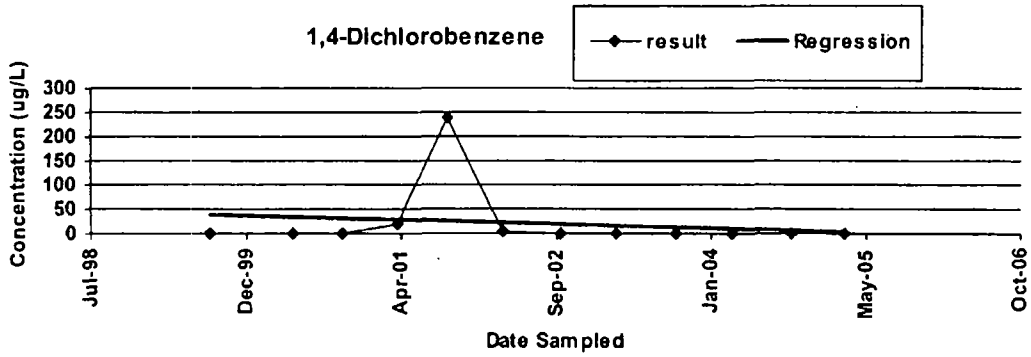




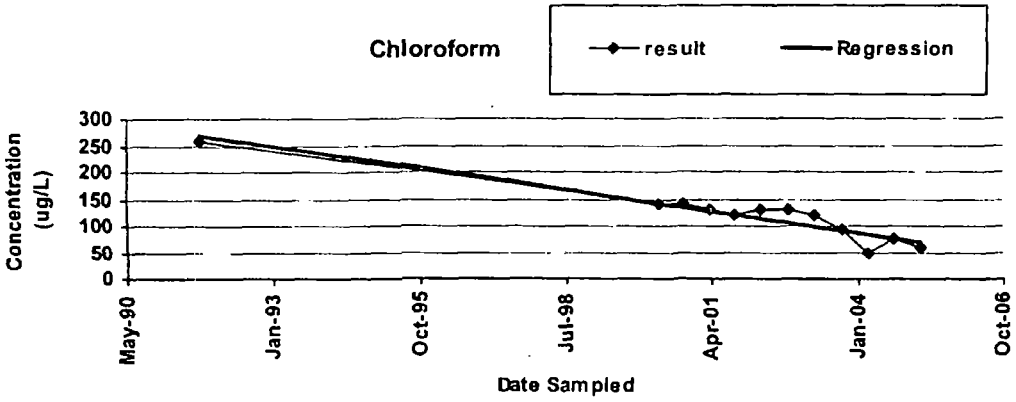
Constituent Concentration Versus Time for DH2

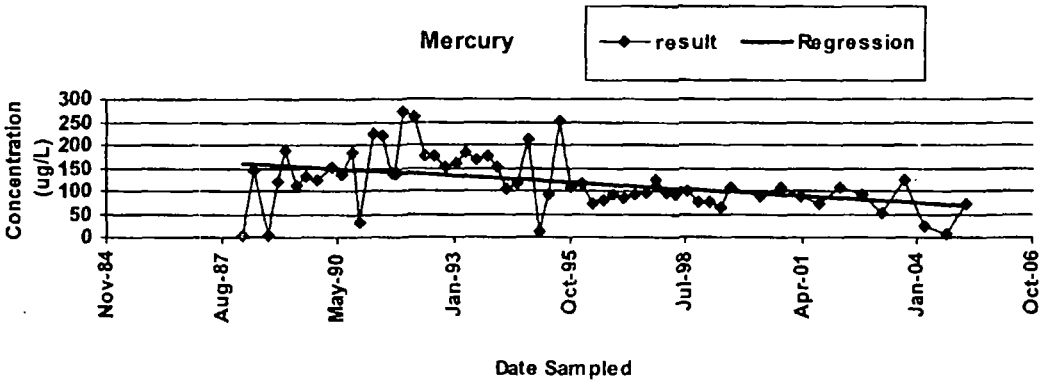


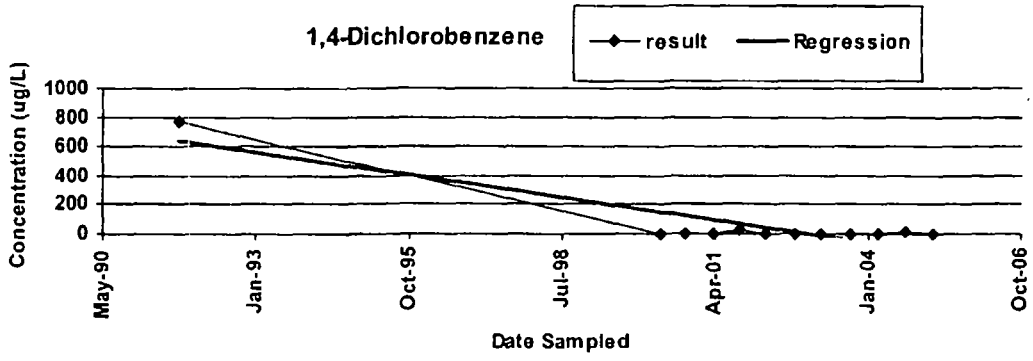




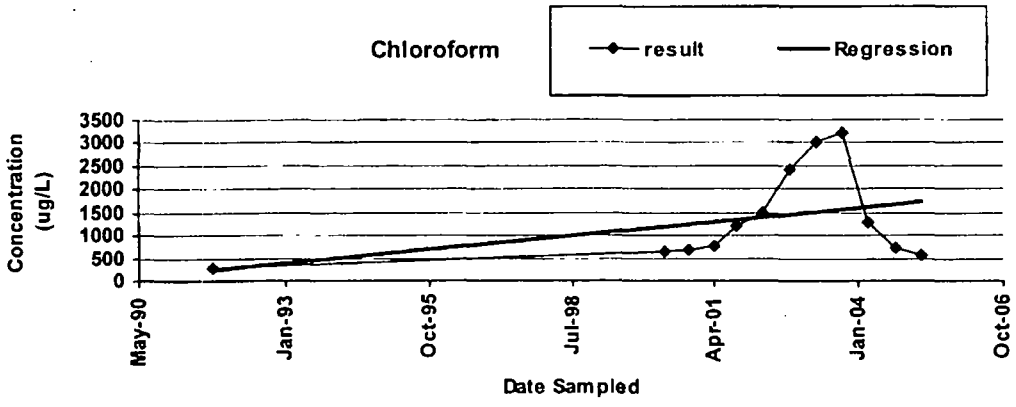
Constituent Concentration Versus Time for BR7D

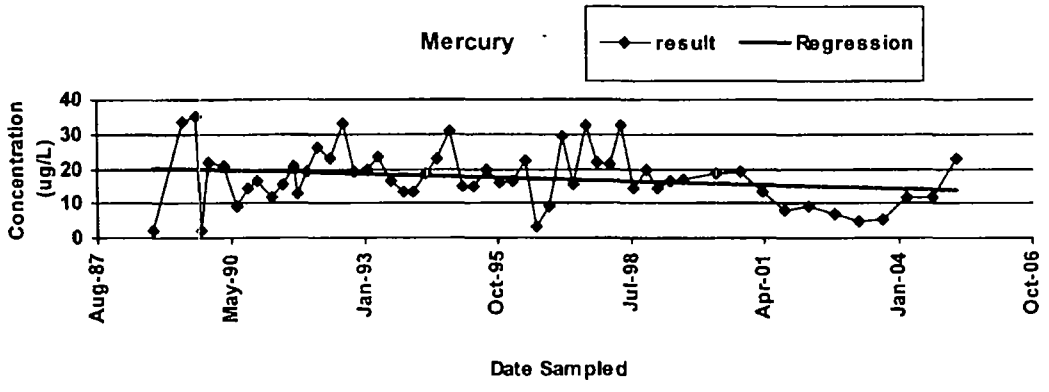


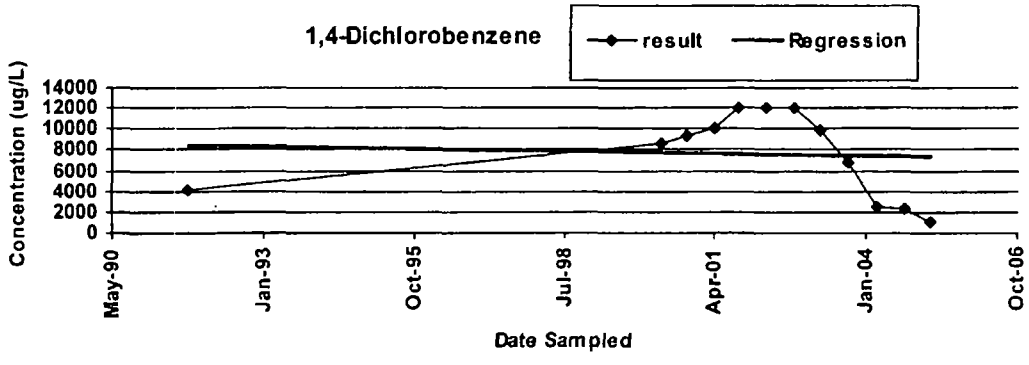




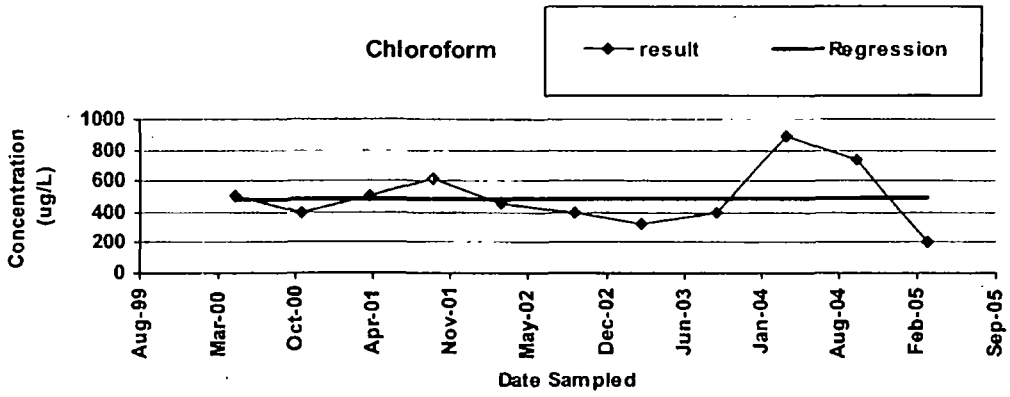
Constituent Concentration Versus Time for BR8

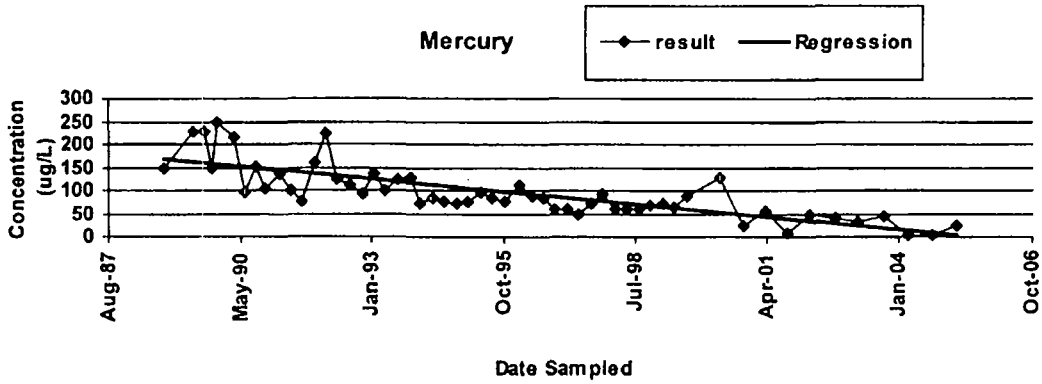


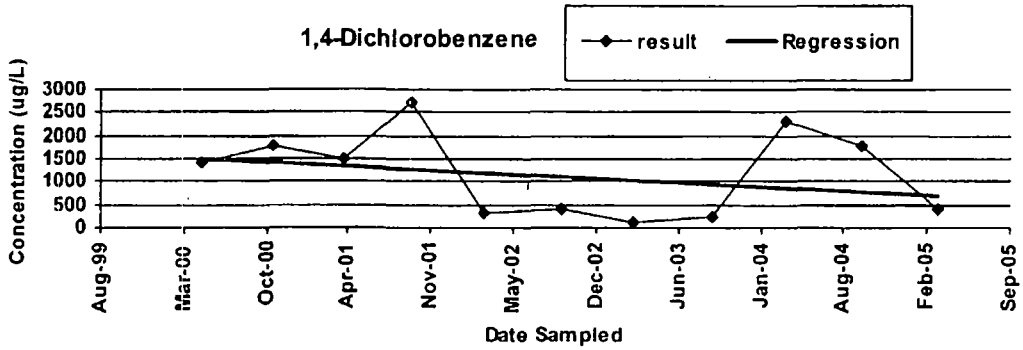




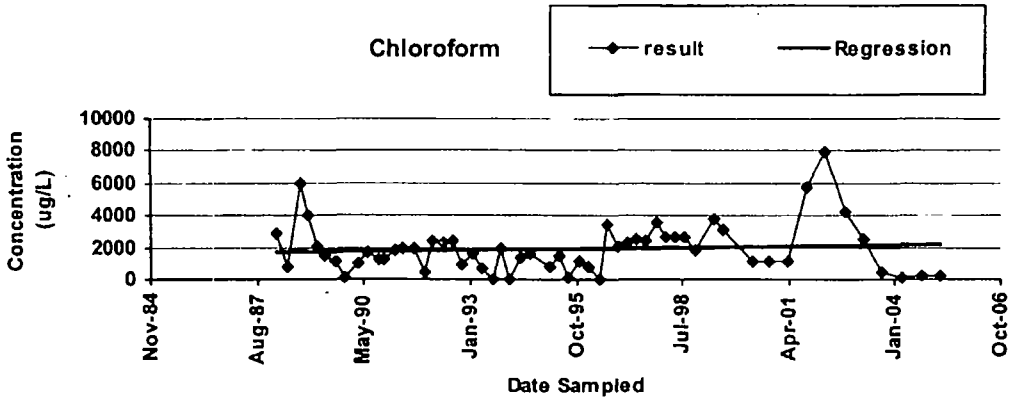
Constituent Concentration Versus Time for BR8D

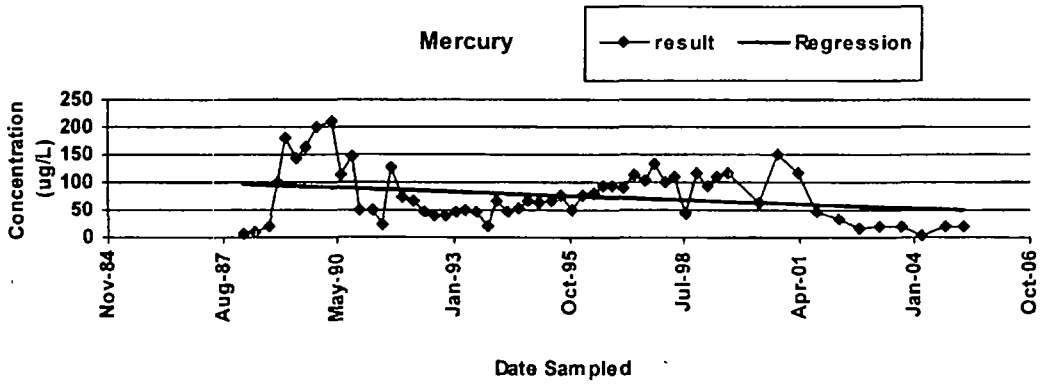


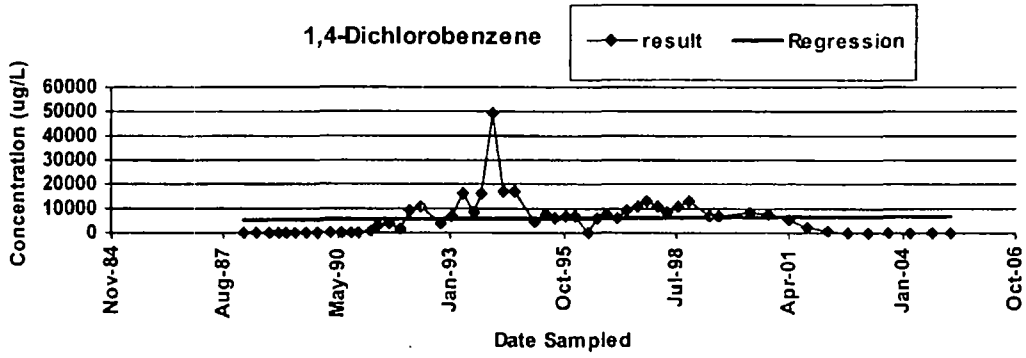




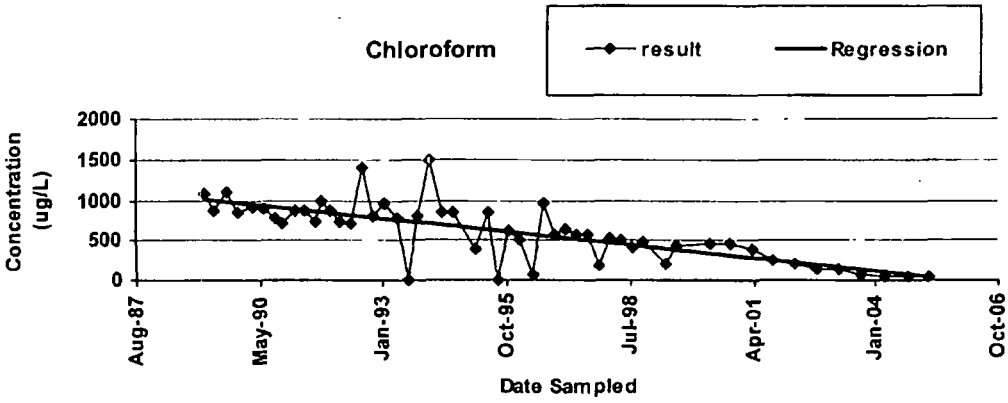
Constituent Concentration Versus Time for E6

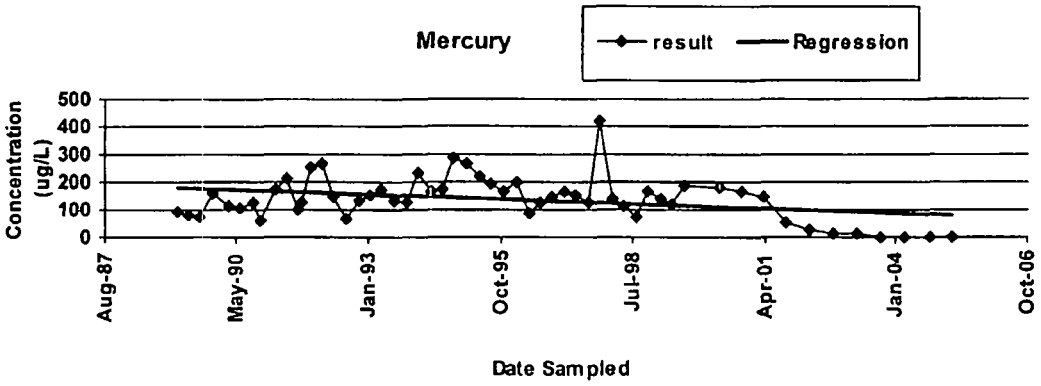


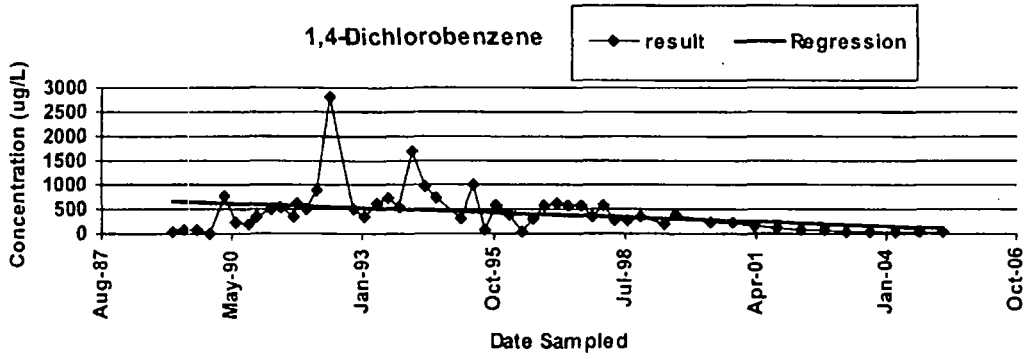




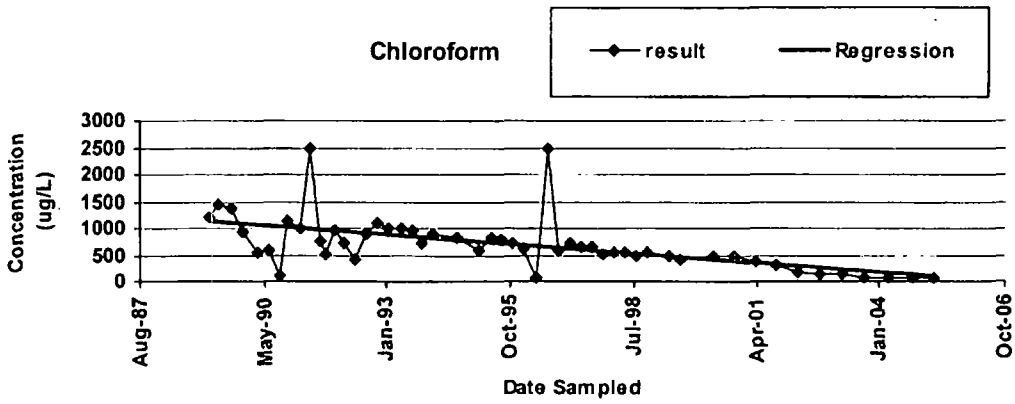
Constituent Concentration Versus Time for MP14

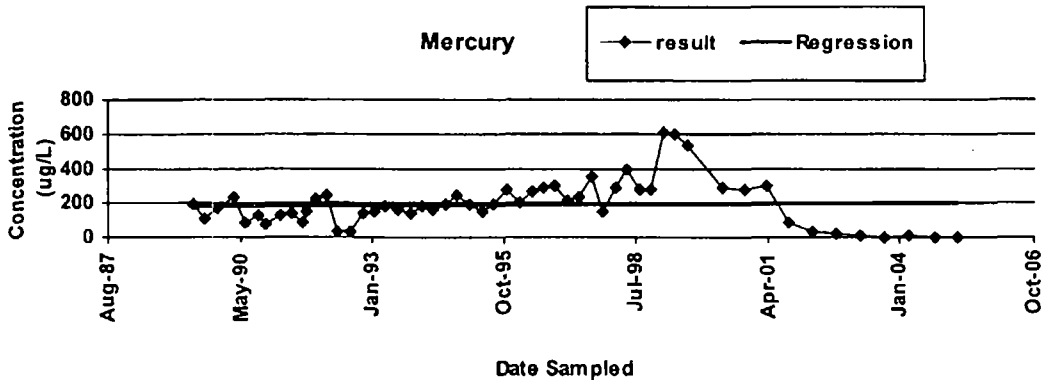


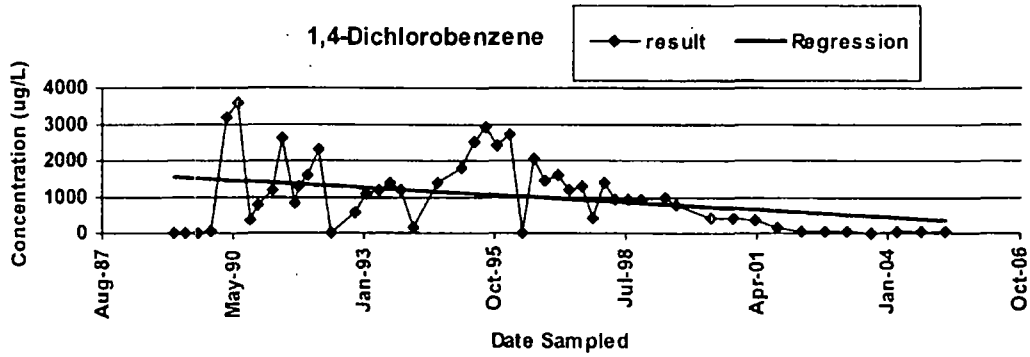




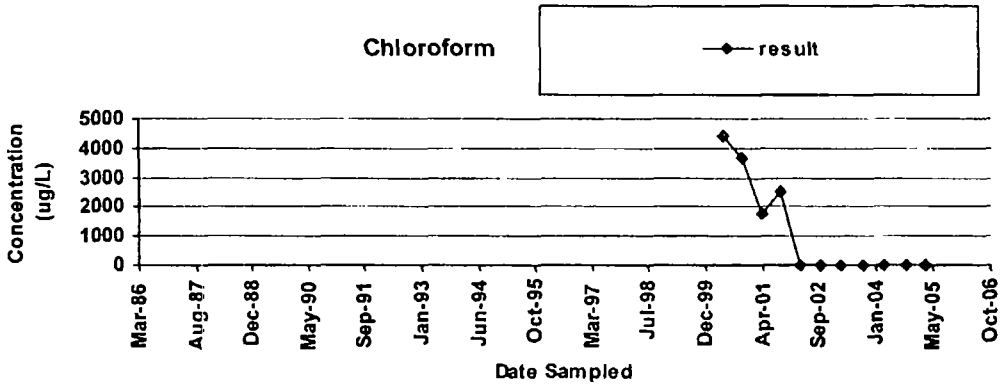
Constituent Concentration Versus Time for MP15

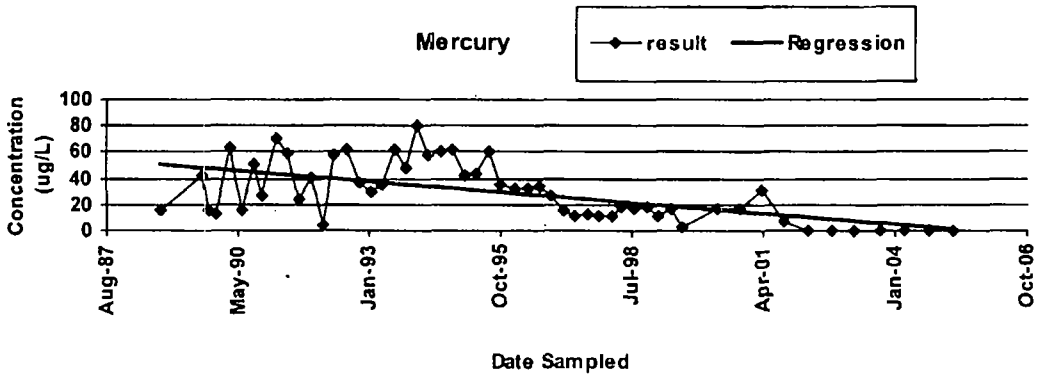


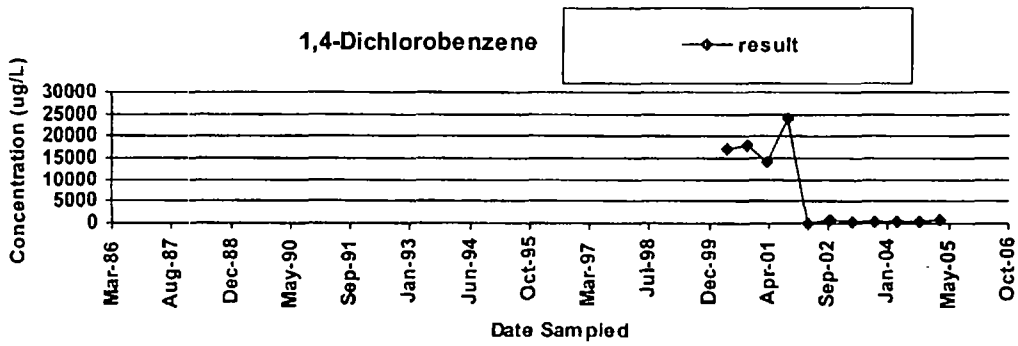




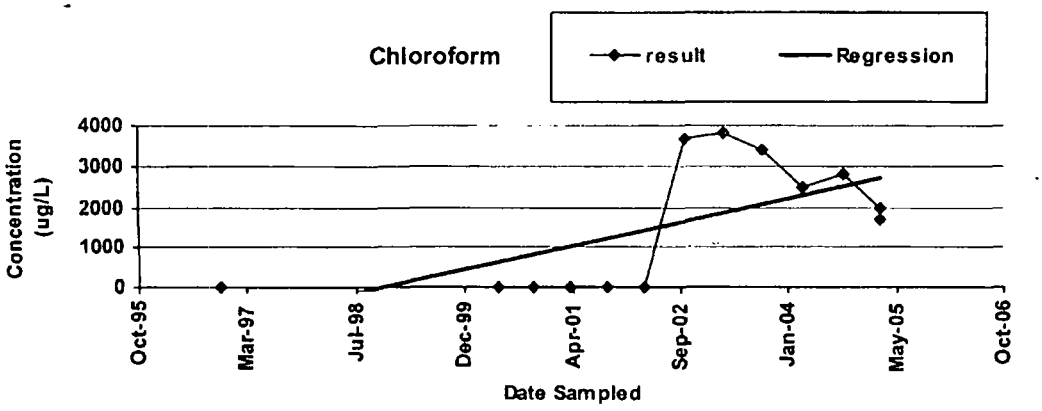
Constituent Concentration Versus Time for MP8

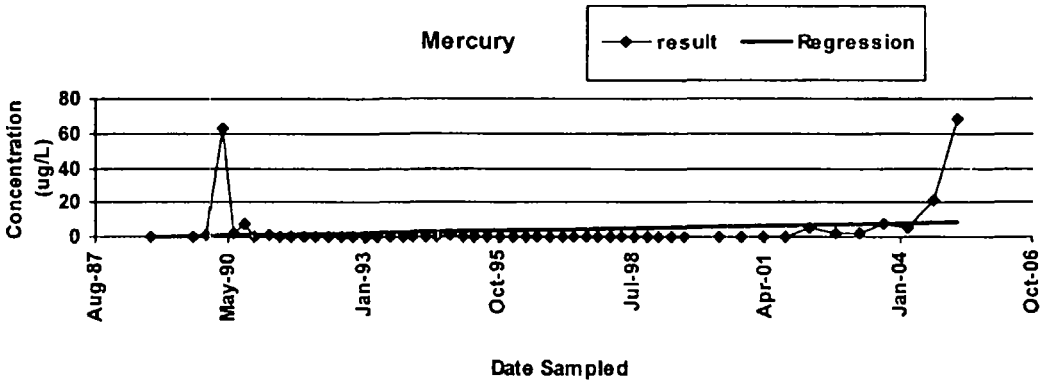


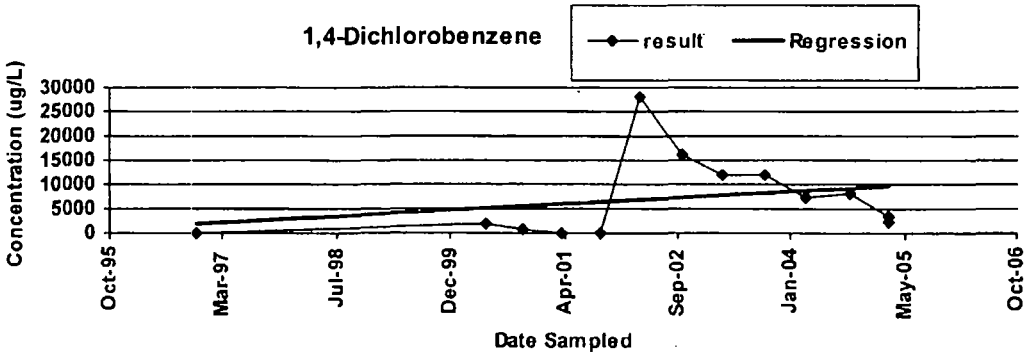




Constituent Concentration Versus Time for MP9







ATTACHMENT 6: List of Documents Reviewed

1. Remedial Investigation Report (RI Report), McIntosh Plant Site Olin Corporation McIntosh, Alabama, July 1993.

2. EPA Superfund Record of Decision, Olin Corp. (McIntosh Plant), McIntosh, Alabama, EPA/ROD/R04-95/216, 1995.

3. Semiannual Effectiveness Report (SER) First Semiannual Reporting Period 2005, Olin Corporation McIntosh, Alabama, May 2005.

ATTACHMENT 7: Photographs

A Selection From Photographs Taken During The
Olin Corporation (McIntosh Plant) NPL Site
Hurricane Katrina Impact Assessment

CPC Landfill Cap

Closed Lime Ponds

Well Sand Residue Area

CA6 Withdrawal Well