PART 1
Revised Remedial Investigation Addendum and Enhanced Sedimentation Pilot Project Annual Report, Year Two Results

Operable Unit 2, McIntosh, Alabama

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ABBREVIATIONS AND ACRONYMS

Acronym	**Definition**
ADEM	Alabama Department of Environmental Management
Anchor QEA	Anchor QEA, LLC
AOC	Administrative Order of Consent
ASI	Aqua-Survey, Inc.
AUF	area use factor
AWQC	Ambient Water Quality Criterion
AVS/SEM	acid-volatile sulfide/simultaneously-extracted metals
BAF	bioaccumulation factor
Basin	Olin Basin
Battelle Marine	Battelle Marine Sciences Laboratory
BHC	Bachmann-Hoyer-Canfield
BW	body weight of receptor
°C	degree Celsius
$CaCO_3$	calcium carbonate
Cs	cesium
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	centimeter
cm^2	square centimeter
COC	constituent of concern
COPC	constituent of potential concern
CSF	cancer slope factor
CSM	Conceptual Site Model
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
Df	degrees of freedom
DDT	dichlorodiphenyltrichloroethane
DDTr	4,4'-isomers of DDD, DDE, and DDT
DDTR	2,4'- and 4,4'-isomers of DDD, DDE, and DDT

ABBREVIATIONS AND ACRONYMS (Continued)

DO	dissolved oxygen
DOC	dissolved organic carbon
dpm/g	disintegrations per minute per gram
DPT	direct push technology
DQO	Data Quality Objective
dw	dry weight
ED	exposure duration
EDD	estimated daily dose
EHI	Evans-Hamilton, Inc.
EPC	exposure point concentration
EPT	Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies)
ERA	Ecological Risk Assessment
ERAGS	Ecological Risk Assessment Guidance for Superfund
ER-L	Effects Range-Low
ER-M	Effects Range-Medium
ESPP	Enhanced Sedimentation Pilot Project
°F	degree Fahrenheit
g/cm^3	gram per cubic centimeter
g/d	gram per day
GI	gastrointestinal
GPS	global positioning system
HCB	hexachlorobenzene
HHRA	Human Health Risk Assessment
HI	hazard index
HQ	hazard quotient
In	inch
IRIS	Integrated Risk Information System
Kg	kilogram
L	liter

ABBREVIATIONS AND ACRONYMS (Continued)

L/hr	liter per day
LCS	Laboratory Control Sample
LMB	largemouth bass
LOAEL	lowest observed adverse effect level
LOEC	lowest observed effect concentration
LOED	lowest observed effects dose
m	meter
m^2	square meter
mg	milligram
MACTEC	MACTEC Engineering and Consulting, Inc.
µg/kg	microgram per kilogram
µg/L	microgram per liter
µm	micrometer
µmole/g	micromole per gram
mph	mile per hour
mg/kg	milligram per kilogram
mg/L	milligram per liter
mL	milliliter
MS	matrix spike
MSD	matrix spike duplicate
mS/cm	milliSiemen per centimeter
mV	millivolt
N	number of samples
NA	not analyzed
NAD83	North American Datum 1983
NAVD88	North American Vertical Datum 1988
Neptune	Neptune & Company
NFIR	normalized food ingestion rate
NOAEL	no observed adverse effect level
NOEC	no observed effects concentration
NOED	no observed effects dose
NPDES	National Pollutant Discharge Elimination System

ABBREVIATIONS AND ACRONYMS (Continued)

NPL	National Priority List
NSR	net sedimentation rate
NTU	nephelometric turbidity unit
NWS	National Weather Service
O&M	Operation and Maintenance
Olin	Olin Corporation
ORD	Office of Research and Development
ORP	oxidation-reduction potential
OU-1	Operable Unit 1
OU-2	Operable Unit 2
Pace	Pace Analytical Laboratories, Inc. in St. Rose, Louisiana
Pace Green Bay	Pace Analytical Laboratories, Inc. in Green Bay, Wisconsin
Pb	lead
PEC	probable effects concentration
PRG	Preliminary Remediation Goal
Pro-Diving	Pro-Diving Services, Inc.
PVC	polyvinyl chloride
Q_1	Upper Clay Unit at the Alluvial Sediment
Q_2	Alluvial Aquifer system of the Quaternary Alluvial Sediment
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
R	Riverine deposits
R^2	correlation coefficient
RAGS	Risk Assessment Guidance for Superfund
RCRA	Resource Conservation and Recovery Act
RfD	reference dose
RGO	remedial goal option
RI/FS	Remedial Investigation/Feasibility Study
river	Tombigbee River
RME	reasonable maximum exposure

ABBREVIATIONS AND ACRONYMS (Continued)

RPM	remedial project manager
RSL	regional screening level
SD	standard deviation
SDG	sample data group
SERAFM	Spreadsheet-Based Ecological Risk Assessment for the Fate of Mercury
site	Olin McIntosh Plant
SPLP	synthetic precipitation leaching procedure
SRB	sulfate-reducing bacteria
TDS	total dissolved solids
TEC	threshold effects concentration
TestAmerica Mobile	TestAmerica Laboratories, Inc. in Mobile, Alabama
TL	total length
Tm_1	Miocene Confining Unit
TOC	total organic carbon
TRV	toxicity reference values
TSS	total suspended solids
UCL	upper confidence limit
UF	uncertainty factor
URS	URS Corporation
USGS	U.S. Geological Survey
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WCC	Woodward-Clyde Consultants
WEFH	Wildlife Exposure Factors Handbook
wind trap	resuspension study traps
work plan	ESPP Baseline and Evaluation Sampling Work Plan

1.0 INTRODUCTION

Olin Corporation (Olin) is preparing Remedial Investigation/Feasibility Study (RI/FS) Reports for its McIntosh, Washington County, Alabama Plant Site (site) under the oversight of the U.S. Environmental Protection Agency (USEPA). The site is an active chemical production facility, located approximately 1 mile east-southeast of the town of McIntosh, Alabama (Figure 1-1). The site is listed on the National Priority List (NPL) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Olin signed an Administrative Order of Consent (AOC), effective May 9, 1990, to satisfy the National Contingency Plan (40 Code of Federal Regulations 300). The site is composed of two operable units. Operable Unit 1 (OU-1) comprises the Olin property, except for Operable Unit 2 (OU-2), and includes the manufacturing process areas. OU-2 comprises the Olin Basin (Basin), Round Pond, surrounding wetlands on the Olin property, and the former wastewater ditch that discharged to the Basin from 1952 to 1974 (Figure 1-1).

The FS and implementation of the remedial action have been completed for OU-1 and are being monitored under the Resource Conservation and Recovery Act (RCRA). Work at OU-2 is ongoing.

This report is prepared in accordance with the AOC between USEPA and Olin. It includes summary information from the documents listed above and includes the monitoring results of the enhanced sedimentation pilot project (ESPP) for OU-2 and sampling activities designed to fill RI data gaps. The ESPP was a treatability study that was conducted in accordance with USEPA's October 18, 2005, letter, which provided conditional concurrence with the implementation of the ESPP.

1.1 PURPOSE OF REPORT

Part 1 of this report provides the results of the second year of ESPP monitoring and the results of sampling activities undertaken to address data gaps identified by USEPA and Olin during their evaluation of available historical data, including:

- ESPP bathymetric study (contours of sediment elevation) and debris evaluation
- Monthly surface water profiles
- Surface water sampling
- Storm event sampling
- Gate overflow sampling
- Surficial sediment sampling
- Quarterly sediment trap sampling
- Quarterly sediment pin measurements

- Sediment coring
- Sediment porewater sampling
- Sedimentation rate estimation
- Background atmospheric deposition study
- Floodplain soil investigation
- Groundwater investigation
- Terrestrial vegetation study
- Insect study
- Fish tissue sampling
- Bioaccumulation (*Corbicula*) studies

The above data represent an addendum to the RI. These combined datasets were used to develop the conceptual site model presented in Section 5.

Updates to the Ecological Risk Assessment (ERA) and Human Health Risk Assessment (HHRA) are provided as Parts 2 and 3, respectively, of this document. The site description and background information in Part 1 is intended to complement the ERA in Part 2 and HHRA in Part 3. This information is not repeated in Parts 2 and 3.

1.2 SITE BACKGROUND

A description of the OU-2 site, a discussion of site history, and a discussion of previous investigations including historic studies, baseline ESPP monitoring, ESPP Year 1 monitoring, and biota sampling studies are presented in this section.

1.2.1 Site Description

The Basin is located between a bluff to the west and the Tombigbee River (the river) to the east. The bluff is approximately 20 to 30 feet higher in elevation than the floodplain area near the Basin. The Basin and Round Pond are thought to be part of a former natural oxbow lying within the floodplain of the river. The Basin and Round Pond cover approximately 76 and 4 acres, respectively, at a water elevation of 3 feet North American Vertical Datum 1988 (NAVD88). The inundated area of OU-2 is approximately 135 acres when the water is held at 6 feet NAVD88, while the area contained within the berm surrounding the Basin is approximately 156 acres. Flooding typically occurs from fall to the end of spring each year. Results of the 2006 bathymetric study of the area are presented in Figure 1-2.

Construction of the berm and gate system comprising the ESPP was initiated in June 2006. The Basin is connected to the river via an inlet channel. The design purpose of this constructed system was to enhance the capture of sediment-laden floodwater in the Basin and then hold the water and sediment to allow the sediment to be deposited within the Basin as part of the pilot study. The berm and gate system has also been used to control water elevations to help reduce wind-driven resuspension of Basin sediments.

During non-flood conditions in the river, water elevations in the river are typically near 3 feet NAVD88, and there is little or no flow from the Basin to the Tombigbee River or vice versa. Under rising river water levels up to 12 feet NAVD88, river water flows from south to north from the Tombigbee River to the Basin through the inlet channel or spillway. When floodwaters overtop the berm (flood level above 12 feet NAVD88), flow enters the Basin from the north and east through the floodplain areas surrounding the Basin and exits the Basin to the south. The gate is closed in the upright position once water levels have crested and flow begins to move in a southerly direction consistent with the river flow. Procedures, including how decisions are made to operate the gate based on conditions in Tombigbee River and the containment area, are described in a "Decision Diagram" included in the Operation and Maintenance (O&M) Manual (MACTEC, 2007b). A log of the water levels, gate position, date, and time is maintained at the control building.

The ESPP provided conditions where sediment available in floodwaters may settle and cover the existing sediments by holding floodwater in the Basin over a longer duration and in a more quiescent condition than would occur naturally.. The floodwaters held in the Basin are released approximately 48 hours after the gate is closed. The 48-hour holding time does not alter the pattern of flooding in OU-2 above that of the natural variability associated with the flood events. The release of water from the Basin to the river occurs gradually in approximately 6-inch increments so that sediment is not disturbed unnecessarily.

The berm is maintained in accordance with procedures outlined in the O&M Manual (MACTEC, 2007b), and repairs are made as identified through routine inspections. Some erosion of the berm surface is expected. Erosional areas were repaired, and the berm was reseeded in September 2010. Vegetation is growing well on the berm since reseeding.

1.2.2 Site History

The primary constituent of concern (COC) at OU-2 is mercury, which best represents the extent of contamination in sediments and biota in the Basin and Round Pond. USEPA has also requested the evaluation of other COCs, which include hexachlorobenzene (HCB) and the 2,4′- and 4,4′-isomers of dichlorodiphenyltrichloroethane (DDT), dichlorodiphenyldichloroethylene (DDE), and dichlorodiphenyldichloroethane (DDD) (collectively, DDTR). The primary release mechanism for mercury and HCB to OU-2 was the discharge through the former discharge ditch (Figure 1-1) from 1952 to 1974 (Woodward-Clyde Consultants [WCC], 1993). Site runoff and treated wastewater from the plant were re-routed and not discharged to the Basin after 1974. The plant effluent and stormwater discharge are permitted and monitored under the National Pollutant Discharge Elimination System (NPDES). The current discharge is acceptable within the NPDES limits. The presence of DDTR is likely a result of indirect discharges from the BASF (formerly Ciba-Geigy) Superfund site located immediately north of OU-2. Olin did not manufacture DDTR or intermediate daughter products associated with DDTR.

1.2.3 Previous Investigations

Numerous studies and investigations have been conducted at OU-2 since the 1980s. These studies are grouped into two categories. Results from studies conducted from the 1980s to 2001 are considered historical; results from studies conducted immediately before the operation of the berm and gate system are termed baseline. Each category is summarized in the following subsections. Reports on these studies include:

- *Remedial Investigation Report* (WCC, 1993)
- *Additional Ecological Studies of OU-2, Volumes 1 and 2* (WCC, 1994)
- *Ecological Risk Assessment of Operable Unit 2* (ERA) (WCC, 1995)
- *Feasibility Study Operable Unit 2* (WCC, 1996)
- *OU-2 RGO Support Sampling Report* (URS Corporation [URS], 2002)
- *Enhanced Sedimentation Pilot Project (ESPP) Baseline Sampling* (baseline report) (MACTEC Engineering and Consulting, Inc. [MACTEC], 2007a)
- *Enhanced Sedimentation Pilot Project Mercury Methylation Research* (MACTEC, 2008d)
- *Groundwater Investigation* (MACTEC, 2009a)
- *Enhanced Sedimentation Pilot Project Annual Report – Year 1 Results* (Year 1 Report) (MACTEC, 2009b)
- *Remedial Technologies Screening and Alternatives Development in Support of a Feasibility Study* (MACTEC, 2009e)
- *Estimation of Net Sedimentation Rates in Olin OU-2 Basin* (Anchor QEA, 2010b)

- *Age-Dating Analysis of Radioisotope Cores Collected From Olin OU-2 Basin* (Anchor QEA, 2010c)
- *Bench Scale Studies to Understand Mercury Methylation at the Sediment-Water Interface – Phase 2* (Battelle, 2010a)
- *Part 3 – Updated Human Health Risk Assessment.* Revision 1 (MACTEC, 2010d)
- *Updated Ecological Risk Assessment Report Olin McIntosh Operable Unit 2* (MACTEC, 2010e)
- *Updated Human Health Risk Assessment Report Olin McIntosh Operable Unit 2* (MACTEC, 2010f)
- *Final Report Evaluation of Materials for Use in Remediation of Mercury-Contaminated Fresh Water Sediments* (Battelle, 2010b)
- *Revised Groundwater Investigation Report Olin McIntosh Operable Unit 2* (MACTEC, 2010a)

1.2.3.1 Historical Studies

Results for mercury, methylmercury, HCB, DDTr (sum of 4,4'-DDT, DDE, and DDD isomers), DDTR, dissolved oxygen (DO), organic carbon, and other parameters for surface water and surficial sediment are presented in Table 1-1. When DDTR is not available, a factor was applied to DDTr data to estimate DDTR. The ratios of the 2,4′- and 4,4′- isomers were evaluated; the factor to convert DDTr to DDTR is estimated at 1.97. Surface water samples were collected at shallow (0.5 foot to 3 feet from the water surface) and deep (4 to 9 feet from the water surface) locations in 1991. In 1995, surface water samples were collected near the water surface and at the surface water-sediment interface (termed "bottomwater" samples in WCC, 1995). Historical surficial sediment samples were collected to a depth of 4 to 6 inches.

Results indicated oxic (oxygen-containing) conditions within surface water, except for one bottomwater sample collected in 1995 at a depth of 14 feet. This sample was likely collected near the surface water-sediment interface. Basin sediments were anoxic. Historical analytical results are summarized in Table 1-1.

The wastewater ditch and former discharge ditch were investigated during the initial RI sampling activities in 1991/1992 and again in 2001. Mercury and HCB samples results are depicted in Figure 1-3 and 1-4. The wastewater ditch runs from the plant area in OU-1 to an area south of the Basin. The former discharge ditch received discharge from the wastewater ditch to the Basin between 1952 to 1974.

Surficial sediment samples were analyzed for mercury and HCB in 1991; select locations were sampled and analyzed for HCB in 2001. Core samples were also collected at one location in the former discharge ditch and two locations in the wastewater ditch in 1991/1992.

A total of 31 surficial sediment samples were collected from the wastewater and former discharge ditches and analyzed for mercury in 1991. Surficial sediment mercury concentrations in the wastewater ditch ranged from non-detect (reporting limit = 0.12 mg/kg) to 115 mg/kg in 1991. Only 3 of the 25 sediment samples collected from the wastewater ditch contained mercury concentrations greater than 6 mg/kg. Surficial sediment mercury concentrations in the former discharge ditch ranged from 3.7 mg/kg to 5.8 mg/kg in 1991.

A total of 31 surficial sediment samples were collected from the wastewater and former discharge ditches in 1991 and analyzed for HCB. Five of the 31 locations were sampled again in 2001 and analyzed for HCB. Surficial sediment HCB concentrations in the wastewater ditch ranged from non-detect (reporting limit = 1 mg/kg) to 1,002 mg/kg in 1991. HCB in surficial sediment ranged from 1.9 to 1,400 mg/kg in 2001. Surficial sediment HCB concentrations in the former discharge ditch ranged from non-detect (reporting limit = 1 mg/kg) to 4.5 mg/kg.

Cores were collected at two locations in the wastewater ditch (OD25 and OD15) and one location in the former discharge ditch (BD02/C3). The core collected at OD25 in the wastewater ditch had mercury and HCB concentrations at the surface (213 mg/kg and 51 mg/kg, respectively). Both mercury and HCB concentrations decreased with depth until refusal was encountered at 3.2 feet. The mercury concentration at 3 feet was 3.5 mg/kg. The HCB concentration at 3 feet was 2.3 mg/kg. The core collected at OD15 in the wastewater ditch had "no particular trends in mercury and HCB concentration with depth [to 5 feet]" (WCC, 1993). HCB was not detected from 5-11 feet in this core. Mercury was less than 0.5 mg/kg in the sampled intervals from 6 to 9 feet, and was not detected below 9 feet in core OD15. Mercury concentrations core BD02/C3 from the former discharge ditch were 1.8 mg/kg at the surface, increased to 44.6 mg/kg from 2-3 feet, and were not detected at 4-5 feet. HCB was not detected at the surface and from 2 to 4 feet in the former discharge ditch core samples. HCB concentrations were 2.8 mg/kg in the 1-2 feet interval and 7.8 mg/kg in the 4-5 feet interval. The completion depth of this core was 5.2 feet.

Additional samples will be collected in the wastewater and former discharge ditch in accordance with EPA approval during the remedial process to represent current conditions. An elevation survey of the ditches will also be performed.

1.2.3.2 Baseline ESPP Monitoring

Baseline physical and chemical data were collected in May 2006 to document baseline conditions before implementation of the ESPP, and a baseline report was submitted to USEPA (MACTEC, 2007a). Surface water samples were collected at two-tenths (shallow) and eight-tenths (deep) of the total water depth, or six-tenths of the total water depth if the depth was equal to or less than 2.5 feet. Surficial sediment samples were collected to a depth of 4 inches. Analytical results of the surface water and sediment samples collected for baseline ESPP evaluation are summarized in Table 1-2.

Baseline data indicated that water quality parameters were similar to those during previous sample collection activities where sample locations were comparable to historical locations. Dissolved organic carbon (DOC), pH, and specific conductance in surface water were similar to historical levels. Conditions were also similar in surficial sediments for total organic carbon (TOC) and pH. The range of the 1991 sulfate and sulfide sediment concentrations was within the range reported for 2006. Mercury concentrations in sediment ranged from 6.45 milligrams per kilogram (mg/kg) to 95.3 mg/kg, with higher concentrations of mercury measured across the central portion of the Basin. Methylmercury concentrations in sediment ranged from 0.0026 mg/kg to 0.0110 mg/kg. Methylmercury accounted for approximately 0.09 percent and 0.04 percent of total mercury concentrations in Round Pond and Basin sediments, respectively. Acid volatile sulfide/simultaneously extracted metals (AVS/SEM) ratios greater than 1 indicated that excess sulfides were present in OU-2 sediments. Baseline AVS/SEM ratios ranged from 19.4 to 52.3. Oxidation-reduction (ORP) values in sediment indicated that sediments were anoxic.

1.2.3.3 ESPP Year 1 Monitoring

Environmental samples were collected to evaluate the first year of ESPP operation in June 2008. Results are summarized in Table 1-3. The ESPP was not operated during 2007 because of extreme drought conditions and a lack of flooding events in 2007. When floods returned in February 2008, they produced some elevated river levels and sediment loading to the Basin. However, these events did not convey to the Basin the potential sediment load that may be experienced in non-drought conditions until December 2008. This effect may be the result of the higher than normal water storage capacity created in the upstream watershed during the period of lower stream flow.

Additional sediment sampling locations in the northern portion of the Basin and Round Pond and analyses for HCB and DDTr at select locations were added to the annual ESPP monitoring program in 2008 at the request of USEPA. Surface water analyses for mercury were modified for low-level analytical methods.

In situ water and sediment quality were similar to 2006 conditions, except for decreased surface water DO concentrations and increased sediment temperatures that were likely due to sample collection when the weather was warmer. Unfiltered mercury in surface water ranged from 0.0443 to 0.909 microgram per liter (µg/L), and filtered mercury ranged from 0.00858 µg/L to 0.0249 µg/L. The Alabama Ambient Water Quality Criterion (AWQC) for mercury is 0.012 µg/L and is applied to filtered surface water samples. Unfiltered methylmercury ranged from 0.00191 to 0.00484 µg/L, and filtered methylmercury ranged from 0.000606 to 0.00225 µg/L. The 2008 mercury surface-water concentrations were not compared with the 2006 concentrations because of higher reporting limits in 2006. Unfiltered methylmercury concentrations generally increased in surface water. Lower water levels during drought conditions and possibly an increase in wind-driven resuspension may have contributed to the detection of higher methylmercury concentrations in 2008. Other factors, such as higher temperatures and lower DO, may have contributed to higher methylmercury surface water concentrations as well.

The mean sediment mercury concentrations decreased from 41.1 to 32.8 mg/kg from 1991 to 2009; however, this trend is not statistically significant because an evaluation of this trend to show significance cannot be provided given the limited number of sampling events and variability within the data sets.

Sources of mercury to the Basin have ceased since 1974, and the groundwater studies submitted to the USEPA indicate that OU-2 is not a source of mercury to groundwater beneath the Basin. Groundwater beneath the Basin does not contain mercury at concentrations above the AWQC of 0.012 µg/L, thus OU-2 groundwater discharge to the river would not result in exceedances of the AWQC in the river (MACTEC, 2009a, 2010a). An increase in wind-driven resuspension under low water conditions caused by the drought may also contribute to differences in surficial sediment concentrations at a given location and time. Other factors such as seasonal turnover, groundwater seepage velocity, geochemistry, and the inherent difficulty of sampling heterogenic sediment over multiple sampling events may contribute to differences in surficial sediment concentrations between sampling events.

Sediment AVS/SEM ratios well exceeded 1, as in 2006. AVS/SEM is a mercury methlylation parameter that indicates the potential for excess sulfide at ratios above one. The distribution of HCB also followed a similar pattern to that seen historically (i.e., higher in the southern portion of the Basin and lower in the northern portion of the Basin). HCB concentrations at one location north of the gate structure exhibited an order of magnitude reduction. DDTr results showed an order of magnitude decrease in concentrations from the early 1990s.

In 2008, DDT was either not detected in the sediment samples or, if it was detected, its concentration was less than that of DDE and DDD concentrations in the same sample. DDTR concentrations in sediment decreased one to two orders of magnitude in 2008 from 1990s sediment concentrations. DDT is currently not detected at several locations where it previously was detected. These observations may indicate that DDT degradation is occurring; however, the relative rates of DDT degradation and rates of degradation of its breakdown products are unknown because of the complicated bio-facilitated (aerobic and anaerobic) degradation pathways.

The 2008 bioaccumulation study results indicated an overall increase in average mercury tissue concentration as compared to the 2006 study results. This increase was irrespective of sediment mercury or methylmercury concentration next to the bioaccumulation cages. Methylmercury tissue concentrations and bioaccumulation rates were similar between the 2006 and 2008 sampling events. Because storm events were very limited during 2007 and 2008 due to severe drought conditions, a decrease in tissue concentrations was not expected.

Mercury was detected at an average concentration of 24 mg/kg in the sediment traps in 2008. A flood event that overtopped the berm did not occur before collection of sediment trap data; therefore, the sediment collected in sediment traps was not representative of incoming sediment deposited in the Basin during flood events. Stochastic, wind-driven wave events resulting in resuspension of bottom sediments may have been responsible for the quantity of sediment and mercury concentrations in the traps. Sediment potentially underwent resuspension followed by settling during these wind-driven wave events. Resuspended sediment that is entrained into sediment traps is not allowed to settle to the substrate but remains in the trap. Therefore, the mercury concentration in the trap is not representative of mercury concentrations suspended in the surface water at any one time based on the surface water grab samples collected , but potentially represents accumulation over an approximately 3-month period in the trap.

A detailed discussion of the 2006, 2008, and 2009 ESPP monitoring results and historical results is presented in Section 4.0.

1.2.3.4 Biota Sampling Studies

Historical fish tissue results for mercury, HCB, methylmercury, and DDTR are presented in Table 1-4. Fish filet samples were collected in 1986, 1991, and 2001. Whole body samples were collected in 1991, 1994, 1995, and 2001. Results for mercury and HCB for fish filet and whole body samples collected from 2003 to 2008 are presented in Table 1-5.

Biota samples were collected in 1994, 1995, and 2001. Organisms sampled included insects, spiders, raccoon, little blue heron, bullfrog, crayfish, and freshwater mussels. The biota samples were analyzed for mercury, HCB, DDTr, and DDTR. The results of these analyses are presented in Table 1-6.

1.3 REPORT ORGANIZATION

This document is organized into the following sections:

- Section 1.0 – Introduction
- Section 2.0 – Study Area Investigation
- Section 3.0 – Physical Characteristics of the Study Area
- Section 4.0 – Nature and Extent of Contamination
- Section 5.0 – Contaminant Fate and Transport
- Section 6.0 – Summary
- Section 7.0 – References

2.0 STUDY AREA INVESTIGATION

Sample collection was conducted in accordance with the following work plans and response documents:

- *Enhanced Sedimentation Pilot Project (ESPP) Baseline and Evaluation Sampling Work Plan.* Operable Unit 2, Olin Corporation, McIntosh, Alabama (MACTEC, 2006a)
- *Storm Event Surface Water Sampling Plan, Addendum to the Enhanced Sedimentation Pilot Project (ESPP) Baseline and Evaluation Sampling Work Plan.* Olin McIntosh Operable Unit 2, Olin Corporation, McIntosh, Alabama (MACTEC, 2008a)
- *Groundwater Investigation Work Plan* Operable Unit 2, McIntosh, Alabama (MACTEC, 2008c)
- *Quality Assurance Project Plan, Operable Unit 2, McIntosh, Alabama.* Revised October 9, 2008. (MACTEC, 2008e)
- *Sediment Core and Porewater Investigation Work Plan*, Operable Unit 2, McIntosh, Alabama (MACTEC, 2008f)
- *Response to EPA Comments Dated June 29, 2009, Regarding Olin's May 29, 2009, Submittal for Sediment Core, Porewater, and Floodplain Soils Collection Activities, OU-2 Enhanced Sedimentation Pilot Project (ESPP), Olin Chemicals/McIntosh Plant Site, McIntosh, Alabama.* Prepared for Olin Corporation. (MACTEC, 2009c)
- *Response to EPA Request for Tables and Figures for the Annual ESPP Sampling, Sediment Core, Porewater, and Floodplain Soils Collection Activities, OU-2 McIntosh, McIntosh, Alabama.* Prepared for Olin Corporation. (MACTEC, 2009d)
- *Response to EPA Request for Gate Overflow Sampling Plan.* Prepared for Olin Corporation. January 28, 2010. (MACTEC, 2010b)

Samples were collected from the same locations as those collected in the 2006 baseline and 2008 sampling events, and from a new sampling location in the deeper portion of the Basin, which is in the north central portion of the Basin. Table 2-1 summarizes the samples collected during the 2009 monitoring, including analytical methods, preservation, sample holding times, and quality assurance/quality control (QA/QC) samples. Table 2-1 also summarizes samples collected to address either USEPA-identified data gaps or RI update data. Samples collected in 2009 included monitoring samples (surface water, sediment, sediment traps/pins, background soil, and storm event samples), sediment core/porewater, surface water profiles, and gate overflow samples. Fish collection and bioaccumulation studies were not conducted in 2009 due to flooding during the designated study periods.

2.1 BATHYMETRIC SURVEY AND DEBRIS EVALUATION

An evaluation of the debris in the Basin was prepared by Evans-Hamilton, Inc. (EHI) using swath bathymetry data that was collected November 14 through 16, 2006, during the bathymetric survey (MACTEC, 2006a). The methods used for evaluating the data collected during the bathymetric survey for debris evaluation are summarized below. EHI's debris evaluation is included as Appendix A.

Bathymetry and sidescan data were collected using an interferometric swath sonar system (SWATHplus 234 kHz) integrated with an Ixsea Octans motion sensor that removed the effect of vessel motion in real time. Dual-channel RTK global positioning system (GPS) (Trimble 4700) provided horizontal and vertical control. HYPACK® software developed by Coastal Oceanographics was used to navigate survey track lines and log vertical tide correction files. Geodesy controls utilized the North American Datum 1983 (NAD83), Alabama State Plane West (meters) for horizontal and the Geoid 2003 model for vertical. Elevations were converted to NAVD88.

Post-processing using proprietary SEA Ltd. software, SWATHplus, corrected for errors associated with the speed of sound variations and low-frequency vessel motion (portion not removed by motion sensor). Processed swath sonar files were then imported to Grid2000, a proprietary SEA Ltd. program, for data gridding. A nearest-neighbor, weighted gridding algorithm determined depths at irregularly spaced, 1-meter (m) grid nodes from swath soundings. These soundings were then despiked using a standard deviation threshold followed by gridding into a regularly spaced, rectilinear grid using a krieging algorithm weighted for anisotropic data. These highly anisotropic soundings were then imported to the Fledermaus Professional Suite Version 6.4.1a for further QC and assessment, and the edited grid soundings were then exported in ASCII format as x, y, and z coordinates (m, state plane, and NAVD88, respectively).

Post-processing of the co-registered backscatter data involved importing the raw SWATHplus files into SonarWiz.MAP 4 (Chesapeake Technology, Inc.). This software package does not require gridding of the amplitude data, allowing the resolution of bottom features as small as approximately 10 centimeters (cm) long and/or wide. During the survey, instrument malfunction resulted in far-range amplitude errors associated with the starboard SWATHplus transducer. These errors rendered approximately 60 percent of the far range of the starboard sidescan data unusable for sidescan analysis. Given that approximately 150 percent overlap was obtained during the original bathymetric mapping effort, sidescan data for most of the Basin could be obtained from the port transducer alone. Sidescan data from the starboard transducer were used only along the Basin edges, where the bathymetry naturally limited the range of the starboard transducer to the usable range. An area of 579,248.0 square meters (m^2) was mapped from approximately 20 million individual soundings (pings), with sidescan coverage of approximately 89 percent of the Basin bottom. During post-processing, a smoothing process can be applied, which averages adjacent soundings to produce a cleaner map (average smoothing of 300 pings). Smoothing reduces the resolution of the final mosaiced image. Accordingly, minimal smoothing was applied to the data during importation (<10 pings) to maximize potential resolution. Layback corrections were not required because the sidescan data were collected simultaneously with the real-time, geo-referenced bathymetry data. Averaging was used during the mosaicing process. After importing, individual survey lines were trimmed where necessary to remove artifacts, and water column data were removed using a manual bottom-tracker tool based on visual interpretation of the sonar data. Gain control was applied to enhance the resolution of the relatively small size of features found on the Basin bottom. The resulting sidescan mosaic was exported as a geotiff with a resolution of 20 cm per pixel, and the image was subsequently draped over the previously processed interferometric bathymetry to provide a general view of the Basin bottom using IVS Fledermaus ver. 7.0d.

Individual features interpreted as debris were identified as targets, and length and width were measured for over 150 of the smaller features (<1 m) and over 30 of the larger (>1 m) features, although many more targets were identified. Using the transducer attitude and range to target, estimates of individual feature heights were calculated from measurements of individual shadows. These measurements are estimates only, and the actual height above the bottom of individual features may exceed the values reported in Appendix A. The results of the debris evaluation are summarized in Section 4.1.

2.2 SURFACE WATER AND SEDIMENT INVESTIGATIONS

Surface water investigations conducted during the 2009 sampling events included collection of in situ surface water quality measurements, surface water sample collection, storm event surface water sample collection, and gate overflow surface water sample collection. Sediment investigations conducted during the 2009 sampling events included sediment monitoring, sediment trap sampling, a wind-driven sediment resuspension study, sediment pin accumulation monitoring, collection of sediment cores and porewater samples, and an evaluation of the sedimentation rate. The sample collection methodology is summarized in this section.

2.2.1 Surface Water Quality

In situ water quality data were collected using a YSI Model 6920 water quality meter. The YSI meter was calibrated daily before use according to the manufacturer's specification using standard solutions. YSI calibration was checked at the end of the sampling day. Calibration results were recorded in indelible ink on calibration logs (Appendix B). Surface-water field parameters included pH, conductivity, turbidity, temperature, DO, and ORP. These profile measurements were typically collected at 1- or 2-foot intervals from the water surface to just above the surface water/sediment interface. The field measurements were recorded in indelible ink in the bound field logbook.

Surface water quality profiles were collected at select locations in the Basin and Round Pond (Figure 2-1). The selected locations for surface-water quality profiles coincide with sediment trap and sediment pin locations (Section 2.2.8). The water quality profiles were measured at four locations in the Basin on April 29, 2009. The water quality profiles were subsequently measured at eight locations in the Basin and one location in Round Pond on May 27 through 29, June 23, July 9, August 10, and November 11 through 12, 2009. Surface water quality profiles were not collected during September and October 2009 because of flood conditions at OU-2. The monthly surface water quality profile results are discussed in Section 4.2.1.1, and the profile data are presented in Appendix C (Table C-1).

In situ water quality profiles were also recorded before the collection of surface water and sediment samples from June 3 through 9, 2009. Water depth was recorded, and transparency was measured using a Secchi disk. The in situ water quality results collected during annual ESPP monitoring are presented in Section 4.2.1.2 and are recorded by depth and location in Appendix C (Table C-2).

2.2.2 Surface Water Collection

The 2009 surface water sampling event was conducted in accordance with the work plans (MACTEC, 2006a, 2009d). Surface water samples were collected on June 3, 4, and 8, 2009. Sampling locations were the same as those in 2006 and 2008 with an additional location in the deeper portion of the Basin (Figure 2-2). The deeper portion is in the northwest portion of the Basin where the bathymetry shows a low elevation of approximately -36 feet NAVD88. The sampling points were located using a handheld GPS unit. Grab water samples were collected at each sampling location at approximately two-tenths and eight-tenths of the water depth using a peristaltic pump and laboratory pre-cleaned Teflon® tubing. Twenty-two surface water samples were collected. Surface water samples were analyzed for the following parameters:

- Mercury (low level, unfiltered and filtered)
- Methylmercury (unfiltered and filtered)
- Hardness, as calcium carbonate ($CaCO_3$)
- Alkalinity
- DOC
- Total suspended solids (TSS)
- Total dissolved solids (TDS)

The 2006 surface water samples were analyzed for total sulfate and total sulfide. The 2008 and 2009 samples were not analyzed for total sulfate or total sulfide.

Sample analytical methods, preservation, reporting limits, and holding times are included in Table 2-1. MS/MSD, field duplicate, equipment rinsate, and blank samples were collected in accordance with the specifications listed in Table 2-1. The samples were placed in coolers on wet ice and shipped overnight under chain-of-custody procedures to an analytical laboratory. Filtered/unfiltered low-level mercury and filtered/unfiltered methylmercury surface water samples were shipped to Battelle Marine Sciences Laboratory (Battelle Marine) in Sequim, Washington, for analysis. The remaining surface water samples were shipped to Pace Analytical Services, Inc. (Pace) in St. Rose, Louisiana, for analysis. Custody seals were employed to check for tampering during shipment. The analytical results for the surface water samples are discussed in Section 4.2.2.

2.2.3 Storm Event Surface Water Collection

Surface water samples were collected for evaluation of the solids load to the Basin during storm events. The collection of these samples was event-driven. The goal was to collect surface water samples during various types of storm events and subsequent flooding of the Basin during the ESPP evaluation.

Storm events and the resulting increase in water levels at OU-2 are generally random, natural events that are difficult to predict. Predictions from the National Weather Service Advanced Hydrologic Prediction Service were viewed daily to assess the most appropriate timing for collection of storm event samples. Attempts were made to sample a May 2009 storm event, but high winds and lightning prevented safe access to the Basin, and samples could not be collected during the targeted first half of the rising limb of the hydrograph. An attempt was also made to sample a September 2009 storm event, but this event reached the upper portion and plateau of the hydrograph before sample personnel could arrive at the Basin. One storm event was sampled in October 2009. The gate was lowered to receive incoming floodwaters on October 14, 2009. The gate was closed to maintain floodwaters on October 21, 2009, and remained closed until November 3, 2009. Storm event TSS samples and turbidity profiles were collected daily throughout the rising limb of the hydrograph from October 14 to 21, 2009. Surface water samples were collected at two-tenths and eight-tenths depth at each sampling location. Other flood events that occurred during 2009 were not sampled because they were similar in water elevation and duration to events when samples were collected previously.

Samples were collected from 11 locations: one immediately north of the gate structure in the intake channel (D-1) and ten within the Basin (Figure 2-3). Attempts were made to collect samples from a twelfth location in the wetland area north of the Basin (E-1). Water levels at this location did not allow access to the area, and it could not be sampled. Water levels at OU-2 were recorded from gauges and transducers south and north of the gate structure.

Samples were shipped under chain-of-custody procedures to Pace, where they were analyzed for TSS in accordance with USEPA Method 160.2. A subset of these samples was analyzed for grain size by MACTEC. One grain-size partition sample was collected from each transect. Grain size samples were delivered to MACTEC and analyzed in accordance with the vacuum filter test procedure detailed in the *Long Tube Testing Report* (MACTEC, 2006b). The results of storm event sampling are discussed in Section 4.2.3.

2.2.4 Gate Overflow Surface Water Collection

The purpose of the gate overflow sampling was to collect the decant water from the top of the gate as it leaves the Basin at the beginning, middle, and end of the decant cycle (MACTEC, 2010b). USEPA requested that the decant cycles from two floods more than 12 feet NAVD88 and two floods less than 12 feet NAVD88 were targeted for sampling.

Gate overflow samples for storm events that overtopped the berm were collected on 1) November 2, 2009; 2) November 30, and December 1 and 2, 2009; and 3) on January 12, 14, and 18, 2010. A sample was also collected from the Tombigbee River upstream of the channel mouth on November 2, 2009. The November 2 samples were only collected at the beginning of the decant cycle because water levels rose and the decant cycle ceased before mid-level samples could be collected. The November 30 through December 2, 2009, samples were collected during the beginning and middle of the decant cycle; water levels again rose before the full decant cycle was complete. The January 2010 samples were collected during the beginning, middle, and end of the decant cycle. Gate overflow samples were collected on

March 9, 2010, and June 2 and 7, 2010, for floods that did not overtop the berm. These samples were collected at the beginning, middle, and end of the decant cycle.

Water grab samples were collected at the gate and at one-half of the total depth from the Tombigbee River location using a peristaltic pump and laboratory pre-cleaned Teflon® tubing. The samples were analyzed for mercury (low level, unfiltered, and filtered), methylmercury (unfiltered and filtered), TSS, and TDS. Sampling and analysis for mercury and methylmercury were performed in triplicate at the request of USEPA.

Sample analytical methods, preservation, reporting limits, and holding times are listed in Table 2-1. The samples were collected in triplicate, as requested by USEPA. One ambient field blank per day and one equipment blank rinsate sample per event were collected for QA/QC purposes. The samples were placed in coolers on wet ice and shipped overnight under chain-of-custody procedures to the analytical laboratories. Filtered and unfiltered low-level mercury and filtered and unfiltered methylmercury surface water samples were shipped to Battelle for analysis. The remaining surface water samples were shipped to Pace for analysis. Custody seals were employed to check for tampering during shipment. The analytical results for the gate overflow samples are discussed in Section 4.2.4.

2.2.5 Sediment Collection

The annual sediment ESPP monitoring was conducted on June 3 and 5 through 9, 2009. A TetraTech representative (USEPA contractor) oversaw the sampling activities on June 5, 2009. Sample locations were the same as those sampled in 2008, with the addition of one composite location in the deeper portion of the Basin (Figure 2-4). Sample locations were logged using a handheld GPS unit. At each sampling area, surficial sediment samples (0 to 4 inches) were collected using a petite Ponar dredge. Each sediment sampling area consisted of five discrete sample locations, collected in the center and approximately 5 feet to the northeast, southeast, southwest, and northwest from the center point (Figure 2-4). Twenty-five areas along six transects were sampled from the Basin and Round Pond. At 17 of the 25 areas, the 5 discrete samples were composited for analysis. At the remaining eight areas, the five discrete samples comprising a sampling area were analyzed as individual samples to assess potential variability within a sampling area. A total of 51 surficial sediment samples was analyzed from the Basin, and 6 sediment samples were collected from Round Pond and analyzed. Surficial sediment pH, ORP, and temperature were measured in the field using an Orion 250A pH, temperature, and ORP probe at the sediment sample locations. In situ sediment quality parameter results are discussed in Section 4.2.5.1.

Surficial sediment samples were analyzed in the laboratory for the following constituents parameters:

- Mercury
- Methylmercury
- Total sulfide
- Total sulfate
- TOC
- Grain size
- Percent moisture
- AVS/SEM
- Bulk density

Seven samples were analyzed for HCB and five samples were analyzed for DDTR. The sediment samples were placed in coolers on wet ice (except for the methylmercury and AVS/SEM analyses, which were placed on dry ice) and shipped overnight under chain-of-custody procedures to an analytical laboratory. Methylmercury/percent moisture and AVS/SEM sediment samples were shipped to Battelle for analysis. The remaining analyses, including percent moisture, were performed by Pace. Custody seals were employed to check for tampering during shipment. Sample analytical methods, preservation, and holding times are listed in Table 2-1. Six blind duplicate and three MS/MSD samples were collected for QA/QC purposes in accordance with the Quality Assurance Project Plan (QAPP; MACTEC, 2008e). The analytical results of the sediment sample collection are presented in Section 4.2.5.

2.2.6 Sediment Traps

The original purpose of the sediment traps was to evaluate the potential for trapping inflowing sediments during flood events. The accumulation of sediment in the traps during drought and non-flood conditions, and the concentrations of mercury in the trap sediments, may indicate that wind-driven resuspension of sediments was potentially occurring in the Basin. The purpose of the traps changed, as a result, to evaluate the potential for wind-driven resuspension to occur and to evaluate the effectiveness of maintaining additional water in the Basin for reducing wind-driven resuspension. The data presentation and evaluation of sediment trap data changed during the ESPP monitoring because the purpose of the traps changed. This change in purpose represents an evolution of the understanding of Basin hydrodynamics and management. The use of sediment traps to evaluate wind-driven resuspension is further discussed in Section 2.2.7.

Twelve sediment traps were constructed to collect sediment from the water column as described in the baseline ESPP report (MACTEC, 2007a) and installed in the Basin in September and November 2006.

Sediment traps were placed in the center and deeper portions of the Basin (Figure 2-5), where water depth was sufficient to maintain a minimum of 3 feet of water over the top of the traps and a minimum of 3 to 4 feet between the sediment and the bottom of the sediment traps during non-flood conditions. Sediment traps were set and retrieved quarterly and sampled as part of the ESPP monitoring.

The twelve sediment traps in the Basin are divided among three zones. Zones 1, 2, and 3 are located in the north, central, and central south areas of the Basin, respectively (Figure 2-5). Three sediment traps (ST26, ST27, and ST28) were relocated from their 2008 positions in February 2009 to better characterize the sediment deposition in the northern portion of the Basin and the deeper portion of the Basin. The three sediment traps were moved from locations where other nearby traps could easily represent the targeted zone. The relocated sediment traps were placed in Zones 1 (ST31) and 2 (ST32 and ST33). ST32 was placed closer to the surface in the deeper portion of the Basin (approximately 11 feet from the Basin sediment), and ST33 was placed closer to the bottom of the deeper portion (approximately 7 feet from the Basin sediment; Figure 2-5). Four sediment traps (ST14, ST17, ST19, and ST32) were designated as wind traps to study the effect of water level on resuspension and were not sampled during the May and August quarterly sampling events.

A minimum of 3 feet of water was present over the top of the traps during non-flood conditions prior to February 2009. The water level over the traps after February 2009 was approximately 5 to 6 feet; the distance between traps' bottoms and the sediment remained the same.

Sediment trap samples were collected quarterly on February 18 and 19, May 28, August 11 and 12, and November 11 and 12, 2009; and February 24 and 25, 2010. USEPA provided oversight for the sediment trap sampling on May 28 and 29, 2009.

Sediment traps were inspected by commercial divers from Pro-Diving Services, Inc. (Pro-Diving) before retrieval. Pro-Diving noted the distance of the trap bottom above the sediment and the condition of the sediment trap. The sediment trap jars were removed and capped while underwater, brought to the surface, and exchanged for new jars, which were placed in the sediment trap. Sediment traps requiring replacement of parts were brought into the boat for repairs and then reinstalled in the Basin by Pro-Diving. The depth of sediment in each jar, sample mass, temperature, pH, and ORP were recorded. The sediment collected from each location was composited in a decontaminated, stainless steel bowl and then placed in sample jars. The samples were placed on wet ice and shipped overnight under chain-of-custody procedures to Pace. Custody seals were employed to check for tampering during shipment.

The sediment trap samples were analyzed for total mercury, percent moisture, density, TSS, grain size, and TOC as sample size permitted. A dedicated jar from each of four sediment traps (ST13, ST23, ST24, and ST31) was sent to Pace for total organic and inorganic solids analysis in May and August 2009 at the request of USEPA. Sample analytical methods, preservation, and holding times are included in Table 2-1. The results of the sediment trap analyses are presented in Section 4.2.6.

2.2.7 Wind-Driven Sediment Resuspension Study

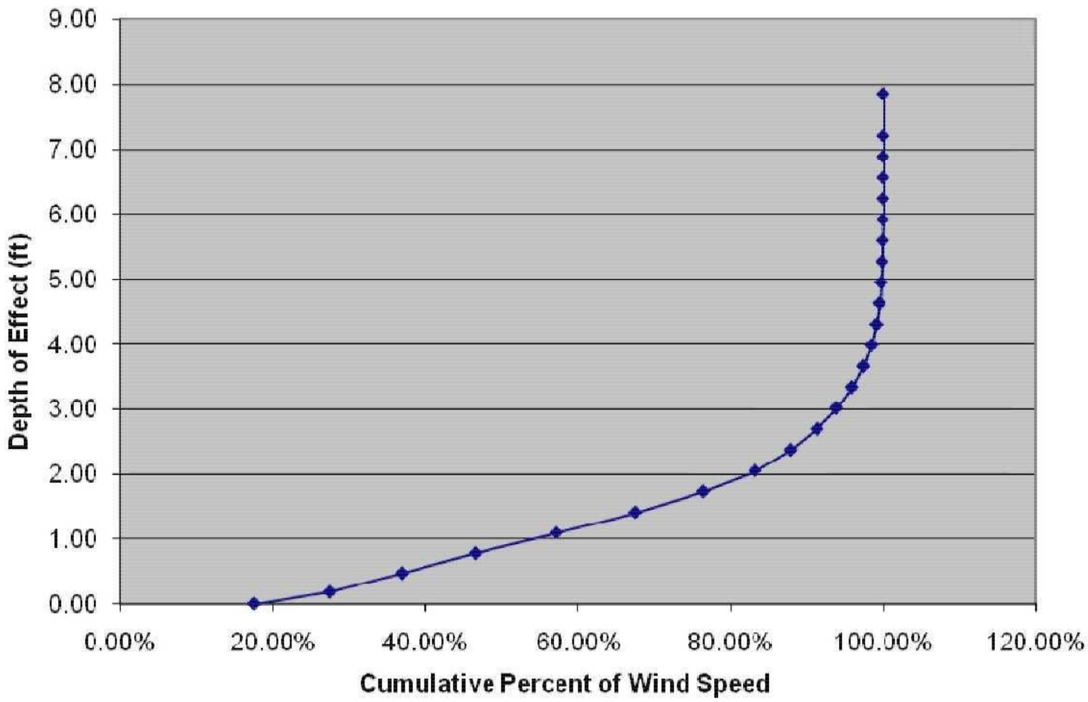
Concentrations of mercury in sediment traps in 2008 averaged 24 mg/kg. The sediment traps were designed to collect incoming sediments to evaluate enhanced sedimentation; however, a drought occurred in 2008, and there were no floods until August 2009. The presence of mercury-containing sediment in the traps may be due to the periodic resuspension of sediments that became entrained and concentrated in the traps. The sediment resuspension is potentially a result of stochastic wind events during low water levels associated with the drought conditions in 2007 and 2008.

Resuspension typically increases during drought and low water level conditions such as those experienced in 2007 and 2008, when water levels dropped below 3 feet NAVD88. Several models that estimate the effect of wind over a body of water were considered to further evaluate the potential for the reduction of resuspension. The U.S. Geological Survey (USGS) Bachmann-Hoyer-Canfield (BHC) model was selected because it is compatible with the physical features of OU-2, was presented in a peer-reviewed publication, and is commonly used to estimate the potential for resuspension in larger freshwater bodies (Bachman, et al., 2000). Two other models identified for this type of evaluation (de Vicente et al., 2006; and Cozar et al., 2005) are mathematical reformulations that produce similar values.

Wind movement over the water's surface generates waves, and the amplitudes of the waves increase with increasing wind speed: the stronger the wind speed, the more deeply the wave penetrates the water column to disturb and resuspend sediment. Wind speed and fetch are the main input parameters to the BHC model. Fetch is the distance over which wind can interact with a body of water to produce waves. Wind speed measurements recorded at the Olin McIntosh Plant from November 2007 through January 2009 were summarized and are tabulated in Appendix D. The maximum fetch of 660 meters was input into the BHC model.

The output from the BHC model is depicted in the following graph (Figure 2-6), which shows depth of effect versus cumulative wind speed.

Figure 2-6. BHC Model – Cumulative Percent of Wind Speed and Depth of Effect



Prepared by: KPH 01/05/2011
Checked by: ELF 01/17/2011

The BHC model was used to evaluate the depth of wave effect for various wind speeds at the Basin. The depth of wave relates to the depth where sediment, if present, would likely resuspend because of the energy of the wind moving over the water. Inputs and outputs to the model are provided in Appendix D. The model demonstrated that, by maintaining an additional 3 feet of water in the Basin, the effects of wind-driven resuspension could be reduced for winds equal to or less than 10 miles per hour (mph). The wind speed of 10 mph was chosen as a value to test and confirm in the field, because wind speeds at OU-2 are less than 10 mph approximately 94 percent of the time, based on historical, site-specific data maintained by the Olin McIntosh Plant. It is not the intent of the model or wind study to completely eliminate the potential for resuspension of sediment under all conditions. The relative importance of different wind speeds on the mass of sediments resuspended and the redistribution of suspended sediments has not been evaluated. The evaluation was not performed because the volume of sediment collected in the sediment traps jars was likely exceeded during some of the sampling events and could not be quantified. A particular wind speed also could not be isolated to evaluate the volume of sediment collected in the sediment trap jars. The areal extent of the Basin that may be affected by 10 mph and 20 mph winds with the Basin 3-ft and 6-ft water elevation is depicted on Figure 2-6a and 2-6b, respectively.

Wind speed will be an important factor in evaluating remedial technologies in the FS and in the design of a cap.

A decision was made in February 2009 to maintain at least 3 additional feet of water depth at the gate in an attempt to minimize the effect of wind on sediment resuspension based on the outcome of the BHC model. Four of the available 12 sediment traps were temporarily utilized as resuspension study traps or wind traps from April 2009 through August 2009 (Figure 2-4) to evaluate the effectiveness of the additional 3 feet of water in reducing resuspension. Traps were kept in the Basin for at least a 7- to 10-day period that did not include a significant storm event (water level rise greater than 6 feet in elevation) or high wind speeds (greater than 13 mph sustained over one or more hours). If a storm or high wind event occurred while the traps were deployed, then the traps were reset, and the process began again. Traps were retrieved in the same manner as the sediment traps (Section 2.2.6). Wind traps were reset on May 27, June 23, and July 9, 2009. The wind traps were returned to their original designated function during the August sediment trap sampling event.

In situ water quality profiles were completed during retrieval of the wind traps. Sample volume and mass of each jar in each trap were recorded in indelible ink in the field logbook. Observations of little or no accumulation were also recorded. The samples collected from each trap were composited for mercury and TOC analysis. Samples were shipped using chain-of-custody procedures to Pace for analysis. The results of these activities are discussed in Section 4.2.7.

A minimum water level of 6 feet NAVD88 was maintained at the gate from March 1 to June 6, 2009. From June 6 to September 19, 2009, the minimum water level was lowered to 5.1 feet NAVD88 as a result of maintenance procedures. The water level has been maintained at a minimum of 6 feet NAVD88 at the gate since the floods returned in September 2009.

2.2.8 Sediment Pins

Fifteen sediment pins were constructed from ultraviolet-resistant polyvinyl chloride (PVC) by Precision Plastics as described in the baseline ESPP report (MACTEC, 2007a). These sediment pins were installed at OU-2 in December 2006 (Figure 2-5). Sediment pin accumulation was to be measured annually; however, pins were read quarterly during the quarterly sediment trap sampling events. Sediment accumulation was measured on February 24 and 25, May 28 and 29, August 11 and 12, and November 11 and 12, 2009; and February 23, 2010. Pro-Diving measured sediment pin accumulation by counting the grooves on each sediment pin from the top down until a tactically firm sediment surface was reached; visual observations were also recorded. USEPA provided oversight for the sediment pin measurements on May 28 and 29, 2009.

Two pins were broken and replaced in 2009. Divers were unable to locate the pin plate for OU2B-SP-304 during the August 2009 measurement. Divers also reported that the OU2R-SP-101 pin was broken and apparently snapped by a large tree. Observations of the broken pin portions and locator buoys indicated that alligators and/or large trees might have snapped the pin rods from the base. Pins were generally repaired and replaced by the next sampling event. The results of the sediment pin deposition study are presented in Section 4.2.8.

2.2.9 Sediment Cores and Porewater Collection

Sediment core and porewater samples were collected from September 23 through 28, 2009. Sediment cores were collected in accordance with the *Response to EPA Comments dated June 29, 2009, Regarding Olin's May 29, 2009, Submittal for Sediment Core, Porewater, and Floodplain Soils Collection Activities* (MACTEC, 2009c) and the *Response to EPA Request for Tables and Figures for the Annual ESPP Sampling, Sediment Core, Porewater, and Floodplain Soils Collection Activities* (MACTEC, 2009d). Coring and porewater collection techniques were refined after a trial collection event in June 2009. These documents were approved by USEPA on August 18, 2009. Aqua-Survey, Inc. (ASI) was subcontracted to collect cores using standard push methods for short (less than 3 feet deep) cores and Vibracore® technology for deep cores greater than 3 feet deep. A representative from USEPA oversaw the sediment core collection and sample processing activities from September 22 through 24, 2009. An Alabama Department of Environmental Management (ADEM) representative also observed sample processing activities on September 28, 2009. A representative from TetraTech (USEPA contractor) oversaw the coring and porewater collection trial on June 4, 2009, and on September 22, 2009.

2.2.9.1 Coarsely Sectioned Cores

Coarsely sectioned cores were collected from 13 locations in the Basin and Round Pond (Figure 2-7). The cores were completed to various depths by ASI using Vibracore® technology. The completion depths were selected during discussions with USEPA based on historical core data collected in the 1990s, and the completion depths are summarized in the following table.

Table 2-2. Coarsely Sectioned Cores – Location and Depth

Coarse Core ID	Sample Location	Coarse Core Depth (Feet) [b]
SDCR1[a]	Southwest Basin near former wastewater ditch discharge	6 [c]
SDCR2	South Basin near channel	11
SDCR3	Southeast Basin	11
SDCR4	West Basin	9
SDCR5	West Central Basin	9
SDCR6	Central Basin	9
SDCR7	East Central Basin	9
SDCR8	Deeper Portion of the Basin	11
SDCR9	Northwest Basin	6
SDCR10	North Central Basin	6
SDCR11	Northeast Basin	6
SDCR12	Round Pond	6
SDCR13	Round Pond	6

(a) SDCR1 coarse core collected during the coring and porewater collection trial, June 3-5, 2009.
(b) These depths are 1foot deeper than the depths indicated in the work plan (MACTEC, 2009d). The bottom interval of each core was archived by the analytical laboratory for future analysis, if necessary, based on the chemical results in the interval above the bottom interval.
(c) SDCR1 was completed to a shallower depth because the coring trial conducted in June 2009 yielded results showing clean sediments below 5 feet.

PREPARED BY/DATE: HEF 10/20/09
CHECKED BY/DATE: FKM 10/22/09

Excess water was drained from the top of each core, and percent recovery was calculated by dividing recovered core length by length of core tube pushed into sediment. The excess water was drained by drilling a hole approximately half an inch above the sediment interface while the core was upright. Each core was opened in the horizontal position using a power router and a sharp knife. Once opened, the cores were logged and the lithology of the sediment core was described and photographed. Core boring logs are included in Appendix E.

Samples for chemical analyses were collected from 1-foot intervals throughout the core length to the completion depth. The 1-foot sampling intervals were adjusted based on percent core recovery, except for SDCR1. For example, core lengths of 0 to 0.9 foot were collected to represent the 0- to1-foot interval if the core recovery was 90 percent. Core recovery of less than 100 percent was likely the result of sediment compression while coring. For locations that had finely sectioned cores associated with them, sample analyses were adjusted in the upper 18 inches to account for the finely sectioned core analyses. Sampling intervals were measured with a tape measure. The sediment from each interval was thoroughly mixed in a decontaminated stainless steel bowl and transferred to the appropriate sample jars.

Samples were transported by courier under chain-of-custody to TestAmerica Laboratories, Inc. in Mobile, Alabama (TestAmerica Mobile), for analysis. Custody seals were employed to check for tampering during shipping. Table 2-3 presents the core locations, sampling intervals, analyses for each interval, and percent recoveries for the cores. The bottom interval of each core was archived by the analytical laboratory for future analysis, if needed, based on the chemical results in the interval above the bottom interval. The bottom interval was analyzed if the mercury concentration was greater than 0.2 mg/kg in the preceding interval. Archived bottom intervals were analyzed for the following cores: SDCR4, SDCR5, SDCR8, SDCR10, and SDCR12. The results for the coarsely sectioned cores are presented in Section 4.2.9.1.

2.2.9.2 Finely Sectioned Cores

Finely sectioned sediment cores were collected from six locations in the Basin and Round Pond (Figure 2-7). The finely sectioned core from location SDCR1 was collected during the June 3 through 5, 2009, sediment core and porewater collection trial. The sediment cores were collected by pushing 24-inch core tubes into the sediment. Once retrieved, the excess water was drained from the top of each core, and percent recovery was calculated as described above. Each core was opened in the horizontal position using a power router and a sharp knife. Samples for chemical analysis were collected from the following depth intervals: 0 inch to 2 inches, 2 to 4 inches, 4 to 8 inches, 8 to 12 inches, and 12 to 18 inches. These depth intervals were adjusted based on percent recovery, except for SDCR1, which was not adjusted. The samples were analyzed for total mercury, methylmercury, percent moisture, and TOC. Finely sectioned core samples were couriered and shipped, respectively, under chain-of-custody procedures to TestAmerica Mobile (total mercury, percent moisture, and TOC analyses) and Battelle (methylmercury and percent moisture analyses). Custody seals were employed to check for tampering during shipping. The results for the finely sectioned cores are presented in Section 4.2.9.2.

2.2.9.3 Aging Cores

Select sediment cores were collected for aging analysis using lead (Pb) 210 and cesium (Cs) 137 dating from three locations in the Basin: SDCR2 (southern part of the Basin near the inlet channel), SDCR8 (deeper portion of the Basin), and SDCR9 (northwestern part of the Basin). SDCR2 and SDCR8 aging cores were completed to 11 feet, and SDCR 9 aging core was completed to 6 feet. The cores were completed to depth by ASI using Vibracore® technology. Once retrieved, the excess water was drained from the top of each core. Each core was opened in the horizontal position using a power router and a sharp knife. Once opened, the cores were checked, and if different from the coarse core at the same location, they were logged by a geologist. Sediment core boring logs are included in Appendix E.

The aging cores were sectioned at varying intervals throughout the core length; these sections were not adjusted based on percent recovery. Within the upper 50 cm, the cores were sectioned in 2-cm intervals. Every other interval within the upper 50 cm, starting with the 2- to 4-cm interval, was archived for future analysis, if needed. The remaining intervals in the upper 50 cm were analyzed for Pb^{210}. From 50 cm to 120 cm, each core was sectioned in 5-cm increments. Each sample was analyzed for Pb^{210}. Cores deeper than 120 cm were sectioned in 10-cm increments until the targeted completion depth. These intervals were analyzed for Pb^{210} except for the last three 10-cm intervals (30 cm), which were archived for later analysis, if needed. Once the Pb^{210} analyses were complete, the laboratory selected 30 intervals for Cs^{137} dating. Aging samples were shipped under chain-of-custody procedures to Battelle. Custody seals were employed to check for tampering during shipping. The sediment aging results are presented in Section 4.2.9.3.

2.2.9.4 Porewater Collection

Sediment cores were collected for the extraction of porewater from six locations in the Basin and Round Pond (Figure 2-7). These locations corresponded to finely sectioned core locations. The sediment cores were collected by pushing 24-inch core tubes into the substrate. Once retrieved, the excess water was drained from the top of each core, and percent recovery was calculated as described above. A USEPA contractor oversaw the sediment pore water extraction (preliminary testing using syringe method), collection and processing on June 4, 2009. A trip report was submitted by Tetra Tech to USEPA and Olin on June 10, 2009. The cores were placed vertically in a freezer and frozen overnight. Once the cores were frozen, they were shipped and couriered to Battelle and TestAmerica Mobile on dry ice under chain-of-custody procedures. Custody seals were employed to check for tampering during shipping.

The cores were sectioned while frozen by the laboratories. The intervals sectioned by the laboratories were adjusted based on percent recovery. The laboratories thawed the samples after sectioning the cores and centrifuged them to extract porewater from each sampling interval. Samples that were analyzed for methylmercury were centrifuged in an inert atmosphere. Sampling intervals for total mercury and methylmercury analysis (Battelle) were 0 inch to 2 inches, 2 to 4 inches, 4 to 8 inches, 8 to 12 inches, and 12 to 18 inches. Three cores for each sampling location were shipped to Battelle for porewater extraction and mercury and methylmercury analysis. The porewater from the corresponding intervals was composited to produce enough sample volume for the required analyses once the porewater was extracted for the various sampling intervals at each location. Sampling intervals for DOC analysis (TestAmerica Mobile) were 0 inch to 4 inches, 4 to 8 inches, and 8 to 18 inches. Two cores for each sampling location were shipped to TestAmerica Mobile for porewater extraction and DOC analysis. The porewater from the corresponding intervals was composited to produce enough sample volume for the required analyses once the porewater was extracted for the various sampling intervals at each location. The results of the porewater analyses are presented in Sections 4.2.9.4 and 4.2.9.5.

2.2.10 Evaluation of Sedimentation Rate

A refinement of the estimated sedimentation rate presented in MACTEC, 2009a was performed by Anchor QEA using TSS concentration data collected in August 2008, December 2008, and October 2009. Anchor QEA evaluated two transport pathways and summed the two transport pathways to estimate the total net sedimentation per year. The two evaluated sediment transport pathways were:

- Pathway 1 (Channel Transport, stage height of 6 to 12 feet): When the river stage is rising and is at a stage height of 6 to 12 feet NAVD88, water flows from the river through the intake channel into the Basin, transporting sediment into the Basin. Historical hydrographs of river flow were analyzed to determine periods when river water and sediment were transporting into the Basin via the channel.
- Pathway 2 (Basin Inundation by River Flow, stage height greater than 12 feet): When the river stage exceeds 12 feet NAVD88, overtops the berm, and the Basin is inundated by river flow, a continuous sediment load is provided to the Basin during the entire period of overtopping.

Some of the suspended sediment that enters the Basin will remain long enough to be deposited on the sediment bed. It was assumed that a certain portion of the suspended sediment, specified as the background concentration, would never be deposited on the bed, but the suspended sediment exceeding the background value would settle on the sediment bed. Background concentration was assumed to be 7.2 milligrams per liter (mg/L), based on data collected in January 2008.

The volume of water that enters the Basin was calculated for each measured stage height using topographic and bathymetric data. Sediment load to the Basin was calculated by estimating the TSS concentration that the water carried. The rate of change of the stage height was calculated for each time interval and the corresponding estimated TSS concentration for the rising limb of the flood. The average net sedimentation rate (NSR) was calculated for the entire Basin once the total mass for an event was determined.

The procedure described in the preceding paragraph was used for berm-overtopping events until the berm was overtopped. After the berm was overtopped, the amount of water and TSS that was transported through the Basin depended on flood duration. The river flowing over the inundated Basin is a continuous source of TSS, and a portion of that TSS settles in the Basin. The amount of deposited TSS depends on the volume of water flowing over the Basin (which depends on stage height and water velocity), TSS concentration, and deposition rate. Values for these parameters were estimated, and estimates of uncertainty in the three parameters were developed to quantify predicted net sedimentation rates. Two approaches were used for estimating the deposition rate of suspended sediment: calculation of settling speed based on particle diameter (from grain size data collected in October 2009), and use of long-tube testing data to estimate trapping efficiency (MACTEC, 2006b).

The mass of sediment deposited in the Basin was calculated for high-flow events during a particular year to obtain an annual NSR. The analysis was conducted for the base-case and bounding parameter combinations for the 5-year period from 2005 to 2009. This period was chosen because stage height measurements were collected at the Olin dock between 2005 and 2009. The estimated rate of annual deposition in the Basin was based on Basin-wide averages of TSS data.

Detailed methodology for evaluation of sedimentation rate is included in Anchor QEA's technical memorandum (Appendix F). The results of the evaluation are presented in Section 4.2.10.

2.3 SOIL INVESTIGATION

Soil investigations conducted during the 2009 ESPP and RI update sampling events included background soil sampling and floodplain soil sampling. The sample collection methodology is summarized in this section.

2.3.1 Background Atmospheric Deposition

Atmospheric transportation and deposition is an important pathway for the global, regional, and local distribution of mercury. The addition of inorganic mercury in wet deposition has been linked with increased methylmercury production (Engle et al., 2008). Atmospheric mercury is typically categorized by three species: elemental mercury, reactive gaseous mercury, and particulate mercury. Engle et al. (2008) found that elemental mercury deposition appears to originate from the global tropospheric pool, while particulate mercury deposition and reactive gaseous mercury deposition appear to originate from local and regional industrial sources, such as coal-fired power plants and waste incinerators. High annual precipitation, tied with the potential scavenging of particulate mercury and reactive gaseous mercury by water droplets during precipitation events, may create elevated deposition rates in the Gulf Coast region (Engle et al., 2008). The Mercury Deposition Network (2006) calculates up to 27 micrograms of mercury deposition per square meter per year in the area.

A control test plot of clean soils similar in physical characteristics to those at OU-2 was installed in an upland area next to OU-2 (Figure 2-2) on April 25, 2007, to evaluate potential atmospheric deposition contributions to OU-2. The soil in the test plot was 6 feet square and 8 inches deep. Background samples of the soil were collected in the area before construction of the berm in 2006 and later in the test plot in 2008 and 2009. These samples were analyzed for total mercury. The background soil sample collected on June 9, 2009, was shipped using chain-of-custody procedures to Battelle. Custody seals were employed to check for tampering during shipment. The 2009 sample was analyzed using low-level mercury analysis (USEPA Method 1631E), since mercury was not detected above 0.2 mg/kg in the previous samples. The results of the background deposition sampling are presented in Section 4.3.1.

2.3.2 Floodplain Soils

Floodplain soil samples were collected from July 9 to 12, 2010, at 21 locations as shown in Figure 2-8. A representative from Neptune & Company (Neptune) provided USEPA oversight on July 9, 2010. The water level in OU-2 was maintained at 6 feet NAVD88 at the gate to the outlet channel during the sampling event. Three of the 21 floodplain soil sample locations (FPSB5, FPSS11, and FPSS13) were moved from their original locations, with USEPA field oversight approval, to be collocated with terrestrial vegetation sample locations. Figure 2-8 presents the final locations of the floodplain soil samples. Three of the floodplain soil samples were collected under water: FPSS3, FPSS9, and FPSS15. These locations are classified as sediment. Surficial floodplain soil samples (0-1 inch) were collected using decontaminated stainless steel spoons. Soil borings were collected at 6 of the 21 locations using a coring device with core tubes. The cores were then split into four intervals: 0 to 1 inch, 1 inch to 2 inches, 2 to 6 inches, and 6 to 12 inches. The inundated samples were collected using a decontaminated petite Ponar dredge. Samples were collected in accordance with the USEPA-approved work plan (MACTEC, 2009c, d) except for the sieving of samples. Sieving through a 2-millimeter sieve, as requested by USEPA, was initially attempted at floodplain soil sample location (FPSS13). Sieving was demonstrated to be impractical for floodplain soil samples given their wet condition. USEPA oversight approved sampling the remaining locations without sieving. Debris was removed by hand from the sample before it was placed in sample jars for analysis. Floodplain soils were analyzed for the following constituents:

- Mercury
- Methylmercury
- HCB
- DDTR
- TOC
- Grain size

Table 2-4 presents the floodplain soil sample locations, sampling intervals, and laboratory analytical methods. Composite soil samples were prepared for grain size analysis at locations FPSB3/FPSB4 (to represent northern/eastern conditions), FPSB5/FPSB6 (to represent southeastern conditions), and FPSS13/FPSS14 (to represent southwestern conditions). The decision to composite samples for grain size analysis was made in the field with approval by USEPA oversight. Compositing the samples provided for sufficient sample size and represented various regions within the OU-2 floodplains. Only grain size samples were composited; samples for the remaining parameters were not composited.

The samples were placed in coolers and shipped overnight under chain-of-custody procedures to the analytical laboratories. Soil samples analyzed for methylmercury were shipped to Battelle on dry ice. The remaining soil samples were shipped to Accutest Laboratories in Dayton, New Jersey, on wet ice. Custody seals were employed to check for tampering during shipment. The analytical results of the floodplain soil sample collection are presented in Appendix H, Table H-8, and discussed in Section 4.3.2.

2.4 GROUNDWATER INVESTIGATION

Seventeen micro-wells were installed between July 31, 2008, and August 16, 2008, at eight locations around the Basin for groundwater collection and analysis. Micro-well BA-MW1 in OU-1 serves as an upgradient well to the Basin during non-flood or baseline conditions. The remaining wells are located within OU-2. The OU-2 wells were spaced approximately 500 to 700 feet apart along the berm (Figure 2-9). The micro-wells were generally positioned at locations thought to be potentially hydraulically downgradient and sidegradient from the largest area of higher mercury concentrations in the Basin sediments. The screens for the micro-wells were installed in the lithologic units of Riverine Deposits (R) and Alluvial Aquifer of the Alluvial Sediments (Q_2). The micro-wells were installed in clusters of two or three so that water quality parameters could be collected at shallow and intermediate depths from R and Q_2, respectively. Well depth varied based on location because of the variation in unit depth throughout the site (Table 2-5).

The micro-wells were installed with a direct push technology (DPT) rig by advancing 3.5-inch inner-diameter, hollow steel rods to total depth. The micro-wells were set within the rods by installing a 1-inch Schedule 40 PVC screen with a factory-installed sand pack and a 1-inch Schedule 40 PVC casing (Figure 2-11). Additional sand pack (a 20/40 silica sand) was installed between the factory-installed sand pack and the drill rods. The sand pack was placed up to a depth of 4 feet above the well screen. In some cases, because of bridging, small amounts of potable water were used to free bridging sand as the drill rods were withdrawn from the borehole. Potable water was also used at some locations to keep sand from flowing into the borehole during well installation. After the sand was installed, the remaining annular space was tremie-grouted to land surface, and the drill rods were extracted, leaving the micro-well in place. Well construction details are summarized in Table 2-5. Boring logs, including construction details and geologic cross sections, are presented in Appendix E.

Ten piezometers were installed between August 17 and 21, 2008, in clusters of two or three at four locations (BA-PZ1, BA-PZ2, BA-PZ3, and BA-PZ4) to provide permanent locations for water level measurements (Figure 2-9). Piezometers BA-PZ1 and BA-PZ2 are installed within OU-1 and are upgradient to the Basin during non-flood or baseline conditions. The remaining piezometers are located within OU-2. The screens for the piezometers were installed in the lithologic units of Riverine Deposits (R) and Alluvial Aquifer of the Alluvial Sediments (Q_2) at varied depths.

The piezometers were installed using a DPT rig by advancing 3.5-inch inner-diameter, steel rods to total depth. At the desired depth, the piezometers were installed following the same procedure used in installing the micro-wells (Figure 2-10). The only difference between the installation method for micro-wells and piezometers was the grouting process. During piezometer installation, grout was not tremied but was slowly poured into the annular space between the casing and the rods. As the drill rods were slowly removed from the borehole, additional grout was poured into the annular space. This process continued until the annular space was filled to the land surface. Additional details on piezometer installation are presented in MACTEC, 2008c. Piezometer construction details are summarized in Table 2-5 and on Figure 2-10. Piezometer completion logs and geologic cross sections are presented in Appendix E.

Groundwater samples for chemical analysis were collected from the newly installed micro-well clusters (BA-MW1 through BA-MW8). Purging was not completed and a groundwater sample for chemical analysis was not collected from micro-well BA-MW1A because of an insufficient quantity of groundwater in the micro-well.

Two groundwater sampling events were conducted. The first event occurred from September 23, 2008, to September 30, 2008. During this event, groundwater samples were collected from micro-well clusters BA-MW1 through BA-MW8. The second groundwater sampling event occurred between November 11 and 12, 2008, and served as a confirmation sampling event. During this confirmation event, groundwater samples were collected from micro-wells BA-MW1B, BA-MW1C, BA-MW2C, BA-MW3B, BA-MW4C, and BA-MW5C.

The wells were purged and sampled in accordance with the USEPA standard operating procedures and USEPA Method 1669 *Sampling Ambient Water for Determination of Metals at EPA Water Quality Criteria Levels* (USEPA, 1996). The groundwater depth was measured in each well and piezometer, and the groundwater elevations were calculated. The micro-wells were purged before sample collection using low-flow purging techniques with a peristaltic pump and new polyethylene tubing. Field parameters (including temperature, pH, specific conductance, turbidity, DO, and ORP were measured during purging. A groundwater sample was collected when the field parameters stabilized (i.e., three consecutive measurements were within a range of 5 percent) and the water turbidity was less than 10 nephelometric turbidity units (NTUs). Groundwater elevation and field parameters are summarized in Tables 2-6 and 2-7, respectively. Groundwater field sampling logs are provided in Appendix B.

The groundwater and quality control samples collected during the two groundwater sampling events were placed in coolers with "wet" ice and transported under chain-of-custody procedures to Battelle and Pace Analytical Services, Inc. in Green Bay, Wisconsin (Pace Green Bay) for analysis.

Battelle analyzed the groundwater samples for mercury (filtered and unfiltered) by USEPA Method E1631. Confirmation samples were collected from monitoring wells BA-MW1B, BA-MW1C, and BA-MW2C in November 2008 and analyzed for mercury (filtered and unfiltered).

Groundwater samples collected in September 2008 from monitoring wells BA-MW2B, BA-MW2C, BA-MW3B, BA-MW3C, BA-MW4B, BA-MW4C, BA-MW5B, and BA-MW5C were analyzed for HCB by Pace Green Bay (USEPA Method SW8081). These micro-wells were selected for HCB analysis with USEPA approval because they were nearest to and likely downgradient/sidegradient from the southern portion of the Basin, which contained the highest HCB concentrations in sediment. Confirmation groundwater samples were collected from monitoring wells BA-MW3B, BA-MW4C, and BA-MW5C in November 2008 and analyzed for HCB.

Groundwater samples collected in September 2008 from monitoring wells BA-MW2B, BA-MW2C, BA-MW4B, and BA-MW4C were analyzed by Pace Green Bay for DDTR (USEPA Method SW8081). These micro-wells were selected for DDTR analysis with USEPA approval based on potential preferred flow paths within a potential historical river channel.

2.5 ECOLOGICAL INVESTIGATIONS

Ecological investigations at OU-2 have included vegetation studies, spider and insect sample collection, fish tissue sample collection, benthic macroinvertebrate community assessment, and collection of aquatic invertebrates and various other biota for COC analyses; vertebrate community assessment; protected species assessment; and bioaccumulation studies. The sample collection methodology is summarized in this section.

2.5.1 Terrestrial Vegetation

Terrestrial vegetation samples were collected on July 7 and 8, 2010 (Figure 2-12). A representative from Neptune provided USEPA oversight during sample collection. Nine of the 10 terrestrial vegetation samples were collected as proposed (MACTEC, 2010a,c). One of the 10 terrestrial vegetation sample locations (FPVSS9) was relocated because it was underwater, and there was no suitable vegetation. The sampling location was moved to FPVSS10. The new location had the same soil analyses as FPVSS9, was the same distance north of the boat ramp as FPVSS9, and was not underwater. USEPA oversight approved this relocation. Vegetation samples were collected using decontaminated stainless steel pruning shears. Vegetation samples were triple-rinsed with ASTM Type II water to remove soil and debris and prevent cross-contamination.

Terrestrial vegetation samples were analyzed for mercury, methylmercury, HCB, DDTR, and percent lipids. The samples were placed in coolers on wet ice and shipped overnight under chain-of-custody procedures to the analytical laboratories. Samples for methylmercury analysis were sent to Battelle. Samples for the remaining analyses were sent to Pace Green Bay. The analytical results of the vegetation sample collection are presented in Appendix H (Table H-9). The analytical results for the terrestrial vegetation samples are discussed in Section 4.5.1.

Aquatic vegetation was not collected as proposed (MACTEC, 2010a,c) because none was present at the proposed sampling locations. USEPA oversight concurred with this decision.

2.5.2 Spiders and Insects

Spider and insect samples were collected on July 9, 12, and 13, 2010. A representative from Neptune provided USEPA oversight on July 9, 2010. Six insect sampling locations were proposed (Figure 2-13), and three types of samples were to be collected from each location: spiders, flying insects, and crawling insects. The six locations were sampled as proposed; however, due to insufficient sample mass for spiders and crawling insects, three samples were composited. These samples were the spider samples from INS4 and INS5; the spider samples from INS1, INS2, and INS3; and the crawling insect samples from INS1, INS2, and INS3. USEPA approved this methodology. Spider and insect samples were collected in accordance with the USEPA-approved work plan (MACTEC 2010d, e). Spiders were collected using nets, flying insects were collected using white sheets lit with ultraviolet light, and crawling insects were collected by disturbing shrubs and grasses and collecting the insects on a canvas tarp.

Spiders and insects were analyzed for mercury, HCB, DDTR, and percent lipids. The samples were placed in coolers on dry ice and shipped overnight under chain-of-custody procedures to Pace Green Bay. The analytical results are presented in Appendix H (Table H-10) and discussed in Section 4.5.2.

2.5.3 Fish

Fish collections have been performed at various times throughout investigative activities at OU-2 to obtain tissues for mercury, methylmercury, HCB, DDTr, and DDTR analyses from lower, middle, and upper trophic level to evaluate bioaccumulation.

Multiple methods were used to collect target fish during the 1991 RI (WCC, 1993). Target fish included largemouth bass (*Micropterus salmoides*), bullheads, or catfish. The methods used included hoopnets, gillnets, and boat electrofishing. Target fish captured in gillnets were removed and stored on ice until processing. Stunned fish from boat electroshocking were collected using dipnets and stored on ice until processing. During efforts to collect the target species, observations were recorded on the numbers and sizes of other fish collected. Largemouth bass and channel catfish (*Ictalurus punctatus*) filet and whole body analyses were conducted for mercury, HCB, and DDTr.

Largemouth bass were targeted for collection using boat electrofishing during the additional ecological studies and for the ERA (WCC, 1994, 1995). Fine-mesh nets, including seine nets, were used in littoral areas to capture mosquitofish. Largemouth bass and mosquitofish (*Gambusia affinis*) were also collected in 2001. Mosquitofish were collected using seines and dipnets at seven sites within the Basin and Round

Pond (URS, 2002). Largemouth bass were also collected during this sample period using large and small electroshocking units including boat-mounted and backpack units. Fish collected during 1994 and 2001 were analyzed for mercury, HCB, DDTr, and DDTR. Both whole body and filet tissues of largemouth bass were analyzed.

Largemouth bass were collected using boat electroshocking techniques in 2003, 2006, and 2007. Largemouth bass filets were analyzed for mercury. Channel catfish were also collected in 2003, with filets analyzed for mercury.

Fish tissue collections in October 2008 targeted brook silversides (*Labidesthes sicculus*), bluegill (*Lepomis macrochirus*), and largemouth bass to assess concentrations in lower, middle, and upper trophic level fish. Fish sampling was performed using boat electrofishing in four quadrants within the Basin: northeast, northwest, southeast, and southwest. The following protocols were used when collecting fish, based on predator feeding habits:

- Silversides were greater than 1 inch total length (TL). Five fish were collected per quadrant and composited for whole body analysis for mercury and HCB.
- Bluegill whole body samples were analyzed for mercury and HCB:
    - One fish 2 to 3 inches TL per quadrant
    - One fish 3 to 4 inches TL per quadrant
    - One fish 4 to 5 inches TL per quadrant
    - One fish 5 to 6 inches TL per quadrant
    - One fish 6 to 8 inches TL per quadrant
- Largemouth bass:
    - Five fish between 3 and 10 inches TL per quadrant. Whole body analyses for mercury and HCB were conducted on these fish.
    - Five fish between 10 and 19 inches TL per quadrant. Filet analyses for mercury and HCB were conducted on these fish.

Lengths and weights were recorded for each fish collected. Fish tissue collection results are discussed in Section 4.5.3.

2.5.4 Other Biota

Benthic macroinvertebrate sampling to characterize the infaunal community was conducted in three phases at OU-2 during the RI/FS investigation in 1991 and 1992 (WCC, 1993) and during the additional ecological studies (WCC, 1994).

Additional aquatic invertebrates (various crayfish species, grass shrimp, and blue crab [WCC, 1994]) were encountered during efforts to collect selected prey animals for COC analyses for the additional ecological studies.

Other organisms sampled during RI activities have included aquatic insect nymphs (including Ephemeroptera [mayflies], Plecoptera [stoneflies], and Trichoptera [caddisflies] and other insect species), terrestrial insects and spiders, freshwater mussels, crayfish, bullfrogs (*Rana catesbeiana*), little blue herons (*Egretta caerulea*), and raccoons (*Procyon lotor*). These biota samples were analyzed for mercury, HCB, DDTr, and DDTR. The results of these analyses, which were used to evaluate ecological risk to various trophic level organisms, are discussed in Part 2 (Updated Ecological Risk Assessment) of this document.

The occurrence and relative abundance of terrestrial and semi-aquatic vertebrates (amphibians, reptiles, birds, and mammals) in OU-2 was summarized in WCC, 1994. The faunal lists were updated throughout the field investigations at OU-2, in particular the annotations regarding confirmed presence in the area. These species are discussed in Section 3.9.4.

The potential occurrence of federally protected species at OU-2 was evaluated from a review of the U.S. Fish and Wildlife Service (USFWS) Alabama Ecological Service Field Office list of federally protected species by county (USFWS, 2010). The potential occurrence of federally protected species at OU-2 is discussed in Section 3.9.5.

2.5.5 *Corbicula* Bioaccumulation Study

In situ bioaccumulation studies were performed as a means of evaluating the ESPP (MACTEC, 2006a, 2009d). These studies involved placing caged Asiatic clams (*Corbicula fluminea*) in the Basin for 28 days. The *Corbicula* bioaccumulation cages were placed at consistent locations from one study to the next (Figure 2-14) at the same time of year to evaluate changes in bioaccumulation rates of mercury and methylmercury. The bioaccumulation studies occurred over a 28-day period from the end of September to the end of October. Flood conditions in 2009 precluded placement of the bioaccumulation cages during that period. Flooding conditions continued through the end of the year. The 2006 and 2008 bioaccumulation study results are presented in Section 4.5.5.

3.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

Physical characteristics of OU-2 including surface features, meteorology, surface water hydrology, geology, soils, hydrogeology, demography, land use, and ecology are described in this section.

3.1 SURFACE FEATURES

The area surrounding OU-2 is part of the Coastal Plains and Flatwoods (Lower) Section of the Outer Coastal Plain Mixed Forest Province. The predominant landform is a flat, weakly dissected alluvial plain that was formed by deposition of continental sediments onto a submerged, shallow continental shelf, which was later exposed by sea level subsidence. About 90 percent of this section consists of irregular or smooth plains. Other landforms include open hills. Land surface elevation ranges from 80 to 660 feet. Local relief ranges from 10 to 30 feet on smooth plains, and from 30 to 50 feet in areas of hills (McNab and Avers, 1994).

OU-2 is next to the Tombigbee River in Washington County, Alabama. OU-2 comprises the Olin Basin (Basin), Round Pond, surrounding floodplains on the Olin property, and the former wastewater ditch. The Basin and Round Pond cover approximately 76 and 4 acres, respectively. The Basin is located between a bluff to the west and the river to the east. The bluff is approximately 20 to 30 feet higher in elevation than the floodplain area near the Basin (Figure 1-1). The Basin and Round Pond are thought to be part of a former natural oxbow lying within the floodplain of the river. The site also includes a berm and gate system and an inlet channel that provides a hydraulic connection between the Basin and the river. A detailed description of the system is included in Section 1.2.1.

3.2 METEOROLOGY

The climate in this area is humid subtropical, with relatively mild winters. Rainfall in southern Alabama is distributed relatively evenly throughout the year. Frost and especially snow seldom occur. According to the National Weather Service (NWS) regional report (1971-2000), the region has an average annual precipitation of 66.62 inches, and an average annual temperature is 67.4 degrees Fahrenheit (°F), with July having the highest monthly average (82.1°F) and January having the lowest monthly average (50.7°F). The National Climatic Data Center reported an average annual precipitation of 66.3 inches from 1990 to 2009 at McIntosh, Alabama. Winds are variable throughout the year, but there are general seasonal patterns. Winds are mainly from the south or southeast from March through August; winds tend to be from the north during the remainder of the year (McNab and Avers, 1994).

3.3 SURFACE WATER HYDROLOGY

The ESPP includes a berm and gate system plus an inlet channel that provides a hydraulic connection between the Basin and the Tombigbee River. The purpose of this constructed system is to enhance movement of sediment-laden floodwater into the Basin and then hold the water and sediment to allow the sediment to be deposited within the Basin.

During base flow or non-flood conditions in the Tombigbee River, water levels in the river are typically near 3 feet NAVD88, and there is little or no flow from the Basin to the Tombigbee River or vice versa. River water flows from the south to north from the Tombigbee River to the Basin through the inlet channel under rising water levels up to 12 feet NAV88. Water enters the Basin from the north and east through the floodplain areas surrounding the Basin and exits the Basin to the south when floodwaters overtop the berm (flood level above 12 feet NAVD88). Minor tidal influences have also been observed at the Basin when the Tombigbee River level is about 3 feet NAVD88.

The ESPP provided conditions where sediment available in floodwaters may settle and cover the existing sediments by holding floodwater in the Basin over a longer duration and in a more quiescent condition than would occur naturally.. The gate is lowered to receive incoming water when water levels rise above 6 feet in elevation during flooding. The floodwaters held in the Basin are released approximately 48 hours after the water level in the river falls below flood stage. The 48-hour holding time does not alter the pattern of flooding in OU-2 above that of the natural variability associated with the flood events. Additional descriptions of site hydrology are presented in Sections 1.2.1 and 5.1.

3.4 GEOLOGY/HYDROGEOLOGY

The Basin and Round Pond lie with the floodplain of the Tombigbee River. Alluvial deposits of unspecified age are present from the land surface of OU-2 to a depth of approximately 20 to 30 feet. These deposits consist of reworked and redeposited sediments and river-transported sediment. The sediments consist of interlayered sands, silty or clayey silts, and clays. These sediments represent numerous depositional environments including natural levees, bars, infilled channels, channel deposits, flood-splays, and other deposits associated with meandering rivers. Cores collected within the Basin and Round Pond, including the deepest portion of the Basin, indicated the presence of predominantly clay Riverine deposits continuously beneath the Basin and Round Pond. Geologic conditions based on hydrogeologic investigations at OU-2 are presented in cross-sections (Figures 3-1 and 3-2) and are described in descending order in the following paragraphs.

Riverine deposits (R), accumulated beneath the Basin and Round Pond, are flood deposits from the Tombigbee River. These sediments are typically composed of tan, black, and dark gray silty clays and clayey silts that are interspersed with fine-, medium-, and coarse-grained sands (Figures 3-1 and 3-2). The 2009 core data collected within the Basin and Round Pond indicate that these deposits are at least 6.5 to 11 feet thick and are continuously present beneath the Basin and Round Pond. Cores collected in the sediment beneath the Basin and Round Pond contain predominately clay. Sand, silt, and broken shells were observed within the upper portion of this clay starting at the clay surface to approximately 2 to 5 feet in depth. The clay becomes more dense and stiff with depth; sand, silt, and broken shells were not observed below 5 feet in the cores. The clays vary ini thickness from approximately 13 to 23 feet and are unconfined. Groundwater flow appears to be to the southeast.

The bluff to the west of OU-2 is approximately 20 to 30 feet higher in elevation than the floodplain. Previous investigations indicated that the Upper Clay Unit at the Alluvial Sediment (Q_1) west of OU-2 primarily consists of a silty/sandy plastic clay (Figure 3-1) (WCC, 1993). Q_1 sediments were observed immediately west of the bluff in OU-1 at a thickness ranging from 10 to 20 feet. These sediments were composed of sandy clay, low plasticity clay, and clayey sand.

The Alluvial Aquifer system of the Quaternary Alluvial Sediment (Q_2) varies in thickness from approximately 37 feet in the west plant area to 60 feet in OU-1. East of the bluff, Q_2 averages about 40 feet thick and typically grades downward from fine sands to coarse-grained sands with some gravel in OU-2. Q_2 is divided into two zones, an upper zone and a lower zone, and is generally unconfined near the Basin. Groundwater flow is generally to the southeast.

The upper zone of Q_2 is composed primarily of very fine to fine-grained silty quartzose, subangular to surbround sand. The lower zone of Q_2 is composed of fine to very coarse, orange-brown, quartzose, cherty, subangular to subrounded sands containing varying amounts of gravel. Although composed predominantly of sands, Q_2 also contains some thin beds of clay or silty, gravelly clay.

To the north, south, and east of the Basin it appears that Q_1 and the upper zone of Q_2 have been eroded by the Tombigbee River and are not present, but the lower zone of Q_2 is present.

Significant vertical gradients were not observed between R and Q_2 based on September 22, 2008, groundwater measurements. It is likely that the variable lithology of the units and potential error in field measurements resulted in minor variations in the vertical gradients.

Bottom elevation of the Basin ranges from approximately 2 to -36 feet NAVD88. Shallow areas (2 to -4 feet NAVD88) are located in the southern portion of the Basin. The deepest part of the Basin is in the northwest. Floodplains are located to the north, northeast, and east of the Basin. The Basin is underlain by R, followed by the alluvial sediments of the lower zone of Q_2; therefore, the Basin is in direct hydraulic connection with R.

The Miocene Confining Unit (Tm_1) underlies Q_2. This unit consists of clays, sandy clays, or clayey sands. Although the lithology may be complex, it is predominantly clay, with various amounts of discontinuous sand, silt, or fine gravel. Boring logs from wells that penetrate Tm_1 indicated that this unit is laterally continuous beneath OU-1 and approximately 80 to 100 feet thick in the plant areas west of OU-2. At OU-2, Tm_1 consisting of a low-plasticity clay was found along the bluff at depths ranging from 55 to 65 feet below land surface. Just above the clay unit, a 10- to 15-foot layer of coarse sand and gravel was present and served as a marker for the approaching Tm_1 unit. Along the southern berm, the top of Tm_1 was not always encountered. Where Tm_1 was not encountered, a layer of well-graded gravel underlain by poorly graded fine sand was used as a marker bed for approaching the top of Tm_1. This gravel layer was encountered at depths ranging from 39 to 42 feet below the top of the berm.

Tm_1 is underlain by the Miocene Aquifer. The Miocene Aquifer is composed primarily of thick-bedded, coarse sand and gravel beds; however, sandy clay lenses occur within this unit. The attitude of the upper boundary of this aquifer is nearly horizontal in the main plant area; however, in the west plant area there is a pronounced southeastward dip, from -114 to -166 feet NAVD88 at OU-1. These differences are interpreted to be related to structural deformation of sediments associated with an underlying salt dome. The Miocene Aquifer was not encountered during the OU-2 investigation.

Review of potentiometric surface maps from OU-1 investigations and monitoring reports (WCC, 1995; URS, 2007) indicates groundwater flow in the Alluvial Aquifer west of OU-2 is generally toward the southeast in the vicinity of OU-2. However, during elevated flow events when the water surface of the Tombigbee River is higher than the potentiometric surface in the Alluvial deposits, the groundwater flow direction near OU-2 is likely to be temporarily toward the west (WCC, 1993). The groundwater surface in the Alluvial Aquifer in OU-1 lies more than 25 feet below the bottom of the wastewater ditch near OU-1. Groundwater would not recharge the wastewater ditch near OU-1 (WCC, 1993). During flood events, OU-2 and surrounding flooded areas would be a recharge area for Q_2, and groundwater flow is expected to be temporarily in a western direction immediately west of the flooded area.

Potentiometric flows during low flow condition at OU-2 are depicted on Figure 3-3. Groundwater flow is from west to east during low flow conditions with a drop in head from the bluff to the eastern side of the berm. The elevation of the wastewater and former discharge discharge relative to the groundwater surface elevation in OU-2 is not currently known. An elevation survey of these ditches, along with depth to groundwater measurements, will be collected as part of the remedial process.

3.5 SOILS

Soils in the area of the plant, OU-1, and OU-2 are mostly Udults, with Paleudults and Hapludults on uplands. Fragiudults and Fragiudalfs are associated soils on sites that range from well drained to poorly drained. Localized areas of Quartzipsamments occur in the southern part of the Coastal Plains and Flatwoods (Lower) Section, along with Paleudalfs and Glossaqualfs. Ochraquults, Albaquults, and Paleaquults are locally common on low wetlands. Udifluvents, Fluvaquents, and Dystrochrepts are present in bottomlands. These soils, which have a thermic temperature regime and a udic moisture regime, are deep with loamy or clayey subsoil. Soils range from well drained to poorly drained and are fine to moderately fine textured (McNab and Avers, 1994).

OU-2 lies in the Alluvial-deltaic Plain, which consists of sediment deposits associated with larger rivers. OU-2 is located within the outcrop area of the upper clay unit. The lithology of this unit is variable, but is composed primarily of red-brown, yellow-brown, and gray, silty/sandy plastic clay. The silt and sand content varies and generally increases with depth. Thin, probably discontinuous sand and silt lenses occur interbedded with the clay. The thickness of the upper clay unit varies from 10 feet to 60 feet in depth (WWC, 1993; MACTEC, 2010a).

A relatively thin unit consisting of tan, black, and gray, silty clays and clayey silts thins from 5 feet to 1 foot from west to east in the Basin. Interspersed through the unit are fine-, medium-, and coarse-grained sands up to 1.5 inches thick. Dark gray, organic, silty clay was encountered at the same depth relative to the depth of water, and is interpreted to be floodplain deposits of the adjacent Tombigbee River (WWC, 1993; MACTEC, 2010a).

3.6 DEMOGRAPHY

The population of Washington County is 18,097, with 16.7 people per square mile according to the 2000 census. Infants and schoolchildren (birth to 18 years old) made up about 24.0% of the population. The 65 and older population was about 15.2% of the total. There were 6,705 households with an average of 2.69

persons per household. The median household income for the county was $37,076 in 2008, with 18.2% of individuals living below the poverty level.

3.7 LAND USE

Natural vegetation has been cleared for agriculture on about 40 percent of the area in much of the Coastal Plains and Flatwoods (Lower) Section (McNab and Avers, 1994). The most common land uses are forest (64.35%), wetland (7.43%), and rangeland (7.42%) in Washington County (USGS, 2011).

Residential land use within 3 miles of OU-2 includes individual dwellings and groups of 2 to about 20 dwellings (WWC, 1993). Commercial activity is generally related to basic domestic needs and services along Highway 43. The two main industries within a 3-mile radius of OU-2 are the Olin and BASF (formerly Ciba-Geigy) facilities. A compressed air power plant (Alabama Power) and a cement company are also within a 3-mile radius. Recreation areas include the town park next to River Road, and a fishing camp at McIntosh Landing. Public use areas within a 3-mile radius include town government buildings, public schools, a public library, churches, and cemeteries. The predominant land use with a 3-mile radius is forest, followed by wetland areas.

3.8 ECOLOGY

This section provides a brief overview of information previously compiled on the biological populations and major communities of OU-2 during the 1990s, supplemented by current observations, to complete a description of the setting and context for assessment of ecological risks. Intensive studies were performed in the 1990s on vascular plant communities, infaunal benthic invertebrates, and fish (WCC, 1993, 1994, 1995). Qualitative assessments were made of terrestrial or semi-aquatic vertebrates (amphibians, reptiles, birds, and mammals, collectively referred to as tetrapods) and the potential occurrence of federally protected species at OU-2 (WCC, 1994, 1995).

The area surrounding OU-2 is part of the Southeastern Floodplains and Low Terraces Ecoregion (USEPA Level IV), a subdivision of the Southeastern Plains Ecoregion (USEPA Level III). The Southeastern Floodplains and Low Terraces comprise a riverine ecoregion of large, sluggish rivers and backwaters with ponds, swamps, and oxbow lakes. River swamp forests of bald cypress and water tupelo and oak-dominated bottomland hardwood forests provide important wildlife corridors and habitat. In Alabama, cropland is typical on the higher, better-drained terraces, while hardwood forests cover the floodplains (USEPA, 2000).

3.8.1 Vegetation

Six basic vascular plant communities, or vegetative cover types, were identified within OU-2 as presented in Table 3-1. The cover types include ponds and streams (permanent water bodies), semipermanently and permanently flooded bottomland forest, temporarily flooded bottomland forest, successional shrub-dominated bottomland areas, herbaceous-dominated bottomland areas, and mixed hardwood and pine upland forest. The vascular flora communities identified during the previous survey were consistent with the current vegetative communities present on site (WCC, 1994).

Details of vegetative community structure in these various habitat types (by stratum) are available in the RI Report (WCC, 1993). The distribution of vascular plant communities in OU-2 generally follows a pattern expected for a riparian wetland. Early successional herbaceous and shrub-dominated zones occur along the lower terrace of the river southeast of OU-2. The zonation of these communities generally is perpendicular to the river, reflecting a pattern of active terrace and natural levee development near the river. Most of the herbaceous vegetation consists of annual species and grasses or sedges commonly found along such periodically inundated areas. A successional gradient from an herbaceous zone along a shrub zone to a mature hardwood forest occurs towards the Basin. Although the successional areas southwest and southeast of the Basin have the superficial appearance of disturbed lands (especially from the air and in relation to the dense bottomland forest), the areas do not show evidence of stresses other than those normally associated with active riverine or stream bank areas.

The temporarily flooded bottomland forest, semi-permanently flooded bottomland forest, and mixed upland forest all appeared to be typical of these types within the Southern Pine Hills District of the Eastern Gulf Coastal Plain in terms of species composition and structural characteristics. The limited signs of stress and disturbance in these wooded areas included evidence of logging (apparently many decades ago); at least one (perhaps more) localized fire; and localized physical disruption of the soil and/or hydrology (e.g., along where BASF's discharge line was laid next to the eastern property boundary of the site, where the berm was constructed around the Basin and Round Pond, and in the borrow area on the top of the western bluff area). Insect and disease damage, including webworms, chewing insects, and rusts, were noted in scattered locations but were not indicative of a pattern that could be associated with any other stressors, such as the presence of constituents of potential concern (COPCs), fire, or hydrologic factors. Other than the effects mentioned above, vegetative conditions throughout OU-2 appear to be good, with normal vigor and color. Significant deformities or other indications of altered plant growth were not found.

3.8.2 Benthic and Other Aquatic Invertebrates

The benthic community at OU-2 was dominated by oligochaetes (segmented worms, especially of the families Tubificidae and Naididae); larval dipteran insects (especially chironomids [midges] and chaoborids [phantom midges]); and ostracods, as would be expected in a freshwater or oligohaline environment such as OU-2.

3.8.3 Fish

The Lower Tombigbee River drainage has 131 documented fish species (Mettee et al., 1996). Approximately 60 of these species are expected to occur in OU-2 or the immediate vicinity based on habitat preferences (Table 3-2). The presence of 41 of the expected species has been confirmed (Table 3-2), and approximately 30 to 35 species appear to be relatively abundant based on the semiquantitative data summarized in the RI Report (WCC, 1993) and observations during fish collection activities. The location of OU-2 in the Lower Tombigbee River Basin near the Mobile River Basin (two of the most diverse river systems in Alabama) accounts for the high species diversity at OU-2. Habitat diversity within OU-2 (deepwater habitat, shallows, large woody debris, permanently and semi-permanently flooded wetlands, and floodplains) and abundant food sources further support the species diversity observed at OU-2.

Fish were collected in 1986, 1991, 1994, 1995, 2001, 2003, 2005, 2006, and 2008. The main objective of fish sampling activities at OU-2 has been to obtain tissues for COC analyses. The results of the sampling are summarized in Section 4.5.3. The fish community of OU-2 appears to be typical of similar environments throughout the Eastern Gulf Coastal Plain, considering the gear used, level of effort, and the prevailing sampling conditions. The only species that is usually common in such habitats that has not been observed is the bowfin (*Amia calva*). The OU-2 fish community includes certain euryhaline fishes (e.g., least killifish [*Heterandria formosa*], Atlantic needlefish [*Strongylura marina*], and hogchoker [*Trinectes maculatus*]).

3.8.4 Terrestrial and Semi-Aquatic Vertebrates (Wildlife)

The occurrence and relative abundance of terrestrial and semi-aquatic vertebrates (amphibians, reptiles, birds, and mammals) in OU-2 was summarized in the additional ecological studies report (WCC, 1994). MACTEC scientists updated these faunal lists throughout the field investigations at OU-2, in particular the annotations regarding confirmed presence in the area. These species are presented in Table 3-3. Many of the strictly terrestrial vertebrates (e.g., some reptiles, most mammals) probably occur in the floodplain area of OU-2 only as dry-season transients. WCC (1994) indicated that there was no evidence to suggest that the terrestrial vertebrate populations in OU-2 were different from those in comparable habitats in the region.

The available information on tetrapod vertebrates in OU-2 is generally observational and limited, since minimal standardized quantitative sampling was performed. Nevertheless, it provides a basis for a general qualitative description of the higher vertebrate communities in the study area. The presence of at least 12 types of amphibians, 17 types of reptiles, 58 types of birds, and 16 types of mammals in OU-2 have been confirmed directly through observation or indirectly through scat and sign.

3.8.5 Threatened and Endangered Species

The potential occurrence of federally protected species at OU-2 was evaluated from a review of the USFWS Alabama Ecological Service Field Office list of federally protected species by county (USFWS, 2010). Twenty-two federally protected taxa are known to occur in Washington, Baldwin, Choctaw, Clarke, and Mobile Counties. These species include one amphibian, five birds, two fishes, three mammals, two invertebrates (mussels), two plants, and seven reptiles (Table 3-4). Of these 22 protected species, the bald eagle (*Haliaeetus leucocephalus*) has been observed at OU-2. Bald eagles were delisted as a protected species by USFWS as of June 29, 2007. Although no longer afforded protection by the Endangered Species Act, the bald eagle is still protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act, both of which protect bald eagles by prohibiting killing, selling, or otherwise harming eagles, their nests, or eggs.

The wood stork (*Mycteria americana*) and the Alabama redbelly turtle (*Pseudemys alabamensis*) are two federally protected species with moderate likelihood of actually residing in OU-2, although neither of these has been observed throughout numerous field efforts. Occurrence of the remaining federally protected species in habitats available at OU-2 is highly improbable, because either the preferred habitat is elsewhere; or suitable habitat is present but the species were reportedly extirpated from the area long ago.

4.0 NATURE AND EXTENT OF CONTAMINATION

The results for the 2006 baseline ESPP sampling, 2008 and 2009 monitoring, and historical (collected prior to and including 2001) data are discussed below. A data quality evaluation is presented in Appendix G. Tables containing analytical results for individual samples from 2006, 2008, and 2009 are included in Appendix H. Copies of the 2009 laboratory analytical reports for are provided on a compact disk in Appendix I. A sample summary listing sample name, analysis method, and reporting limit is also provided in Appendix I for each sample. Historical data prior to 2001 and biota data are summarized in Section 1.2.3.4.

This section also presents field and analytical results for sampling activities conducted to address the data gaps identified in Table 4-1. The ESPP monitoring data, summary of historical data, and data obtained to address data gaps comprise the RI Addendum.

4.1 BATHYMETRIC SURVEY AND DEBRIS EVALUATION

A bathymetric survey was conducted in the Basin in November 2006 by EHI. A contour map generated from swath soundings is shown on Figure 1-2. A total of 242,855 grid nodes were generated from approximately 20 million individual soundings. The water level defining the shoreline on November 16, 2006, was 4.64 feet NAVD88. The deepest depths were -36.3 feet NAVD88, which creates a depth relief of approximately 40 feet with slopes as high as 13 degrees.

Sidescan data collected during the bathymetric survey revealed that the Basin bed is covered in substantial amounts of debris. Debris is significantly larger closer to the Basin edge, up to tens of meters long, several meters wide, and protruding from tens of centimeters to up to a meter from the Basin bed. This debris likely consists of larger logs and stumps. Approximately 50 percent of the Basin edges are characterized by debris of this type. The shallower portion of the Basin (less than approximately -8 m water depth NAVD88) has numerous smaller features, ranging from less than 1 m to several meters long, and up to 1 m or more wide. The average length and/or width of these features is approximately 60 cm, with an average height above the sediment bed of less than 20 cm, and these features are interpreted to be tree branches and/or other forest litter. This smaller debris is more prevalent in the southern portion of the Basin (covering approximately 40 to 50 percent of the Basin bottom) than in the northern portion (approximately 30 percent of the Basin bottom). The deeper portion of the Basin in the northwestern quadrant is composed of significantly softer sediment, which absorbs the seismic energy and results in fewer apparent features (approximately 15 percent of the Basin bottom). The features that are observed are approximately the same size as the larger features of the shallower environs described above, likely tree branches and/or other forest litter. Smaller features might be buried in the softer sediments of the deeper Basin region, or might not reflect sufficient energy to be detectable in the sidescan record.

The visible measurements (length, width, and height estimates) may have changed for a given individual feature due to settling and/or sedimentation. New debris may have accumulated since the features were mapped in the 2006 survey. Detailed results of the debris evaluation are provided in Appendix A.

4.2 SURFACE WATER AND SEDIMENT INVESTIGATION RESULTS

Surface water investigations conducted in 2009 included collection of in situ surface water quality measurements, surface water sample collection, storm event surface water sample collection, and gate overflow surface water sample collection. Sediment investigations conducted during the 2009 sampling events included sediment monitoring, sediment trap sampling, a wind-driven sediment resuspension study, sediment pin accumulation monitoring, collection of sediment cores and porewater samples, and an evaluation of the sedimentation rate. The results of the surface water and sediment investigations are presented in this section.

4.2.1 Surface Water Quality

The surface water quality profile data, which are presented in Appendix C, include both the monthly water quality profile data collection and the water quality data collected at each surface water and sediment sampling location during the annual ESPP monitoring. Data summaries are also included in Tables 4-2, 4-3, and 4-4.

Temperatures were generally coolest in the deeper portion of the Basin (ST32/ST33), and water temperature profiles followed similar patterns throughout the Basin within each month. Temperatures in the profiles were warmer at the surface than at depth (Appendix C, Figure C-1).

Thermal stratification was evident at ST17, ST14 (next to the deeper portion of the Basin), ST19, and ST32/33 (the deeper portion of the Basin) in April. Water depths at those locations were approximately 11 feet, 19 feet, 10 feet, and 40 feet, respectively. Temperature gradients were consistent throughout the epilimnion (the upper, well-mixed, well-illuminated, nearly constant temperature region of a stratified lake) and hypolimnion (the poorly illuminated lower region of a stratified lake) in and near the deeper portion of the Basin. Temperature gradients dropped by more than 1 degree Celsius (°C) per meter within the metalimnion (region between the epilimnion and hypolimnion where the thermocline is located). The metalimnion was located around 4 feet deep. Shallower areas of the Basin did not exhibit this stratification, even though temperature decreased with depth.

Thermal stratification was also evident at location ST32/33 and ST14 in July and August. The maximum depth in the deeper portion of the Basin and at ST14 during that time was approximately 42 feet and 18 feet, respectively. Temperature gradients were consistent throughout the epilimnion and hypolimnion, and dropped by more than 1°C per meter within the metalimnion, which was around 13 feet deep. Summer thermal stratification was not evident at other locations.

Dimictic lakes are defined as having two turnover events (two circulation or mixing periods). A vernal period occurs in the spring before direct thermal stratification in the summer. An autumnal period occurs in the fall after temperature stratification is destroyed. The thermal stratification observed in the Basin is consistent with a dimictic lake profile, which includes direct stratification during summer months (Cole, 1994).

Surface water DO concentrations were consistent with spatial and seasonal temperature trends (Appendix C, Figure C-2). DO concentrations in the Basin and Round Pond generally decreased with depth, particularly in the summer, with hypoxic DO concentrations in the deeper portion of the Basin. Higher DO concentrations were reported in the shallower southern portion of the Basin, where more mixing and entrainment of oxygen into surface water may occur.

DO concentration profiles formed a negative heterograde pattern in the Basin in July and August when direct thermal stratification occurred. A negative heterograde pattern is an unusual vertical distribution of oxygen where oxygen consumption below the epilimnion exceeds oxygen inputs within the epilimnion. This pattern, which is referred to as the metalimnetic oxygen minima, results in a noticeable spike in DO concentrations below the epilimnion, followed by a gradual decrease in DO concentrations. Metalimnetic oxygen minima may be attributed to respiration of resident populations of nonmigratory organisms, such as fish (Shapiro, 1960; Cole, 1994).

The pH values were relatively consistent with depth (Appendix C). The pH ranged from 5.91 to 7.04 with an overall average of 6.52 in April and May 2009. The pH ranged from 5.85 to 8.55, with an overall average of 7.04 in July and August 2009. Relatively higher pH values were observed in the southern portion of the Basin with a trend toward lower pH values in the north.

ORP values throughout the year generally indicated oxidizing conditions throughout the Basin and in Round Pond, except for the deeper portion of the Basin at depths below approximately 15 feet in the summer months. The ORP values throughout the year trended with the DO values (Appendix C).

Turbidity values throughout the water column were generally less than 15 NTU until the surface water-sediment interface was reached. Turbidity increased to approximately 60 to 70 NTU within approximately 1 to 2 feet of the surface water-sediment interface (Appendix C). Turbidity was slightly higher in summer months than in other periods.

The specific conductivity in surface water ranged from 0.116 milliSiemen per centimeter (mS/cm) to 0.188 mS/cm. These specific conductivity values are indicative of a freshwater environment.

Table 4-5 presents an overall comparison of the 2006, 2008, and 2009 results for surface water quality parameters. Table 4-6 presents a comparison of the results by transect. Detailed analytical results are provided in Appendix H. Table 1-1 presents the results of the laboratory analyses and in situ water quality of historical data for 1991, 1994, and 1995.

In situ pH and ORP have been consistent throughout historical and current sampling events. DO and temperature varied depending on the time of year the values were collected, but these parameters followed the trends that would be expected based on season. Turbidity was consistent throughout the water column until approximately 1 to 2 feet above the surface water-sediment interface, where it increases approximately one order of magnitude.

Specific conductivity has decreased approximately one order of magnitude compared to historical and the 2006 values, indicating a reduction in suspended ion concentrations. The reasons for this decrease are not known, but may be due to several factors. Plant discharge may have been high in ionic strength. Ionic strength may have been reduced slowly over time after discharge ceased in 1974 with incoming floods until the baseline sampling in 2006. The 2006 conductivity measurements were similar to those in the 1990s. The reduction in conductivity occurred between 2006 and 2008 after construction of the berm. The Tombigbee River is tidally influenced, and a salt wedge penetrates upstream, sometimes as far as Jackson, Alabama (30 river miles upstream of OU-2). Berm construction, followed by a drought, may have affected conductance in the Basin by limiting exchange of the Basin and tidally influenced river waters.

4.2.2 Surface Water Results

Tables 4-1, 4-2, and 4-3 summarize the results of the laboratory analyses of the 2009 surface water samples. Table 4-2 presents a comparison of the results by transect. Table 4-3 presents the shallow surface water sample results. Table 4-4 presents the deep surface water sample results. Tables 4-5 and 4-6 present a summary comparison of the results of the laboratory analyses and in situ water quality of the 2006, 2008, and 2009 surface water samples. Table 4-5 presents an overall comparison of the results. Table 4-6 presents a comparison of the results by transect. Detailed analytical results are also provided in Appendix H. Table 1-1 presents detailed results of the laboratory analyses and in situ water quality of historical data for 1991, 1994, and 1995.

4.2.2.1 Mercury and Methylmercury

Mercury concentrations in surface water ranged from 0.00731 µg/L to 0.155 µg/L in unfiltered samples and from 0.00357 µg/L to 0.0147 µg/L in filtered samples (Figure 4-1 and Table 4-3). Average mercury concentrations per transect (in both filtered and unfiltered surface water samples) decreased from north to south in the Basin and were lowest in Round Pond; however, the ranges of concentrations overlapped and the difference was not statistically significant. Average mercury concentrations in both filtered and unfiltered surface water samples increased from west to east in the Basin; however, the ranges of concentrations overlapped and the difference was not statistically significant. Average mercury concentrations were lower at shallow sample locations than at deep sample locations. Shallow unfiltered mercury concentrations averaged 0.0239 µg/L, and shallow filtered mercury concentrations averaged 0.00574 µg/L. Deep unfiltered mercury concentrations averaged 0.0706 µg/L, and deep filtered mercury concentrations averaged 0.00988 µg/L.

Methylmercury concentrations ranged from 0.000613 µg/L to 0.00171 µg/L in unfiltered surface water samples and from 0.000413 µg/L to 0.000649 µg/L in filtered surface water samples (Figure 4-2). Filtered methylmercury concentrations in shallow water samples averaged 0.000452 µg/L, and unfiltered methylmercury in shallow water samples averaged 0.000831 µg/L. Average filtered methylmercury in deep water samples was 0.000508 µg/L, and unfiltered average methylmercury was 0.000873 µg/L. Average methylmercury concentrations in filtered surface water samples decreased from north to south in the Basin; however, the ranges of concentrations overlapped. Percent methylmercury ranged from

0.645 percent to 11.3 percent in unfiltered surface water samples and from 3.38 percent to 14.9 percent in filtered surface water samples.

Mercury concentrations in the filtered and unfiltered surface water samples decreased an order of magnitude from 2008 to 2009 throughout the Basin and Round Pond. The average mercury concentration in 2009 was 0.0473 µg/L compared to 0.246 µg/L in 2008. The average filtered mercury concentration was 0.00781 µg/L in 2009 compared to 0.0147 µg/L in 2008. The range of mercury concentrations in unfiltered shallow and deep samples collected during 2009 was generally lower than historical concentrations by approximately an order of magnitude (Appendix H and Table 1-1, respectively) where low-level mercury analysis is available. Historical mercury concentrations ranged between 0.447 and 4.61 µg/L for unfiltered mercury and 0.00642 and 0.0118 µg/L for filtered mercury (Table 1-1). Unfiltered mercury concentrations ranged between 0.00731 and 0.155 µg/L, and filtered mercury concentrations ranged between 0.00357 and 0.0147 µg/L in 2009.

Average methylmercury concentrations in the filtered and unfiltered surface water samples increased from 2006 to 2008 and decreased from 2008 to 2009. The 2009 methylmercury average concentration was similar to that in 2006.

4.2.2.2 Total Hardness and Total Alkalinity

Total hardness measures the amount of metal ions, particularly calcium and magnesium, that occur in a water sample. Total alkalinity measures the ability of a water sample to neutralize an acid (i.e., its buffering capacity).

Total hardness in surface water ranged from 34 mg/L to 52 mg/L in 2009 (Tables 4-3 and 4-4). Average total hardness increased from north to south from Round Pond through transects 1, 2, and 3. Total hardness was also greater in deep surface water samples than in shallow surface water samples.

Total alkalinity in surface water ranged from 31.8 mg/L to 44.5 mg/L in 2009 and was consistent among locations and depth, indicating little difference in buffering capacity throughout OU-2.

Total hardness in 2006 averaged 60 mg/L with a range of 56 mg/L to 64 mg/L. Year 1 (2008) yielded slightly higher total hardness results, averaging 74 mg/L with a range of 66 mg/L to 80 mg/L (Table 4-5). Total hardness in OU-2 during Year 2 (2009) was less than 2006, averaging 41 mg/L with a range of

34 mg/L to 52 mg/L. According to the standard USGS water hardness scale, the 2006 and 2009 averages were in the soft range (0 to 60 mg/L), and the 2008 average was within the lower end of the moderately hard range (61 to 120 mg/L) (USGS, 2009). The change in hardness from 2006 to 2008 was temporary, as evidenced by the comparability of the 2009 hardness results to the 2006 hardness results.

Total alkalinity in 2006 averaged 38.9 mg/L and ranged from 35.9 to 42.1 mg/L. Year 1 (2008) yielded slightly higher total alkalinity results, averaging 54.3 mg/L with a range from 53.5 to 58.0 mg/L. Total alkalinity during Year 2 (2009) averaged 32.6 mg/L and ranged from 31.8 mg/L to 44.5 mg/L. The change in alkalinity from 2006 to 2008 was temporary, as evidenced by the comparability of the 2009 alkalinity results to the 2006 hardness results. The total alkalinity values indicate a buffered system that can withstand changes in pH (Barkay et al., 1997).

Hardness and alkalinity results from 1991 were similar to current conditions.

4.2.2.3 Dissolved Organic Carbon

The average DOC concentration in surface water in 2009 was 16 mg/L and ranged from 15 mg/L to 18 mg/L (Tables 4-3 and 4-4). The shallow and deep locations did not differ in average DOC concentration.

DOC concentrations increased slightly throughout the evaluation; however, the ranges of concentrations overlapped. Concentrations in 2006 ranged from 2.5 to 13 mg/L, and 2008 concentrations ranged from 4.3 to 18 mg/L. The DOC concentrations in 2009 ranged from 15 mg/L to 18 mg/L.

Historical DOC samples ranged from 3.7 to 7.0 mg/L. DOC concentrations during the ESPP have increased over historical DOC values, which were collected from near the surface water-sediment interface.

4.2.2.4 Total Dissolved Solids and Total Suspended Solids

TDS in surface water in 2009 ranged from 45 mg/L to 125 mg/L (Table 4-5). The average concentration of TDS in surface water increased from north to south among transects 1, 2, and 3 (Table 4-2) at Round Pond; and was lower in the shallow samples than in the deep samples (Tables 4-3 and 4-4, respectively).

TSS in surface water ranged from non-detect at a reporting limit of 4 mg/L to 22 mg/L in 2009 (Table 4-2). The average concentration of TSS in the surface water samples was lowest in Round Pond, decreased from north to south among transects 1, 2, and 3 (Table 4-2), and was slightly lower in the shallow samples than in the deep samples (Tables 4-3 and 4-4, respectively).

TDS in surface water increased from an average of 141 mg/L in 2006 to an average of 395 mg/L in 2008 surface water samples, and then decreased in 2009 to an average of 75.7 mg/L.

The location of the maximum concentration of TSS during the ESPP sampling period coincided with the location of the maximum unfiltered mercury and filtered methylmercury concentrations. This correlation indicates that the mercury and methylmercury may be associated with suspended particles in the water column. Drought conditions experienced from 2007 and 2008 and low water levels may have contributed to the higher concentrations of mercury in surface water in 2008 (Section 4.2.2.1).

4.2.2.5 Total Sulfates and Sulfides

Total sulfate concentrations in 2006 ranged from 29 to 35.1 mg/L. Total sulfide concentrations in 2006 ranged from non-detect at a reporting limit of 1 mg/L to 4.4 mg/L. Total sulfides were not detected in seven of the 11 samples analyzed. The 2006 results were consistent with historical results. Surface water samples were not analyzed for total sulfate and total sulfide in 2008 and 2009.

4.2.3 Storm Event Surface Water Results

Storm event sample locations are shown in Figure 2-3. Figures 4-3a through 4-3c depict the Basin and river elevations during the storm events.

The full rising limb of the hydrograph was sampled for two storm events in December 2008/January 2009 and October 2009. The December 2008/January 2009 storm event samples represent one continuous event. This event, which was discussed in the Year 1 Annual Report (MACTEC, 2009b), is provided herein for completeness of data reporting for 2009 (Table 4-7). Average TSS concentrations in the Basin during this event are listed in Table 4-8. Incoming sediment ranged from 57 to 92 mg/L during the rising limb and 12 mg/L when the gate was closed as shown on Figure 4-3c. Water levels rose to approximately 16 and 19 feet during the two peaks in the hydrograph for this event.

The October 2009 storm event was sampled, and overtopped the berm with a maximum water elevation of approximately 18 feet. Samples collected during this event are characteristic of the second half of the rising limb of the hydrograph and the plateau of the flood event, because water levels did not return to baseline conditions from a previous storm event in September 2009 (Figure 4-3a). Table 4-8 presents average TSS at each sampling location for the October 2009 storm event. Average TSS concentrations during the second half of the rising limb of the hydrograph ranged from 11 to 22 mg/L and were 12 mg/L during the plateau of the flood event, as shown on Figure 4-3a.

TSS entering the Basin was less than anticipated. The 2009 and 2008 storm event data were used to update the 2008 estimate of the NSR in the Basin presented in the Year 1 report (MACTEC, 2009b). The estimated rate of annual deposition in the Basin was based on Basin-wide averages of TSS data. The NSR update is discussed in Section 4.2.10.

4.2.4 Gate Overflow Surface Water Results

Gate overflow samples for storm events that overtopped the berm were collected on 1) November 2, 2009; 2) November 30 and December 2, 2009; 3) on January 12, 14, and 18, 2010; and 4) June 2, 4, and 7, 2010, in accordance with the methodology outlined in Section 2.2.4. A sample was also collected in the Tombigbee River upstream of the inlet channel on November 2, 2009. Gate overflow samples were collected on March 9, 2010, for an event that did not overtop the berm. Gate overflow samples are targeted for collection during the beginning, middle, and end of the decant cycle. However, the November 2, 2009, samples were collected only during the beginning of the decant cycle because water levels rose and the decant cycle ceased before mid-level samples could be collected. The November 30 through December 2, 2009, event samples were collected during the beginning and middle of the decant cycle; water levels again rose before the full decant cycle was complete. The January and June 2010 samples were collected during the beginning, middle, and end of the decant cycle. The analytical results are summarized in Table 4-9.

4.2.4.1 Mercury and Methylmercury

Mercury concentrations were averaged for the duplicate and triplicate gate overflow samples as shown in Table 4-10.

Table 4-10. Gate Overflow Sample Results: Average Mercury Concentration and Decant Elevation

Event	Berm Topped?	Decant Cycle (Elevation, Feet NAVD88)	Average Mercury Concentrations (µg/L)
November 2, 2009	Yes	Beginning (10 to 11)	0.0371
November 30, 2009	Yes	Beginning (10 to 11)	0.0563
December 2, 2009	Yes	Middle (8 to 9)	0.0836
January 12, 2010	Yes	Beginning (10 to 11)	0.0182
January 14, 2010	Yes	Middle (8 to 9)	0.0186
January 18, 2010	Yes	End (6 to 7)	0.0311
March 9, 2010	No	Middle (8 to 9)	0.0704
June 2, 2010	Yes	Beginning (10 to 11)	0.0748
June 4, 2010	Yes	Middle (8 to 9)	0.111
June 7, 2010	Yes	End (6 to 7)	0.126

Prepared by: RMR 12/29/10
Checked by: KPH 12/30/10

Mercury was detected in the upstream river sample at a concentration of 0.00564 µg/L.

Flow rates over the gate and river flow rates near the inlet channel, were calculated as provided in Appendix J. The mercury concentrations in the Tombigbee River near the mouth of the inlet channel for each event and cycle portion were estimated. A mass balance calculation using instantaneous mixing as allowed by ADEM in their application of the AWQC is also provided in Appendix J. This calculation indicates that the mercury concentration in the Tombigbee River at the confluence with the inlet channel would range from 0.00623 to 0.00631 µg/L, which is approximately half the mercury Ambient Water Quality Criterion (AWQC) of 0.012 µg/L. Therefore, the Basin does not contribute mercury to the Tombigbee River that would result in an exceedance of the AWQC in the river.

Filtered mercury and filtered and unfiltered methylmercury concentrations in samples from the gate overflow in 2009 and 2010, as listed in Table 4-9, did not exceed the mercury AWQC.

4.2.4.2 Total Dissolved Solids and Total Suspended Solids

TDS and TSS results for gate overflow surface water collection in 2009 and 2010 are summarized in Table 4-9. TDS levels from gate overflow samples ranged from 82.5 to 652 mg/L when the Basin elevation was 10 to 11 feet NAVD88, 67.5 to 137 mg/L when the Basin elevation was 8 to 9 feet NAVD88, and 70 to 128 mg/L when the Basin elevation was 6 to 7 feet NAVD88. TSS levels from gate overflow samples ranged from 9.5 to 65 mg/L when the Basin elevation was 10 to 11 feet NAVD88, 7.5 to 14 mg/L when the Basin elevation was 8-9 feet NAVD88, and 5.5 to 11 mg/L when the Basin elevation was 6 to 7 feet NAVD88.

4.2.5 Sediment Results

The sediment analytical results for 2009 are summarized by transect in Table 4-11. Sample locations are shown on Figure 2-4. Table 4-11 provides the average and range of values by transect for the Basin and Round Pond. Table 4-12 presents a compilation of the sediment analytical results for 2006, 2008, and 2009. Analytical results for historical samples are presented in Table 1-1.

4.2.5.1 In Situ Sediment Quality Parameters

Average sediment temperatures per transect ranged from 22.9ºC to 26.1°C during 2009. These values correlate well with average surface water temperatures. Average sediment pH values per transect ranged from 6.55 in the deeper portion of the Basin to 7.36 along transect 4 in the north-central portion of the Basin. ORP values ranged from -440 to -165 millivolts (mV) and indicated reducing conditions in the Basin and Round Pond. Surficial sediment ORP in the southwestern portion of the Basin (location B301) was less negative than other areas of the Basin, but this difference was not statistically significant from the surrounding locations (B201, B202, and B302). B301 had a similar ORP in 2006 (-146 mV), but had an ORP consistent with other areas of the Basin in 2008, a drought year (-329 mV). Preliminary data from February 2011 indicate that ORP in the southwestern portion of the Basin is within the range of other areas of the Basin. This area of less negative ORP observed in 2009 may be attributed to the influence of surface water flow into the Basin.

Sediment temperatures were generally higher in 2008 (23.4ºC–35ºC) than in 2006 (18.9ºC–31ºC), likely due to the later time of sample collection in June 2008 compared to May 2006. Sediment temperatures were lower in 2009 (22.9ºC–26.1°C) than in 2008, likely due to flooding conditions and higher water levels. Average temperatures in 2009 were either lower than or consistent with conditions in 2006.

Sediment pH values were consistent and circumneutral in 2006 (6.29–7.15), 2008 (6.22–7.41), and 2009 (6.55–7.36). Sediment ORP values throughout each transect consistently indicated reducing conditions (Table 4-12).

4.2.5.2 Mercury and Methylmercury

Figures 4-4a and 4-5a, respectively, depict the mercury and methylmercury results and distribution in sediment for 2009. Analytical results are summarized in Table 4-11 and compared to previous years in Table 4-12. Detailed results are provided in Appendix H.

Average mercury concentrations by transect in the Basin ranged from 13.8 to 57.0 mg/kg. The lowest mercury concentration, 2.01 mg/kg, was from sample OU2B-SED-302C-09 in the southern portion of the Basin. The highest mercury concentration, 116 mg/kg, was collected at sample location OU2B-SED-203DNW-09 in the central transect. The five samples collected at OU2-SED-203 were analyzed discretely, and the mercury concentrations from the remaining four were 84.2, 85.1, 96.5, and 103 mg/kg. Round Pond mercury concentrations ranged between 14.1 mg/kg and 32.1 mg/kg, with an average mercury concentration of 21.5 mg/kg using the seven sample locations shown on Figure 4-4a. Average mercury concentrations were generally higher in the central portion of the Basin. An isolated area of higher mercury concentrations was detected in the northern transect (transect 5) and had an average mercury concentration of 83.1 mg/kg.

Figure 4-4a shows the distribution of mercury in sediment using isoconcentration contours. The isoconcentrations were developed using the 2009 surficial sediment concentrations (0-4 inches) and the 0-2 inch and 2-4 inch intervals collected from the finely sectioned sediment cores (see Section 4.2.9). Sediment concentrations were averaged at the discrete sampling locations and the two core depth intervals were averaged at a location for isoconcentration development. The area immediately north of the inlet channel (southern portion of the Basin) may represent a depositional area for incoming sediment during storm events based on lower mercury concentrations, grain size, and TOC results. The isoconcentration contours show that the area of high mercury concentration in the northeast corner of the Basin is isolated.

Average methylmercury concentrations by transect in the Basin ranged between 0.00431 mg/kg and 0.0115 mg/kg. Methylmercury concentrations ranged from 0.00142 mg/kg, at sample location OU2-SED-302C-09 in the southernmost transect, to 0.0257 mg/kg, at sample location OU2-SED-404C-09 in the north-central transect. Round Pond methylmercury concentrations ranged between 0.00451 mg/kg and 00.00640 mg/kg, with an average concentration of 0.00562 mg/kg.

The percentage of methylmercury to mercury in sediments ranged between 0.00736 and 0.136 percent. Methylmercury percentages were within the same order of magnitude throughout the Basin and Round

Pond, except for OU2B-404 (0.136 percent). Figure 4-5a shows the distribution of methylmercury in sediment using isoconcentration contours. The isoconcentrations were developed using the 2009 surficial sediment concentrations (0-4 inches) and the 0-2 inch and 2-4 inch intervals collected from the finely sectioned sediment cores (see Section 4.2.9). Sediment concentrations were averaged at the discrete sampling locations and the two core depth intervals were averaged at a location for isoconcentration development. Higher concentrations of methylmercury are shown along the northeast and eastern edge of the Basin and in the central portion of the Basin.

Basin and Round Pond average mercury concentrations for 2006, 2008, and 2009 sampling events were compared by transect. The sediment samples were collected within the upper 4 inches, which represents the depth range with the highest potential for mercury methylation and the bioactive zone. Transects 4 and 5 were added during the 2008 sampling; therefore, comparisons cannot be made to the 2006 data for these transects. Mercury concentrations in the southern transects generally decreased, potentially due to the presence of incoming sediment during the 2009 flood events. Mercury concentrations in the northern transects increased.

Methylmercury concentrations decreased or remained at similar concentrations in each transect. The percentage of methylmercury for each transect remains less than 0.1 percent.

Average concentrations of mercury were compared among the 1991, 2008, and 2009 surficial sediment samples, which were collected in the upper 4 inches. The 1991 results presented here were limited to the upper 4 to 6 inches of the sediment. The 2006 average mercury concentration was not considered comparable because samples were not collected in the northern portion of the Basin.

Table 4-13 summarizes the statistical parameters for the three datasets. Discrete sample results were mathematically composited by averaging for calculation of means and standard deviations. A decrease in the mean concentration was observed from 1991 to 2009.A statistical evaluation of this trend has limited statistical significance because only three yearly averages can be compared to date. The variations within and distributions of the datasets also limit the determination of a statistically significant trend.

Table 4-13. Mercury Concentrations in Surficial Sediment over Time

	1991 Sediment Samples	2008 Sediment Samples	2009 Sediment Samples
Number of Samples	77	22	22
Minimum Hg Concentration (mg/kg)	<0.19	0.97	2.01
Maximum Hg Concentration (mg/kg)	290	213	172
Mean Hg Concentration (mg/kg)	41.4	36.3	32.8
Standard Deviation	57.1	28.8	21.9

Notes:
Hg – mercury
mg/kg – milligram per kilogram

PREPARED/DATE: AES 10/05/2009
CHECKED/DATE: RMR 3/3/2010

The distribution of mercury using isoconcentrations contours for 2009, 2008, 2006, and 1991 is shown on Figures 4-4a, b, c, and d, respectively. The 1991, 2006, 2008, and 2009 studies are similar in that they indicate a larger area of higher mercury concentrations in the central portion of the Basin with a relatively "cleaner spot" immediately north of the inlet channel in the southern portion of the Basin. The 1991, 2008, and 2009 results also indicate an isolated area of higher mercury concentration in the northeast portion of the Basin.

The distribution of methylmercury in 2009, 2008, and 2006 is shown on Figures 4-5a, b, and c, respectively. Higher methylmercury concentrations were observed along the northeast/eastern edge of the Basin and in the central portion of the Basin in 2009. Methylmercury concentrations were generally lower in the southern and northern portions of the Basin, the deeper portion of the Basin, and Round Pond.

4.2.5.3 HCB

HCB and DDTR were also identified as COCs for OU-2. The primary COC at OU-2 is mercury, which best represents the extent of contamination in sediments and biota in the Basin and Round Pond. The 2006 sampling focused on mercury for this reason. The sampling events in 2008 and 2009 included analysis for HCB at select locations at the request of USEPA. Table 4-12 summarizes this data, including average HCB concentrations and ranges. Detailed HCB results are provided in Appendix H. Figure 4-6 shows the 2009 HCB results next to the historical HCB contours (WCC, 1995).

Sediment HCB concentrations ranged from non-detect at a reporting limit of 0.0069 mg/kg to 8.90 mg/kg in 2009. The maximum HCB concentration was reported at OU2B-SED-303DC-09 in the southern portion of the Basin, approximately 200 feet northeast of the inlet channel.

Surficial sediment samples were collected in 1991 from selected nodes within a grid with approximately 200-foot spacing and analyzed for HCB as part of the RI (WCC, 1993). Grab samples were collected from within the upper 6 inches of sediment. HCB ranged from non-detect (0.67 mg/kg reporting limit) to 265 mg/kg in 1991 and 1994 sediment grab samples. Historical HCB contours (WCC, 1994) are shown on Figure 4-6 with 2009 HCB sampling locations and results. The HCB results followed a consistent distribution pattern (i.e., higher in the southern portion of the Basin and lower in the northern portion of the Basin). In 2009, samples collected north of the gate structure (OU2B-SED-302C-09 and OU2B-SED-303DC-09) indicated an order of magnitude decrease in HCB from 1991 to 2009.

4.2.5.4 DDTR

DDTr is a combination of the 4,4'-isomers of DDT, DDE, and DDD. DDTr was analyzed in 1991 as part of the RI and in 2008. DDTR, which is the total of the 2,4'- and 4,4'-isomers of DDD, DDE, and DDT, was analyzed in subsequent investigations in the 1990s, and in 2001 and 2009. DDTr and DDTR results are provided in Tables 4-11 and 4-12.

DDTR concentrations ranged from 0.06 mg/kg to 2.68 mg/kg in 2009. DDTr ranged from <0.014 to 0.739 mg/kg. When an individual isomer was below the detection limits, zero was used in the summation for DDTR.

Historical DDTr results (WCC, 1994) and the 2009 concentrations are shown on Figure 4-7. DDTr was analyzed in surficial sediment collected from 15 locations in 1991 and 5 locations in 1994. The 1991 and 1994 DDTr concentrations ranged from 0.272 mg/kg to 63.5 mg/kg. The highest DDTr concentrations were collected in Round Pond (WCC, 1993). DDTr concentrations decreased from north to south for the RI data. The 2009 results show an approximate order of magnitude decrease in DDTr concentrations from 1991. The higher concentrations of DDTr/DDTR were detected in the southern portion of the Basin in 2009. This distribution is not consistent with the DDTr distribution in 1991 and represents notable changes since 1991. The DDTR concentrations in OU-2 decreased two orders of magnitude from 1991 to 2008/2009. DDTR is currently not detected at several locations where it previously was detected. Table H-2 provides the data for DDT and its daughter products, DDE and DDD, collected in sediment in 2008 and 2009. DDT was either not detected in the sediment samples, or if it was detected, its concentration was less than that of DDE and DDD concentrations in the same sample. The reduction in the DDTR/DDTr concentrations may be the result of two remedial efforts implemented at the adjacent property immediately north of OU-2 and the natural degradation of DDTR.

4.2.5.5 Total Sulfate and Total Sulfides

Research indicates that sulfate stimulates sulfate-reducing bacteria to methylate mercury (MACTEC, 2008d). However, in high-sulfate environments, methylmercury production by sulfate-reducing bacteria may be inhibited due to the buildup of sulfide, a product of sulfate reduction (Benoit et al., 1999). Total sulfide analytical results are presented in Tables 4-11 and 4-12.

Total sulfate concentrations in the Basin and Round Pond were <2,440 mg/kg. Total sulfide concentrations in the Basin ranged from 800 mg/kg to 3,300 mg/kg. The total sulfide concentration in Round Pond was 2,100 mg/kg. Higher sulfide concentrations were typically reported in the central portion of the Basin, most notably in the deeper portion. The production of sulfides from sulfates commonly occurs as an anaerobic process in sediment. Deeper areas generally have less oxygen and may subsequently be more favorable to sulfide production than shallower areas. The sample results indicate that this reduction may occur within the deeper portions of OU-2 (MACTEC, 2007a). The potential for methylation of mercury to increase in the deeper portion of the Basin because of conditions favorable to methylation (such as a lower DO or reducing environment at depth) may be balanced by conditions less favorable to methylation (such as higher sulfide concentrations and AVS/SEM ratios >1).

Total sulfates and sulfides are similar among 2006, 2008, and 2009 sampling events. Historical data indicated that sulfate and sulfide were measured in surficial sediments (0 to 6 inches) in August 1991. Sulfate in surficial sediment samples ranged from <130 mg/kg to 1,360 mg/kg, and sulfide ranged from 259 mg/kg to 2,830 mg/kg (WCC, 1993). Sulfide is a significant component in sediment in comparison with sulfate concentrations in both the historical and current data.

4.2.5.6 Metals

Sediment samples were not analyzed for metals other than mercury in 2009 because concentrations of these metals are not expected to change significantly over time. Metal analytical results from previous sampling events are presented in Table 4-12 and summarized below.

During baseline ESPP sampling activities, sediment samples were analyzed for iron and manganese, which can affect the methylation of mercury. Sediment iron concentrations ranged from 11,000 mg/kg to 57,005 mg/kg, and sediment manganese concentrations ranged from 135 mg/kg to 1,165 mg/kg (MACTEC, 2007a). Generally, iron and manganese levels in sediment were higher in the northern portion of OU-2, with the highest concentrations occurring in Round Pond. This trend generally correlated with the higher silt and clay percentages in the grain size distributions in the northern portion of OU-2 (with clay containing higher percentages of iron and manganese). These parameters were not analyzed in 2008 and 2009 because iron and manganese concentrations are not expected to change significantly over time.

Sediment samples were analyzed for selenium and molybdenum in 2008 because both metals have been shown to either reduce bioavailability of methylmercury (selenium; Barkay et al., 1997) or block mercury methylation (molybdenum as sodium molybdate; Gilmour et al., 1992). Neither parameter was previously analyzed at OU-2. Selenium was not detected (detection limits ranged from 6.2 mg/kg to 56 mg/kg) in sediment samples. Molybdenum was also not detected (detection limits ranged from 8.87 mg/kg to 80 mg/kg). Because both selenium and molybdenum were not detected, they have not contributed to reducing bioaccumulation of methylmercury or methylation of mercury in the Basin, and they were not analyzed in 2009.

4.2.5.7 AVS/SEM

Where the concentration of AVS (sulfide released by dilute acid treatment of moist sediment) exceeds the sum of the SEM from the same treatment, the excess sulfide can bind metals in insoluble and, hence, biologically unavailable forms (Environment Australia, 2002). Caution is necessary in interpretation of the ratios of AVS to SEM (AVS/SEM) data, particularly because of concern as to its relevance in longer-term and community-level effects. AVS/SEM ratios are also subject to seasonal changes (Environment Australia, 2002). Table 4-11 summarizes 2009 AVS/SEM ratios, including averages and ranges, by transect. The analytical data used to derive the AVS/SEM ratios are included in Appendix H. The SEM values were summed to develop a total SEM value for generation of the ratio. One-half the detection limit was used in the SEM total calculation when a particular metal was not detected. The 2006, 2008, and 2009 AVS/SEM ratios and analytical data are presented in Table 4-12.

The 2009 AVS/SEM ratios ranged from 9.93 to 99.0. Ratios well exceeded 1, indicating that excess sulfide may be available to bind a portion of the mercury in insoluble, biologically unavailable forms. AVS/SEM ratios were also well above 1 in 2006 and 2008. Moderate sulfide concentrations may be preferred over high sulfide concentrations when it comes to formation of stable mercuric sulfide complexes.

4.2.5.8 Total Organic Carbon

Table 4-11 summarizes the 2009 TOC data, including average concentrations and ranges by transect. The 2009, 2008, and 2006 TOC data are presented in Table 4-12.

TOC concentrations ranged from 29,000 mg/kg to 39,000 mg/kg in Round Pond and from 644 mg/kg to 60,500 mg/kg in the Basin in 2009. TOC levels generally decreased from north to south in OU-2. Areas within the Basin and Round Pond grouped according to TOC and grain size are shown on Figure 4-8.

TOC concentrations ranged from 34,000 mg/kg to 41,000 mg/kg in Round Pond and from 2,800 mg/kg to 34,000 mg/kg in the Basin in 2006. TOC concentrations ranged from 20,700 mg/kg to 45,700 mg/kg in Round Pond and from 2,220J mg/kg to 59,900 mg/kg in the Basin in 2008. These values were consistent with the 2009 TOC levels in both Round Pond and the Basin.

TOC concentrations decreased from north to south in OU-2. This trend generally correlated with the higher silt and clay percentages in the grain size distributions in the northern portion of OU-2 (with TOC being adsorbed to smaller grain size particles, such as silts and clays) and higher sand percentages in the southern portion of OU-2. Because TOC acts as a food source for methylating bacteria, these TOC concentrations may favor the methylation of mercury in sediment; however, methylation of mercury may be inhibited because methylmercury only comprised between 0.00736 and 0.136 percent of mercury in the Basin. TOC can also bind mercury and methylmercury and may render a portion of those compounds not bioavailable.

TOC was analyzed in surficial sediment samples collected in 1991, 1994, 1995, and 2001, and concentrations were consistent with those collected during the ESPP. These TOC values are typical of lacustrine, depositional environments like OU-2.

4.2.5.9 Grain Size, Bulk Density, and Percent Moisture

Tables 4-11 and 4-12 summarize the grain size, bulk density, and percentage moisture data, including average concentrations and ranges per transect.

Areas within the Basin and Round Pond grouped according to TOC and grain size are shown on Figure 4-8. These data show that grain size increases from north to south. Samples from the south and southwest areas of the Basin (OU2B-SED-301C-09, OU2B-SED-302C-09, and OU2B-SED-303DSE-09) had the highest percentage composition of sand (26.4 percent, 84.1 percent, and 40.4 percent, respectively).

Bulk density in the sediment samples ranged from 0.921 gram per cubic centimeter (g/cm^3) to 2.00 g/cm^3 in 2009. Bulk densities were generally higher in the southern portion of OU-2 along transects 2 and 3, where the sediments have higher sand percentages.

Percentage moisture content in the 2009 sediment samples ranged from 30.5 percent to 81.4 percent. A low value of <0.1 percent was reported by the laboratory but is considered anomalous. Percentage moisture content is generally higher in the northern portion of OU-2, where the sediments have higher clay and silt percentages, and lower in the southern portion of OU-2 where the sediments have higher sand percentages.

Samples from the southwest portion of the Basin had the highest percentage composition of sand. Floodwaters traveling north through the inlet channel from the Tombigbee River during flood events are expected to provide larger grain-size particles. The former discharge ditch also carries surface water flow and suspended solids into the southwest portion of the Basin. When the water reaches the Basin and velocities decrease, sand would theoretically be the first particle size to fall out of suspension and deposit in the southern portion of the Basin. The slower-moving water from the river and from overland flow from the north would be expected to hold the silt and clay particles in suspension longer and eventually deposit the smaller particles over time across the remainder of OU-2 (MACTEC, 2007a). In 2008 and 2009, an additional particle size, gravel, was observed in the northeast portion of the Basin. This gravel was likely deposited in the Basin during boat ramp construction in late 2006.

Bulk densities in the 2009 sediment samples varied from 0.921 g/cm^3 to 2.00 g/cm^3 and were similar to bulk densities in 2006 and 2008. Bulk densities were slightly higher in the southern portion of OU-2 during the three monitoring events and were generally consistent with grain-size distribution patterns.

Percentage moisture content in the 2006 sediment samples ranged from 27 percent to 80.4 percent, with an average of approximately 62 percent. Percentage moisture content was generally higher in the northern portion of OU-2, where the sediments have higher clay and silt percentages (MACTEC, 2007a). Percentage moisture content was lower along transects 2 and 3 in the southern portion of the Basin. The 2006, 2008, and 2009 data showed similar results and spatial trends for grain-size analysis, bulk density, and moisture content.

4.2.6 Sediment Trap Results

At the commencement of the ESPP evaluation, sediment deposition was to be measured at OU-2 using sediment traps and sediment pins. The first flood event in the Basin after berm and gate construction was completed occurred in February 2008, almost one year after the berm and gate were operational in March 2007. The years 2007 and 2008 reflect extreme drought conditions; storm events that occurred in 2008 generally occurred at a lower frequency and stage height. The lower frequency and stage height may be because of the larger than usual upstream storage capacity of the river. Storm events in 2009 had a higher frequency, stage height, and duration compared to 2007 and 2008 and were representative of typical flood conditions over time. The results of the ESPP sedimentation study may have been affected by the frequency and the character of the storm events. The sediment trap data are discussed below.

The initial purpose of the sediment traps was to capture and analyze incoming suspended sediment on a quarterly basis. The purpose of the sediment traps has changed to that of characterizing resuspended sediment. This assessment is supported by the information presented in Section 4.2.7 regarding wind-driven sediment resuspension. Sediment that is captured in the traps may represent Basin sediment that has repeatedly resuspended and settled over several stochastic wind-driven events within a quarter. The sediment that accumulates in the traps does not represent overall water quality based on surface water sampling results presented in Section 4.2.1. Accumulated sediment also may not represent deposition in the floodplains because vegetation around the Basin limits the movement of suspended materials into the floodplain and deposition on floodplain soils.

Sediment trap sample collections occurred quarterly in February, May, August, and November 2009, and in February 2010. Minimum water levels were maintained at 6 feet NAVD88 for the quarters ending in May 2009, November 2009, and February 2010; and at 5.2 feet NAVD88 for the quarter ending in August 2009. A minimum water level was not maintained throughout the quarter ending in February 2009. These water levels were maintained at the elevations listed above starting in February 2009 to reduce wind-driven resuspension as discussed in Sections 2.2.6 and 2.2.7. The results of the wind-driven resuspension study are presented in Section 4.2.7.

Sediment trap samples were analyzed quarterly for mercury, percent moisture, density, TSS, grain size, and TOC as sample size allowed. The quantity of sediment collected in the sediment traps (mass and depth of accumulation) and the temperature, pH, and ORP of the samples were recorded in the field. One undisturbed jar from each of four traps was analyzed for total solids, organic solids, and inorganic solids during the May and August 2009 sediment trap sampling events at the request of USEPA.

The averages and ranges of the sediment trap analytical results are presented by zone for each quarter in Table 4-14. The analytical results for individual sediment traps are presented in Appendix H.

4.2.6.1 Mercury

Average mercury concentrations per zone ranged from 15.9 to 33.1 mg/kg during the February and August 2009 quarters. Average mercury concentrations per zone ranged from 3.0 to 19.0 mg/kg during the May and November 2009 and February 2010 quarters. Mercury concentrations in the traps did not correlate with mercury concentrations in sediment near the traps. Mercury concentrations between zones, where more than one trap is analyzed, were not statistically different. Mercury concentrations in the traps were reduced approximately 35 to 75 percent when average concentrations per zone were compared for data collected between February 2009 and February 2010. Mercury concentrations per zone were reduced approximately 55 to 85 percent when February 2009 data were compared directly to February 2010 data. A strict comparison between trap data quarters is difficult to make because every quarter presented slightly different hydrologic conditions. However, an overall comparison of the February 2009 to the February 2010 sediment trap results infer that maintaining a higher water elevation may have reduced resuspension and accumulation in the traps. Reduction in mercury concentrations in May 2009, November 2009, and February 2010 compared to 2008 data is statistically significant and may be due in part to reduced resuspension due to maintenance of higher minimum water levels, although differences in natural hydrological conditions between those time periods may also have played a role.

Sediment trap data collected in 2008 may reflect the effects of resuspension of the Basin sediment and not incoming sediment during storm events. Average mercury concentrations in 2008 per zone ranged from 6.5 to 31.8 mg/kg. Sediment trap data collected in May 2009, November 2009, and February 2010 reflected a reduction in mercury concentrations. The periods preceding collections of these samples had water levels greater than 6 feet NAVD88. Average May 2009, November 2009, and February 2010 sediment trap mercury concentrations per zone ranged from 3.0 to 11.9 mg/kg. The average August 2009 concentration was 28.2 mg/kg. The time period preceding collection of the August 2009 sample had a reduction in water levels to 5.2 feet NAVD88. A comparison of averages and ranges of the sediment trap analytical results are presented by zone for each quarter in Appendix H. Resuspension may be reduced when water levels was maintained at 6 feet NAVD88.

4.2.6.2 Mass/Day/Jar

Average mass per zone ranged from 0.2 to >8.1 g/day/jar in 2008, August 2009, and February 2010. Average mass per zone ranged from 0.6 to 5.6 g/day/jar when water levels during May 2009, November 2009, and February 2010. The field measurement of mass accumulated in each jar was approximate. The sediment collection jars were removed from the trap and excess water was decanted from the jar before the jar was weighed. It was observed in the field that accumulation in the jars was occasionally precluded by debris in the sediment trap funnels. Some jars were filled near or to capacity, which indicated that the sediment accumulation was greater than the jar capacity. A statistical analysis could not be performed for the average mass/day/jar before and after the water in the Basin are maintained at 6 feet NAVD88 because the sediment accumulation exceeded the capacity of the jar.

4.2.6.3 Other Parameters

The remaining parameters analyzed from the sediment trap samples are summarized in Table 4-14. TOC concentrations were highest during the February 18-19, 2009, sampling event, ranging from 54,800 to 239,000 ppm. Concentrations were relatively consistent over the remaining events, ranging from 5,080 to 56,000 ppm. Bulk density was consistent across each zone and event, ranging from 0.956 to 1.05 g/cm^3. Grain size was also consistent across zones and events, with samples primarily composed of silt- and clay-size materials. Percent moisture ranged from 74.3 percent to 94.4 percent. TSS concentrations were inconsistent among zones and sampling events, ranging from 100 to 57,100 ppm.

4.2.7 Sediment Traps (Wind-Driven Sediment Resuspension) Results

The sediment traps at locations ST14 and ST19 in Zone 2 and locations ST17 and ST32 in Zone 3 were designated as wind traps from April to July 2009. Data from the four wind traps were used to evaluate the potential impact of maintaining a higher Basin water elevation on wind-driven resuspension of the bed sediment. The additional water may create a buffer zone to minimize resuspension of surficial sediments, and could potentially reduce resuspension approximately 94 percent of the time based on Figure 2-6. A water elevation of 6 feet NAVD88 was maintained from February to June 2009; maintenance of this minimum level provided an additional 3 feet of water over the water already present in the Basin. The gate was lowered to 5.2 feet NAVD88 in June 2009 during gate maintenance procedures. The 5.2-foot elevation was maintained until the next flood event in September 2009.

The sample collection goal for the wind traps was to collect sediment that accumulated over a 7- to 10-day period that did not include a storm event above 6 feet NAVD88 in elevation or wind speeds greater than 13 mph for more than 1 hour in duration. These sample conditions were met in July 2009, with sample collection on July 9, 2009, when a minimum water level of 5.2 feet NAVD88 was maintained. The July 2009 results were from a limited number of sediment traps and represented a trap duration of 10 days; these results are not comparable to the quarterly sediment trap results discussed above. Mercury concentrations of 23.9, 29.0, 32.7, and 44.1 mg/kg were detected in the four wind traps.

4.2.8 Sediment Pins

Sediment pins were installed at 15 locations along 3 transects in the Basin and at 1 location in Round Pond in 2006 (Figure 2-5). Accumulation was measured quarterly as described in Section 2.2.8. Details of the recorded measurements are provided in Appendix H. Accumulations from December 2006 to February 2010 are shown on Figure 4-9. Sediment pins were occasionally found broken when accumulation was measured. The broken pins were removed from OU-2, repaired, and replaced before February 2010. Broken pin reset dates are denoted on Figure 4-9.

The deeper portion of the Basin and area immediately north of the intake channel showed greater deposition, as expected based on sediment transport mechanisms. Other areas of the Basin, e.g. the eastern portion, showed less than a half-inch of accumulated sediment. Accumulation on the sediment pins likely consisted of a mixture of resuspended sediments and sedimentation from flood events. Sediment accumulation on the sediment pins should be qualitatively interpreted because resuspension and deposition may affect the accumulated measurement. The measurements may be viewed as compared to each other because each pin is subject to resuspension. Higher deposition in the areas noted can be interpreted as areas that are receiving greater deposition on a comparative basis.

Deposition was observed north of the inlet channel in the southern portion of the Basin where 2.5 inches of net accumulation was reported (Figure 4-9). Accumulation north of the channel was expected based on the TSS concentrations and flow of incoming water during flood events. Information from grain size analysis and aerial photography was consistent with deposition in this area (Figure 4-10) and supported the relative increase in deposition as measured from the sediment pins. Deposition of 5 to 7 inches was also observed in the northwest portion of the Basin (Figure 4-9). This accumulation may be partly attributed to the erosion of BASF's (formerly Ciba-Geigy's) native material cap in August 2008 into the Basin through the stormwater flow pipe in the northern berm. BASF's site is next to OU-2 and north of the berm. Accumulation increased by 2.5 to 3.5 inches in the northwest portion of the Basin between sediment pin measurements in July and October 2008 after BASF's cap material was eroded during an August 2008 storm event, while deposition in other areas of the Basin ranged from 0 inch to 1.5 inches. Some of the accumulation in this area may also be due to the focusing (the sediment rolls "downhill") of resuspended sediment into the deeper portion of the Basin. Deposition in Round Pond from August 2008 to September 2009 was 2 inches. The pin for Round Pond was reset and accumulated <0.5 inch from September 2009 and February 2010.

4.2.9 Sediment Cores and Porewater Collection

Sediment core and porewater sampling was performed in the Basin in June and September 2009, as discussed in Section 2.2.9. The following sections present the analytical results from the coarsely sectioned cores (~1-foot intervals), finely sectioned cores (~2-inch intervals), porewater (~2- to 6-inch intervals), and aging cores (~2- to 10-cm intervals). Data are presented in Tables 4-15 through 4-22 and Figures 4-11 through 4-16 and Appendix I.

4.2.9.1 Coarsely Sectioned Cores

Coarsely sectioned core samples were collected at 13 locations throughout the Basin, as shown on Figure 2-7 and discussed in Section 2.2.9.1. Table 4-15 presents mercury analytical results for the coarsely sectioned sediment cores. The data listed in Table 4-15 indicate that a consistent correlation of mercury concentrations with depth throughout the Basin and Round Pond was not evident in the coarse cores.The intervals of mercury concentrations above relatively low concentrations (> 0.2 mg/kg) within OU-2, as measured from the sediment surface, are listed in Table 4-16. The 0.2 mg/kg table guideline is based on the Lavaca Bay, California, cleanup direction of 0.25 mg/kg (USEPA, 2001), the lowest cleanup control value observed during research.

Table 4-16. Sediment Intervals with Mercury Concentration > 0.2 mg/kg

Location	Interval (feet)
Southeast Portion of Basin	0 to 4
Southwest Portion of Basin	0 to 6
East Central Portion of Basin	0 to 3
West Central Portion of Basin	0 to 9
Deeper Portion of the Basin	0 to > 11
Northeast Portion of Basin	0 to 4
Northwest Portion of Basin	0 to 5
Round Pond	0 to 3

Prepared by: KPH 01/13/2011
Checked by: ELF 01/17/2011

This deposition pattern indicates that intervals where mercury concentrations are greater than 0.2 mg/kg form a wedge that narrows as one moves north and east from the former discharge ditch across the Basin. The deeper portion of the Basin and the areas in the west central portion of the Basin near the deeper portion of the Basin are an exception to the wedge distribution pattern. Sediment accumulation may concentrate in the deeper portion of the Basin due to focusing. Figures 4-11a and 4-12a show cross-sections A-A' and B-B', respectively, at no vertical exaggeration and 20 times vertical exaggeration. Subsequent cross-sections were presented using the 20 times vertical exaggeration scale so that the distribution of mercury could be shown. The distribution of mercury with sediment sample intervals is shown on cross sections A-A' and B-B' on Figures 4-11b, c and 4-12b,c respectively. Figures 4-11d and 4-12d show finer sediment increments of 1 to 5 parts per million (ppm) and 5 to 10 ppm. These cross sections illustrate that relatively lower mercury concentrations are encountered in the top one foot of sediment in the Basin for some cores and relatively higher concentrations of mercury are encountered in the top 1 foot of the Basin sediment in other cores. Five of the 11 Basin cores had higher mercury concentrations in the upper one foot of sediment. Mercury concentrations greater than 0.2 mg/kg were detected from 0 to 2 feet in Round Pond. Figure 4-13 provides two 3-dimensional views through the Basin to the sample interval where the highest concentrations of mercury were detected. The south to north view provides a view of the sediment surface as if a person was standing at the gate looking north and into the deeper portion of the Basin. The west to east view provides a view of the sediment surface as if a person was standing on top of the bluff and looking into the deeper portion of the Basin and across to the Tombigbee River.

Table 4-17 presents the coarsely sectioned sediment core HCB analytical results. Three cores were collected from the southern portion of the Basin (SDCR-1, -2, -3) and one was collected in the deeper portion of the Basin (SDCR-8). At SDCR-1, HCB was detected at a concentration of 1.3 mg/kg in the 0- to 1-foot interval; HCB was not detected at concentrations greater than 1 mg/kg in the deeper interval samples. At SDCR-2, HCB concentrations ranged from 9.9 to 330 mg/kg in the top 4 feet of sediment; concentrations were not detected above 1 mg/kg in deeper interval samples. HCB was not detected in SDCR-3 and was not detected at concentrations greater than 1 mg/kg in the deeper portion of the Basin (SDCR-8). HCB was detected within the horizontal and vertical footprint of mercury.

Table 4-18 presents the coarsely sectioned sediment core analytical results for DDTR and DDTr. The concentration of the individual isomers of DDTR are listed in Table 4-18 and in Appendix I. Samples from locations SDCR-3, -8, -9, and -13 represent a south to north transect from the southern portion of the Basin to Round Pond. The DDTR results for these locations were compared to a cleanup value of 1 mg/kg. Table 4-19 lists sample intervals with DDTR concentrations greater than 1.0 mg/kg. Sample cores SDCR-3 and -13 did not have DDTR concentrations above 1.0 kg/mg.

Table 4-19. Sample Intervals with DDTR Concentration > 1.0 mg/kg

Location	DDTR Range (mg/kg)	Sample Interval (feet)
SDCR-8 (Deeper Portion of the Basin)	1.0 to 34.2	3 to >11
SDCR-9 (Northwest Portion of the Basin)	1.0 to 1.56	0 to 2

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Checked by: ELF 01/17/2011

Relatively lower concentrations of DDTR were detected near the sediment surface at SDCR-8; relatively higher concentrations of DDTR were observed within the interval of 3 to >11 feet in depth. DDTR was detected within the horizontal and vertical footprint of mercury, except at Round Pond (SDCR-13).

Density, grain size, and percent solids of the coarsely sectioned sediment cores were also analyzed; the analytical results are presented in Appendix I. Density generally increased with depth at the sediment core locations. Grain size analysis indicated that clay and silt-sized particles were predominant in the sediment cores collected. These results were consistent with the lithological descriptions of the sediment core logs (included in Appendix E). Each sediment core terminated in a dense layer of clay, indicating the clay at the bottom of the core had no contact with the underlying sandy aquifer.

Two sediment samples from SDCR-3 and SDCR-9 at the 0- to 1-foot sample interval were also analyzed for mercury using the synthetic precipitation leaching procedure (SPLP). The SPLP results of 0.03 mg/L indicate that the sediment would not be considered characteristically hazardous.

4.2.9.2 Finely Sectioned Cores

Finely sectioned core samples were collected at six locations throughout the Basin, as shown on Figure 2-7 and discussed in Section 2.2.9.2. Samples were collected in 2-inch intervals from 0 inch to 12 inches, and a 6-inch interval was collected from 12 to 18 inches. Samples were analyzed for mercury, methylmercury, percent moisture, and TOC. These analytical results are presented in Table 4-20 and Appendix K. Concentrations of mercury ranged from 0.37J to 200 mg/kg. Concentrations of methylmercury ranged from 0.000222 JB to 0.0167 mg/kg. (JB indicates that the result is estimated and possibly biased high or a false positive based on blank sample results.) The vertical distribution of both mercury and methylmercury showed no defined pattern within depth intervals or locations within the top 18 inches of sediment (Appendix K). Concentrations increased and decreased sporadically within the cores at most of the locations. The percent methylmercury ranged from 0.01 to 0.08 percent, which matched the range observed in surficial sediments.

The concentration of TOC was consistently higher in the samples from locations SDCR-3, -8, -11, and -12, most of which were in the northern part of the Basin, where sediments are finer than those in the southern portion. TOC concentrations at these locations ranged from 9,000 mg/kg (SDCR-3) to 38,000 mg/kg (SDCR-12). Sediment samples from the southern portion of the Basin had relatively lower TOC concentrations of 1,320 to 14,000 mg/kg.

4.2.9.3 Aging Cores

Core samples were collected at three locations (Figure 2-7) for sediment aging using Cs^{137} and Pb^{210} using alpha and gamma spectroscopy as discussed in Section 2.2.9.3. Laboratory aging results are provided in Appendix I and reported in units of disintegrations per minute per gram (dpm/g). Aging could not be performed for two of the three cores. SDCR-2 collected from north of the inlet channel could not be aged because the sample exhibited extreme disturbance consistent with cycles of resuspension and deposition from incoming sediment. SDCR-9 collected from the northwest portion of the Basin could not be aged because the aging results in dpm/g were uniform and a background level of excess lead could not be found.

Aging was performed for SCDR-8, which was collected from the deeper portion of the Basin. Sediment from 0 foot to approximately 6 feet in depth was dated from 2009 near the surface to 1959 at 6 feet. Discharge to the Basin began in 1952. These data correlated well with the mercury concentrations detected in the coarse core. The 0- to 1-foot interval with mercury concentrations of 23 mg/kg corresponds approximately to the years 2001 to 2009. This concentration was similar to the average Basin-wide mercury concentration. The highest mercury concentration in SDCR-8 of 440 mg/kg in the 5- to 6-foot interval corresponded to the years 1959 to 1968. Sediments below 6 feet could not be aged because of density changes. Annual deposition rates in SDCR-8 ranged from 1.3 to 1.6 inches per year based on the aging data.

4.2.9.4 Sediment Porewater

Porewater samples were collected from six locations throughout the Basin correlating to the finely sectioned sediment core samples, as shown on Figure 2-7 and discussed in Section 2.2.9.4. Porewater samples were analyzed for DOC, mercury, and methylmercury. These results are presented in Table 4-21. Three of 30 porewater mercury results were considered anomalous, as explained in the next section, and were noted in the table. The vertical distribution of both mercury and methylmercury in porewater did not show a clear correlation within a core similar to the finely sectioned sediment core results (Appendix K). Porewater mercury concentrations were generally higher in the southern portion of Basin and range from 0.038 to 4.7 μg/L, excluding the anomalous data. Mercury concentrations in porewater cores from the deeper portion of the Basin, the northern portion of the Basin, and Round Pond ranged from 0.0101 to 0.307 μg/L.

Porewater methylmercury concentrations also tended to be higher in the southern portion of the Basin, ranging from 0.000456 to 0.00673 μg/L. Methylmercury concentrations in porewater in the deeper portion of the Basin, the northern portion of the Basin, and Round Pond ranged from 0.000121 to 0.00178 μg/L. Methylmercury in porewater in Round Pond and the deeper portion of the Basin was not elevated relative to the remainder of the Basin. The percent methylmercury in porewater ranged from 0.03 to 3.18 percent.

4.2.9.5 Correlation of Fine Core and Porewater Results

The finely sectioned sediment core analytical results and porewater analytical results were assessed for trends or correlations. Table 4-22 summarizes the mercury and methylmercury analytical results from finely sectioned sediment cores and porewater. Figures 4-14 through 4-16, respectively, depict the relationships between mercury and methylmercury concentrations in finely sectioned cores, mercury versus TOC concentrations in finely sectioned cores, and mercury versus methylmercury concentrations in porewater. Charts depicting mercury and methylmercury in finely sectioned cores and porewater, TOC in finely sectioned cores, and DOC in porewater with core depth for each core are provided in Appendix K.

Three of 30 porewater results and one of 30 fine core sediment results were considered anomalous because the data points showed discontinuity with the trends shown in Appendix J over the depth of the core. These data points, which are labeled in Appendix J and in Tables 4-20 through 4-22, were excluded from the trend graphs in Figures 4-14 through 4-16. This method for determining anomalies was employed because the datasets per core were too small to complete a meaningful statistical analysis. Anomalous results may be the result of disturbance when cutting and then thawing the core at the laboratory.

A positive correlation with a correlation coefficient (R^2) value of 0.70 was observed in Figure 4-14 between mercury and methylmercury in finely sectioned cores. Figure 4-15 showed no clear correlation when mercury was compared to TOC concentrations in finely sectioned cores. The absence of a trend between mercury and TOC concentrations in the finely sectioned cores may be due to the overall elevated TOC concentrations (the minimum TOC concentration was 1,320 mg/kg). A positive correlation with an R^2 of 0.78 was observed in Figure 4-16 between mercury versus methylmercury concentrations in porewater.

Concentrations of mercury and methylmercury in fine cores and porewater correlated well in that both the fine core and porewater concentrations tended to increase or decrease similarly within individual cores. Graphs for individual cores are provided in Appendix K.

Concentrations of TOC in the finely sectioned cores are listed in Table 4-20. TOC concentrations generally decreased with depth in the first 18 inches. Table 4-21 lists the concentrations of DOC in porewater. No clear correlation or notable variation was apparent in the DOC results.

4.2.10 Evaluation of Sedimentation Rate

TSS data collected during 2008 and 2009 storm events were used to estimate sediment load associated with representative storm events. The NSR for the five-year period from 2005 to 2009 was estimated based on the availability of site-specific data. The predicted NSRs for 2005 to 2009 ranged from 0 inch/year during the drought in 2007 to 0.3 inch/year in 2009. The average NSR for this 5-year period was 0.2 inch/year.

The analysis was applied to the 49-year period of historic flow data collected at Coffeeville Dam from 1961 through 2009 to represent a larger set of climatic conditions. The annual NSR ranged from a minimum of 0.0 inch/year in 1963 to a maximum of 1.1 inch/year in 1983. Based on these results, the estimated annual average NSR in the Basin was 0.3 inch/year for the 49-year period, with the 95 percent confidence interval ranging from 0.2 to 0.4 inch/year. NSR generally increased with increasing river flow rate, increasing frequency of berm overtopping events, and longer durations of inundation by river flow. Most of the storm event data were collected during a low-flow period or drought conditions in 2008 and were then applied to represent the quality of storm events from 1961 to 2009. As a result of data collection under drought conditions, annual NSR estimates may be lower than the actual long-term average value. Detailed results of Anchor QEA's NSR evaluation are provided in Appendix F.

4.3 SOIL INVESTIGATION

The results of the background soil sampling and floodplain soil sampling events are presented in this section.

4.3.1 Background Atmospheric Deposition

The background soil sampling location is shown on Figure 2-2. The sample was analyzed for mercury; the analytical results may be used to evaluate contributions of mercury to the Basin and floodplain soils from atmospheric deposition. The mercury concentration of the background soil sample, collected on June 6, 2009, was 0.0142 J mg/kg.

Mercury was not detected in the background soil sample collected in 2008 (reporting limit = 0.0211 mg/kg) or in 2006 (reporting limit = 0.02 mg/kg). The results from 2006, 2008, and 2009 indicated that atmospheric deposition was not a significant source of mercury to sediments or floodplain soils at OU-2 over the three-year period of study. The 2009 background mercury concentration was slightly below the reporting limit of 0.02 mg/kg for the 2006 and 2008 results.

4.3.2 Floodplain Soil Investigation

The results for mercury, methylmercury, HCB, DDTR, and other parameters in floodplain soils are summarized below. Individual results are provided in Table H-8 in Appendix H and are shown on Figures 4-17 through 4-20. Floodplain soil results for COCs were reported as dry weight.

Concentrations of mercury in surficial floodplain soils (0-1 inch) averaged 1.20 mg/kg; individual sample results are shown in Figure 4-17. The minimum mercury concentration in surficial soil was 0.061 mg/kg at FPSB4 located east of the Basin, and the maximum mercury concentration was 8.9 mg/kg at FPSS2 next to the channel connecting the Basin and Round Pond (Figure 4-17). ProUCL was used to evaluate whether the maximum mercury concentration at FPSS2 was consistent with the floodplain soil data. ProUCL uses Dixon's Extreme Value test when the sample size is less than or equal to 25. Dixon's Extreme Value test indicated that the maximum concentration, at FPSS2, was not consistent with the floodplain soil data with 99 percent confidence. The range of mercury concentrations in surficial floodplain soils excluding this value was 0.061 mg/kg to 2.5 mg/kg, with an average of 0.814 mg/kg. The maximum value of 8.9 mg/kg may be representative of sediment/soils near the channel connecting Round Pond and the Basin. It did not represent floodplain soils throughout OU-2.

Mercury concentrations in surficial floodplain soils generally decreased with increasing distance from the water's edges of the Basin and Round Pond. Three of the surficial floodplain soil locations were inundated at the time of sample collection. These locations, FPSS3, FPSS9, and FPSS15, may be considered sediment when the water elevation is maintained at a minimum of 6 feet NAVD88. The concentrations of mercury at these locations were within the range of concentrations of non-inundated floodplain soils.

Mercury concentrations in the soil borings were generally less than 1 mg/kg with small increases or decreases with depth (Figure 4-17). The exception was FPSB5, which was near the southeastern Basin edge. Concentrations at this location ranged from 2.4 mg/kg at the surface (0 to 1 inch) to 3.6 mg/kg (6 to 12 inches) at depth. Mercury concentrations in soil borings were low compared to sediment concentrations in the Basin (MACTEC, 2010d).

Methylmercury concentrations in surficial floodplain soils (0 to 1 inch deep) averaged 0.00303 mg/kg and ranged from 0.000367 mg/kg at FPSB4 to 0.00703 mg/kg at FPSB5 (Figure 4-18). The percentage of mercury that was methylmercury in surficial floodplain soils ranged from 0.123 percent at FPSB6 (southeast of the Basin) to 1.29 percent at FPSB3 (northeast of the Basin). Methylmercury concentrations from 1 to 2 inches deep ranged from 0.000176 JB mg/kg at FPSB6 to 0.00822 mg/kg at FPSB5. The percentage of mercury that was methylmercury in 1 to 2 inch soils ranged from 0.126 percent at FPSB6 to 1.19 percent at FPSB3.

Soil methylmercury concentrations were four to five times less than that detected in 2009 surficial sediments (0-4 inches). Surficial sediment concentrations ranged from 0.00142 mg/kg to 0.0257 mg/kg. The floodplain at OU-2 is bottomland hardwood forest, a type of wetland. Wetlands have saturated soils, and saturated soils are anaerobic because water from the capillary fringe forces oxygen out of the soil. Methylmercury that was formed in the floodplain soils while inundated may remain for some time after flood waters recede because of the hydric, anaerobic conditions of the soil.

HCB was collected in surficial soils (0 to 1 inch deep) from three locations in the southern portion of the floodplain as shown in Figure 4-19. Concentrations ranged from 0.0035 mg/kg at FPSB5 in the southeastern floodplain to 0.275 J mg/kg at FPSS14 in the southwestern floodplain. Location FPSS15 was inundated and had a concentration of 0.135 mg/kg.

DDTR was collected from 15 locations throughout the floodplain (Figure 4-20). The results for the six analyzed congeners were summed to obtain the DDTR value listed in Figure 4-20. Zero was used in the summations for congeners that were not detected at the associated reporting limit for the sample. DDTR concentrations in surficial floodplain soils ranged from < 0.002 UJ mg/kg (FPSB6) in the southeast portion of the floodplains to 2.23 mg/kg (FPSS1) in the northwest portion of the floodplain. Summations were also calculated using one-half the reporting limit for non-detected concentrations at USEPA's request for evaluating uncertainty in non-detected concentrations. These summations resulted in concentrations ranging from 0.0038 JQ mg/kg (FPSS10) to 2.23 mg/kg (FPSS1). Concentrations decreased from north to south, with the highest concentrations in the northwest portion of the floodplain. DDTR concentrations in the northwest were two to three orders of magnitude higher than those in the eastern and southern portions of the floodplain.

Soils in the floodplain consisted of 73 to 95 percent silts and clays, with 3 to 25 percent sand and 0.06 to 2.5 percent gravel. The sand and gravel portions were higher in the southern portion of the floodplain and decreased moving north (increasing distance from Tombigbee River). Percentage solids of the surficial soils ranged from 48.0 to 78.3 percent, and percentage solids for the inundated sediment samples ranged from 15.1 to 28.7 percent. TOC in surficial soils ranged from 15,900 mg/kg to 61,700 mg/kg, and TOC for the inundated sediment samples ranged from 33,700 mg/kg to 298,000 mg/kg. TOC decreased with depth in soil borings. These values are typical of floodplain forested wetlands.

4.4 GROUNDWATER INVESTIGATION

Mercury concentrations in micro-wells between the Basin and the river were not above the screening criterion of 0.012 µg/L, which is the Alabama AWQC for mercury. The mean mercury concentration for filtered samples was 0.00124 µg/L, and the 95 percent upper confidence limit (UCL) was 0.00254 µg/L for micro-wells within OU-2. Both the filtered mercury mean and 95 percent UCL were below the screening level. The only detection of mercury exceeding the screening level was west of the bluff adjacent to OU-2 in the upgradient micro-well cluster BA-MW1 in OU-1, which is monitored under RCRA. Mercury in the OU-2 sediments does not act as a continuing source to groundwater or the Tombigbee River via the groundwater pathway because mercury above the screening level was not detected in groundwater associated with OU-2.

Core data collected within the Basin during the RI further supported that mercury in sediment in the Basin is not a continuing source to groundwater or the river via the groundwater pathway. The RI core results indicated that mercury did not fully penetrate the sediment deposits underlying the Basin and, therefore, a pathway for mercury transport between the Basin sediment and the underlying Alluvial Aquifer (Q_2) was not complete (WCC, 1993). The results from core samples collected in 2010 confirm that mercury did not fully penetrate the sediment deposits.

HCB was detected above its screening level in only one micro-well, BA-MW3B, along the southern portion of the berm, and the detection appears to be isolated. The screening level of HCB defaulted to the reporting limit (0.010 µg/L) because the AWQC of HCB (0.0003 µg/L) was less than this limit. The potential for HCB in groundwater to discharge to the Tombigbee River was calculated using a conservative, one-dimensional fate and transport model, BIOSCREEN-AT. Model results demonstrated that HCB concentrations at BA-MW3B would not result in an exceedance of the HCB AWQC in the Tombigbee River.

DDTr was not detected above the reporting limit in the groundwater samples. DDTr in sediment was not a continuing source to groundwater or the Tombigbee River.

The groundwater analytical data, core data, and the model results indicate that the OU-2 sediment is not a source of COCs to the Tombigbee River via the groundwater pathway. A mercury, HCB, or DDTr groundwater plume above the screening level at OU-2 was not evident.

Mercury was detected above the screening level in micro-well cluster BA-MW1 as discussed above. Mercury in these wells may be the result of a historical remnant of the OU-1 plume near the bluff adjacent to OU-2. Currently, the groundwater recovery system at OU-1 captures water above the OU-1 groundwater cleanup level of 2 µg/L. OU-1 groundwater monitoring and compliance is currently regulated under RCRA.

The potential for mercury at concentrations between the OU-2 screening level and the OU-1 cleanup level, as detected in OU-1 groundwater west of the bluff, to discharge to the Basin and the Tombigbee River was calculated using the fate and transport model BIOSCREEN-AT. The model results demonstrate that mercury concentrations at BA-MW1 would not result in an exceedance of the screening level in the Basin or in the Tombigbee River. Micro-wells between the Basin and the Tombigbee River do not contain mercury concentrations above the screening level. Therefore, a groundwater plume of mercury exceeding the AWQC in the Basin or the Tombigbee River is not currently evident or predicted in the future.

Groundwater beneath the Basin may contact and seep upward through the clayey sediments. Additional studies will be performed to estimate the groundwater seepage velocity as part of the remedial process.

4.5 ECOLOGICAL INVESTIGATIONS

The results of the ecological investigations conducted at OU-2 are presented in this section.

4.5.1 Terrestrial Vegetation

The results for mercury, methylmercury, HCB, DDTR, and percent lipids in terrestrial vegetation are summarized below. Individual results are provided in Table H-9 in Appendix H and are shown on Figure 2-12. Vegetation results for COCs are reported as wet weight.

Mercury was not detected in terrestrial vegetation samples (reporting limit = 0.017 mg/kg). Methylmercury was detected in the terrestrial vegetation samples at concentrations ranging from 0.000643 JQ mg/kg (estimated concentration between the method detection limit and the reporting limit) to 0.0147 mg/kg. The average methylmercury tissue concentration was 0.00314 mg/kg. Six of the 10 vegetation samples had methylmercury concentrations between the method detection limit and the reporting limit.

HCB was analyzed in five vegetation samples, but was only detected above the reporting limit in one sample (FPVSS14) at 0.0048 J mg/kg. DDTR was analyzed in five vegetation samples. The results for the six analyzed congeners were summed to obtain the DDTR value. Zero was used in the summations for congeners that were not detected at the associated reporting limit for the sample. DDTR was detected above the reporting limit in only one sample in FPVSS-1 (northeast of the Basin) at 0.0045 J mg/kg.

Percent lipids in vegetation ranged from 0.13 to 0.4 percent. Vegetation sampled as part of this effort included vines and leaves from shrubs near associated soil samples.

4.5.2 Spiders and Insects

The results for mercury, HCB, DDTR, and percent lipids in spiders and insects are summarized below. Individual results are provided in Table H-10 in Appendix H and are shown on Figures 2-13. Spider and insect results for COCs are reported as wet weight.

Mercury concentrations in spiders collected in the OU-2 floodplain ranged from 0.13 mg/kg to 0.17 mg/kg and were similar throughout the floodplain as shown in Figure 2-13. HCB concentrations in spiders ranged from 0.001 JQ mg/kg (estimated concentration between the method detection limit and the reporting limit) to 0.016 mg/kg. DDTR concentrations in spiders ranged from 0.141 mg/kg to 0.335 mg/kg. The results for the six analyzed congeners were summed to obtain the DDTR value. Zero was used in the summations for congeners that were not detected at the associated reporting limit for the sample. This method was also used for flying and crawling insects. Summations of congeners were also calculated using one-half the reporting limit for non-detected concentrations at USEPA's request for evaluating uncertainty in non-detected concentrations. These summations resulted in DDTR concentrations ranging from 0.14 JQ mg/kg to 0.33 JQ mg/kg. Percent lipids in spiders ranged from 3.5 to 3.9 percent. The use of half the reporting limit in the summations for the congeners that were not detected is also reported in Appendix H.

Mercury concentrations in flying insects ranged from 0.14 mg/kg to 0.71 mg/kg. HCB concentrations in flying insects ranged from 0.002 JQ mg/kg to 0.039 mg/kg. DDTR in flying insects (ND = 0) ranged from

0.038 J mg/kg to 0.659 J mg/kg. DDTR in flying insects using one-half the reporting limit for non-detects ranged from 0.05 JQ mg/k to 0.66 J mg/kg. Percent lipids in flying insects ranged from 3.2 to 4.1 percent.

Mercury concentrations in crawling insects ranged from 0.008 JQ mg/kg to 0.37 mg/kg. HCB concentrations in crawling insects ranged from 0.002 JQ mg/kg to 0.035 mg/kg. DDTR in crawling insects (ND = 0) ranged from 0.004 JQ mg/kg to 0.352 mg/kg. DDTR in crawling insects using one-half the reporting limit for non-detects ranged from 0.015 JQ mg/k to 0.35 J mg/kg. Percent lipids in crawling insects ranged from 2.8 to 4.4 percent.

4.5.3 Fish

Fish tissue samples have been collected from the Basin since 1986, with the most recent collection occurring in 2008. Fish species collected for tissue analysis from the Basin include largemouth bass, channel catfish, bluegill, smallmouth buffalo, rock bass, mosquitofish, brook silversides, and mullet. These species are discussed in this section by trophic level. The upper, middle, and lower trophic levels are discussed separately. The fish tissue samples have been analyzed historically for mercury, HCB, and DDTR. By examining the fish tissue concentrations of mercury, HCB, and DDTR in fish species that are representative of different trophic levels, the movement of mercury, HCB, and DDTR through the food web can be discussed.

4.5.3.1 Lower Trophic Level Fish

Fish in the lower trophic levels feed on plankton and terrestrial insect larva (Fry et al., 1999). Lower trophic level fish that were sampled in the Basin include mosquitofish, brook silversides, and mullet.

Samples of lower trophic level fish species including mosquitofish (1994 and 2001), mullet (1986), and silversides (2008) were analyzed for mercury. Mosquitofish showed a 14 percent decrease in concentration between 1994 and 2001 (Figure 4-21). Lower trophic level fish (silversides) species sampled in 2008 from the Basin show slightly higher mercury tissue concentrations than mosquitofish, which could be attributed to silversides feeding slightly higher in the food web than mosquitofish (Figure 4-21). Mullet tissue samples had lower concentrations than silversides and the average mosquitofish concentrations, but with some sample concentration overlap with mosquitofish. Recovery times for middle and lower trophic level species are shorter and occur first, followed by the upper trophic level recovery. Figure 4-21, as with most other figures in this section, shows both pre-berm and post-berm conditions in the Basin. Mosquitofish and silverside tissue samples are a composite analysis of the whole bodies of several individual fish of the same species, while the mullet samples are individual fish.

Seasonality resulting from temperature changes affects the methylation of mercury. The potential for mercury methylation varies at different times of the year, with the greatest potential generally occurring in the summer from mid-July to September (Korthals and Winfrey, 1987). Higher temperatures tend to increase methylation rates, and summer conditions had been in effect for a month when the June 1994 fish samples were collected. Mosquitofish tissue samples collected in June 1994 could have had lower concentrations of mercury than the samples collected in October 2001, if seasonality played a role, because the fish should have accumulated higher mercury concentrations through the period of higher methylmercury availability during the hot summer in 2001. In contrast to the expected seasonality effect, the mosquitofish samples collected earlier in the year in June and August 1994 were higher in concentration than the samples collected at the end of the long, hot summer in October 2001.

HCB analyses were performed on mosquitofish (1994 and 2001) and silversides (2008). The tissue concentrations of HCB in mosquitofish decreased 19 percent between 1994 and 2001 (Figure 4-22). The mosquitofish dataset was tested for significance, and this decrease was not statistically significant. Lower trophic level fish (silversides) species sampled in 2008 from the Basin show slightly higher HCB tissue concentrations than mosquitofish, which could be attributed to silversides feeding slightly higher in the food web than mosquitofish and to sediment disturbances during the construction of the berm (Figure 4-22).

Lower trophic level fish species tissue (mosquitofish) samples were analyzed for DDTR in 1994 and 2001. The DDTR mosquitofish tissue concentrations decreased 78 percent from 1994 to 2001 (Figure 4-23), indicating a decreasing trend in fish tissue concentrations.

4.5.3.2 Middle Trophic Level Fish

Middle trophic level fish feed on aquatic insect larva, terrestrial insects, and plankton. The middle trophic level consumers sampled from the Basin include channel catfish, rock bass, smallmouth buffalo, and bluegill. These fish serve as prey for larger fish, as well as terrestrial and avian predators. Bluegill will prey on both aquatic and terrestrial insects and plankton (Baumann and Kitchell, 1974); catfish are opportunistic omnivores that feed on a wide variety of organisms (Marsh, 1981).

Channel catfish filet samples were analyzed for mercury in 1986, 1991, and 2003; bluegill whole-body samples were analyzed for mercury in 1995 and 2008. Single-year sample collections were also performed for whole-body catfish in 1991 and for bluegill, rock bass, and smallmouth buffalo filets in 1986. Mercury concentrations in tissue of middle trophic level fish species (channel catfish and bluegill) decreased in the Basin from 1986 to 2008 (Figure 4-24). Channel catfish filet samples collected between 1986 and 2003 decreased 48 percent over the period. Bluegill whole-body samples collected between 1995 and 2008 decreased 31 percent over the period.

Middle and lower trophic level fish were not collected in 2005 and 2006. Data may have shown a lower concentration in middle and lower trophic level species, based on trends observed in upper trophic level fish (see Section 4.3.5.3). Largemouth bass showed a decreasing trend in tissue mercury concentrations during that period. The same trend would be expected in the middle and lower trophic level fish tissue mercury concentrations as was seen in the 2005/2006 largemouth bass, but a 2005/2006 dataset for middle and lower trophic level fish species was not collected. Thus, the tissue concentrations of middle and lower trophic level species could reflect natural recovery for mercury over time. The lower and middle trophic level mercury concentrations increased in 2008, and concentrations were magnified into the largemouth bass concentrations.

HCB tissue concentrations of middle trophic level fish species indicate a decreasing trend in the Basin (Figure 4-25), though a species-specific comparison cannot be performed because different species were collected in different years. Channel catfish were sampled and analyzed for HCB in 1991 with concentrations ranging from 0.16 to 1.8 mg/kg, while bluegill were sampled and analyzed in 2008 with concentrations ranging from 0.05 to 0.64 mg/kg. The decreasing trend of mercury and HCB in the middle trophic level species may indicate natural recovery; however, because of the difference in feeding habits between the two species, the observed decrease is not definitive. HCB also does not significantly bioaccumulate into fish tissue or biomagnify in the food chain when compared to chemicals like DDT and mercury (Agency for Toxic Substances and Disease Registry [ATSDR], 1999, 2011a, b).

The only middle trophic level species to be analyzed for DDTR in the Basin was channel catfish in 1991 (Figure 4-26); therefore, no timeline comparisons are possible. Catfish sample concentrations were less than 10 mg/kg, except for one sample with a DDTR concentration of 29.0 mg/kg. These concentrations were slightly higher than the lower trophic level DDTR concentrations found in mosquitofish in 1994, and lower than the upper trophic level concentrations found in largemouth bass in 1991 and 1994, which is likely attributable to the fishes' relative positions in the food web in OU-2.

4.5.3.3 Upper Trophic Level Fish

Upper trophic level fish are consumers of fish, crustaceans, and other large prey (Fry et al., 1999). Largemouth bass was the only upper trophic level fish species that has been sampled in the Basin. Largemouth bass as juveniles feed on smaller prey such as insect larva and plankton. The fish will opportunistically feed on a wide variety of prey upon reaching adulthood that can include small terrestrial organisms venturing into the water and young alligators. Climatological changes in habitat such as drought and flood conditions have a significant impact on the availability of prey items and how the fish forage; therefore, many factors affect the diet of the largemouth bass. However, largemouth bass will consistently feed on other consumers and not producers (aquatic plants).

Largemouth bass fish tissue was analyzed for mercury in 1991, 1994, 2001, 2003, 2006, 2007, and 2008. The mercury concentrations in filet fish tissue samples for the largemouth bass showed a statistically significant downward trend between 1991 and 2006 before berm construction and the drought, with a decrease of 35 percent (Figure 4-27a). Whole-body analysis of largemouth bass showed an increase of 18 percent between 1991 and 2001. The whole-body dataset for largemouth bass was tested for significance, and this increase was not statistically significant. Whole-body analysis was not performed in 2003 and 2006. The data for largemouth bass filet tissue samples indicated an overall statistically significant increase in the mercury concentration of 66 percent from 1991 to 2008, and whole body fish tissue mercury concentrations increased by 115 percent from 1991 to 2008 (Figure 4-27b). Largemouth bass fish tissue was analyzed for HCB in 1991, 1994, 2001, and 2008. HCB fish tissue concentrations decreased by 49 percent in filet samples and by 43 percent in whole-body samples from 1991 to 2008 (Figure 4-28). This decreasing trend in fish tissue HCB concentration may indicate natural ecosystem recovery moving up through the food chain.

Whole body largemouth bass fish tissue samples were analyzed for DDTR in 1991 and 1994, and filet samples were analyzed for DDTr in 1991 and 2001. DDTR fish tissue concentrations in the Basin for filet samples decreased by 74 percent in largemouth bass (Figure 4-29). The 1991 and 1994 whole body fish tissue data were tested for outliers using the Dixon's test in ProUCL Version 4.04. Each year has significant variability in the dataset; the 1991 dataset had one statistical outlier and the 1994 dataset had two statistical outliers. Excluding the outliers, the dataset showed a decrease of approximately 26 percent. The dataset was tested for significance, and this decrease was not statistically significant. These two datasets were collected within a short period (1991 and 1994). When the 2001 fish filet tissue concentrations for DDTR were compared to the 1991 tissue concentrations, results indicated successful natural recovery for DDTR over the 10-year period.

Trends in Fish Concentrations

Trends in fish tissue concentrations over time in the Basin are summarized as follows:

- Mercury concentrations in upper trophic level fish increased in 2007, while the middle and lower trophic level fish decreased. As the upper trophic level fish continue to feed on the middle and lower trophic level fish with lower tissue concentrations, the upper trophic level fish could decrease in concentration, as discussed in the prior subsections.
- HCB concentrations in the upper and lower trophic level fish decreased over time. No middle trophic level fish sampled from multiple years were available for historical trend comparison.
- DDTR concentrations in the upper and lower trophic level fish decreased over time. No middle trophic level fish sampled from multiple years were available for historical trend comparison.

The documented increases in fish tissue mercury concentrations without increases for HCB and DDTR could be associated with the lack of continuous, uniform data for statistical analysis. The increase in mercury could be attributed to the fact that mercury bioaccumulates/biomagnifies up the food chain more quickly than HCB and DDTR, and the rate of depuration of mercury is slow in fish after concentrations return to normal conditions. This effect is also magnified by the age structure of the upper trophic level fish such as largemouth bass, which are a long-lived species. The largemouth bass sampled in 2008 were estimated to be between 2 and 7 years old and would experience little depuration during this period. The middle (bluegill) and lower (silversides) trophic level fish are faster growing and shorter-lived species. The sampled bluegill represented an age structure between 1 and 3 years while the silversides typically only live 1 year and die after they spawn. The younger age structure in the middle and tropic level fish can yield a different data trend in fish tissue samples, as a result, than the older higher trophic level fish that have been exposed over a longer period.

4.5.4 Other Biota

Benthic macroinvertebrate sampling to characterize the infaunal community was conducted in three phases at OU-2 during the RI/FS investigation in 1991 and 1992 (WCC, 1993) and during the additional ecological studies (WCC, 1994). The benthic community at OU-2 was dominated by oligochaetes (segmented worms, especially of the families Tubificidae and Naididae); larval dipteran insects (especially chironomids [midges] and chaoborids [phantom midges]); and ostracods, as would be expected in a freshwater or oligohaline environment such as OU-2. There was a strong inverse correlation between taxonomic richness and invertebrate densities versus depth, likely due to hypoxic conditions at depth. Multivariate statistical analyses (clustering procedures) indicated no significant relationships between benthic invertebrate diversities and densities and COC concentrations in the sediments. No clear patterns were evident in a qualitative assessment of the distribution of pollutant-tolerant or pollutant-sensitive taxa relative to COCs. Relatively high incidences of oligochaete worms with aberrant chetae were noted in some locations, although these had no definite relationship to location-specific COC concentrations. Details of the benthic macroinvertebrate studies were presented in the RI (WCC, 1993).

The tubificid worms are most commonly found in soft sediments that are rich in organic matter. As lakes become eutrophic and DO concentrations decrease, tubificid oligochaetes tend to replace other benthic animals due to their tolerance for these conditions (Soil & Water Conservation Society of Metro Halifax, 2008). None of the oligochaete worms identified from OU-2 have a designated habit classification; however, oligochaetes are generally expected to be important freshwater bioturbators (Barbour et al., 1999).

Members of the chironomid family are classified as burrowers (Barbour et al., 1999). Chironomids are often the only insects found in lake sediments of the profundal zone where hypoxic (oxygen concentrations less than 3 mg/L) and anoxic conditions sometimes occur (Rasmussen, 1996). The larvae and pupae of most species occurring in low-oxygen sediments construct burrows and fixed tubes of sediments held together with silky secretions. Tube and burrow dwellers can ventilate their tubes with fresh water by dorso-ventral undulations of the body, thereby facilitating gas exchange during times of low ambient oxygen and resulting in bioadvection and bioirrigation.

The benthic macroinvertebrates listed in WCC (1993) were provided to several experts in invertebrate ecology and bioturbation to assess expected bioturbation depths in OU-2. Douglas Clark, a co-author on several subaqueous cap design guidance documents for the U.S. Army Corps of Engineers, responded: "It appears from your list of taxa that you are dealing with a freshwater or perhaps an oligohaline system. I base this on the listing of tubificid oligochaetes and chironomids. It is impossible to tell much more about taxa shown at the family level. Freshwater systems are less well-understood than estuarine systems with respect to bioturbation depths, but largely would be expected to be confined to the uppermost 10 to 15 cm of the sediment column, *and probably considerably shallower than that* [emphasis added]."

Mr. Clark's response is interpreted to indicate that, based on the benthic infaunal species present at OU-2, bioturbation would be largely confined to the uppermost 6 inches (i.e., 15 cm) of the sediment column.

The benthic invertebrate community of OU-2 exhibited some evidence of stress (lower diversity and abundance, and chetal aberrations in many oligochaetes) based on limited comparisons with a reference area, Hatchetigbee Lake, that may in part be attributable to the presence of COPCs. Another important factor to recognize in characterizing the benthic invertebrate community of OU-2 is that limnological conditions in the deeper portions of the Basin appear to be unfavorable to aerobically respiring organisms.

4.5.5 Corbicula Bioaccumulation Study

The 2006 and 2008 bioaccumulation data are presented in Table 4-23. Mercury and methylmercury tissue concentrations increased from 2006 to 2008 by approximately one order of magnitude during the 28 days of exposure, irrespective of sediment mercury and methylmercury concentrations at the location of cage placement. The 2008 study results showed an overall increase in average mercury tissue concentration. Average methylmercury tissue concentrations were similar to the 2006 study results. The average percentage of methylmercury in *Corbicula* tissue in 2006 was 28 percent and 21 percent in 2008. Bioaccumulation rates for total mercury and methylmercury were similar between 2006 and 2008.

5.0 CONTAMINANT FATE AND TRANSPORT

This section presents an updated conceptual site model (CSM) for OU-2 and analyses of potential routes for contaminant migration, contaminant persistence within the Basin, and contaminant migration in relation to geophysical parameters.

5.1 UPDATED CONCEPTUAL SITE MODEL

This updated CSM for OU-2 has been refined from the CSM developed during the 1991 RI and subsequent investigations, using additional information and data developed between 2006 and 2009. An explanation of Basin hydrology, COC deposition within the Basin, and sediment deposition within the Basin are provided below.

5.1.1 Basin Hydrology

The Tombigbee River is hydraulically controlled upstream of the Coffeeville Lock and Dam and is free-flowing downstream of the dam to the river's confluence with the Alabama River. The lower Tombigbee River, which is next to OU-2, typically experiences a drier season in the summer and fall months and a wetter, flooding season in the winter and spring months. Tidal fluctuations are evident upstream of OU-2 to the USGS gauge at Leroy during summer low-flow conditions. Winter and spring storms typically cause flooding in the Lower Tombigbee River drainage. These floods often exceed the action stage (19 feet NAVD88) and flood stage (24 feet NAVD88) and can be several weeks in duration.

The Basin was connected to the Tombigbee River and subject to its water elevation changes until the construction of the berm and gate system in 2006 as part of the ESPP. The berm and gate system became operational in 2007. The berm was constructed on an area of existing higher ground in the floodplain (i.e., eastern shoreline of the Tombigbee River). This higher ground was present along the northern and eastern sides of the Basin and Round Pond. Minimum surface elevations in this area were approximately 6 to 7 feet NAVD88. An approximately 35-foot-high bluff (likely the former western shore of the Tombigbee River) bounds the floodplain and Basin on the western boundary. The southern portion of OU-2 was connected to the Tombigbee River by bottomland hardwood forest and a meandering natural channel. Basin hydraulics before berm construction were such that, when flooding occurred, floodwaters flowed into the Basin from the Tombigbee River through the natural channel and through the bottomland hardwood forest from south to north until floodwaters exceeded 6 to 7 feet NAVD88. At this elevation, flow was from north to south through OU-2. Once floodwaters receded below 6 to 7 feet NAVD88, the Basin drained to the south through the natural channel to the Tombigbee River.

The berm was completed to an elevation of 12 feet NAVD88, with the top of the gate and associated spillway at 11 feet NAVD88. The natural channel was straightened to allow more effective sediment transport into the Basin at water elevations less than 12 feet NAVD88. The gate system became operational in March 2007, altering Basin hydraulics slightly. The increased berm elevation allows flooding of the Basin to occur from south to north to an elevation of 12 feet NAVD88, when the flow direction switches from north to south. The operation of the gate maintains floodwaters at an elevation of 11 feet NAVD88 to allow incoming suspended sediment to settle. Sediments are allowed to settle for 48 hours before the controlled release of the floodwaters.

Basin water elevations were allowed to equilibrate with the river water elevations before January 2009. The effects of wind speed on sediment resuspension were evaluated in January 2009 as described in Section 2.2.7. This study indicated that a minimum water elevation of 6 feet NAVD88 may protect sediments from wind-driven resuspension under most wind speed scenarios at OU-2. Floodwaters are currently retained for a 48-hour period and slowly decanted to a minimum elevation of 7 feet NAVD88, so that the Basin and the river do not equilibrate at elevations less than 7 feet NAVD88.

5.1.2 COC Deposition in OU-2

The Olin McIntosh Plant discharged wastewater to the Basin from 1952 to 1974. BASF (formerly Ciba-Geigy, located north of OU-2) manufactured DDTR during this period. The COCs that were transported with the wastewater deposited in the Basin and the deposition pattern of the COCs were influenced by several factors, including:

- Discharge location
- Basin bathymetry
- Elevation, duration, and inundation rates of floods
- Water levels, particularly pertaining to low water conditions in summer and droughts
- Wind effects
- Geochemical and physical parameters

Mercury concentrations greater than 0.2 mg/kg in sediment form a wedge that narrows as one travels north and east across the Basin, except for the deeper portion of the Basin, where focusing likely increases sediment deposition. Maximum depths with mercury concentrations greater than 0.2 mg/kg range from 5 to 6 feet, north to south, and from 4 to 9 feet, east to west (Tables 4-15 and 4-16). COC distribution with depth is discussed further in Section 5.3.2.

HCB is more prevalent in the southern portion of the Basin (Figure 4-6). HCB is not as mobile as mercury because of its hydrophobic properties and likely settled first from the discharge wastewater in this area. Concentrations of HCB in 2009 sediment results were highest in the southern portion of the Basin near the inlet channel and the former wastewater ditch.

DDTR historically exhibited a different distribution pattern from mercury and HCB. In 1991, DDTR concentrations in surficial sediment decreased from north to south in the Basin. This pattern was reversed by 2008, when higher concentrations were observed in the south, and lower concentrations were observed in the north (Figure 4-7). Overall, concentrations decreased over time by an order of magnitude. The reduction in DDTR concentrations may be the result of the implementation of natural degradation and two remedial efforts by BASF. DDTR concentrations detected in the southern portion of the Basin may reflect residuals from BASF's property, including their discharge ditch east of the Basin.

5.1.3 Sediment Resuspension

The mobility of mercury within the Basin may be related to resuspension of surficial sediment from stochastic wind events and possibly other factors. The effects of wind speed on sediment resuspension were evaluated in January 2009, as described in Section 2.2.7. Environmental factors that may drive sediment resuspension in the Basin include wind speed, depth of water, surface water velocity, and geochemical parameters in the water column. Alluvial sediments do not always deposit in uniform layers in floodplains and oxbows, and mixing and lateral displacement of sediment is possible (Longwell et al., 1969). High wind speeds and low water elevations may exacerbate this effect at OU-2. Shallower portions of the Basin may also be more susceptible to wind-driven resuspension and the effects of a drought.

Other factors such as surface water velocity, seasonal turnover, groundwater seepage velocity, and geochemistry may also contribute to resuspension effects. Surface water velocities, even during storm events, were very low (0.2 foot per second or less) and do not appear to control migration to a great extent. Large storms (e.g., hurricanes) may produce higher surface water velocities. Geochemistry in the water column, as it relates to sediment already resuspended, is further evaluated in Section 5.4. Resuspension due to seasonal turn over may occur for a portion of year (spring and fall) and would be limited to the deeper portions of the Basin, which comprises approximately 20 percent of the Basin by area and does not include Round Pond. Groundwater seepage velocity may also affect resuspension if velocities are sufficient to move sediment.

5.1.4 Sediment Deposition

Some areas of the Basin, such as the deeper and southern portions of the Basin, experience more deposition than other areas. The deeper portion of the Basin contains higher concentrations of COCs at greater depths than other areas of the Basin because of sediment transport (also known as focusing) into this deeper area. More deposition is also evident in the southern portion of the Basin, based on sediment pin data. There is a statistically significant decrease in concentrations in surficial sediments in the southern portion of the Basin. The COC depths from the coring results indicate a pattern of greater sedimentation in the southern portion of the Basin and the deeper portion of the Basin.

Sediments in the southern portion of the Basin contain more sand and lower TOC than other areas of the Basin (Figure 4-8), and may indicate deposition when river flows enter the Basin from the south during flooding. Samples from the southern portion of the Basin had the highest percentage composition of sand. Floodwaters traveling north through the inlet channel from the Tombigbee River during flood events are expected to provide larger grain-size particles. After the water reaches the Basin and velocities decrease, sand and larger silts would theoretically be the first particle sizes to fall from suspension and deposit in the southern portion of the Basin. The slower-moving water from the river and from overland flow from the north would be expected to hold the silt and clay particles in suspension longer and eventually deposit the smaller particles over time across the remainder of OU-2 (MACTEC, 2007a). The sediment load entering the Basin during floods is less than that available in the river, as indicated by lower TSS entering the Basin than is contained in the river during flooding. Accumulation of incoming sediment is evident in the southern portion of the Basin where surficial sediment mercury concentrations have decreased, grain size and TOC data are consistent with incoming sediment, and a review of aerial photographs over time shows deposition (Figure 4-10).

The mercury concentrations in sediment form a wedge that narrows as one travels north and east across the Basin, except for the deeper portion, indicating the potential for less long-term sedimentation in the northern portion of the Basin in comparison with the southern portion (Tables 4-15 and 4-16). The northwest portion of the Basin received 5 to 6 inches of net accumulation in 2008, the highest accumulation during sediment pin monitoring. It is likely that the bathymetry of the northwest portion of the Basin lends itself to focusing (Figure 1-2). BASF placed a soil cap in Cypress Swamp as a remedy for DDTR contamination just before the August 2008 flood event. Approximately half of this sediment accumulation appeared suddenly after the BASF soil cap eroded during the August 2008 storm event. BASF modified the drainage path in this area and replaced their cap after this storm event. This accumulation appeared quickly, is tactilely firm, and has remained with little erosion over time. The cap material was native quarry material containing sands, silts, and clays. It is also possible that native soils from the BASF property eroded into the Basin along with the cap material, contributing to the sediment pin accumulation in the northwest portion of the Basin.

The annual average NSR in the Basin is estimated to be 0.3 inch/year, with the 95 percent confidence interval ranging from 0.2 to 0.4 inch/year. NSR increases with increasing river flow rate, increasing frequency of berm overtopping, and longer duration of Basin inundation by river flow. Most of the site data were collected during a low-flow period or drought. Annual NSR calculated for the 2005 through 2009 period may be lower than the actual long-term average value.

Anchor QEA's estimation of NSR assumes an even distribution of sediment over the Basin. Figure 4-10 indicates that deposition was concentrated in the southern portion of the Basin based on measured sediment accumulation. The volume of annual deposition in the Basin (excluding the northwest accumulation suspected from BASF) based on the sediment pin data (Figure 4-9) was calculated to be 90,000 cubic feet per year. The volume of annual deposition was also calculated using Anchor QEA's estimated annual sedimentation rate over the Basin, which was 83,000 cubic feet per year. The two values are within 10 percent of each other and represent two lines of evidence (one estimated through modeling techniques and one based on physical measurements) indicating deposition in portions of the Basin.

5.2 POTENTIAL ROUTES OF MIGRATION

This section presents potential routes of COC migration, and discusses sediment interactions with surface water and groundwater.

5.2.1 Sediment and Surface Water Relationship

Unfiltered and filtered mercury in 2008 surface water samples averaged 0.246 and 0.0147 µg/L, respectively. Unfiltered and filtered mercury in 2009 surface water samples averaged 0.0473 and 0.00781 µg/L, respectively, a two-fold decrease from the previous year. Methylmercury in unfiltered and filtered samples also decreased an order of magnitude from 2008 to 2009. Most of the mercury and methylmercury in surface water is associated with suspended solids in the water column. Average concentrations of mercury in overflow from the gate ranged from 0.0182 to 0.126 µg/L. Mercury was detected in an upstream river sample at 0.00564 µg/L. A mass balance between the flow rate and mercury concentrations in the overflow and river indicates that mercury in the overflow will not cause an exceedance of the mercury AWQC (0.012 µg/L) in the river. Concentrations of filtered mercury and methylmercury in overflow from the gate were below the mercury AWQC.

5.2.2 Sediment and Groundwater Relationship

The overall goal of the OU-2 groundwater investigation was to determine whether the OU-2 sediments act as a continuing source of COCs to groundwater and the Tombigbee River. Filtered mercury was not detected above screening levels in micro-wells installed in OU-2. Cores generally showed that an unimpacted zone of clay remains between the Basin sediments and the alluvial aquifer.. Based on the evaluation of the analytical data collected and the solute transport model results, a groundwater plume with COC concentrations above the AWQC was not present at the Basin. The AWQC for COCs in the Tombigbee River is not predicted to be exceeded as a result of contributions from groundwater. Groundwater beneath the Basin may contact and seep upward through the clayey sediments. Additional studies will be performed to estimate the groundwater seepage velocity as part of the remedial process.

5.3 CONTAMINANT PERSISTENCE

This section presents COC persistence in the Basin and the vertical and horizontal COC distribution with sediment depth.

Relatively lower mercury concentrations were encountered near the sediment surface with relatively higher mercury concentrations at mid-depth in the total core interval for some cores. Other core locations indicated relatively higher mercury concentrations nearer to the surface. The horizontal and vertical distribution of HCB and DDTR, where detected in sediment, was within the mercury footprint.

Vertical migration of mercury within the sediment deposits was not evident in the data from the 2009 sediment fine and coarse cores. Graphs of mercury concentration with depth are included in Appendix J. A review of these graphs indicated that the maximum mercury concentration was not consistently detected at any one depth throughout the fine cores (i.e., a consistent "spike" was not apparent). Groundwater seepage velocity and erosion/relocation during storm events may also affect migration of mercury if the magnitude of the groundwater seepage velocity and storm event is sufficient.

Sediment depths with age were successfully correlated in core SDCR-8 (Appendix H, Table H-7). These data indicated that the highest mercury concentration of 440 mg/kg in SDCR-8 was detected at a depth of 6 feet; the mercury concentration in the top 1 foot was 23 mg/kg. The higher mercury concentrations in this core correlated with the years 1959 to 1968, when wastewater that contained mercury was discharged to OU-2.

Battelle, performed sorption studies on the sediment from the Basin and potential cap materials (Battelle Laboratory, 2010b). The study concluded that the sediment is extremely sorptive of mercury because of the small particle size, high sulfur content, and high organic content of the sediment. Both the Battelle study data and the pore water/sediment ratios obtained from the fine cores will be used to provide a range of K_d values in the FS. This range may be lower and higher than that provided by the Battelle study.

5.4 CONTAMINANT MIGRATION

Natural forces move mercury through the environment, while the chemical form of mercury generally determines how it moves through the environment (Congressional Research Service [CRS], 2006). Methylmercury is the biologically active form of mercury and bioaccumulates up the food chain (MACTEC, 2008d). The significance of methylation is that relative to inorganic mercury, methylmercury is more easily absorbed by living tissues (CRS, 2006). This section discusses the geophysical parameters and factors that may affect the distribution of mercury in OU-2, and Basin water quality contributions to the Tombigbee River.

5.4.1 Geophysical and Geochemical Parameters

Mercury in the environment undergoes a biogeochemical cycle, and its presence is the result of natural (e.g., geothermal activity) and anthropogenic activities (MACTEC, 2008d). Geochemical and physical factors can affect the methylation of mercury, because mercury methylation in ecosystems depends on mercury loadings, nutrient content, pH, oxidation-reduction conditions, bacterial activity, and other variables (Eisler, 2006). Small changes in these parameters can increase or decrease methylation and demethylation rates in aquatic systems (Eisler, 2006).

This section summarizes the factors that affect methylation of mercury and how the conditions at OU-2 relate to these factors. While general trends may be observed as individual indicator parameters increase or decrease, the suite of parameters should be evaluated as a whole to indicate the potential for methylation of mercury.

5.4.1.1 Geophysical and Geochemical Parameters in Sediment

Several geochemical factors that can affect the methylation of mercury in sediment include AVS/SEM, organic carbon (i.e., TOC), metals, sulfates and sulfides, temperature, pH, and ORP. Other factors, such as sediment grain size, are correlated with the occurrence and distribution of total mercury.

AVS/SEM ratios are greater than 1 throughout OU-2 (range = 9.93 to 156), and exceed 1 to the extent that temperature or seasonal variability would not likely decrease the ratio below 1. These ratios may be an indication that methylation of mercury may be limited because of excess sulfide ions present in the sediment that complex with mercury and methylmercury. Even the lowest AVS/SEM ratios in sediment samples have excess capacity to complex with complexing ions, and increasing the AVS/SEM ratio does not increase complexing with additional excess sulfide. A correlation between AVS/SEM is not expected because any additional AVS/SEM does not contribute additional complexing, leading to no increased complexing with additional AVS/SEM and no correlation between AVS/SEM and mercury.

The sulfide concentrations (<37 J – 3,300 mg/kg in 2008) detected throughout OU-2 further support this conclusion. Excess sulfide may bind mercury and makes it unavailable for methylation by bacteria by reacting with the mercury to form mercuric sulfide (cinnabar) and by inhibiting the dissolution of mercury. Sulfides in the sediment may also complex with methylmercury and reduce its bioavailability. Battelle Laboratory's sediment sorption study also supported the high sulfur content of OU-2 sediments (Battelle Laboratory, 2010b). Sediments were analyzed for total sulfides, which includes sulfides other than hydrogen sulfide. The binding of sulfide is a complex process. Depending on concentrations of DOC, sulfides, and sulfates, sulfide and DOC may bind preferentially to each other instead of the mercury. The levels of sulfide in the Basin may inhibit the formation of stable metacinnabar. The amount of sulfide that accumulates in response to sulfate reduction can shift the optimal range for methylmercury production and bioavailability.

Existing concentrations of iron (11,000 – 57,005 mg/kg) and manganese (135 – 1,165 mg/kg) in sediments may indicate the mineralization of mercury. Iron and manganese may affect methylation or demethylation, depending on the concentration and chemistry of the environment. Iron and manganese may also reduce dissolved mercury through complexation.

TOC may affect methylation or demethylation depending on the environment. TOC can enhance mercury methylation by acting as a food source, thereby increasing the metabolism of heterotrophic microorganisms. In contrast, mercury methylation may be inhibited through the formation of mercury complexes with organic ligands. Methylmercury comprises between 0.00736 and 0.136 percent of mercury in the Basin. TOC concentrations in 2009 ranged from 644 – 60,500 mg/kg.

Other factors that influence the methylation of mercury in sediment at OU-2, but likely do not play as important a role as the factors discussed above, are sulfate concentrations, ORP, oxidative dissolution of cinnabar, and pH.

Sediment and surface water sampling for methylmercury represents a snapshot of methylmercury production in the Basin at a given moment; the sampling period was selected to represent conditions favoring methylmercury production. Methylation potential may be slightly higher or slightly lower at other times of the year.

The concentration of sulfates in sediment at OU-2 are not limiting for sulfate-reducing bacteria (SRB), the major group of organisms responsible for methylation of mercury in sediments. Though sulfate reduction results in decreased methylmercury formation, when sulfate is present, a kinetic relationship relating sulfate reduction to mercury methylation has been documented (King et al., 1999). However, the percentage of total mercury that is methylmercury in sediment in the central portion of the Basin is 0.01 to 0.07 percent, indicating that methylation by SRB may be limited. Areas near the shoreline exhibit a slightly higher methylmercury percentage, approximately 0.1 percent. Reducing conditions in OU-2 sediment indicated by the ORP values also favor the methylation of mercury, but other factors as described above may limit this process. The pH of sediments in OU-2 was acidic to neutral and is not expected to favor the methylation of mercury.

The occurrence and distribution of total mercury concentrations commonly are correlated with the occurrence and distribution of silt, clay, and TOC. An important factor in controlling sediment trace-metal concentrating capacity is grain size. As grain size decreases, metal concentrations increase. The affinity between trace-metal cations and silt- and clay-size particles is relatively strong because of the high positive charge of the trace-metal cations and the high density of negative charges of silt- and clay-size particles (USGS, 1998). A comparison of the grain size in the Basin (Figure 4-8) with the isoconcentrations of mercury (Figures 4-4a through d) and methylmercury (Figures 4-5a through c) does not indicate a clear relationship between grain size and concentration. Other geophysical parameters may contribute to the distribution of these constituents in the Basin.

Analysis of these geochemical factors using Spearman correlations reveals weak relationships when methylmercury and percent methylmercury are compared to these geochemical factors. The maximum coefficient of determination for the various correlations, including total mercury, yields a predictive variability of approximately 43 percent. Coefficients less than 50 percent are considered very weak or not meaningful. Though trends or relationships may be described based on the data and on predictive values of the geochemical correlations with methylmercury, use of the correlations to define interactions or significant relationships in OU-2 is not recommended. Relationships to geochemical parameters are presented in a qualitative manner as a result. These geophysical parameters may be used in performing a sensitivity analysis for modeling remedial alternatives in the FS.

5.4.1.2 Geophysical Parameters in Surface Water

Several geophysical factors, including alkalinity, hardness, organic carbon, ORP, pH, and DO are reported to affect the methylation of mercury in surface water.

Water hardness (calcium levels) and alkalinity may affect the bioaccumulation and toxicity of metals, including mercury, to higher trophic level organisms. Generally, as water hardness increases (i.e., as calcium levels increase), the gill permeability of aquatic organisms (especially fish) decreases, reducing the uptake of metals (Stokes and Wren, 1987). Calcium may also directly inhibit the transfer of methylmercury at trophic levels above the phytoplankton (Watras et al., 1995). According to the standard USGS water hardness scale, the 2006 and 2009 averages were in the soft range (0 to 60 mg/L), and the 2008 average was within the lower end of the moderately hard range (61 to 120 mg/L) (USGS, 2009).

Total alkalinity (i.e., carbonate and bicarbonate) may also regulate metal content in surface water by precipitating toxic metals out of solution. Total alkalinity is also an indication of the buffering capacity of the surface water system or the ability of a water body to resist changes in pH. Buffering capacity of a water body is dependent on geology, but, in general, total alkalinity levels less than or equal to 10 mg/L indicate a poorly buffered system that is susceptible to changes in pH (Wilkes University, 2007). Like higher water hardness levels, higher alkalinity levels have also been correlated with reduced bioaccumulation rates (Barkay et al., 1997). Total alkalinity averaged 38.9 mg/L in 2006, 54.3 mg/L in 2008, and 32.6 mg/L in 2009. The total alkalinity results indicate a buffered system that can withstand changes in pH and may have the potential to reduce bioaccumulation rates of methylmercury (Barkay et al., 1997).

DOC may increase or decrease mercury methylation. DOC may increase the production rate of methylmercury (Brumbaugh et al., 2001; Shanley et al., 2005) by serving as a food source for aquatic microorganisms. Both mercury and methylmercury may complex strongly with DOC and, as a result, both may decrease and increase bioaccumulation (Brumbaugh et al., 2001). Organic complexation may increase the amount of mercury substrate for methylation in the water column, but the binding of methylmercury by DOC in the water column may result in lower fish bioconcentration factors (Watras et al, 1995). DOC associations may decrease the bioaccumulation of mercury in aquatic food webs by lowering the bioavailability of mercury to methylating organisms (Barkay et al., 1997; Haitzer et al., 2003).

ORP indicates the presence of an oxidizing or reducing environment and is an indicator of whether aerobic or anaerobic respiration may occur. Aerobic respiration occurs during oxic conditions, and anaerobic respiration occurs during anoxic conditions. During oxic conditions, oxygen is used as the final electron receptor during microbial metabolism, and during anoxic conditions, a substance other than oxygen is used as a final electron receptor during microbial metabolism (methylmercury may be a byproduct of this process). A positive ORP value indicates an oxidizing environment where aerobic respiration is occurring, and a negative ORP value indicates a reducing environment where anaerobic respiration is occurring. Generally, methylation of mercury is favored at low ORPs (negative values) (Compeau and Bartha, 1984), while demethylation of mercury is favored at higher ORPs (Gilmour et al., 1992). ORP values throughout 2009 generally indicated oxidizing conditions in surface water throughout the Basin and in Round Pond, except for the deeper portion of the Basin at depths below approximately 15 feet during the summer months. In situ ORP has been consistent throughout historical and current sampling events.

The pH of a system also plays a role in the methylation of mercury. Acidic pH generally favors the methylation of mercury. In surface water, acidification may increase the rate of net methylmercury production in lake water (Ramlal et al., 1986), and methylmercury concentrations tend to be highest in lakes that are acidic (Shanley et al., 2005). Very acidic conditions, however, may kill the microbes that methylate mercury, resulting in a decrease of methylmercury production. The pH ranged from 5.91 to 7.04, with an overall average of 6.52, in April and May 2009. The pH ranged from 5.85 to 8.55, with an overall average of 7.04, in July and August 2009. Relatively higher pH values were observed in the southern portion of the Basin with a trend toward lower pH values in the north.

Oxic and oxidizing conditions do not favor the methylation of mercury, which occurs commonly as the reduction of divalent mercury to methylmercury. DO concentrations in the upper surface water layers of OU-2 indicate oxic conditions in the Basin. DO concentrations in deeper surface waters, while lower than those in the epilimnion, are also usually oxic, except for a short period in July and August. The methylation of mercury in surface water may be favored in a small area of the Basin (the hypolimnion in the deeper portion of the Basin) for a short duration of each year.

5.4.2 Gate Overflow

The purpose of the gate overflow sampling was to evaluate Basin water quality contributions to the Tombigbee River based on a USEPA request. Gate overflow sampling and a mass balance calculation using instantaneous mixing indicated that the mercury concentration in the Tombigbee River at the confluence with the inlet channel ranged from 0.00623 to 0.00631 µg/L. This concentration was approximately half the mercury AWQC, indicating the Basin does not contribute mercury to the Tombigbee River that would result in an exceedance of the AWQC in the river. The average filtered mercury concentration was 0.00769 ug/L. Twenty-four out of 28 filtered mercury concentrations were less than the AWQC. The average unfiltered and filtered methylmercury concentrations were 0.000314 ug/L and 0.00029 ug/L, respectively. The concentrations would also not cause an exceedance of the mercury AWQC in the river. Gate overflow samples were also analyzed for TDS and TSS. The TDS in the gate overflow ranged from 67.5 to 652 mg/L, while the TSS in the gate overflow ranged from 5.5 to 65 mg/L. The Basin water quality contributions to the Tombigbee River were within established standards based on the surface water analysis of the decant water from the OU-2.

6.0 SUMMARY

This document provides the results of the 2009 sampling activities. These data represent an addendum to the RI and the ESPP annual report. An update to the CSM was prepared based on these data and is presented in Section 5.0. Conclusions are provided below.

- Mercury was discharged to the Basin via the former wastewater ditch from 1952 to 1974, and became distributed across the Basin and Round Pond, and to a lesser degree, the OU-2 floodplain. Year-to-year concentrations have shown some variability though mercury is detected in the top 4 inches of sediment in most areas of the Basin and Round Pond (as shown in Figures 4-4a, b, and c).

- Overflow collected from the gate was collected from three gate-overtopping events and two events that did not overtop the berm. Unfiltered mercury concentrations in the gate overflow ranged from 0.0179 to 0.134 ug/L. Flow rates and mercury concentrations in the gate overflow and Tombigbee River were used to perform a mass balance to determine the concentration of mercury in the river. The resulting mercury concentrations in the river were 0.0063 ug/L, which was below the AWQC of 0.012 ug/L. The average filtered mercury concentration was 0.00769 ug/L. Twenty-four out of 28 filtered mercury concentrations were less than the AWQC. The average unfiltered and filtered methylmercury concentrations were 0.000314 ug/L and 0.00029 ug/L, respectively. These concentrations are less than the mercury AWQC. The concentrations would also not cause an exceedance of the mercury AWQC in the river.

- Average mercury concentrations in surface water decreased from 1.07 µg/L to 0.0473 µg/L between 1991 and 2009. Average mercury concentrations in surface water decreased from 0.246 µg/L to 0.0473 µg/L from 2008 to 2009.

- Average mercury concentrations in surficial sediment samples decreased from 41.4 to 32.8 mg/kg between 1991 and 2009. Average surficial mercury concentrations also decreased from 36.3 to 32.8 mg/kg between 2008 and 2009. These averages represent only 3 sampling events. The statistical significance is limited due to the limited number of sampling events and variability in sampling. Decreased concentrations were most prevalent in the southern portion of the Basin north of the inlet channel, where sediment from incoming flood events deposit.

- Mercury concentrations in the surficial sediment (top 4 inches) are relatively higher in the central portion of the Basin in a west-east direction. An isolated area of higher mercury concentrations was observed in the northeast corner of the Basin. The distribution of mercury in the surficial sediment changed slightly over the years, potentially due to resuspension and deposition of incoming sediments.

- Average surficial methylmercury concentration per transect ranged from 0.00431 to 0.0115 mg/kg with the higher concentrations present along the northeast and eastern edges of the Basin. The percentage of methylmercury to mercury ranged between 0.00739 and 0.136 percent. The percentage of methylmercury was generally within the lower range for most of the Basin and Round Pond. The higher percentages were associated with the samples collected along the eastern edge of the Basin.

- Operation of the berm and gate system at the 6-foot minimum water elevation may reduce resuspension of bed sediment due to wind effects. This minimum water elevation was maintained from February 2009 to the present, excluding a period from June to September when a 5.2-foot elevation was maintained. Mercury concentrations that accumulated in sediment traps was significantly reduced between February 2009 and February 2010, due at least in part to maintenance of water at the 6-foot elevation.

- Results from the coarse cores indicated that mercury was detected at higher concentrations at depth compared to surface concentrations at some locations in the Basin. Other cores indicated higher concentrations at the surface. Sample intervals with mercury concentrations greater than 0.2 mg/kg were collected from a wedge that narrows as one travels north and east throughout the Basin, except for the deeper portion of the Basin where focusing may increase deposition. HCB and DDTR were detected within the mercury depth footprint.

- Aging of the sediment core from the deeper portion of the Basin indicated that the upper 1 foot of sediment dated from 2001 to 2009, with a concentration of 23 mg/kg. The highest mercury concentration in the coarse cores was detected in the 5- to 6-foot interval of the deeper portion of the Basin core. This interval corresponded to a period from 1959 to 1968 when mercury was discharged to the Basin.

- Fine core samples were collected within the top 18 inches of sediment. Porewater samples associated with the fine cores were also collected. These data will be used to support modeling of diffusion through cap materials in an FS and modeling of mercury uptake in a food chain model in the updated ERA.

- The annual rate of sediment deposition from incoming floodwaters over the Basin was estimated by Anchor QEA at 0.3 inch/year. Measurement of sediment accumulation in the southern portion of the Basin in 2009 was approximately 2.5 inches. Comparison of the volume of material deposited over the Basin based on Anchor QEA's overall deposition rate and the volume of material deposited annually in the southern portion of the Basin indicated a similar sediment deposition. The two volume estimates were within 10 percent of each other and represented two lines of evidence (one estimated through modeling and one based on physical measurements in the Basin).

- Mercury concentrations in the surficial sediment in the southern portion of the Basin decreased from 1991 to 2009. Grain size distributions and TOC analyses for the southern portion of the Basin indicated a higher sand percentage and lower TOC percentage, which may indicate incoming sediment, compared to northern and central portions of the Basin. This area was where heavier particles would settle when floodwaters entered the Basin from the inlet channel. Deposition was also evident from aerial photographs. The average concentration of mercury in surficial floodplain soils was 0.814 mg/kg. Mercury concentrations in subsurficial soils were generally less than 1 mg/kg with slight increases and decreases with depth. Mercury concentrations in surficial floodplain soils generally decreased with increasing distance from the water's edges of the Basin and Round Pond. These concentrations were less than those collected in the 1990s. HCB concentrations ranged from 0.0035 mg/kg to 0.275 J mg/kg and were less than historical soil samples. Average DDTR concentrations in surficial floodplain soils ranged from < 0.002 UJ mg/kg in the southeastern portion of the floodplains to 2.23 mg/kg in the northwest portion of the floodplain. Concentrations decreased from north to south, with the highest concentrations in the northwest portion of the floodplain. DDTR concentrations in the northwest were two to three orders of magnitude higher than those in the eastern and southern portions of the floodplain.

- Mercury concentrations in micro-wells between the Basin and the river were less than the AWQC of 0.012 µg/L. Mercury in the OU-2 sediments did not act as a continuing source to groundwater or the Tombigbee River via the groundwater pathway because mercury above the screening level was not detected in groundwater associated with OU-2. Model results demonstrated that HCB concentrations at the isolated location where HCB was detected in groundwater would not result in an exceedance of the HCB AWQC in the Tombigbee River. DDTR was not detected above the reporting limit in the groundwater samples. DDTR in sediment was not a continuing source to groundwater or the Tombigbee River.

- Mercury was not detected in terrestrial vegetation. The average methylmercury concentrations in terrestrial vegetation was 0.00314 mg/kg. HCB and DDTR were detected in one vegetation sample.

- Mercury, HCB, and DDTR concentrations in spiders were similar throughout the floodplain, likely due to their predatory nature. Flying insect COC concentrations varied throughout the floodplain and reflected the potential wide-ranging habits of these insects. Concentrations of COCs in crawling insects were the lowest of the three groups, likely reflective of their localized nature.

- Mercury concentrations in 2008 fish tissue in upper trophic level fish increased since 2007. Fish were not collected in 2009. Mercury concentrations in middle and lower trophic level fish decreased. The upper trophic level fish may decrease in mercury concentration as the upper trophic level fish continue to feed on the middle and lower trophic level fish.

- The amount of debris within the Basin was evaluated from sidescan data collected during the bathymetric survey. Debris covers approximately 30 to 50 percent of the shallow portions of the Basin and approximately 15 percent of the deeper portions. The percent of debris in the deeper portions of the Basin may be underestimated because of limitations of the scanning equipment in deeper, softer sediment environments.

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TABLE 1-1

ANALYTICAL RESULTS SUMMARY FOR HISTORICAL SURFACE WATER, SEDIMENT, AND SOIL SAMPLES
Updated RI Addendum
Olin McIntosh OU-2

Surface Water	Range of Concentrations - 1991 shallow samples	Range of Concentrations - 1991 deep samples	Range of Concentrations - 1992	Range of Concentrations - 1994	Range of Concentrations - 1995 surface samples	Range of Concentrations - 1995 bottom samples	Range of Concentrations - 2001
Mercury (unfiltered)	0.26 - 1.5 µg/L	0.45 - 1.8 µg/L	na	0.23 - 3.6 µg/L	0.447 - 1.65 µg/L	0.451 - 4.61 µg/L	na
Mercury (filtered)	<0.2 µg/L	<0.2 µg/L	na	na	0.00642 - 0.0367 µg/L	0.00720 - 0.0118 µg/L	na
Methylmercury (unfiltered)	na		na	na	0.00245 - 0.00431 µg/L	0.00409 - 0.0121 µg/L	na
Methylmercury (filtered)	na		na	na	0.000359 - 0.000576 µg/L	0.000233 - 0.00174 µg/L	na
Dissolved Oxygen	5 - 10.5 mg/L	3.1 - 6.4 mg/L	na	na	4.7 - 8.0 mg/L	0.1 - 5.7 mg/L	na
Dissolved Organic Carbon	na		na	na	na	3.7 - 7.0 mg/L	na
4,4'-DDD	<0.1 µg/L		na	0.0286 - 0.092 µg/L	na		na
Pesticides 4,4'-DDE	<0.1 µg/L		na	0.018 - 0.0983 µg/L	na		na
4,4'-DDT	<0.1 µg/L		na	<0.00047 - 0.0082 µg/L	na		na
Hexachlorobenzene	<10 µg/L		na	0.00313 - 0.0442 µg/L	na		na
pH	7.2 - 8.79	7.07 - 7.66	na	na	7.1 - 8.4	6.5 - 7.8	na
Specific Conductance	1.94 - 2.13 mS/cm	2.06 - 2.19 mS/cm	na	na	na	na	na
Temperature	28.6 - 34.9 °C	28.5 - 29.3 °C	na	na	29.7 - 32.2 °C	27.8 - 30.5 °C	na
Iron	na		na	na	0.284 - 0.452 mg/L	na	na
Manganese	na		na	na	0.083 - 0.259 mg/L	na	na
Total Organic Carbon	6.1 - 15.8 mg/L	5.6 - 8.9 mg/L	na	na	na	4.0 - 6.0 mg/L	na

Surficial Sediment	Range of Concentrations - 1991	Range of Concentrations - 1992	Range of Concentrations - 1994	Range of Concentrations - 1995	Range of Concentrations - 2001
Mercury	<0.19 - 290 mg/kg dw	na	18.6 - 113 mg/kg dw	0.844 - 780 mg/kg dw	3.4 - 590 mg/kg dw
Methylmercury	na	na	na	0.00191 - 0.255 mg/kg dw	na
Methylmercury %	na	na	na	0.012 - 0.267%	na
Total Sulfate	<130 - 1,360 mg/kg dw	na	na	na	na
Total Sulfide	259 - 2,830 mg/kg dw	na	na	na	na
DDTr	0.272 - 6.9 mg/kg dw	na	0.67 - 4.01 mg/kg dw	na	0.082 - 25.9 mg/kg dw
DDTR	0.775 - 11.8 mg/kg dw	na	1.41 - 7.14 mg/kg dw	na	0.16 - 51.0 mg/kg dw [1]
Pesticides 4,4'-DDD	0.12 - 1.8 mg/kg dw	na	na	na	na
4,4'-DDE	0.1 - 1.4 mg/kg dw	na	na	na	na
4,4'-DDT	0.052 - 4 mg/kg dw	na	na	na	na
Hexachlorobenzene	<0.67 - 265 mg/kg dw	na	na	na	<0.01 - 53 mg/kg dw
Total Organic Carbon	6,000 - 80,500 mg/kg dw	na	3,220 - >16,000 mg/kg dw	5,600 - 53,300 mg/kg dw	2,600 - 170,000 mg/kg dw
pH	6.93 - 7.37	na	na	na	na

Floodplain Soils	Range of Concentrations - 1991	Range of Concentrations - 1992	Range of Concentrations - 1994	Range of Concentrations - 1995	Range of Concentrations - 2001
Mercury	na	<0.15 J - 6.6 J mg/kg dw	2.7 - 25 mg/kg dw	na	24 - 480 mg/kg dw
2,4'-DDD	na	na	0.0327 D - 28 mg/kg dw	na	0.2 - 1.7 mg/kg dw
2,4'-DDE	na	na	0.163 D - 43 mg/kg dw	na	1.5 - 5.7 mg/kg dw
2,4'-DDT	na	na	0.0269 D - 27 mg/kg dw	na	0.032 - 0.096 mg/kg dw
Pesticides 4,4'-DDD	na	na	0.0326 D - 11 mg/kg dw	na	0.34 - 2.4 mg/kg dw
4,4'-DDE	na	na	0.413 D - 41 mg/kg dw	na	1.2 - 4.9 mg/kg dw
4,4'-DDT	na	na	0.0199 D - 31 mg/kg dw	na	0.12 - 0.36 mg/kg dw
DDTr	na	na	0.52 - 83 mg/kg dw	na	1.66 - 7.66 mg/kg dw
DDTR	na	na	0.739 - 177 mg/kg dw	na	3.36 - 15.1 mg/kg dw
Hexachlorobenzene	na	<0.5 - 2.7 mg/kg dw	0.051 - 0.67 mg/kg dw	na	0.032 - 0.16 mg/kg dw
Total Organic Carbon	na	na	na	na	48,000 - 130,000 mg/kg dw

Notes:
°C - degrees Celsius
D - sample was diluted
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethylene
DDT - dichlorodiphenyltrichloroethane
DDTr - sum of 4,4' - isomers DDT, DDD, DDE
DDTR - sum of 2,4' - and 4,4' - isomers DDT, DDD, DDE
dw - dry weight
J - estimated
mg/kg - milligrams per kilogram
mg/L - milligrams per liter
mS/cm - milliSiemens per centimeter
na - not analyzed for this constituent
µg/L - microgram per liter
< - less than the reporting limit
% - percent
Ranges reported for surficial sediment samples include samples collected within the upper 6 inches.
[1] - Where only DDTr was reported, an estimate of DDTR is provided based on a ratio of DDTR to DDTr where both are available (DDTR = DDTr*1.97)

PREPARED BY/DATE: KPH 4/13/10
CHECKED BY/DATE: RMR 4/19/10

TABLE 1-2

ANALYTICAL RESULTS SUMMARY FOR THE 2006 BASELINE ESPP SAMPLES
Updated RI Addendum
Olin McIntosh OU-2

	Range of Concentrations	
Surface Water	**Shallow Samples**	**Deep Samples**
Mercury (Unfiltered)	<0.2 - 0.329 µg/L	<0.2 µg/L
Mercury (Filtered)	<0.2 µg/L	<0.2 µg/L
Methylmercury (Unfiltered)	0.000239 - 0.00097 µg/L	0.000416 - 0.000514 µg/L
Methylmercury (Filtered)	0.000108 - 0.000295 µg/L	0.000234 - 0.000396 µg/L
Total Sulfate	28.9 - 33.2 mg/L	31.1 - 35.1 mg/L
Total Sulfide	<1 - 4.4 mg/L	< 1 mg/L
Total Hardness	56 - 61 mg/L	58 - 64 mg/L
Total Alkalinity	37.4 - 42.1 mg/L	35.9 - 39 mg/L
DOC	< 2 - 10 mg/L	3.3 - 13 mg/L
TDS	120 - 164 mg/L	136 - 160 mg/L
TSS	6 - 48 mg/L	7 - 34 mg/L
Temperature	24.6 - 29.6 °C	21.8 - 23.2 °C
Specific Conductance	2.40 - 3.71 mS/cm	2.67 - 3.77 mS/cm
DO	5.1 - 10.6 mg/L	4.25 - 4.8 mg/L
pH	6.96 - 8.73	6.78 - 7.13
ORP	140 - 205 mV	192 - 215 mV
Turbidity	11.2 - 74.1 NTU	17.8 - 20.1 NTU

Sediment	**Range of Concentrations**
Mercury	6.45 - 95.3 mg/kg dw
Methylmercury	0.0026 - 0.011 mg/kg dw
HCB	NA
DDTr	NA
DDTR (estimated)	NA
Total Sulfate	<861 J - 10,900 mg/kg dw
Total Sulfide	<47 J - 8,100 J mg/kg dw
Selenium	NA
Molybdenum	NA
AVS/SEM	9.09 - 99.0
TOC	6,100 - 41,000 mg/kg dw
Grain Size: Clay	12.4 - 67.9 %
Grain Size: Silt	18.3 - 70.3 %
Grain Size: Sand	0.9 - 67.4 %
Percent Moisture	27 - 80.4 %
Bulk Density	0.945 - 1.82 g/cm^3 dw
pH	6.29 - 7.15
ORP	-525 - -117 mV
Temperature	18.9 - 31 °C

Notes:

AVS/SEM - ratio of acid-volatile sulfide to simultaneously extracted metals
°C - degrees Celsius
DO - dissolved oxygen
DOC - dissolved organic carbon
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethylene
DDT - dichlorodiphenyltrichloroethane
DDTr - sum of 4,4' - isomers of DDD, DDE, and DDT
DDTR - sum of 2,4' - and 4,4' - isomers of DDD, DDE, and DDT
DDTR (estimated) - Where only DDTr was reported, an estimate of DDTR is provided based on a ratio of DDTR to DDTr where both are available. DDTR = DDTr*1.97
dw - dry weight
g/cm^3 - gram per cubic centimeter
HCB - hexachlorobenzene

J - estimated
mg/kg - milligram per kilogram
mg/L - milligram per liter
mS/cm - milliSiemens per centimeter
mV - millivolt
NA - not analyzed
NTU - nephelometric turbidity unit
ORP - oxidation-reduction potential
TDS - total dissolved solids
TOC - total organic carbon
TSS - total suspended solids
µg/L - microgram per liter
% - percent
< - less than the reporting limit

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CHECKED BY/DATE: RMR 4/14/10

TABLE 1-3

ANALYTICAL RESULTS SUMMARY FOR THE 2008 ESPP YEAR 1 SAMPLES
Updated RI Addendum
Olin McIntosh OU-2

	Range of Concentrations	
Surface Water	**Shallow Samples**	**Deep Samples**
Mercury (Unfiltered)	0.0443 - 0.36 µg/L	0.0834 - 0.909 µg/L
Mercury (Filtered)	0.00858 - 0.0227 µg/L	0.0109 - 0.0249 µg/L
Methylmercury (Unfiltered)	0.00191 - 0.00484 µg/L	0.00238 - 0.00553 µg/L
Methylmercury (Filtered)	0.000606 - 0.00225 µg/L	0.000586 - 0.00342 µg/L
Total Sulfate	NA	NA
Total Sulfide	NA	NA
Total Hardness	66 - 80 mg/L	68 - 80 mg/L
Total Alkalinity	53.5 - 58.0 mg/L	53.5 - 55.8 mg/L
DOC	4.3 - 18.0 mg/L	7.6 - 18 mg/L
TDS	328 - 415 mg/L	280 - 445 mg/L
TSS	7.0 - 18 mg/L	7 - 23 mg/L
Temperature	28.2 - 31.9°C	26.6 - 28.7°C
Specific Conductance	0.493 - 0.763 mS/cm	0.453 - 0.760 mS/cm
DO	6.62 - 12.9 mg/L	0.68 - 9.71 mg/L
pH	6.78 - 8.81	6.69 - 8.58
ORP	-52.1 - 401 mV	-17.1 - 427 mV
Turbidity	< 0.1 - 11.7 NTU	< 0.1 - 23.8 NTU

Sediment	**Range of Concentrations**
Mercury	0.965 - 213 mg/kg dw
Methylmercury	0.00206 J - 0.0234 mg/kg dw
HCB	<0.979 - 34.1 mg/kg dw
DDTr	<0.0144 - 0.324 mg/kg dw
DDTR (estimated)	<0.0144 - 0.638 mg/kg dw
Total Sulfate	<677 - 9,250 mg/kg dw
Total Sulfide	<38 J - 3,200 mg/kg dw
Selenium	<56 mg/kg dw
Molybdenum	<80 mg/kg dw
AVS/SEM	14.2 - 78.2
TOC	2,220 J - 59,900 mg/kg dw
Grain Size: Clay	5.3 - 79.5 %
Grain Size: Silt	11.1 - 59.5 %
Grain Size: Sand	0.7 - 81.2 %
Percent Moisture	23.6 - 80.7 %
Bulk Density	0.839 - 1.58 g/cm^3 dw
pH	6.22 - 7.41
ORP	-459 - -253 mV
Temperature	23.4 - 35.0°C

Notes:

AVS/SEM - ratio of acid-volatile sulfide to simultaneously extracted metals
°C - degrees Celsius
DO - dissolved oxygen
DOC - dissolved organic carbon
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethylene
DDT - dichlorodiphenyltrichloroethane
DDTr - sum of 4,4' - isomers of DDD, DDE, and DDT
DDTR - sum of 2,4' - and 4,4' - isomers of DDD, DDE, and DDT
DDTR (estimated) - Where only DDTr was reported, an estimate of DDTR is provided based on a ratio of DDTR to DDTr where both are available. DDTR = DDTr*1.97
dw - dry weight
g/cm^3 - gram per cubic centimeter
HCB - hexachlorobenzene

J - estimated
mg/kg - milligram kilogram
mg/L - milligram per liter
mS/cm - milliSiemens per centimeter
mV - millivolt
NA - not analyzed
NTU - nephelometric turbidity unit
ORP - oxidation-reduction potential
TDS - total dissolved solids
TOC - total organic carbon
TSS - total suspended solids
µg/L - microgram per liter
% - percent
< - less than the reporting limit.

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TABLE 1-4

ANALYTICAL RESULTS SUMMARY FOR HISTORICAL FISH SAMPLES
Updated RI Addendum
Olin McIntosh OU-2

Sample Type	Sample Location	Constituent	Units[2]	1986 Range of Concentrations	1991 Range of Concentrations	1994 Range of Concentrations	1995 Range of Concentrations	2001 Range of Concentrations
Smallmouth Buffalo Filet	OU-2	Hg	mg/kg	0.59	--	--	--	--
Channel Catfish Whole Body	OU-2	Hg	mg/kg	--	<0.20 - 0.60	--	--	--
		HCB	mg/kg	--	0.16 J N - 1.8 J N	--	--	--
		DDTr	mg/kg	--	2.9 - 29.0	--	--	--
Channel Catfish Filet	OU-2	Hg	mg/kg	0.66 - 0.68	0.28 - 0.67	--	--	--
		HCB	mg/kg	--	<0.66 - 0.58 J N	--	--	--
		DDTr	mg/kg	--	1.1 - 9.3	--	--	--
Mosquitofish[1] Whole Body	OU-2	Hg	mg/kg	--	--	0.27 J - 0.58 J	--	0.19 - 0.51
		HCB	mg/kg	--	--	<0.027 - 0.13	--	<0.10 - 0.14
		DDTR	mg/kg	--	--	2.8 - 43.2	--	--
		DDTr	mg/kg	--	--	2.2 - 30.7	--	0.49-10.8
	Tombigbee River	Hg	mg/kg	--	--	0.04 J - 0.14 J	--	--
		HCB	mg/kg	--	--	<0.031	--	--
		DDTR	mg/kg	--	--	<0.01 - 0.026	--	--
		DDTr	mg/kg	--	--	<0.01 - 0.026	--	--
Rock Bass Filet	OU-2	Hg	mg/kg	0.97	--	--	--	--
Bluegill Whole Body	OU-2	Hg	mg/kg	--	--	--	0.69 - 1.2	--
		MeHg	mg/kg	--	--	--	0.57 - 1.2	--
Bluegill Filet	OU-2	Hg	mg/kg	0.78	--	--	--	--
Largemouth Bass Whole Body	OU-2	Hg	mg/kg	--	0.47 - 1.2	0.49 - 1.2	--	0.2 - 1.58
		HCB	mg/kg	--	0.23 J N - 1.6	0.093 - 1.8	--	--
		DDTR	mg/kg	--	--	8.8 - 106	--	--
		DDTr	mg/kg	--	7.0 - 47	6.6 - 80.8	--	--
	Lake Hatchetigbee (Reference)	Hg	mg/kg	--	--	0.13 - 0.36	--	--
		HCB	mg/kg	--	--	<0.01	--	--
		DDTR	mg/kg	--	--	0.042 - 0.36	--	--
		DDTr	mg/kg	--	--	0.042 - 0.31	--	--
Largemouth Bass Filet	OU-2	Hg	mg/kg	0.12 - 1.9	0.9 - 2.2	--	--	0.30 - 2.3
		HCB	mg/kg	--	<0.66 - 0.20 J N	--	--	<0.025 - 0.18
		DDTr	mg/kg	--	1.4 - 10.0	--	--	<0.05 - 2.61

Notes:

[1] Composite sample

[2] Sample basis as received

DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethylene
DDT - dichlorodiphenyltrichloroethane
DDTr - the sum of the 4,4'- isomers of DDT, DDD, and DDE
DDTR - the sum of the 2,4'- and 4,4' - isomers of DDT, DDD, and DDE
HCB - hexachlorobenzene
Hg - mercury
J - estimated result
MeHg - methylmercury
mg/kg - milligrams per kilogram
N - spiked sample recovery was not within detection limits
-- - sample not collected and/or sample not analyzed for specified constituent
< - less than the reporting limit

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CHECKED BY/DATE: RMR 4/14/10

TABLE 1-5

ANALYTICAL RESULTS SUMMARY FOR 2003 - 2008 FISH SAMPLES
Updated RI Addendum
Olin McIntosh OU-2

Sample Type	Sample Location	Constituent	Units[2]	2003 Range of Concentrations	2005 Range of Concentrations	2006 Range of Concentrations	2007 Range of Concentrations	2008 Range of Concentrations
Longnose Gar Whole Body	OU-2	Hg	mg/kg	--	1.7	--	--	--
Channel Catfish Filet	OU-2	Hg	mg/kg	0.10 - 0.51	--	--	--	--
Silversides[1] Whole Body	OU-2	Hg	mg/kg	--	--	--	--	0.60 - 1.2
		HCB	mg/kg	--	--	--	--	0.087 - 2.0
Striped Bass Whole Body	OU-2	Hg	mg/kg	--	0.38	--	--	--
Bluegill Whole Body	OU-2	Hg	mg/kg	--	--	--	--	0.54 - 1.20
		HCB	mg/kg	--	--	--	--	0.054 - 0.64
Largemouth Bass Whole Body	OU-2	Hg	mg/kg	--	--	--	--	1.1 - 2.0
		HCB	mg/kg	--	--	--	--	0.034 - 1.03
Largemouth Bass Filet	OU-2	Hg	mg/kg	0.30 - 1.3	--	1.0 - 1.5	1.5 - 2.2	1.6 - 3.0
		HCB	mg/kg	--	--	--	--	0.036 - 0.14

Notes:

[1] Composite sample

[2] Sample basis as received

HCB - hexachlorobenzene

Hg - mercury

mg/kg - milligrams per kilogram

-- - sample not collected and/or sample not analyzed for specified constituent

PREPARED BY/DATE: KPH 4/13/10

CHECKED BY/DATE: RMR 4/14/10

TABLE 1-6

ANALYTICAL RESULTS SUMMARY FOR HISTORICAL BIOTA SAMPLES
Updated RI Addendum
Olin McIntosh OU-2

Sample Type	Sample Location	Constituent	Units[e]	1994 Range of Concentrations	1995 Range of Concentrations	2001 Range of Concentrations
Terrestrial Insects and Spiders	OU-2	Hg	mg/kg	0.10 - 0.21	0.05 - 0.24	--
		HCB	mg/kg	<0.014 - 0.45	--	--
Spiders	OU-2	Hg	mg/kg	--	0.24 (a)	--
Terrestrial Insects (f)	OU-2	Hg	mg/kg	<0.04 - 0.21	0.05 (b)	--
		HCB	mg/kg	<0.013 - 0.45	--	--
		DDTr	mg/kg	0.07 - 2.9	--	--
		DDTR	mg/kg	0.08 -5.3	--	--
	Lake Hatchetigbee (Reference)	Hg	mg/kg	<0.03 - 0.04	--	--
		HCB	mg/kg	<0.012 - 0.048	--	--
		DDTr	mg/kg	<0.020	--	--
		DDTR	mg/kg	<0.020	--	--
Aquatic Insects (f)	OU-2	Hg	mg/kg	0.20 - 0.24	0.25 (c)	0.033 - 0.15
		HCB	mg/kg	1.1 - 1.2	--	<0.25 - 3.1
		DDTr	mg/kg	5.3 - 6.5	--	--
		DDTR	mg/kg	11.7 - 14.1	--	4.19 - 27.3
	Lake Hatchetigbee (Reference)	Hg	mg/kg	0.06	--	--
		HCB	mg/kg	<0.016	--	--
		DDTr	mg/kg	<0.020	--	--
		DDTR	mg/kg	<0.020	--	--
Raccoon Whole Body (d)(f)	OU-2	Hg	mg/kg	0.53 - 0.96	--	--
		HCB	mg/kg	<0.01 - 0.21	--	--
		DDTr	mg/kg	0.055 - 0.556	--	--
		DDTR	mg/kg	0.07 - 0.57	--	--
	Lake Hatchetigbee (Reference)	Hg	mg/kg	0.14 - 0.29	--	--
		HCB	mg/kg	<0.01	--	--
		DDTr	mg/kg	<0.01	--	--
		DDTR	mg/kg	<0.01	--	--
Raccoon Hair (f)	OU-2	Hg	mg/kg	12 - 14	--	--
		HCB	mg/kg	<0.0071 - 0.053	--	--
		DDTr	mg/kg	0.028 - 0.18	--	--
		DDTR	mg/kg	0.038 - 0.29	--	--
	Lake Hatchetigbee (Reference)	Hg	mg/kg	0.93 - 3.0	--	--
		HCB	mg/kg	<0.0076	--	--
		DDTr	mg/kg	<0.0076	--	--
		DDTR	mg/kg	<0.0076	--	--
Little Blue Heron Whole Body (d)(f)	OU-2	Hg	mg/kg	0.30 - 1.7	--	--
		HCB	mg/kg	<0.01 - 0.41	--	--
		DDTr	mg/kg	0.339 - 28.1	--	--
		DDTR	mg/kg	0.35 - 32.8	--	--
	Lake Hatchetigbee (Reference)	Hg	mg/kg	0.48 - 0.91	--	--
		HCB	mg/kg	<0.01	--	--
		DDTr	mg/kg	<0.01 - 0.13	--	--
		DDTR	mg/kg	<0.01 - 0.147	--	--

TABLE 1-6

ANALYTICAL RESULTS SUMMARY FOR HISTORICAL BIOTA SAMPLES
Updated RI Addendum
Olin McIntosh OU-2

Sample Type	Sample Location	Constituent	Units[e]	1994 Range of Concentrations	1995 Range of Concentrations	2001 Range of Concentrations
Little Blue Heron Feathers (g)	OU-2	Hg	mg/kg	0.60 - 7.7	--	--
		HCB	mg/kg	<0.01 - 0.017	--	--
		DDTr	mg/kg	<0.01 - 0.745	--	--
		DDTR	mg/kg	<0.01 - 0.878	--	--
	Lake Hatchetigbee (Reference)	Hg	mg/kg	1.6 - 3.3	--	--
		HCB	mg/kg	<0.01	--	--
		DDTr	mg/kg	<0.05	--	--
		DDTR	mg/kg	<0.05	--	--
Bull Frog (f)	OU-2	Hg	mg/kg	0.10 J - 0.46 J	--	--
		HCB	mg/kg	<0.01 - 0.057	--	--
		DDTr	mg/kg	0.033 - 2.73	--	--
		DDTR	mg/kg	0.048 - 2.795	--	--
	Lake Hatchetigbee (Reference)	Hg	mg/kg	<0.04 J - 0.06 J	--	--
		HCB	mg/kg	<0.01	--	--
		DDTr	mg/kg	<0.01	--	--
		DDTR	mg/kg	<0.01	--	--
Crayfish (g)	OU-2	Hg	mg/kg	0.13 - 0.20	--	--
		HCB	mg/kg	0.088 - 0.91	--	--
		DDTr	mg/kg	0.4 - 1.5	--	--
		DDTR	mg/kg	0.43 - 1.6	--	--
	Lake Hatchetigbee (Reference)	Hg	mg/kg	<0.04 - 0.04	--	--
		HCB	mg/kg	<0.008	--	--
		DDTr	mg/kg	<0.008	--	--
		DDTR	mg/kg	<0.008	--	--
Mussels (g)	OU-2	Hg	mg/kg	0.05 - 0.25	--	--
		HCB	mg/kg	0.017 - 0.16	--	--
		DDTr	mg/kg	0.522 - 2.297	--	--
		DDTR	mg/kg	0.951 - 4.52	--	--
	Lake Hatchetigbee (Reference)	Hg	mg/kg	<0.04	--	--
		HCB	mg/kg	<0.008	--	--
		DDTr	mg/kg	<0.008	--	--
		DDTR	mg/kg	<0.008	--	--

Notes:
(a) Samples (n=36) collected during prothonotary warbler study conducted at the site (Texas Tech University, 1999). Concentration is the average concentration of the 36 samples.
(b) Samples (n=201) collected during prothonotary warbler study conducted at the site (Texas Tech University, 1999). Concentration is the average concentration of the 201 samples.
(c) Samples (n=30) collected during prothonotary warbler study conducted at the site (Texas Tech University, 1999). Concentration is the average concentration of the 30 samples.
(d) Contents of digestive systems were not removed prior to analysis.
(e) Sample basis as received by the laboratory.
(f) DDTr and DDTR were calculated historically using one half of dection limits where non-detect.
(g) Obtained from database, which were calculated using 0 where non-detect.
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethylene
DDT - dichlorodiphenyltrichloroethane
DDTr - the sum of the 4,4' - isomers of DDT, DDD, and DDE
DDTR - the sum of the 2,4' - and 4,4' - isomers of DDT, DDD, and DDE
HCB - hexachlorobenzene
Hg - mercury
J - estimated result
mg/kg - milligram per kilogram
ND - not detected
-- - sample not collected and/or sample not analyzed for specified constituent
< - less than the reporting limit

PREPARED BY/DATE: KPH 4/13/10
CHECKED BY/DATE: RMR 4/14/10

TABLE 2-1

ANALYTICAL METHODS, PRESERVATION, HOLDING TIMES, REPORTING LIMITS AND QA/QC SAMPLES
Updated RI Addendum
Olin McIntosh OU-2

Sample Medium	Collection Method	Sample Type	Number	Analyses [a]	Analytical Methods	Sample Preservation	Sample Holding Times	Reporting Limits	QA/QC
Surface Water (ESPP Annual)	Peristaltic Pump	Grab	22	LL Mercury (unfiltered)	USEPA Method 1631E	zero headspace, 0.45µm filter in lab prior to $BrCl_2$ in lab within 48 hours	90 days after $BrCl_2$	0.0005 µg/L ar	2 duplicates
				LL Mercury (filtered)	USEPA Method 1631E	zero headspace, 0.45µm filter in lab prior to $BrCl_2$ in lab within 48 hours	90 days after $BrCl_2$	0.0005 µg/L ar	1 MS/MSD
				Methylmercury (unfiltered)	USEPA 1630 (draft)	4°C, zero headspace, HCl to pH <2 within 48 hours	180 days after preservation	0.00005 µg/L ar	3 field blanks
				Methylmercury (filtered)	USEPA 1630 (draft)	4°C, zero headspace, HCl to pH <2 within 48 hours	180 days after preservation	0.00005 µg/L ar	1 rinsate blank
				Total Hardness	USEPA Method 130.2	4°C, zero headspace, 0.45µm filter in lab prior to HNO_3 to pH<2 within 48 hours	180 days	10 mg/L ar	
				Total Alkalinity as $CaCO_3$	SM 2320B	4°C, unpreserved	14 days	5 mg/L ar	
				DOC	USEPA Method 9060	4°C, filter and preserve with H_2SO_4 to pH <2 in lab	28 days	1 mg/L ar	
				TDS	USEPA Method 160.1	4°C, unpreserved	7 days	4 mg/L ar	
				TSS	USEPA Method 160.2	4°C, unpreserved	7 days	4 mg/L ar	
Surface Water (Storm Event)	Peristaltic Pump	Grab	154	TSS	USEPA Method 160.2	4°C, unpreserved	7 days	4 mg/L ar	21 duplicates
Surface Water (Storm Event)	ISCO 6712	Grab	18	TSS	USEPA Method 160.2	4°C, unpreserved	per project history, none established	4 mg/L ar	
Surface Water (Gate Effluent)	Peristaltic Pump	Grab	18	LL Mercury (unfiltered)	USEPA Method 1631E	zero headspace, $BrCl_2$ in lab within 48 hours	90 days afer $BrCl_2$	0.0005 µg/L ar	
				LL Mercury (filtered)	USEPA Method 1631E	zero headspace, $BrCl_2$ in lab within 48 hours	90 days afer $BrCl_2$	0.0005 µg/L ar	1 MS/MSD
				Methylmercury (unfiltered)	USEPA 1630 (draft)	4°C, zero headspace, HCl to pH <2 within 48 hours	180 days after preservation	0.00005 µg/L ar	3 field blanks
				Methylmercury (filtered)	USEPA 1630 (draft)	4°C, zero headspace, HCl to pH <2 within 48 hours	180 days after preservation	0.00005 µg/L ar	1 rinsate blank
				TSS	USEPA Method 160.2	4°C, unpreserved	7 days	4 mg/L ar	
				TDS	USEPA Method 160.1	4°C, unpreserved	7 days	4 mg/L ar	
Pore Water	4-inch Coring Tube	Composite	6	LL Mercury (unfiltered)	USEPA Method 1631E	freeze (dry ice) until sectioning	frozen 6 months/freeze dried unlimited	0.0005 µg/L ar	3 duplicates
				Methylmercury (unfiltered)	USEPA 1630 (draft)	freeze (dry ice) until sectioning	frozen 6 months/freeze dried unlimited	0.00005 µg/L ar	2 MS/MSDs
				DOC	USEPA Method 9060	freeze (dry ice) until sectioning	frozen 6 months/freeze dried unlimited	1 mg/L ar	
Surficial Sediment (ESPP Annual)	Petite Ponar Dredge	Composite	57	Mercury	USEPA Method 7471A	4°C, unpreserved	28 days	0.02 mg/kg dw [c]	6 duplicates
				Methylmercury	USEPA 1630 (draft) by extraction	freeze (dry ice)	28 days	0.0001 µg/kg dw [c]	3 MS/MSDs
				AVS/SEM	Allen, et al., 1991/USEPA 1638	freeze (dry ice)	14 days	(µmole/g) dw [d]	1 rinsate blank
				Percent moisture	Freeze Drying or ASTM D2216	4°C, unpreserved	none established	0.1%	
				Sulfide	USEPA Method 9030A	4°C, unpreserved	7 days	25 mg/kg dw [c]	
				Sulfate	USEPA Method 9038	4°C, unpreserved	28 days	50 mg/kg dw [c]	
				TOC	USEPA 9060M	4°C, unpreserved	28 days	2,000 mg/kg dw [c]	
				Grain size	ASTM D422 M/PSEP	4°C, unpreserved	none established	(%) [d]	
				Density	SM2710F-Mod	4°C, unpreserved	none established	0.5 g/cm^3 dw	
				Hexachlorobenzene	USEPA 3550B/8081A	4°C, unpreserved	14 / 40 days [e]	0.0017 mg/kg dw [c]	
				2,4'-DDE, DDD, and DDT	USEPA 3550B/8081A	4°C, unpreserved	14 / 40 days [e]	0.0017 mg/kg dw [c]	
				4,4'-DDE, DDD, and DDT	USEPA 3550B/8081A	4°C, unpreserved	14 / 40 days [e]	0.0033 mg/kg dw [c]	
Sediment Core (Fine)	4-inch Coring Tube	Composite	25	Mercury	USEPA Method 7471A	4°C, unpreserved	28 days	0.02 mg/kg dw [c]	3 duplicates
				Methylmercury	USEPA 1630 (draft) by extraction	freeze (dry ice)	28 days	0.0001 µg/kg dw [c]	2 MS/MSDs
				TOC	Lloyd-Kahn	4°C, unpreserved	28 days	2,000 mg/kg dw [c]	1 rinsate blank
				Percent moisture	Freeze Drying or ASTM D2216	4°C, unpreserved	none established	0.1%	
Sediment Core (Coarse)	4-inch Coring Tube	Composite	103	Mercury	USEPA Method 7471A	4°C, unpreserved	28 days	0.02 mg/kg dw [c]	10 duplicates
				Percent moisture	Freeze Drying or ASTM D2216	4°C, unpreserved	none established	0.1%	5 MS/MSDs
				Grain size	ASTM D422 M/PSEP	4°C, unpreserved	none established	(%) [d]	2 rinsate blanks
				Density	SM2710F-Mod, ASTM D2937	4°C, unpreserved	none established	0.5 g/cm^3 dw	
				Hexachlorobenzene	USEPA 3550B/8081A	4°C, unpreserved	14 / 40 days [e]	0.0017 mg/kg dw [c]	
				2,4'-DDE, DDD, and DDT	USEPA 3550B/8081A	4°C, unpreserved	14 / 40 days [e]	0.0017 mg/kg dw [c]	
				4,4'-DDE, DDD, and DDT	USEPA 3550B/8081A	4°C, unpreserved	14 / 40 days [e]	0.0033 mg/kg dw [c]	
				SPLP Mercury	USEPA Method 1312/7470	4°C, unpreserved	28 days	0.020 mg/L dw	
Sediment Core (Aging)	4-inch Coring Tube	Composite	152 (45 archived)	Cesium-137	Batelle SOP MSL C-013	none	NA	3(√SBC)	none required
Sediment Core (Aging)	4-inch Coring Tube	Composite	152 (45 archived)	Lead-210	Batelle SOP MSL C-012	none	NA	3(√SBC)	none required
Sediment	Wind Trap	Composite	4	Mercury	USEPA Method 7471A	4°C, unpreserved	28 days	0.02 mg/kg dw [c]	

TABLE 2-1

ANALYTICAL METHODS, PRESERVATION, HOLDING TIMES, REPORTING LIMITS AND QA/QC SAMPLES
Updated RI Addendum
Olin McIntosh OU-2

Sample Medium	Collection Method	Sample Type	Number	Analyses [a]	Analytical Methods	Sample Preservation	Sample Holding Times	Reporting Limits	QA/QC
				TOC	Lloyd-Kahn	4°C, unpreserved	28 days	2,000 mg/kg dw [c]	
Sediment (Quarterly)	Sediment Trap	Composite	33	Mercury	USEPA Method 7471A	4°C, unpreserved	28 days	0.02 mg/kg dw [c]	
				Percent moisture	Freeze Drying or ASTM D2216	4°C, unpreserved	none established	0.1%	
				Density	SM2710F-Mod	4°C, unpreserved	none established	0.5 g/cm^3 dw	
				TSS	USEPA Method 160.2	4°C, unpreserved	7 days	4 mg/L dw	
				TOC	Lloyd-Kahn	4°C, unpreserved	none established	0.1%	
				Total Solids	SM 2540G	4°C, unpreserved	none established	0.1%	
				Inorganic Solids	SM 2540G	4°C, unpreserved	none established	0.1%	
				Organic Solids	SM 2540G	4°C, unpreserved	none established		
				Grain Size	MACTEC, 2006	4°C, unpreserved	none established	%	
Corbicula Tissue (Annual)	Cage	Composite	6 [b]	Mercury	USEPA Method 245.6	freeze (dry ice)	frozen 6 months/freeze dried unlimited	0.017 mg/kg (ww) [d]	1 duplicate [f]
				Methylmercury	USEPA 1630 (draft) by extraction	freeze (dry ice)	frozen 6 months/freeze dried unlimited	0.002 mg/kg (ww) [d]	1 MS/MSD [f]
Fish Tissue (Annual)	Electrofisher	Composite	84 [b]	Mercury	USEPA Method 245.6	freeze (dry ice)	frozen 6 months/freeze dried unlimited	0.017 mg/kg (ww) [d]	8 duplicates [f]
				Hexachlorobenzene	USEPA 3540C/8081A	freeze (dry ice)	frozen 6 months/freeze dried unlimited	2.5 mg/kg (ww) [d]	4 MS/MSDs [f]
				Lipids	Bligh-Dyer, 1959	freeze (dry ice)	frozen 6 months/freeze dried unlimited	0.5%	

Notes:

ar - as received
ASTM - American standard test method
AVS/SEM - the ratio of acid-volatile sulfide to simultaneously extracted metals
$BrCl_2$ - bromine dichloride
°C - degree Celsius
$CaCO_3$ - calcium carbonate
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethylene
DDT - dichlorodiphenyltrichloroethane
DOC - dissolved organic carbon
dw - dry weight
g/cm^3 - gram per cubic centimeter
HCl - hydrochloric acid
HNO_3 - nitric acid
H_2SO_4 - sulfuric acid
LL - low level
mg/kg - milligram per kilogram
mg/L - milligram per liter
MS/MSD - matrix spike/matrix spike duplicate

QA/QC - quality assurance/quality control
SBC - sample background counts
SM - standard method
SPLP - synthetic precipitation leaching procedure
TDS - total dissolved solids
TOC - total organic carbon
TSS - total suspended solids
USEPA - United States Environmental Protection Agency
µg/L - microgram per liter
µmole/g - micromole per gram
µg/kg - microgram per kilogram
ww - wet weight
% - percent
a - not all samples analyzed for all parameters
b - not collected due to heavy rain and flooding conditions
c - varies by individual analyte
d - varies by individual sample
e - 14 days to extraction, then analyze within 40 days of extraction
f - in lab duplicates and MS/MSDs

PREPARED BY/DATE: KPH 4/13/10
CHECKED BY/DATE: RMR 4/14/10

TABLE 2-3

COARSELY SECTIONED CORES - SAMPLING INTERVALS, ANALYSES, AND PERCENT RECOVERY
Updated RI Addendum
Olin McIntosh OU-2

Sample ID	Interval (feet)[a]	Total Mercury EPA 7471/Percent Moisture	Density[c] - SM2710F-Mod, ASTM D2937	Grain Size ASTM D422M/PSEP	HCB - EPA 3550B / 8270C	DDTR - EPA 3550B / 8081A	SPLP Mercury EPA 1312	Percent Recovery
SDCR1-CA-060309	0 - 1.2	X	X	X	X			
SDCR1-CB-060309	1.2 - 2.3	X	X	X	X			
SDCR1-CC-060309	2.3 - 3.5	X	X	X	X			
SDCR1-CD-060309	3.5 - 4.6	X	X	X	X			86
SDCR1-CE-060309	4.6 - 5.8	X	X	X	X			
SDCR1-CF-060309	5.8 - 7.0	X	X	X	X			
SDCR2-CA-092409	0 - 1	[b]	X	X	X			
SDCR2-CB-092409	1 - 2	[b]	X	X	X			
SDCR2-CC-092409	1.5 - 2	X	NA	NA	NA			
SDCR2-CD-092409	2 - 3	X	X	X	X			
SDCR2-CE-092409	3 - 4	X	X	X	X			
SDCR2-CF-092409	4 - 5	X	X	X	X			80
SDCR2-CG-092409	5 - 6	X	X	X	X			
SDCR2-CH-092409	6 - 7	X	X	X	X			
SDCR2-CI-092409	7 - 8	X	X	X	X			
SDCR2-CJ-092409	8 - 9	X	X	X	X			
SDCR2-CK-092409	9 - 10	X	X	X	X			
SDCR2-CL-092409	10 - 11	NA	NA	NA	NA			
SDCR3-CA-092709	0 - 1	[b]	X	X	X	X	X	
SDCR3-CB-092709	1 - 2	[b]	X	X	X	X		
SDCR3-CC-092709	1.5 - 2	X	NA	NA	NA	NA		
SDCR3-CD-092709	2 - 3	X	X	X	X	X		
SDCR3-CE-092709	3 - 4	X	X	X	X	X		
SDCR3-CF-092709	4 - 5	X	X	X	X	X		80
SDCR3-CG-092709	5 - 6	X	X	X	X	X		
SDCR3-CH-092709	*6 - 7*	X	X	X	X	X		
SDCR3-CI-092709	7 - 8	X	X	X	X	X		
SDCR3-CJ-092709	8 - 9	X	X	X	X	X		
SDCR3-CK-092709	9 - 10	X	X	X	X	X		
SDCR3-CL-092709	10 - 11	NA	NA	NA	NA	NA		
SDCR4-CA-092709	0 - 1	X	X	X				
SDCR4-CB-092709	1 - 2	X	X	X				
SDCR4-CC-092709	2 - 3	X	X	X				
SDCR4-CD-092709	3 - 4	X	X	X				
SDCR4-CE-092709	4 - 5	X	X	X				90
SDCR4-CF-092709	5 - 6	X	X	X				
SDCR4-CG-092709	6 - 7	X	X	X				
SDCR4-CH-092709	7 - 8	X	X	X				
SDCR4-CI-092709	8 - 9	X	NA	NA				
SDCR5-CA-092709	0 - 1	X	X	X				
SDCR5-CB-092709	1 - 2	X	X	X				
SDCR5-CC-092709	2 - 3	X	X	X				
SDCR5-CD-092709	3 - 4	X	X	X				
SDCR5-CE-092709	4 - 5	X	X	X				90
SDCR5-CF-092709	5 - 6	X	X	X				
SDCR5-CG-092709	6 - 7	X	X	X				
SDCR5-CH-092709	7 - 8	X	X	X				
SDCR5-CI-092709	8 - 9	X	NA	NA				
SDCR6-CA-092709	0 - 1	X	X	X				
SDCR6-CB-092709	1 - 2	X	X	X				
SDCR6-CC-092709	2 - 3	X	X	X				
SDCR6-CD-092709	3 - 4	X	X	X				
SDCR6-CE-092709	4 - 5	X	X	X				90
SDCR6-CF-092709	5 - 6	X	X	X				
SDCR6-CG-092709	6 - 7	X	X	X				
SDCR6-CH-092709	7 - 8	X	X	X				
SDCR6-CI-092709	8 - 9	NA	NA	NA				

TABLE 2-3

COARSELY SECTIONED CORES - SAMPLING INTERVALS, ANALYSES, AND PERCENT RECOVERY
Updated RI Addendum
Olin McIntosh OU-2

Sample ID	Interval (feet)[a]	Total Mercury EPA 7471/Percent Moisture	Density[c] - SM2710F-Mod, ASTM D2937	Grain Size ASTM D422M/PSEP	HCB - EPA 3550B / 8270C	DDTR - EPA 3550B / 8081A	SPLP Mercury EPA 1312	Percent Recovery
SDCR7-CA-092709	0 - 1	X	X	X				
SDCR7-CB-092709	1 - 2	X	X	X				
SDCR7-CC-092709	2 - 3	X	X	X				
SDCR7-CD-092709	3 - 4	X	X	X				
SDCR7-CE-092709	4 - 5	X	X	X				80
SDCR7-CF-092709	5 - 6	X	X	X				
SDCR7-CG-092709	6 - 7	X	X	X				
SDCR7-CH-092709	7 - 8	X	X	X				
SDCR7-CI-092709	8 - 9	NA	NA	NA				
SDCR8-CA-092809	0 - 1	[b]	X	X	X	X		
SDCR8-CB-092809	1 - 2	[b]	X	X	X	X		
SDCR8-CC-092809	1.5 - 2	NA	NA	NA	NA	NA		
SDCR8-CD-092809	2 - 3	X	X	X	X	X		
SDCR8-CE-092809	3 - 4	X	X	X	X	X		
SDCR8-CF-092809	4 - 5	X	X	X	X	X		90
SDCR8-CG-092809	5 - 6	X	X	X	X	X		
SDCR8-CH-092809	6 - 7	X	X	X	X	X		
SDCR8-CI-092809	7 - 8	X	X	X	X	X		
SDCR8-CJ-092809	8 - 9	X	X	X	X	X		
SDCR8-CK-092809	9 - 10	X	X	X	X	X		
SDCR8-CL-092809	10 - 11	X	X	X	NA	X		
SDCR9-CA-092609	0 - 1	X	X	X		X	X	
SDCR9-CB-092609	1 - 2	X	X	X		X		
SDCR9-CC-092609	2 - 3	X	X	X		X		90
SDCR9-CD-092609	3 - 4	X	X	X		X		
SDCR9-CE-092609	4 - 5	X	X	X		X		
SDCR9-CF-092609	5 - 6	X	NA	NA		X		
SDCR10-CA-092609	0 - 1	X	X	X				
SDCR10-CB-092609	1 - 2	X	X	X				
SDCR10-CC-092609	2 - 3	X	X	X				90
SDCR10-CD-092609	3 - 4	X	X	X				
SDCR10-CE-092609	4 - 5	X	X	X				
SDCR10-CF-092609	5 - 6	X	X	X				
SDCR11-CA-092609	0 - 1	[b]	X	X				
SDCR11-CB-092609	1 - 2	[b]	X	X				
SDCR11-CC-092609	1.5 - 2	X	NA	NA				
SDCR11-CD-092609	2 - 3	X	X	X				90
SDCR11-CE-092609	3 - 4	X	X	X				
SDCR11-CF-092609	4 - 5	X	X	X				
SDCR11-CG-092609	5 - 6	NA	NA	NA				
SDCR12-CA-092509	0 - 1	[b]	X	X				
SDCR12-CB-092509	1 - 2	[b]	X	X				
SDCR12-CC-092509	1.5 - 2	X						
SDCR12-CD-092509	2 - 3	X	X	X				90
SDCR12-CE-092509	3 - 4	X	X	X				
SDCR12-CF-092509	4 - 5	X	X	X				
SDCR12-CG-092509	5 - 6	NA	NA	NA				
SDCR13-CA-092609	0 - 1	X	X	X		X		
SDCR13-CB-092609	1 - 2	X	X	X		X		
SDCR13-CC-092609	2 - 3	X	X	X		X		90
SDCR13-CD-092609	3 - 4	X	X	X		X		
SDCR13-CE-092609	4 - 5	X	X	X		X		
SDCR13-CF-092609	5 - 6	NA	NA	NA		NA		

Notes:

ASTM - American Standard Test Method
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethylene
DDT - dichlorodiphenyltrichloroethane
DDTR - 2,4'- and 4,4'-isomers of DDD, DDE, and DDT
EPA - Environmental Protection Agency
HCB - hexachlorobenzene
NA - not analyzed; archived sample analysis not required based on previous sample interval results.
SM - Standard Method
SPLP - Synthetic Precipitation Leaching Procedure

PREPARED BY/DATE: HEF 4/15/10
CHECKED BY/DATE: CED 4/15/10

[a] Actual sample intervals were adjusted for percent recovery to achieve the targeted interval with the exception of SDCR1.

[b] Mercury analyses for these intervals accounted for in the fine-sectioned core analyses.

[c] Density for SDCR1 analyzed using SM2710F-Mod. Density for remaining cores analyzed using ASTM D2937.

TABLE 2-4

FLOODPLAIN SOIL SAMPLES, SAMPLING INTERVALS, AND LABORATORY ANALYTICAL METHODS
Updated RI Addendum
Olin McIntosh OU-2

Sample ID	Interval (Inches)	Mercury (EPA 7471A)/Percent Moisture	Methylmercury (EPA 1630 draft)	HCB (EPA 8081A)	DDTR (EPA 8081A)	TOC (EPA 9060)	Grain Size (ASTM D422)
OU2B-FPSS1-10	0-1	X			X	X	
OU2B-FPSS2-10	0-1	X				X	
OU2B-FPSS3-10[1]	0-1	X			X	X	
OU2B-FPSS4-10	0-1	X			X	X	
OU2B-FPSS5-10	0-1	X				X	
OU2B-FPSS6-10	0-1	X			X	X	
OU2B-FPSS7-10	0-1	X				X	
OU2B-FPSS8-10	0-1	X			X	X	
OU2B-FPSS9-10[1]	0-1	X			X	X	
OU2B-FPSS10-10	0-1	X		X	X	X	
OU2B-FPSS11-10	0-1	X		X	X	X	
OU2B-FPSS12-10	0-1	X		X	X	X	
OU2B-FPSS13-10	0-1	X				X	X
OU2B-FPSS14-10	0-1	X		X		X	X
OU2B-FPSS15-10[1]	0-1	X		X		X	
OU2B-FPSB1-10-0-1	0-1	X	X		X	X	
OU2B-FPSB1-10-1-2	1-2	X	X			X	
OU2B-FPSB1-10-2-6	2-6	X				X	
OU2B-FPSB1-10-6-12	6-12	X				X	
OU2B-FPSB2-10-0-1	0-1	X	X		X	X	
OU2B-FPSB2-10-1-2	1-2	X	X			X	
OU2B-FPSB2-10-2-6	2-6	X				X	
OU2B-FPSB2-10-6-12	6-12	X				X	
OU2B-FPSB3-10-0-1	0-1	X	X		X	X	X
OU2B-FPSB3-10-1-2	1-2	X	X			X	X
OU2B-FPSB3-10-2-6	2-6	X				X	X
OU2B-FPSB3-10-6-12	6-12	X				X	X
OU2B-FPSB4-10-0-1	0-1	X	X		X	X	X
OU2B-FPSB4-10-1-2	1-2	X	X			X	X
OU2B-FPSB4-10-2-6	2-6	X				X	X
OU2B-FPSB4-10-6-12	6-12	X				X	X
OU2B-FPSB5-10-0-1	0-1	X	X	X		X	X
OU2B-FPSB5-10-1-2	1-2	X	X			X	X
OU2B-FPSB5-10-2-6	2-6	X				X	X
OU2B-FPSB5-10-6-12	6-12	X				X	X
OU2B-FPSB6-10-0-1	0-1	X	X	X		X	X
OU2B-FPSB6-10-1-2	1-2	X	X			X	X
OU2B-FPSB6-10-2-6	2-6	X				X	X
OU2B-FPSB6-10-6-12	6-12	X				X	X

Notes:

ASTM - American Standard Test Method
DDD - Dichlorodiphenyldichloroethane
DDE - Dichloroediphenyldichloroethylene
DDT - Dichlorodiphenyltrichloroethane
DDTR - 2,4'- and 4,4'-isomers of DDD, DDE, and DDT
EPA - Environmental Protection Agency
FPSB - floodplain soil boring
FPSS - floodplain surficial soil
TOC - Total organic carbon
HCB - Hexachlorobenzene
OU2B - Olin OU-2 Basin
[1] Sample location was inundated and may be considered sediment at water levels of 6 feet NAVD.

PREPARED BY/DATE: HEF 9/7/10
CHECKED BY/DATE: JAB 11/2/10

TABLE 2-5

MICRO-WELL AND PIEZOMETER CONSTRUCTION DETAILS
Updated RI Addendum
Olin McIntosh OU-2

Well ID	TOC Elevation (ft)	Ground Elevation (ft)	Total Depth (ft)	Screen Interval (ft)	Well Material	Well Diameter (in)	Zone
BA-MW1A	34.39	32.60	30.61	20.61 - 30.61	PVC riser and Pre-packed screen	1	B
BA-MW1B	34.96	32.50	47.07	37.07 - 47.07	PVC riser and Pre-packed screen	1	B
BA-MW1C	34.26	32.00	67.09	57.09 - 67.09	PVC riser and Pre-packed screen	1	C
BA-MW2B	14.12	11.80	25.65	15.65 - 25.65	PVC riser and Pre-packed screen	1	A
BA-MW2C	14.25	11.80	46.37	36.37 - 46.37	PVC riser and Pre-packed screen	1	C
BA-MW3B	13.72	11.50	25.67	15.67 - 25.67	PVC riser and Pre-packed screen	1	A
BA-MW3C	13.86	11.40	44.10	34.10 - 44.10	PVC riser and Pre-packed screen	1	C
BA-MW4B	14.15	11.70	28.41	18.41 - 28.41	PVC riser and Pre-packed screen	1	A
BA-MW4C	14.01	11.40	42.13	32.13 - 42.13	PVC riser and Pre-packed screen	1	C
BA-MW5B	14.25	11.80	27.01	17.01 - 27.01	PVC riser and Pre-packed screen	1	A
BA-MW5C	13.88	11.60	38.20	28.20 - 38.20	PVC riser and Pre-packed screen	1	C
BA-MW6B	13.73	11.70	26.60	16.60 - 26.60	PVC riser and Pre-packed screen	1	A
BA-MW6C	13.91	11.70	46.13	36.13 - 46.13	PVC riser and Pre-packed screen	1	C
BA-MW7B	14.10	11.90	26.95	16.95 - 26.95	PVC riser and Pre-packed screen	1	A
BA-MW7C	14.20	11.80	46.38	36.38 - 46.38	PVC riser and Pre-packed screen	1	C
BA-MW8B	14.64	12.50	25.18	15.18 - 25.18	PVC riser and Pre-packed screen	1	A
BA-MW8C	14.76	12.40	45.84	35.84 - 45.84	PVC riser and Pre-packed screen	1	C
BA-PZ1A	43.29	41.00	38.88	28.88 - 38.88	PVC riser and screen	1	B
BA-PZ1B	43.29	40.90	49.20	39.20 - 49.20	PVC riser and screen	1	B
BA-PZ1C	42.98	40.80	68.21	58.21 - 68.21	PVC riser and screen	1	C
BA-PZ2A	42.23	39.80	39.13	29.13 - 39.13	PVC riser and screen	1	B
BA-PZ2B	41.82	39.50	49.41	39.41 - 49.41	PVC riser and screen	1	B
BA-PZ2C	42.00	39.60	59.09	49.09 - 59.09	PVC riser and screen	1	C
BA-PZ3B	14.42	12.20	24.86	14.86 - 24.86	PVC riser and screen	1	B
BA-PZ3C	14.46	12.10	45.00	35.00 - 45.00	PVC riser and screen	1	C
BA-PZ4B	14.21	11.90	25.99	15.99 - 25.99	PVC riser and screen	1	B
BA-PZ4C	14.28	11.90	42.89	32.89 - 42.89	PVC riser and screen	1	C

NOTE: Monitoring wells and piezometers installed between July 29, 2008 and August 21, 2008.
All measurements referenced to NAVD88, NAD83
A - Riverine
B - Upper Alluvial
C - Lower Alluvial
TOC - Top of casing

PREPARED BY/DATE: LRP/01/29/09
CHECKED BY/DATE: FKM/01/30/09

TABLE 2-6

MICRO-WELL AND PIEZOMETER GROUNDWATER ELEVATION, SEPTEMBER 22, 2008
Updated RI Addendum
Olin McIntosh OU-2

Well ID	Northing	Easting	TOC Elevation (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
BA-MW1A	460133.44	1815083.77	34.39	27.88	6.51
BA-MW1B	460138.27	1815082.66	34.96	28.76	6.20
BA-MW1C	460137.19	1815087.54	34.26	28.11	6.15
BA-MW2B	459476.43	1815489.95	14.12	11.30	2.82
BA-MW2C	459475.26	1815484.34	14.25	10.45	3.80
BA-MW3B	459556.17	1815966.06	13.72	11.21	2.51
BA-MW3C	459555.31	1815960.97	13.86	11.33	2.53
BA-MW4B	459525.37	1816529.17	14.15	11.56	2.59
BA-MW4C	459523.40	1816524.82	14.01	11.43	2.58
BA-MW5B	459770.88	1816967.14	14.25	11.71	2.54
BA-MW5C	459767.84	1816961.41	13.88	11.35	2.53
BA-MW6B	460088.58	1817342.52	13.73	11.28	2.45
BA-MW6C	460083.49	1817339.75	13.91	11.45	2.46
BA-MW7B	460539.29	1817461.30	14.10	11.61	2.49
BA-MW7C	460533.70	1817461.07	14.20	11.73	2.47
BA-MW8B	461140.47	1817463.95	14.64	12.07	2.57
BA-MW8C	461135.09	1817463.47	14.76	12.19	2.57
BA-PZ1A	461354.70	1814965.48	43.29	36.07	7.22
BA-PZ1B	461359.50	1814967.78	43.29	36.14	7.15
BA-PZ1C	461356.22	1814970.91	42.98	35.78	7.20
BA-PZ2A	461997.92	1815072.89	42.23	34.96	7.27
BA-PZ2B	462003.89	1815074.09	41.82	34.57	7.25
BA-PZ2C	462000.29	1815075.88	42.00	34.81	7.19
BA-PZ3B	462655.10	1815745.13	14.42	11.72	2.70
BA-PZ3C	462654.68	1815749.43	14.46	11.47	2.99
BA-PZ4B	462501.73	1816677.52	14.21	11.43	2.78
BA-PZ4C	462501.18	1816682.59	14.28	11.63	2.65

NOTE: All measurements referenced to NAVD88, NAD83
TOC = Top of casing

PREPARED BY/DATE: KPW 2/13/09
CHECKED BY/DATE: EJS, LRP 11/7/2008

TABLE 3-1

VEGETATION AND LAND COVER TYPES
Updated RI Addendum
Olin McIntosh OU-2

Vegetation/Land Cover Type	**Acres**	**Percentage of Total**
Mixed Upland Forest	1	1%
Semi-Permanently Flooded Bottomland Forest	35	18%
Temporarily Flooded Bottomland Forest	60	30%
Shrub Dominated Zone	4	2%
Herbaceous Dominated Zone	2	1%
Open Water Ponds and Streams	82	42%
Other (roads, etc.)	12	6%

Notes :
Vegetation survey conducted in September 1991.

PREPARED BY/DATE: RMR 5/4/2010
CHECKED BY/DATE: HEF 5/7/10

TABLE 3-2

FISHES KNOWN OR EXPECTED TO OCCUR IN OU-2
Updated RI Addendum
Olin McIntosh OU-2

Scientific Name	Common Name	Status[1]	OU-2 Occurrence Residence[2]	Frequency[3]	Trophic Level[4]	Tolerance[5]
Family POLYODONTIDAE	**paddlefishes**					
Polyodon spathula	paddlefish	ECON	Transient (RI)	I	F	Intolerant
Family LEPISOSTEIDAE	**gars**					
Lepisosteus oculatus	spotted gar	ECON	Resident	V	P	Intermediate
Lepisosteus osseus	longnose gar	ECON	Resident	C	P	Intermediate
Family AMIIDAE	**bowfin**					
Amia calva	bowfin	EXP	(Resident)		P	Intermediate
Family ANGUILLIDAE	**freshwater eels**					
Anguilla rostrata	American eel	ECON	Transient (MA)	I	P	Intermediate
Family CLUPEIDAE	**herrings**					
Alosa chrysochloris	skipjack herring	ECON	Transient (RI)	I	P	Intermediate
Dorosoma cepedianum	gizzard shad	ECON	Resident	C	O	Intermediate
Dorosoma petenense	threadfin shad	ECON	Resident	C	O	Intermediate
Family ENGRAULIDAE	**anchovies**					
Anchoa mitchilli	bay anchovy	EXP	(Transient [MA])		NC	NC
Family CYPRINIDAE	**minnows and carps**					
Cyprinella venusta	blacktail shiner	ECON	Transient (UP)	I	NC	NC
Cyprinus carpio	common carp	ECON	Resident	C	O	Tolerant
Hybognathus nuchalis	Mississippi silvery minnow	ECON	Resident	C	H	Intermediate
Macrhybopsis storeriana	silver chub	ECON	Transient (RI)	I	I	Intermediate
Notemigonus crysoleucas	golden shiner	ECON	Resident	V	O	Tolerant
Notropis atherinoides	emerald shiner	ECON	Transient (RI)	I	I	Intermediate
Notropis candidus	silverband shiner	ECON	Transient (RI)	I	NC	NC
Notropis texanus	weed shiner	ECON	Resident	I	I	Intolerant
Opsopoeodus emiliae	pugnose minnow	ECON	Resident	C	I	Intolerant
Pimephales vigilax	bullhead minnow	ECON	Resident	I	O	Intermediate
Family CATOSTOMIDAE	**suckers**					
Carpiodes cyprinus	quillback (carpsucker)	ECON	Transient (RI)	C	O	Intermediate
Carpiodes velifer	highfin carpsucker	EXP	(Transient [RI])		O	Intolerant
Erimyzon sucetta	lake chubsucker	EXP	(Resident)		I	Intermediate
Ictiobus bubalus	smallmouth buffalo	ECON	Transient (RI)	C	I	Intermediate

TABLE 3-2

FISHES KNOWN OR EXPECTED TO OCCUR IN OU-2
Updated RI Addendum
Olin McIntosh OU-2

Scientific Name	Common Name	Status[1]	OU-2 Occurrence Residence[2]	OU-2 Occurrence Frequency[3]	Trophic Level[4]	Tolerance[5]
Minytrema melanops	spotted sucker	EXP	(Resident)		I	Intermediate
Moxostoma poecilurum	blacktail redhorse	UCON	Transient (UP)	I	I	NC
Family ICTALURIDAE	**bullhead catfishes**					
Ameiurus melas	black bullhead	EXP	(Resident)		I	Intermediate
Ameiurus natalis	yellow bullhead	EXP	(Resident)		I	Tolerant
Ictalurus furcatus	blue catfish	ECON	Resident	C	P	Intermediate
Ictalurus punctatus	channel catfish	ECON	Resident	C	P	Intermediate
Noturus gyrinus	tadpole madtom	EXP	(Resident)		I	Intermediate
Pylodictis olivaris	flathead catfish	EXP	(Transient [RI])		P	Intermediate
Family ESOCIDAE	**pikes**					
Esox americanus	grass pickerel	EXP	(Resident)		P	Intermediate
Esox niger	chain pickerel	ECON	Resident	I	P	Intermediate
Family APHREDODERIDAE	**pirate perches**					
Aphredoderus sayanus	pirate perch	ECON	Resident	C	I	Intermediate
Family BELONIDAE	**needlefishes**					
Strongylura marina	Atlantic needlefish	ECON	Resident	I	NC	NC
Family FUNDULIDAE	**topminnows**					
Fundulus olivaceus	blackspotted topminnow	ECON	Resident	C	I	Intermediate
Family POECILIIDAE	**livebearers**					
Gambusia affinis	mosquitofish	ECON	Resident	C	I	Intermediate
Heterandria formosa	least killifish	UCON	Resident	C	NC	NC
Family ATHERINIDAE	**silversides**					
Labidesthes sicculus	brook silverside	ECON	Resident	C	I	Intermediate
Family MORONIDAE	**striped basses**					
Morone chrysops	white bass	ECON	Transient (RI)	C	P	Intermediate
Morone mississippiensis	yellow bass	ECON	Resident	I	P	Intermediate
Morone saxatilis	striped bass	ECON	Transient (RI)	I	P	Intermediate
Family CENTRARCHIDAE	**sunfishes**					
Centrarchus macropterus	flier	EXP	(Resident)		I	Intermediate
Elassoma zonatum	banded pygmy sunfish	ECON	Resident	I	I	Intermediate
Lepomis cyanellus	green sunfish	EXP	(Resident)		I	Tolerant
Lepomis gulosus	warmouth	ECON	Resident	C	P	Intermediate
Lepomis macrochirus	bluegill	ECON	Resident	V	I	Intermediate

TABLE 3-2

FISHES KNOWN OR EXPECTED TO OCCUR IN OU-2
Updated RI Addendum
Olin McIntosh OU-2

Scientific Name	Common Name	Status[1]	OU-2 Occurrence Residence[2]	Frequency[3]	Trophic Level[4]	Tolerance[5]
Lepomis marginatus	dollar sunfish	EXP	(Resident)		NC	NC
Lepomis megalotis	longear sunfish	ECON	Resident	I	I	Intolerant
Lepomis microlophus	redear sunfish	ECON	Resident	I	I	Intermediate
Lepomis punctatus	spotted sunfish	EXP	(Resident)		I	Intermediate
Micropterus salmoides	largemouth bass	ECON	Resident	C	P	Intermediate
Pomoxis annularis	white crappie	EXP	(Resident)		P	Intermediate
Pomoxis nigromaculatus	black crappie	ECON	Resident	C	P	Intermediate
Family PERCIDAE	**perches**					
Etheostoma chlorosoma	bluntnose darter	EXP	(Resident)		I	Intermediate
Etheostoma fusiforme	swamp darter	EXP	(Resident)		I	Intermediate
Etheostoma proeliare	cypress darter	ECON	Resident	C	NC	NC
Family SCIAENIDAE	**drums**					
Aplodinotus grunniens	freshwater drum	ECON	Transient (RI)	C	V	Intermediate
Family MUGILIDAE	**mullets**					
Mugil cephalus	striped mullet	ECON	Transient (MA)	C	NC	NC
Family SOLEIDAE	**soles**					
Trinectes maculatus	hogchoker	ECON	Transient (MA)	I	G	Intolerant

Notes:

[1] ECON = expected and confirmed (by at least one capture); EXP = expected on the basis of zoogeographic literature (i.e., known to occur in similar habitats of Lower Tombigbee River system), but not confirmed; UCON = unexpected based on zoogeographic literature but confirmed (by at least one capture).
[2] Resident fishes are those known to spend their entire life cycle within habitats similar to those represented in OU-2 (i.e., lowland swamps). Transients are known to spend at least some part of their life cycle in habitat(s) not represented in OU-2 (i.e., RI = predominantly riverine; MA = part of most of life spent in marine/estuarine areas; UP = predominantly in upland streams). Transients in general are unlikely to spawn in OU-2, but in some cases their larval and/or fishes other early life-history stages may be present.

[3]I = infrequent (encountered on only one or a few occasions, usually singly or in very low numbers); C = common (often encountered in appropriate gear/habitat(s), usually in moderate to high numbers); V = very common (encountered during virtually every use of appropriate gear, usually in moderate to high numbers).

[4]F= filter-feeder; P = piscivore; O = omnivore; H = herbivore (includes detritivores); I = insectivore; G = generalist feeder; V = invertivore, NC = not classified. Levels are based on categories established in Barbour, 1999.

[5]NC = not classified. Levels assigned by Barbour, 1999.

PREPARED BY/DATE: RMR 5/4/2010
CHECKED BY/DATE: HEF 5/7/10

TABLE 3-3

TETRAPOD VERTEBRATES KNOWN OR EXPECTED TO OCCUR IN OU-2
Updated RI Addendum
Olin McIntosh OU-2

Scientific Name	Common Name	Status[1]	OU-2 Occurrence Residence[2]	Frequency[3]	Respiration[4] Adults	Young	Habitat[5] Adults	Young	Trophic Level[6] Adults	Young
			CLASS AMPHIBIA							
Family AMBYSTOMATIDAE	**tiger salamanders**									
Ambystoma maculatum	spotted salamander	EXP	(Resident)		TE	AM	TGR	SNK, TGR	Carnivore	Carnivore
Ambystoma opacum	marbled salamander	EXP[7]	(Resident)		TE	AM	TGR	SNK, TGR	Carnivore	Carnivore
Ambystoma talpoideum	mole salamander	EXP	(Resident)		TE	AM	TGR	SNK, TGR	Carnivore	Carnivore
Ambystoma tigrinum	tiger salamander	EXP	(Resident)		TE	AM	TGR	SNK, TGR	Carnivore	Carnivore
Family AMPHIUMIDAE	**amphiumas**									
Amphiuma means	two-toed amphiuma	EXP	(Resident)		AM	AM	ANK, TGR	ANK, TGR	Carnivore	Carnivore
Family PLETHODONTIDAE	**woodland salamanders**									
Desmognathus fuscus	dusky salamander	EXP[7]	(Resident)		AM	AM	TGR, SNK	TGR, SNK	Carnivore	Carnivore
Eurycea cinigera	southern two-lined salamander	EXP	(Resident)		AM	AQ	TGR, SNK	ANK	Carnivore	Carnivore
Eurycea longicauda	long-tailed salamander	ECON	Resident	I	AM	AQ	TGR, SNK	ANK	Carnivore	Carnivore
Eurycea quadridigitata	dwarf salamander	EXP	(Resident)		AM	AQ	TGR, SNK	ANK	Carnivore	Carnivore
Plethodon glutinosus	slimy salamander	EXP[7]	(Resident)		AM	AQ	TGR, SNK	ANK	Carnivore	Carnivore
Pseudotriton montanus	mud salamander	EXP	(Resident)		AM	AQ	TGR, SNK	ANK	ND	ND
Pseudotriton ruber	red salamander	EXP	(Resident)		AM	AQ	TGR, SNK	ANK	Carnivore	Carnivore
Family PROTEIDAE	**mudpuppies and waterdogs**									
Necturus beyeri	Gulf coast waterdog	EXP	(Resident)		AQ	AQ	ANK	ANK	Carnivore	Carnivore
Family SALAMANDRIDAE	**newts**									
Notophthalmus viridescens	eastern newt	EXP	(Resident)		AQ	AM	ANK	TGR, SNK	Carnivore	Carnivore
Family SIRENIDAE	**sirens**									
Siren intermedia	lesser siren	EXP	(Resident)		AQ	AQ	ANK	ANK	Carnivore	Carnivore
Family BUFONIDAE	**toads**									
Bufo quercicus	oak toad	EXP	(Resident)		TE	AQ	TGR	ANK	Carnivore	Herbivore
Bufo terrestris	southern toad	ECON	Resident	C	TE	AQ	TGR	ANK	Carnivore	Herbivore
Bufo woodhousei	Woodhouse's toad	ECON	Resident	I	TE	AQ	TGR	ANK	Carnivore	Herbivore
Family HYLIDAE	**treefrogs and cricket frogs**									
Acris crepitans	northern cricket frog	EXP	(Resident)		TE	AQ	TGR, SNK	ANK	Carnivore	Herbivore
Acris gryllus	southern cricket frog	ECON	Resident	C	TE	AQ	TGR	ANK	Carnivore	Herbivore
Hyla avivoca	bird-voiced frog	EXP	(Resident)		TE	AQ	TAR, TGR	ANK	Carnivore	Herbivore
Hyla cinema	green treefrog	ECON	Resident	C	TE	AQ	TAR, TGR	ANK	Carnivore	Herbivore
Hyla crucifer	spring peeper	ECON	Resident	I	TE	AQ	TAR	ANK	Carnivore	Herbivore
Hyla femoralis	pine woods treefrog	EXP	(Transient)		TE	AQ	TAR	ANK	Carnivore	Herbivore
Hyla gratiosa	barking treefrog	EXP	(Transient)		TE	AQ	TGR	ANK	Carnivore	Herbivore
Hyla squirella	squirrel treefrog	EXP	(Resident)		TE	AQ	TAR	ANK	Carnivore	Herbivore
Hyla versicolor	gray treefrog	ECON	Resident	C	TE	AQ	TGR, TAR	ANK	Carnivore	Herbivore
Pseudacris nigrita	southern chorus frog	ECON	Resident	C	TE	AQ	TGR	ANK	Carnivore	Herbivore
Pseudacris ornata	ornate chorus frog	EXP	(Resident)		TE	AQ	TGR	ANK	Carnivore	Herbivore
Family MICROHYLIDAE	**narrow-mouthed toads**									
Gastrophryne carolinensis	eastern narrow-mouthed toad	ECON	Resident	C	TE	AQ	TGR	ANK	Carnivore	Herbivore
Family PELOBATIDAE	**spadefoot toads**									
Scaphiopus holbrookii	eastern spadefoot toad	EXP[7]	(Resident)		TE	AQ	TGR	ANK	Carnivore	Herbivore
Family RANIDAE	**true frogs**									
Rana catesbeiana	bullfrog	ECON	Resident	C	TE	AQ	TGR, SNK	ANK	Carnivore	Herbivore
Rana clamitans	bronze frog	ECON	Resident	V	TE	AQ	TGR, SNK	ANK	Carnivore	Herbivore
Rana grylio	pig frog	EXP	(Resident)		TE	AQ	TGR, SNK	ANK	Carnivore	Herbivore
Rana sphenocephala	southern leopard frog	ECON	Resident	I	TE	AQ	TGR, SNK	ANK	Carnivore	Herbivore
			CLASS REPTILIA							
Family CHELYDRIDAE	**snapping turtles**									
Chelydra serpentina	common snapping turtle	ECON	Resident	I	AM	AM	ANK	ANK	Omnivore	Omnivore
Macroclemys temminckii	alligator snapping turtle	ECON	Resident	C	AM	AM	ANK	ANK	Omnivore	Omnivore
Family EMYDIDAE	**land and freshwater turtles**									

TABLE 3-3

TETRAPOD VERTEBRATES KNOWN OR EXPECTED TO OCCUR IN OU-2
Updated RI Addendum
Olin McIntosh OU-2

Scientific Name	Common Name	Status[1]	OU-2 Occurrence Residence[2]	Frequency[3]	Respiration[4] Adults	Young	Habitat[5] Adults	Young	Trophic Level[6] Adults	Young
Chrysemys picta	painted turtle	EXP	(Transient)		AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Deirochelys reticularia	chicken turtle	EXP	(Transient		AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Graptemys nigrinoda	black-knobbed sawback	EXP	(Transient		AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Graptemys pulchra	Alabama map turtle	EXP[7]	(Resident)		AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Pseudemys concinna	river cooter	EXP	(Transient)		AM	AM	ANK	TGR, ANK	Herbivore	Herbivore
Pseudemys floridana	water	EXP	(Resident)		AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Terrapene carolina	eastern box turtle	EXP[7]	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Trachemys scripta	slider	ECON	Resident	C	AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Family KINOSTERNIDAE	**mud and musk turtles**									
Kinosternon subrubrum	eastern musk turtle	EXP[7]	(Resident)		AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Sternotherus minor	loggerhead musk turtle	EXP	(Resident)		AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Sternotherus odoratus	stinkpot	ECON	Resident	C	AM	AM	ANK	TGR, ANK	Omnivore	Omnivore
Family TRIONYCHIDAE	**soft-shelled turtles**									
Apalone mutica	smooth softshell	EXP	(Transient)		AM	AM	ANK	TGR, ANK	Carnivore	Carnivore
Apalone spinifera	spiny softshell	EXP	(Transient)		AM	AM	ANK	TGR, ANK	Carnivore	Carnivore
Family ANGUIDAE	**glass lizards**									
Ophisaurus attenuatus	slender glass lizard	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Ophisaurus ventralis	eastern glass lizard	EXP[7]	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Family IGUANIDAE	**iguanids**									
Anolis carolinensis	green anole	ECON	Resident	C	TE	TE	TAR	TAR	Carnivore	Carnivore
Sceloporus undulatus	eastern fence lizard	ECON	Resident	C	TE	TE	TGR, TAR	TGR, TAR	Carnivore	Carnivore
Family SCINCIDAE	**skinks**									
Eumeces anthracinus	coal skink	EXP	(Resident)		TE	TE	TGR, TAR	TGR, TAR	Carnivore	Carnivore
Eumeces fasciatus	five-lined skink	ECON	Resident	I	TE	TE	TAR, TGR	TAR, TGR	Carnivore	Carnivore
Eumeces inexpectatus	southeastern five-lined skink	EXP	(Resident)		TE	TE	TGR, TAR	TGR, TAR	Carnivore	Carnivore
Eumeces laticeps	broad-headed skink	EXP	(Resident)		TE	TE	TGR, TAR	TGR, TAR	Carnivore	Carnivore
Scincella lateralis	ground skink	ECON	Resident	C	TE	TE	TGR	TGR	Carnivore	Carnivore
Family TEIDAE	**racerunners**									
Cnemidophorus sexlineatus	six-lined racerunner	EXP[7]	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Family COLUBRIDAE	**colubrid snakes**									
Coluber constrictor	racer	ECON	Resident	I	TE	TE	TGR, TAR	TGR, TAR	Carnivore	Carnivore
Diadophis punctatus	ring-necked snake	EXP	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Elaphe guttata	corn snake	EXP	(Resident)		TE	TE	TGR	TGR, TAR	Carnivore	Carnivore
Elaphe obsoleta	rat snake	ECON	Resident	I	TE	TE	TAR, TGR	TGR, TAR	Carnivore	Carnivore
Farancia abacura	mud snake	EXP	(Resident)		TE	TE	SNK, TGR	TGR, SNK	Carnivore	Carnivore
Farancia erytrogramma	rainbow snake	EXP	(Transient)		TE	TE	SNK, TGR	TGR, SNK	Carnivore	Carnivore
Heterodon platirhinos	eastern hog-nosed snake	EXP[7]	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Heterodon simus	southern hog-nosed snake	EXP	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Lampropeltis getulus	common kingsnake	ECON	Resident	I	TE	TE	TGR, SNK	TRG,SNK	Carnivore	Carnivore
Lampropeltis triangulum	milk snake	EXP	(Resident)		TE	TE	TAR,TGR	TGR, TAR	Carnivore	Carnivore
Masticophis flagellum	coachwhip	EXP[7]	(Resident)		TE	TE	TGR	TRG,SNK	Carnivore	Carnivore
Nerodia erythrogaster	plain-bellied water snake	ECON	Resident	I	TE	TE	SNK, TGR	TGR, SNK	Carnivore	Carnivore
Nerodia fasciata	banded water snake	ECON	Resident	C	TE	TE	SNK, TGR	TGR, SNK	Carnivore	Carnivore
Nerodia rhombifera	diamond-backed water snake	EXP	(Resident)		TE	TE	SNK, TGR	TGR, SNK	Carnivore	Carnivore
Nerodia sipedon	northern water snake	EXP	(Resident)		TE	TE	SNK, TGR	TGR, SNK	Carnivore	Carnivore
Opheodrys aestivus	rough green snake	EXP	(Resident)		TE	TE	TAR,TGR	TGR, TAR	Carnivore	Carnivore
Regina rigida	glossy crayfish snake	EXP	(Resident)		TE	TE	SNK, TGR	SNK, TGR	Carnivore	Carnivore
Rabida flavilata	pine woods snake	EXP	(Transient)		TE	TE	TAR,TGR	TGR, TAR	Carnivore	Carnivore
Storeria dekayi	brown snake	EXP	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Storeria occipitomaculata	red-bellied snake	EXP[7]	(Resident)		TE	TE	TRG	TGR	Carnivore	Carnivore
Tantilla coronata	southeastern crowned snake	EXP[7]	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore

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Thamnophis sauritus	eastern ribbon snake	EXP	(Transient)		TE	TE	TGR, SNK	TGR, SNK	Carnivore	Carnivore
Thamnophis siralis	garter snake	ECON	Resident	I	TE	TE	TGR, SNK	TGR, SNK	Carnivore	Carnivore
Virginia striatula	rough earth snake	EXP	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Virginia valeriae	smooth earth snake	EXP	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Family ELAPIDAE	**coral snakes**									
Micrurus fulvius	eastern coral snake	EXP	(Resident)	I	TE	TE	TGR	TGR	Carnivore	Carnivore
Family VIPERIDAE	**vipers**									
Agkistrodon contortrix	copperhead	ECON	Resident	C	TE	TE	TGR	TGR	Carnivore	Carnivore
Agkistrodon piscivorus	cottonmouth	ECON	Resident	C	TE	TE	TAR, ANK	TAR, ANK	Carnivore	Carnivore
Crotalus adamanteus	eastern diamond-backed rattlesnake	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Crotalus horridus	timber (canebrake) rattlesnake	EXP	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Sistrurus miliarius	pygmy rattlesnake	EXP	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Family CROCODYLIDAE	**crocodilians**									
Alligator mississippiensis	American alligator	ECON	Resident	C I	TE	TE	SNK, TGR	SNK, TGR	Carnivore	Carnivore
			CLASS AVES							
Family GAVIIDAE	**loons**									
Gavia immer	common loon	ECON	(Transient)	I	TE	TE	SDV	SDV	Carnivore	Carnivore
Family PODICIPEDIDAE	**grebes**									
Podiceps auritus	horned grebe	EXP	(Transient)		TE	TE	SDV	SDV	Carnivore	Carnivore
Podilymbus podiceps	pie-billed grebe	ECON	Resident	I	TE	TE	SDV	SDV	Omnivore	Omnivore
Family PHALACROCORACIDAE	**cormorants**									
Phalacrocorax aurints	double-crested cormorant	ECON	Transient	C	TE	TE	SDV	SDV	Carnivore	Carnivore
Family ANHINGIDAE	**darters**									
Anhinga anhinga	anhinga (snakebird)	ECON	Transient	I	TE	TE	SDV	SDV	Carnivore	Carnivore
Family ARDEIDAE	**herons, bitterns, and allies**									
Ardea herodias	great blue heron	ECON	Transient	C	TE	TE	SWA	SWA	Carnivore	Carnivore
Butorides virescens	green heron	ECON	Transient	I	TE	TE	SWA	SWA	Carnivore	Carnivore
Egretta caerulea	little blue heron	ECON	Transient	C	TE	TE	SWA	SWA	Carnivore	Carnivore
Bubulcus ibis	cattle egret	ECON	Transient	I	TE	TE	TGR	TGR	Carnivore	Carnivore
Ardea alba	great egret	ECON	Transient	C	TE	TE	SWA	SWA	Carnivore	Carnivore
Egretta thula	snowy egret	ECON	Transient	I	TE	TE	SWA	SWA	Carnivore	Carnivore
Hydranassa tricolor	Louisiana heron	EXP	(Transient)		TE	TE	SWA	SWA	Carnivore	Carnivore
Nycticorax nycticorax	black-crowned night heron	EXP	(Transient)		TE	TE	SWA	SWA	Carnivore	Carnivore
Nyctanassa violacea	yellow-crowned night heron	ECON	Transient	C	TE	TE	SWA	SWA	Carnivore	Carnivore
Ixobrychus exilis	least bittern	EXP	(Transient)		TE	TE	SWA	SWA	Carnivore	Carnivore
Botaurus lentiginosus	American bittern	ECON	Transient	I	TE	TE	SWA	SWA	Carnivore	Carnivore
Family CICONIIDAE	**storks**									
Mycteria americana	wood stork	EXP	(Transient)		TE	TE	SWA	SWA	Carnivore	Carnivore
Family THRESKIORNITHIDAE	**ibises**									
Plegadis falcinellus	glossy ibis	EXP	(Transient)		TE	TE	SWA	SWA	Carnivore	Carnivore
Eudocimus albus	white ibis	ECON	Transient	I	TE	TE	SWA	SWA	Carnivore	Carnivore
Family ANATIDAE	**swans, geese, and ducks**									
Cygnus columbianus	whistling swan	EXP	(Transient)		TE	TE	SNK	SNK	Herbivore	Herbivore
Branta canadensis	Canada goose	EXP	(Transient)		TE	TE	TGR, SNK	TGR, SNK	Omnivore	Omnivore
Anser albigrons	white-fronted goose	EXP	(Transient)		TE	TE	TGR, SNK	TGR, SNK	Omnivore	Omnivore
Chen caerulescens	snow goose	EXP	(Transient)		TE	TE	TGR, SNK	TGR, SNK	Omnivore	Omnivore
Dendrocygna bicolor	fulvous tree-duck	EXP	(Transient)		TE	TE	TGR, SNK	TGR, SNK	Herbivore	Herbivore
Anas platyrhynchos	mallard	ECON	Resident	C	TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Anas rubripes	black duck	EXP[7]	(Transient)		TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Anas strepera	gadwall	EXP	(Transient)		TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Anas acuta	pintail	EXP	(Transient)		TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Anas crecca	green-winged teal	ECON	Transient	I	TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore

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			OU-2 Occurrence		Respiration[4]		Habitat[5]		Trophic Level[6]	
Scientific Name	Common Name	Status[1]	Residence[2]	Frequency[3]	Adults	Young	Adults	Young	Adults	Young
Anas discors	blue-winged teal	EXP	(Resident)		TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Anas americana	American wigeon	EXP	(Transient)		TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Anas clypeata	northern shoveler	EXP	(Transient)		TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Aix sponsa	wood duck	ECON	Resident	C	TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Aythya americana	redhead	EXP	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Aythya collaris	ring-necked duck	EXP[7]	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Aythya valisineria	canvasback	EXP	(Transient)		TE	TE	SDV, TGR	SDV, TGR	Omnivore	Omnivore
Aythya affinis	lesser scaup	EXP[7]	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Bucephala clangula	common goldeneye	EXP	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Bucephala albeola	bufflehead	EXP	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Melanitta deglandi	white-winged scoter	EXP	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Oxyura jamaicensis	ruddy duck	EXP	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Lophodytes cucullatus	hooded merganser	EXP	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Mergus merganser	common merganser	EXP	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Mergus serrator	red-breasted merganser	EXP	(Transient)		TE	TE	SDV	SDV	Omnivore	Omnivore
Family CATHARTIDAE	**vultures**									
Cathartes aura	turkey vulture	ECON	Resident	C	TE	TE	TAE, TGR	TAE, TGR	Carnivore	Carnivore
Cathartes atratus	black vulture	ECON	Resident	I	TE	TE	TAE, TGR	TAE, TGR	Carnivore	Carnivore
Family ACCIPITRIDAE	**hawks, kites, eagles**									
Accipiter striatus	sharp-shinned hawk	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Aquila chrysaetos	golden eagle	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Buteo jamaicensis	red-tailed hawk	EXP[7]	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Buteo platypterus	broad-winged hawk	EXP[7]	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Buteo swainsoni	Swainson's hawk	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Buteo lagopus	rough-legged hawk	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Circus cyaneus	marsh hawk	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Elanoides forficatus	swallow-tailed kite	ECON	(Transient)	I	TE	TE	TAE	TAE	Carnivore	Carnivore
Ictinia mississippiensis	Mississippi kite	EXP[7]	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Haliaeetus leucocephalus	bald eagle[9]	ECON	Transient	I	TE	TE	TAE	TAE	Carnivore	Carnivore
Family PANDIONIDAE	**ospreys**									
Pandion haliaetus	osprey	ECON	Transient	I	TE	TE	TAE	TAE	Carnivore	Carnivore
Family FALCONIDAE	**falcons**									
Falco peregrinus	peregrine falcon[8]	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Falco columbarius	merlin	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Falco spatverius	American kestrel (sparrow hawk)	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Family PHASIANIDAE	**quails, pheasants**									
Colinus virginianus	bobwhite	EXP[7]	(Transient)		TE	TE	TGR	TGR	Herbivore	Herbivore
Family MELEAGRIDIDAE	**turkeys**									
Meleagris gallopavo	turkey (wild turkey)	ECON	Resident	C	TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore
Family RALLIDAE	**rails**									
Rallus elegans	king rail		(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Rallus limicola	Virginia rail	EXP[7]	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Porzana carolina	sora	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Porphyrula martinica	purple gallinule	EXP	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Gallinula chloropus	common gallinule	EXP	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Fulica americana	American coot	ECON	Resident	C	TE	TE	SDV, TGR	SDV, TGR	Omnivore	Omnivore
Family CHARADRIIDAE	**plovers**									
Charadrius semipalmatus	semipalmated plover	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Charadrius melodus	piping plover	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Pluvialis dominica	American golden plover	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Pluvialis squatarola	black-billed plover	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore

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			OU-2 Occurrence		Respiration[4]		Habitat[5]		Trophic Level[6]	
Scientific Name	**Common Name**	**Status[1]**	**Residence[2]**	**Frequency[3]**	**Adults**	**Young**	**Adults**	**Young**	**Adults**	**Young**
Family SCOLOPACIDAE	**sandpipers**									
Capella gallinago	common snipe	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Numenius phaeopus	whimbrel	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Bartramia longicauda	upland sandpiper	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Actitis macularia	spotted sandpiper	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Tringa solitaria	solitary sandpiper	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Tringa melanoleuca	greater yellowlegs	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Tringa flavipes	lesser yellowlegs	EXP[7]	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Catoptrophorus semipalmatus	willet	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Calidris melanotos	pectoral sandpiper	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Calidris fuscicollis	white-rumped sandpiper	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Calidris minutilla	least sandpiper	EXP[7]	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Calidris alpina	dunlin	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Calidris pusilla	semipalmated sandpiper	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Calidris mauri	western sandpiper	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Calidris himantopus	stilt sandpiper	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Limnodromus griseus	short-billed dowitcher	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Family LARIDAE	**gulls and terns**									
Larus argentatus	herring gull	ECON	Transient	I	TE	TE	TAE	TAE	Carnivore	Carnivore
Larus delawarensis	ring-billed gull	EXP[7]	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Larus atricilla	laughing gull	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Larus philadelphia	Bonaparte's gull	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Sterna forsteri	Forster's tern	ECON	Transient	I	TE	TE	TAE	TAE	Carnivore	Carnivore
Sterna hirundo	common tern	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Sterna fuscata	sooty tern	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Hydroprogne caspia	Caspian tern	EXP	(Transient)	I	TE	TE	TAE	TAE	Carnivore	Carnivore
Chlidonias niger	black tern	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Family COLUMBIDAE	**pigeons and doves**									
Columba livia	rack dove ("common pigeon")	ECON	Resident	I	TE	TE	TGR	TGR	Herbivore	Herbivore
Zenaida asiatica	white-winged dove	EXP[7]	(Transient)		TE	TE	TGR	TGR	Herbivore	Herbivore
Zenaida macroura	mourning dove	ECON	Resident	C	TE	TE	TGR	TGR	Herbivore	Herbivore
Columbina passerina	common ground dove	EXP[7]	(Resident)		TE	TE	TGR	TGR	Herbivore	Herbivore
Family CUCULIDAE	**cuckoos**									
Coccyzus americanus	yellow-billed cuckoo	ECON	Resident	I	TE	TE	TAR	TAR	Omnivore	Omnivore
Coccyzus erythropthalmus	black-billed cuckoo	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family TYTONIDAE	**barn owls**									
Tyto alba	barn owl	EXP	(Resident)		TE	TE	TAR	TAR	Carnivore	Carnivore
Family STRIGIDAE	**typical owls**									
Otus asio	screech owl	EXP[7]	(Resident)		TE	TE	TAR	TAR	Carnivore	Carnivore
Bubo virginianus	great homed owl	EXP[7]	(Resident)		TE	TE	TAR	TAR	Carnivore	Carnivore
Strix varia	barred owl	ECON	Resident		TE	TE	TAR	TAR	Carnivore	Carnivore
Asio flammeus	short-eared owl	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Aegolius acadicus	saw-whet owl	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Family CAPRIMULGIDAE	**goatsuckers**									
Caprimulgus carolinensis	chuck-will's-widow	EXP[7]	(Transient)		TE	TE	TGR, TAE	TGR, TAE	Carnivore	Carnivore
Caprimulgus vociferus	whip-poor-will	EXP	(Transient)		TE	TE	TGR, TAE	TGR, TAE	Carnivore	Carnivore
Chordeiles minor	common nighthawk	EXP[7]	(Transient)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Family APODIDAE	**swifts**									
Chaetura pelagica	chimney swift	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Family TROCHILIDAE	**hummingbirds**									
Archilochus colubris	ruby-throated hummingbird	EXP[7]	(Transient)		TE	TE	TAE	TAE	Omnivore	Omnivore

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TETRAPOD VERTEBRATES KNOWN OR EXPECTED TO OCCUR IN OU-2
Updated RI Addendum
Olin McIntosh OU-2

			OU-2 Occurrence		Respiration[4]		Habitat[5]		Trophic Level[6]	
Scientific Name	**Common Name**	**Status[1]**	**Residence[2]**	**Frequency[3]**	**Adults**	**Young**	**Adults**	**Young**	**Adults**	**Young**
Family ALCEDINIDAE	**kingfishers**									
Megaceryle alcyon	belted kingfisher	ECON	Transient	C	TE	TE	TAR	TAR	Carnivore	Carnivore
Family PICIDAE	**woodpeckers**									
Colaptes auratus	common flicker	ECON	Transient	I	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Dryocopus pileatus	pileated woodpecker	EXP[7]	(Resident)		TE	TE	TAR	TAR	Omnivore	Omnivore
Melanerpes carolinus	red-bellied woodpecker	ECON	Resident	C	TE	TE	TAR	TAR	Omnivore	Omnivore
Melanerpes erythrocephalus	red-headed woodpecker	EXP[7]	(Resident)		TE	TE	TAR	TAR	Omnivore	Omnivore
Sphyrapicus varius	yellow-bellied sapsucker	ECON	Transient	I	TE	TE	TAR	TAR	Omnivore	Omnivore
Dendrocopos villosus	hairy woodpecker	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Dendrocopos pubescens	downy woodpecker	EXP	(Resident)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family TYRANNIDAE	**flycatchers**									
Tyrannus tyrannus	eastern kingbird	ECON	Transient	I	TE	TE	TAR	TAR	Omnivore	Omnivore
Tyrannus verticalis	western kingbird	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Muscivora forficata	scissor-tailed flycatcher	EXP	(Transient)		TE	TE	TAE	TAE	Omnivore	Omnivore
Myiarchus crinitus	great crested flycatcher	EXP	(Resident)		TE	TE	TAR	TAR	Omnivore	Omnivore
Sayornis phoebe	eastern phoebe	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Empidonax virescens	Acadian flycatcher	EXP	(Resident)		TE	TE	TAR	TAR	Omnivore	Omnivore
Contopus virens	eastern wood pewee	EXP[7]	(Resident)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family HIRUNDINIDAE	**swallows**									
Iridoprocne bicolor	tree swallow	ECON	Transient	I	TE	TE	TAR, TAE	TAR, TAE	Omnivore	Omnivore
Riparia riparia	bank swallow	ECON	Transient	I	TE	TE	TAE	TAE	Carnivore	Carnivore
Stelgidopteryx ruficollis	rough-winged swallow	EXP	(Resident)		TE	TE	TAE, TGR	TAE, TGR	Carnivore	Carnivore
Hirundo rustica	barn swallow	ECON	Resident		TE	TE	TAE	TAE	Carnivore	Carnivore
Petrochelidon pyrrhonota	cliff swallow	EXP	(Transient)		TE	TE	TAE	TAE	Carnivore	Carnivore
Progne subis	purple martin	ECON	Transient	C	TE	TE	TAE	TAE	Carnivore	Carnivore
Family CORVIDAE	**jays, magpies, and crows**									
Cyanocitta cristata	blue jay	ECON	Resident	C	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Corvus brachyrhynchos	common crow	ECON	Resident	C	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Corvus ossifragus	fish crow	ECON	Resident	I	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Family PARIDAE	**titmice**									
Poecile carolinensis	Carolina chickadee	ECON	Resident	I	TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore
Baeolophus bicolor	tufted titmouse	ECON	Resident	I	TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore
Family SITTIDAE	**nuthatches**									
Sitta canadensis	red-breasted nuthatch	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family CERTHIIDAE	**creepers**									
Certhia familiaris	brown creeper	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family TROGLODYTIDAE	**wrens**									
Troglodytes aedon	northern house wren	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Troglodytes troglodytes	winter wren	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Thryomanes bewickii	Bewick's wren	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Thryothorus ludovicianus	Carolina wren	ECON	Resident	C	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Telmarodytes patustris	long-billed marsh wren	EXP[7]	(Transient)		TE	TE	TAE, TGR	TAE, TGR	Carnivore	Carnivore
Cistothorus palustris	sedge wren	EXP[7]	(Transient)		TE	TE	TAE, TGR	TAE, TGR	Carnivore	Carnivore
Family MIMIDAE	**mimic thrushes**									
Dumetella carolinensis	gray catbird	EXP[7]	(Transient)		TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Mimus polyglottos	northern mockingbird	ECON	Resident	C	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Toxostoma rufum	brown thrasher	ECON	Resident	I	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Family TURDIDAE	**true thrushes**									
Turdus migratorius	American robin	ECON	Resident	C	TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore
Hylocichla mustelina	wood thrush	EXP[7]	(Resident)		TE	TE	TAR	TAR	Omnivore	Omnivore
Catharus guttatus	hermit thrush	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore

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TETRAPOD VERTEBRATES KNOWN OR EXPECTED TO OCCUR IN OU-2
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Olin McIntosh OU-2

Scientific Name	Common Name	Status[1]	OU-2 Occurrence Residence[2]	Frequency[3]	Respiration[4] Adults	Young	Habitat[5] Adults	Young	Trophic Level[6] Adults	Young
Catharus ustulatus	Swainson's thrush	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Ominivore
Catharus minimus	gray-cheeked thrush	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Catharus fuscescens	veery	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Sialia sialis	eastern bluebird	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family SYLVIIDAE	**old world warblers**									
Polioptila caerulea	blue-gray gnatcatcher	EXP	(Transient)		TE	TE	TAE, TAR	TAE, TAR	Carnivore	Carnivore
Regulus satrapa	golden-crowned kinglet	EXP[7]	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Regulus calendula	ruby-crowned kinglet	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family MOTACILLIDAE	**wagtails**									
Anthus spinoletta	water pipit	EXP	(Transient)		TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore
Family BOMBYCILLIDAE	**waxwings**									
Bombycilla cedrorum	cedar waxwing	EXP[7]	(Transient)		TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Family LANIIDAE	**shrikes**									
Lanius ludoviclanus	loggerhead shrike	ECON	Resident	I	TE	TE	TAR	TAR	Carnivore	Carnivore
Family STURNIDAE	**starlings**									
Sturnus vulgaris	European starling	ECON	Resident	C	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Family VIREONIDAE	**vireos**									
Vireo griseus	white-eyed vireo	ECON	Resident	C	TE	TE	TAR	TAR	Omnivore	Omnivore
Vireo flavifrons	yellow-throated vireo	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Vireo solitarius	solitary vireo	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Vireo olivaceus	red-eyed vireo	EXP	(Resident)		TE	TE	TAR	TAR	Omnivore	Omnivore
Vireo philadelphicus	Philadelphia vireo	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Vireo gilvus	warbling vireo	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family PARULIDAE	**wood warblers**									
Mniotilta varia	black-and-while warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Protonotaria citrea	prothonotary warbler	ECON	Transient	C	TE	TE	TAR	TAR	Carnivore	Carnivore
Limnothlypis swainsonii	Swainson's warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Helmitheros vermivorus	worm-eating warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Vermivora chrysoptera	golden-winged warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Vermivora peregrina	Tennessee warbler	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Vermivora celata	orange-crowned warbler	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Vermivora ruficapilla	Nashville warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Parula americana	northern parula	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Dendroica petechia	yellow warbler	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Dendroica magnolia	magnolia warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Dendroica coronata	yellow-rumped warbler	ECON	Transient	C	TE	TE	TAR	TAR	Omnivore	Omnivore
Dendroica discolor	prairie warbler	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Dendroica fusca	Blackburnian warbler	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Dendroica dominica	yellow-throated warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Dendroica pensylvanica	chestnut-sided warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Dendroica castanea	bay-breasted warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Dendroica striata	blackpoll warbler	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Dendroica pinus	pine warbler	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Dendroica palmanrum	palm warbler	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Seiurus aurocapillus	ovenbird	EXP[7]	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Seiurus noveboracensis	northern waterthrush	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Seiurus motacilla	Louisiana waterthrush	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Geothlypis forrnosa	Kentucky warbler	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Wilsonia citrina	hooded warbler	EXP	(Transient)		TE	TE	TAR	TAR	Carnivore	Carnivore
Icteria virens	yellow-breasted chat	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Setophaga ruticilla	American redstart	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore

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TETRAPOD VERTEBRATES KNOWN OR EXPECTED TO OCCUR IN OU-2
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Olin McIntosh OU-2

			OU-2 Occurrence		Respiration[4]		Habitat[5]		Trophic Level[6]	
Scientific Name	**Common Name**	**Status[1]**	**Residence[2]**	**Frequency[3]**	**Adults**	**Young**	**Adults**	**Young**	**Adults**	**Young**
Family PLOCEIDAE	**weaver finches**									
Passer domesticus	house sparrow	ECON	Resident	C	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Family ICTERIDAE	**blackbirds, orioles, meadowlarks**									
Dolichonyx oryzivorus	bobolink	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Sturnella magna	eastern meadowlark	EXP[7]	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Agelaius phoeniceus	red-winged blackbird	EXP[7]	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Icterus spurius	orchard oriole	EXP[7]	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Icterus galbula	Baltimore oriole	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Quiscalus quiscula	common grackle	ECON	Resident	C	TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore
Euphagus carolinus	rusty blackbird	EXP[7]	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Euphagus cyanocephalus	Brewer's blackbird	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Molothrus ater	brown-headed cowbird	ECON	(Transient)	C	TE	TE	TGR	TGR	Omnivore	Omnivore
Family THRAUPIDAE	**tanagers**									
Piranga olivacea	scarlet tanager	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Piranga rubra	summer tanager	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Family FRINGILLIDAE	**finches**									
Cardinalis cardinalis	cardinal	ECON	Resident	C	TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Pheucticus lubdovicianus	rose-breasted grosbeak	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Guiraca caerulea	blue grosbeak	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Passerina cyanea	indigo bunting	ECON	Resident	C	TE	TE	TAR	TAR	Omnivore	Omnivore
Passerina ciris	painted bunting	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Coccothraustes vespertinus	evening grosbeak	EXP	(Transient)		TE	TE	TAR	TAR	Herbivore	Herbivore
Carpodacus purpureus	purple finch	EXP	(Transient)		TE	TE	TAR	TAR	Herbivore	Herbivore
Carduelis pinus	pine siskin	EXP	(Transient)		TE	TE	TAR	TAR	Herbivore	Herbivore
Spinus tristis	American goldfinch	EXP	(Transient)		TE	TE	TAR, TGR	TAR, TGR	Omnivore	Omnivore
Pipilo erythrophthalmus	rufous-sided towhee	EXP[7]	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Passerculus sandwichensis	savannah sparrow	EXP7	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Ammodramus savannarum	grasshopper sparrow	EXP	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Ammodramus leconteii	Le Conte's sparrow	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Pooecetes gramineus	vesper sparrow	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Aimophila aestivalis	Bachman's sparrow	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Junco hyemalis	slate-colored junco	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Spizella passerina	chipping sparrow	EXP	(Transient)		TE	TE	TAR	TAR	Omnivore	Omnivore
Spizella pusilla	field sparrow	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Zonotrichia leucophrys	white-crowned sparrow	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Zonotrichia albicollis	white-throated sparrow	EXP[7]	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Passerella iliaca	fox sparrow	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Melospiza georgiana	swamp sparrow	ECON	(Transient)	C	TE	TE	TGR	TGR	Omnivore	Omnivore
Melospira melodia	song sparrow	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
			CLASS MAMMALIA							
Family DIDELPHIDAE	**opossums**									
Didelphis virginiana	Virginia opossum	EXP[7]	Resident	C	TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore
Family SORICIDAE	**shrews**									
Blarina brevicauda	short-tailed shrew	EXP[7]	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Cryptotis parva	least shrew	EXP[7]	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Family TALPIDAE	**moles**									
Scalopus aquaticus	eastern mole	EXP[7]	(Resident)		TE	TE	TGR	TGR	Carnivore	Carnivore
Family VESPERTILIONIDAE	**vespertilionid bats**									
Myotis austroriparius	southeastern myotis	EXP	(Resident)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Pipistrellus subflavus	eastern pipistrelle	EXP	(Resident)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Eptesicus fuscus	big brown bat	EXP[7]	(Resident)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore

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Olin McIntosh OU-2

			OU-2 Occurrence		Respiration[4]		Habitat[5]		Trophic Level[6]	
Scientific Name	**Common Name**	**Status[1]**	**Residence[2]**	**Frequency[3]**	**Adults**	**Young**	**Adults**	**Young**	**Adults**	**Young**
Lasiurus borealis	red bat	EXP	(Resident)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Lasiurus seminolus	Seminole bat	EXP[7]	(Resident)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Lasiurus cinereus	hoary bat	EXP	(Resident)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Nycticeius humeralis	evening bat	ECON	Resident	C	TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Plecotus rafinesquii	Rafinesque's big-eared bat	EXP	(Resident)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Family MOLOSSIDAE	**free-tailed bats**									
Tadarida brasiliensis	Brazilian free-tailed bat	EXP	(Transient)		TE	TE	TAR, TAE	TAR, TAE	Carnivore	Carnivore
Family DASYPODIDAE	**armadillos**									
Dasypus novemcinctus	nine-banded armadillo	ECON	Resident	C	TE	TE	TGR	TGR	Omnivore	Omnivore
Family LEPORIDAE	**hares and rabbits**									
Sylvilagus aquaticus	swamp rabbit	ECON	Resident	V	TE	TE	TGR	TGR	Herbivore	Herbivore
Sylvilagus floridanus	eastern cottontail	ECON	(Transient)	C	TE	TE	TGR	TGR	Herbivore	Herbivore
Family SCIURIDAE	**squirrels**									
Sciurus carolinensis	gray squirrel	ECON	Resident	C	TE	TE	TAR	TAR	Herbivore	Herbivore
Sciurus niger	fox squirrel	EXP	(Resident)		TE	TE	TAR	TAR	Herbivore	Herbivore
Glaucomys volans	southern flying squirrel	EXP	(Resident)		TE	TE	TAR	TAR	Herbivore	Herbivore
Family CASTORIDAE	**beavers**									
Castor canadensis	American beaver	ECON	Resident	C	TE	TE	SNK, TGR	SNK, TGR	Herbivore	Herbivore
Family CRICETIDAE	**new world rats and mice**									
Oryzomys palustris	marsh rice rat	EXP[7]	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Reithrodontomys humulis	eastern harvest mouse	EXP	(Transient)		TE	TE	TGR	TGR	Herbivore	Herbivore
Peromyscus polionotus	oldfield mouse	EXP	(Transient)		TE	TE	TGR	TGR	Herbivore	Herbivore
Peromyscus gossypinus	cotton mouse	EXP[7]	(Transient)		TE	TE	TGR	TGR	Herbivore	Herbivore
Ochrotomys nuttalli	golden mouse	EXP	(Resident)		TE	TE	TGR, TAR	TGR, TAR	Herbivore	Herbivore
Sigmodon hispidus	hispid cotton rat	EXP[7]	Resident	C	TE	TE	TGR	TGR	Omnivore	Omnivore
Neotoma floridana	eastern wood rat	EXP	(Resident)		TE	TE	TGR	TGR	Omnivore	Omnivore
Microtus pinetorum	woodland vole	EXP	(Transient)		TE	TE	TGR	TGR	Herbivore	Herbivore
Ondatra zibethicus	muskrat	EXP[7]	(Resident)		TE	TE	SNK, TGR	SNK, TGR	Omnivore	Omnivore
Family CAPROMYIDAE	**coypus**									
Myocastor coypus	nutria	EXP[7]	(Resident)		TE	TE	SNK, TGR	SNK, TGR	Herbivore	Herbivore
Family MURIDAE	**old world rats and mice**									
Rattus norvegicus	Norway rat	EXP	(Transient)		TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore
Mus musculus	house mouse	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Family CANIDAE	**doglike carnivores**									
Canis lupus familiaris	dog	ECON	Transient	I	TE	TE	TGR	TGR	Carnivore	Carnivore
Vulpes fulva	red fox	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Urocyon cinereoargenteus	gray fox	ECON	Transient	I	TE	TE	TGR	TGR	Carnivore	Carnivore
Family URSIDAE	**bears**									
Ursus americanus	black bear[8]	EXP	(Transient)		TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore
Family PROCYONIDAE	**raccoons**									
Procyon lotor	raccoon	ECON	Resident	C	TE	TE	TGR, TAR	TGR, TAR	Omnivore	Omnivore
Family MUSIELIDAE	**mustelids**									
Mustela frenata	long-tailed weasel	EXP	(Transient)		TE	TE	TGR	TGR	Carnivore	Carnivore
Mustela vison	mink	EXP[7]	(Transient)		TE	TE	TGR, SNK	TGR, SNK	Carnivore	Carnivore
Spilogale putorius	spotted skunk	EXP	(Transient)		TE	TE	TGR	TGR	Omnivore	Omnivore
Mephitis mephitis	striped skunk	ECON	Resident	I	TE	TE	TGR	TGR	Omnivore	Omnivore
Lutra canadensis	river otter	ECON	(Transient)	I	TE	TE	SNK, TGR	SNK, TGR	Carnivore	Carnivore
Family FELIDAE	**cats**									
Felis concolor	cougar	EXP	(Transient)		TE	TE	TGR, TAR	TGR, TAR	Carnivore	Carnivore
Lynx rufus	bobcat	ECON	(Transient)	I	TE	TE	TGR, TAR	TGR, TAR	Carnivore	Carnivore
Family CERVIDAE	**deer**									

TABLE 3-3

TETRAPOD VERTEBRATES KNOWN OR EXPECTED TO OCCUR IN OU-2
Updated RI Addendum
Olin McIntosh OU-2

			OU-2 Occurrence		Respiration[4]		Habitat[5]		Trophic Level[6]	
Scientific Name	**Common Name**	**Status[1]**	**Residence[2]**	**Frequency[3]**	**Adults**	**Young**	**Adults**	**Young**	**Adults**	**Young**
Odocoileus virginianus	white-tailed deer	ECON	Resident	V	TE	TE	TGR	TGR	Herbivore	Herbivore
Family SUIDAE	**hogs**									
Sus scrofa	wild hog	ECON	(Transient)	C	TE	TE	TGR	TGR	Omnivore	Omnivore

Notes:
ND = no data found

[1]ECON = expected and confirmed (by at least one capture or sighting); EXP = expected on the basis of zoogeographic literature (i.e., known to occur at least historically in the general vicinity of McIntosh, Alabama

[2]Resident animals are those known to spend their entire life cycle within habitats similar to, at the scale of, those represented in OU-2 (including uplands

[3]I = infrequent (encountered on only one or a few occasions, usually singly or in very low apparent densities for the group in question); C = common (often encountered, usually in moderate to high apparent densities for the group in question); V = very common (encountered virtually every time appropriate habitat observed, usually in moderate to high apparent densities for the group in question)

[4]TE = Terrestrial (air-breathing); AQ = Aquatic (breathing under water by means of gills and/or direct transfer across integumentary tissues); AM = Amphibious (capable of breathing in both air and water)

[5]TGR = terrestrial, predominantly ground-dwelling; TAR = terrestrial, predominantly arboreal (including shrubs and/or tall grasslike plants); TAE = terrestrial, predominantly flying/soaring; ANK = Aquatic, predominant nektonic (swimming); SIT = semiaquatic, predominantly nektonic; SDV = semiaquatic, predominantly diving; SWA = semiaquatic, predominantly wading

[6]Trophic Level: Carnivore = secondary through tertiary consumer (includes, piscivores, insectivores); Omnivore = diet includes some combination of plant and animal matter (unless one is only an incidental fraction Herbivore = primary consumer (includes detritivores)

[7]Species predicted by Dr. David H. Nelson of the University of South Alabama in 1881 to be "likely to be common.

[8]Federally-listed threatened or endangered species

[9]Protected under the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Ac

PREPARED BY/DATE: RMR 5/7/10
CHECKED BY/DATE: HEF 5/7/10

TABLE 3-4

FEDERALLY PROTECTED SPECIES IN THE MCINTOSH, ALABAMA AREA (BALDWIN, CHOCTAW, CLARKE, MOBILE, AND WASHINGTON COUNTIES)
Updated RI Addendum
Olin McIntosh OU-2

Scientific Name	Common Name	County[1]	Status[2]	Preferred Habitat(s)	Habitat Available at OU-2	Potential of Occurrence
Amphibians						
Ambystoma cingulatum	Flatwoods alamander	Ba, Mo	T	Seasonally wet, pine flatwoods, and pine savannas. Topographically flat or slightly rolling wiregrass dominated grassland having little to no midstory and an open overstory of widely scattered longleaf pine. Lower Coastal Plain regions of Alabama, Florida, Georgia, and South Carolina. Rare; i.e., no individuals found in Alabama since 1981.	No	UnlikeLy
Birds						
Charadrius melodus	Piping plover	Ba, Mo	T	Beach dune/coastal strand, nearshore reef. Winter range typically encompasses South Atlantic, Gulf Coast, and Caribbean beaches and barrier islands. Optimal wintering habitat includes intertidal beaches with sand and/or mud flats with no or sparse vegetation.	No	UnlikeLy
Haliaeetus leucocephalus	Bald eagle	All	BGEPA	High pine, scrubby high pine, maritime hammock, mesic temperate hammock, pine rockland, scrubby flatwoods, mesic pine flatwoods, hydric pine flatwoods, dry prairie, wet prairie, freshwater marsh, seepage swamp, flowing water swamp, pond swamp, mangrove, saltmarsh, and seagrass. In general, habitats include riparian areas along the coast and near major rivers, wetlands, and reservoirs. Typically nest in large, tall open topped trees near open water.	Yes	Present
Picoides borealis	Red-cockaded woodpecker	All	E	Current distribution includes East Texas and Oklahoma, to Florida, and north through Carolinas. Open stands of pines with a minimum age of 80 to 120 years provide suitable nesting habitat. Longleaf pines are most commonly used, but other species of southern pine are also acceptable. Roosting cavities are excavated in living pines, with red heart disease.	No	UnlikeLy
Mycteria americana	Wood stork	Ba, Ch, Cl, Wa	E	Cypress swamp, hydric pine flatwoods, wet prairie, freshwater marsh, seepage swamp, flowing water swamp, pond swamp, mangrove, and saltmarsh. Forages in prairie ponds, flooded pastures, or fields, ditches, and other shallow standing water, including saltwater. Usually roosts communally in tall snags, sometimes in association with other wading birds (i.e., active heronries). Breeds in Mexico and birds move into Gulf States in search of mudflats and other wetlands, even those associated with forested areas.	Yes	Low to Moderate

TABLE 3-4

FEDERALLY PROTECTED SPECIES IN THE MCINTOSH, ALABAMA AREA (BALDWIN, CHOCTAW, CLARKE, MOBILE, AND WASHINGTON COUNTIES)
Updated RI Addendum
Olin McIntosh OU-2

Scientific Name	Common Name	County[1]	Status[2]	Preferred Habitat(s)	Habitat Available at OU-2	Potential of Occurrence
Sterna antillarum	Least tern	Ba, Mo	E	Riverine nesting areas include sparsely vegetated sand and gravel bars within a wide unobstructed river channel or salt flats along lake shorelines.	No	UnlikeLy
Fishes						
Acipenser oxyrinchus desotoi	Gulf sturgeon	All	T	Anadromous; adult fish tend to congregate in deeper waters of rivers with moderate currents and sand and rocky bottoms. Seagrass beds with mud and sand substrates appear to be important marine habitats. Spend 8 to 9 months in rivers and 3 to 4 cool months in the estuarine waters of the Gulf of Mexico. From the Mississippi River eastward to the Tampa Bay area.	No	Unlikely
Scaphirhynchus suttkusi	Alabama sturgeon	Ba, Cl	E	The Alabama sturgeon is endemic to rivers of the Mobile River Basin below the Fall Line. Its current range includes the Alabama River from R.F. Henry Lock and Dam downstream to the confluence of the Tombigbee River. The species is also known to survive in the Cahaba River.	No	Unlikely
Mammals						
Peromyscus polionotus ammobates	Alabama beach mouse	Ba	E	Species known only from coastal dune and scrub habitat in Baldwin County, Alabama.	No	Unlikely
Peromyscus polionotus trissylepsis	Perdido Key beach mouse	Ba	E	Typically inhabits primarily primary and secondary dunes, not including high-elevation (scrub dune) habitat in Baldwin County, Alabama.	No	Unlikely
Trichechus manatus	West Indian manatee	Ba, Mo	E	Typically inhabit warm, shallow, coastal estuarine waters of sufficient depth (5 feet to usually less than 20 feet). During the winter months, most the United States manatee population shifts to the coastal waters of the southern half of peninsular Florida.	No	Unlikely
Mussels						
Pleurobema taitianum	Heavy pigtoe mussel	Ba, Cl	E	The heavy pigtoe mussel was historically found in the Tombigbee River from the mouth of Tibbee Creek near Columbus, Mississippi, to Demopolis, Alabama; the Alabama River at Claiborne and Selma, Alabama; the lower Cahaba River, Alabama; and possibly the Coosa River, Alabama. Only four sites with suitable habitat remain: these consist of localities in a bendway of the Tombigbee River (Alabama), the East Fork Tombigbee River (Mississippi), the Buttahatchie River (Mississippi), and the Sipsey River.	No	Unlikely

TABLE 3-4

FEDERALLY PROTECTED SPECIES IN THE MCINTOSH, ALABAMA AREA (BALDWIN, CHOCTAW, CLARKE, MOBILE, AND WASHINGTON COUNTIES)
Updated RI Addendum
Olin McIntosh OU-2

Scientific Name	Common Name	County[1]	Status[2]	Preferred Habitat(s)	Habitat Available at OU-2	Potential of Occurrence
Potamilus inflatus	Inflated heelsplitter mussel	Ba, Ch, Cl, Wa	T	Soft, stable substrata in slow to moderate currents. It has been found in sand, mud, silt and sandy gravel, but not in large or armored gravel. It is usually collected on the protected side of bars and may occur in depths over 20 feet. Not abundant within any known habitat. Spawning begins in late February or early March through late April. Limited to the Amite River, Louisiana, and five sites in the Tombigbee and Black Warrior Rivers, Alabama.	No	Unlikely
Plants						
Isoetes louisianensis	Louisiana quillwort	Mo, Wa	E	Sand and gravel bars on small to medium sized streams; prefer regular and sometimes long term inundation.	No	Unlikely
Schwalbea americana	American chaffseed	Ba	E	Typically inhabits open pine flatwoods, savannas, and other open areas, in moist to dry acidic sandy loams or sandy peat loams.	No	Unlikely
Reptiles						
Caretta caretta	Loggerhead sea turtle	Ba, Mo	T	Beach dune/coastal strand, seagrass, nearshore reef. Feeds in shallow waters of the continental shelves. Frequently found in bays and estuaries and may enter river mouths. Females nest on sandy beaches, usually just above the average high tide line.	No	Unlikely
Chelonia mydas	Green sea turtle	Ba, Mo	T	Beach dune/coastal strand, seagrass, nearshore reef. Occupies warm tropical waters from New England to South Africa and in the Pacific from Western Africa to the Americas. The only time they emerge from the water is when they are nesting on beaches.	No	Unlikely
Gopherus polyphemus	Gopher tortoise	Ch, Mo, Wa	T	The species is found on droughty, deep sand ridges which originally supported longleaf pine and patches of scrub oak.	No	Unlikely
Lepidochelys kempii	Kemp's Ridley sea turtle	Ba, Mo	E	Inhabits coastal waters and bays of the Gulf of Mexico and Atlantic. Prefers shallow coastal waters. Nest almost exclusively on the beaches of Rancho Nuevo on the Mexican Gulf Coast.	No	Unlikely
Pseudemys alabamensis	Alabama red-bellied turtle	Ba, Mo	E	Inhabits the lower part of the floodplain of the Mobile River System in Baldwin and Mobile Counties, Alabama. Presently occurs at least as far north as the Mobile River below David Lake in Mobile County.	Yes	Low to Moderate

TABLE 3-4

FEDERALLY PROTECTED SPECIES IN THE MCINTOSH, ALABAMA AREA (BALDWIN, CHOCTAW, CLARKE, MOBILE, AND WASHINGTON COUNTIES)
Updated RI Addendum
Olin McIntosh OU-2

Scientific Name	Common Name	County[1]	Status[2]	Preferred Habitat(s)	Habitat Available at OU-2	Potential of Occurrence
Drymarchon corais couperi	Eastern indigo snake	Ba, Mo	T	Typically inhabits pinelands and associated with the gopher tortoise in the longleaf pine system. Also found in dry glades, tropical hammocks, and muckland field from Florida, west to Louisiana.	No	Unlikely
Pituophis melanoleucus lodingi	Black pine snake	Cl, Mo, Wa	C	Requires dry sandy soils for burrowing and is usually found in pine and mixed hardwood forests. Feeds primarily on pocket gophers.	No	Unlikely

Source: http://www.fws.gov/daphne/es/specieslst.html (April 20, 2010)
Listed by the U.S. Fish and Wildlife Service, Region 4.

[1]County
Ba - Baldwin
Ch - Choctaw
Cl - Clarke
Mo - Mobile
Wa - Washington

[2]Federal Status
C - Species of Concern
E - Endangered
T - Threatened
BGEPA - Bald and Golden Eagle Protection

PREPARED BY/DATE: KPH 4/20/2010
CHECKED BY/DATE: RRP 4/27/2010

TABLE 4-1

DATA QUALITY OBJECTIVES TO ADDRESS DATA GAPS AT OU-2
Updated RI Addendum
Olin McIntosh OU-2

LIST OF DATA NEEDS FOR OLIN OU-2 OUTSTANDING QUESTIONS (XXX = CRITICAL DATA NEED; XX = UNCERTAINTY REDUCTION)				
Decision/Question	Determine the remedial action objectives (RAOs) and remedial goals for each of the identified COCs (Hg, MeHg, DDTr, and HCB) and media of concern.	Determine what dredging alternative(s) will be an effective remedy for any or all of the OU-2 Basin, Round Pond or floodplain soils	Determine what capping alternative(s) will be an effective remedy for any or all of the OU-2 Basin, Round Pond or floodplain soils	Determine whether the ESPP will be an effective remedy for any or all of the OU-2 Basin, Round Pond or floodplain soils
Subordinate questions	1. What are the locations and routes of exposure and bioaccumulation to each of the identified COCs for each of the completed exposure pathways? • Side issue: Is Hg in OU-2 surface water leaving the basin and impacting the Tombigbee River. 2. What are the spatial and temporal extents of processes that affect mercury methylation? • Real issue is whether we're capturing the "worst case" time and location, so we can avoid characterizing temporal changes. 3. Do inputs of groundwater contribute to contamination or exposure to aquatic receptors? • Parameters other than Hg, such as pH, ORP, GW geochemistry	1. What is the remedial footprint for dredging that will meet the selected RAOs and remedial goals? 2. What is the vertical distribution of Total Hg in the Basin and Round Pond? 3. What is the relative cost and effectiveness of alternative disposal methods? • Are there data needs related to reducing uncertainties in our evaluation of dredging disposal methods in the FS? 4. What is the relative cost and effectiveness of alternative dredging methodologies in preventing short and long-term exposure to COCs? • Are there data needs related to reducing uncertainties in our evaluation of dredging in the FS?	1. What is the remedial footprint for capping that will meet the selected RAOs and remedial goals? 2. What is the relative cost and effectiveness of alternative capping materials and techniques of application in preventing short and long-term exposure to COCs? 3. What is the predicted transport or chemical flux of Hg through various alternative cap configurations? • What is the concentration of Hg and MeHg in porewater in various sediment layers at stations representative of the range of Hg concentrations in the basin?	1. What is the remedial footprint for enhanced sedimentation that will meet the selected RAOs and remedial goals? 2. What is the rate of sedimentation in the basin (during the ESPP)? 3. How are concentrations of Hg, MeHg and other COCs changing over time in suspended sediment samples (deposited in sediment traps), surface sediment, *Corbicula* tissue and fish tissue? 4. What are the resuspension characteristics of sediments in OU-2?
INPUTS				

1) Coarsely sectioned vertical concentration profiles of total Hg, DDTR and HCB in sediment from an adequate number of cores to represent the OU-2 basin and Round Pond
• 210 Pb and 137Cs should be measured to support a determination of sedimentation rates.
• DDTR and HCB in subset of cores
• Additional variables to be measured in core intervals
  • Grain size, density
  • TOC
		XXX		

	BOUNDARIES • Samples should represent 1 foot intervals to a depth of 6 feet (or clean) consolidated sediment. • An adequate number of cores should be taken in the Basin and Round Pond to characterize the distribution of subsurface contamination at each interval. ANALYTICAL APPROACH • Data will be used to create vertical profiles of contaminant concentrations with depth • Data will be used to create a contour map of concentrations of each COC that exceed the remedial goals to establish the footprint and estimate the volume of sediment to evaluate the dredging alternative. • 210Pb and 137Cs will be used to estimate historical sedimentation rates and assist in interpreting the core chemistry profiles			
2) Finely sectioned vertical concentration profiles of Hg, MeHg, TOC/DOC needed to evaluate diffusion/advection in sediment and pore water from a few cores within the OU-2 Basin and Round Pond. • TOC in sediment • DOC in pore water	XX		XXX	XXX
	BOUNDARIES • Finely sectioned samples will be taken at a small subset of the cores representative of the Basin shallow littoral zone, deep hole and Round Pond, with sampling intervals at 0-2, 2-4, 4-8, 8-12, and 12-18 inches. ANALYTICAL APPROACH • Data will be used to develop detailed pore water and sediment vertical profiles of Hg and MeHg. • Data will be used to model advection-diffusion of mercury and other COCs through various cap materials. • Data will be used to support and calibrate SERAFM as well as other models used to evaluate natural and engineered capping effectiveness.			

TABLE 4-1

DATA QUALITY OBJECTIVES TO ADDRESS DATA GAPS AT OU-2
Updated RI Addendum
Olin McIntosh OU-2

<table>
<tr><td colspan="5">LIST OF DATA NEEDS FOR OLIN OU-2 OUTSTANDING QUESTIONS
(XXX = CRITICAL DATA NEED; XX = UNCERTAINTY REDUCTION)</td></tr>
<tr><td>Decision/Question</td><td>Determine the remedial action objectives (RAOs) and remedial goals for each of the identified COCs (Hg, MeHg, DDTr, and HCB) and media of concern.</td><td>Determine what dredging alternative(s) will be an effective remedy for any or all of the OU-2 Basin, Round Pond or floodplain soils</td><td>Determine what capping alternative(s) will be an effective remedy for any or all of the OU-2 Basin, Round Pond or floodplain soils</td><td>Determine whether the ESPP will be an effective remedy for any or all of the OU-2 Basin, Round Pond or floodplain soils</td></tr>
<tr><td rowspan="2">3) Concentration of COCs of floodplain surface soils (top 2.5 cm [1 inch]) and shallow subsurface soils</td><td>XX</td><td>XXX</td><td>XXX</td><td>XXX</td></tr>
<tr><td colspan="4">BOUNDARIES
• Samples will represent the flood plain soils within the berm and between the berm and the Tombigbee River (south of the berm).
    • Concern with area between berm and river – potential DDTR problem.
• COCs will be measured from top 2.5 cm (0-1 inch) at all locations, and 2.5 -5cm (1-2 inches), 5-15cm (2-6 inches), and 15-30 cm (6-12 inches) at a subset of locations.

ANALYTICAL APPROACH
• Determine the nature and extent of contamination in the floodplain for the purpose of defining remedial footprints.
• Determine the depth to which surface soils would need to be dredged to remove contaminants above remedial goals.</td></tr>
<tr><td rowspan="2">4) Changes in bathymetry over time</td><td></td><td></td><td>XXX</td><td>XXX</td></tr>
<tr><td colspan="4">BOUNDARIES
• Geographical boundaries of the Basin and Round Pond at non-flood stages.
• Depth measurements should represent the depth to consolidated sediment (not the fluff layer).
• Bathymetry measurements not planned until end of ESPP evaluation.
ANALYTICAL APPROACH
• Data will be used to evaluate deposition of sediment over time to evaluate the ESPP, and to evaluate cap placement and to serve as a baseline to design and verify dredging or capping.</td></tr>
<tr><td rowspan="2">5) Distribution of debris in Basin and Round Pond</td><td></td><td>XX</td><td>XX</td><td></td></tr>
<tr><td colspan="4">BOUNDARIES
• Geographical boundaries of the Basin and Round Pond at non-flood stages.
ANALYTICAL APPROACH
• Data will be used to assist in evaluating and costing capping or dredging alternatives.
• Distribution of debris is attainable from 2006 bathymetry data.</td></tr>
<tr><td rowspan="2">6) Temperature, oxygen, ORP, pH, turbidity vertical profiles</td><td>XX</td><td>XXX
data from Round Pond would be XX</td><td>XXX
data from Round Pond would be XX</td><td></td></tr>
<tr><td colspan="4">BOUNDARIES
• Data would represent the conditions in the water column from the surface to depth of consolidated sediment in the deep hole, and littoral regions of the Basin, and if possible the center of Round Pond
• Monthly measurements are desired (May-Nov or until mixing is evident) but, if not possible, should be obtained whenever field crews are in the Basin for data collection activities (e.g., ESPP sampling, quarterly sediment trap sampling, storm event sampling, core and pore water sampling, etc.)
ANALYTICAL APPROACH
• Data will be used to understand how conditions change over time, and the timeframe over which portions of the Basin may stratify and deplete of oxygen.</td></tr>
</table>

DATA QUALITY OBJECTIVES TO ADDRESS DATA GAPS AT OU-2
Updated RI Addendum
Olin McIntosh OU-2

LIST OF DATA NEEDS FOR OLIN OU-2 OUTSTANDING QUESTIONS (XXX = CRITICAL DATA NEED; XX = UNCERTAINTY REDUCTION)				
Decision/Question	Determine the remedial action objectives (RAOs) and remedial goals for each of the identified COCs (Hg, MeHg, DDTr, and HCB) and media of concern.	Determine what dredging alternative(s) will be an effective remedy for any or all of the OU-2 Basin, Round Pond or floodplain soils	Determine what capping alternative(s) will be an effective remedy for any or all of the OU-2 Basin, Round Pond or floodplain soils	Determine whether the ESPP will be an effective remedy for any or all of the OU-2 Basin, Round Pond or floodplain soils
7) Concentration of Hg and MeHg (filtered and unfiltered) in surface water across the year	XXX			XX
	BOUNDARIES • Samples should represent the concentrations of COCs in filtered and unfiltered water samples at current depths (20 and 80 percent depth). • Samples should represent summer “worst case” conditions in June through August. • Samples should represent water from discharge at the gate during or right after an event when releasing water from system. ANALYTICAL APPROACH • Data will be used to determine fluctuations in Hg and MeHg and to calibrate models. • Discharge samples will be used to determine what concentration of Hg is leaving the site.			
8) Results of batch tests for alternative capping materials and native sediment including sorption capacity • Kinetics, leachability, • Select cap materials may be tested for leaching potential (TCLP), and settling test may be run if capping is selected and source of materials is confirmed.			XXX	
	BOUNDARIES • Samples representative of alternative capping materials and Olin sediments. • Test conditions established to provide estimates of the performance of alternative capping materials, to include conditions that may be encountered at OU-2. ANALYTICAL APPROACH • Data will be used to evaluate the relative ability of alternative capping materials to sequester and attenuate mercury for an extended period of time. The timeframe for the sequestering of cap materials (years) will be dependent on model results. • Kinetic laboratory tests performed by EPA ORD with support from Olin/MACTEC.			
9) Concentrations of Hg and mass and particle size of TSS over time in suspended sediments. This includes total dry weight of both organic solids and inorganic solids in sediment trap jars at each sampling period.		XXX	XXX	XXX
	BOUNDARIES • Samples representative of the deep hole and various quadrants of the littoral regions of OU-2. • Samples representative of flood season and non flood season conditions. ANALYTICAL APPROACH • Data will be used to evaluate resuspension and potential migration of contaminants.			
10) Concentrations of COCs in tissue and corresponding sediment and surface water concentrations for *Corbicula* and fish	XX Fish	Will be critical for LTM	Will be critical for LTM XX *Corbicula*	XXX *Corbicula* XX Fish
	BOUNDARIES • *Corbicula* cages and fish should be selected in locations collocated with surface water samples. ANALYTICAL APPROACH • Data will be used to refine estimates of bioaccumulation factors that will be used to develop numeric remedial goals, and to determine trends in tissue concentrations over time to evaluate remedial alternatives. • This data is currently being collected as part of annual sampling.			

TABLE 4-1

DATA QUALITY OBJECTIVES TO ADDRESS DATA GAPS AT OU-2
Updated RI Addendum
Olin McIntosh OU-2

LIST OF DATA NEEDS FOR OLIN OU-2 OUTSTANDING QUESTIONS (XXX = CRITICAL DATA NEED; XX = UNCERTAINTY REDUCTION)				
Decision/Question	Determine the remedial action objectives (RAOs) and remedial goals for each of the identified COCs (Hg, MeHg, DDTr, and HCB) and media of concern.	Determine what dredging alternative(s) will be an effective remedy for any or all of the OU-2 Basin, Round Pond or floodplain soils	Determine what capping alternative(s) will be an effective remedy for any or all of the OU-2 Basin, Round Pond or floodplain soils	Determine whether the ESPP will be an effective remedy for any or all of the OU-2 Basin, Round Pond or floodplain soils
		XXX		
11) Results of treatability studies for dredge spoils	BOUNDARIES • Sediment representing the range of concentrations of COCs from the Basin and Round Pond. • Conditions should represent effluent from a dewatering or settling basin and geotextile bags with and without polymer treatments over the timeframe dewatering is occurring. ANALYTICAL APPROACH • Data will be used to determine the need for treating water during dewatering of sediments under a range of alternative dredge spoil disposal options. • Treatability Study Work Plan for sediment dewatering was submitted to EPA on September 21, 2009 and approved on December 10, 2009.			

COCs: Hg, MeHg, DDTR, and HCB

PREPARED BY/DATE: HEF 04/13/10
CHECKED BY/DATE: MBR 04/13/10

TABLE 4-2

SURFACE WATER DATA (AVERAGE AND RANGE) SUMMARY BY TRANSECT, 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect				
	Round Pond (n = 2)	**1 (Central, n = 6)**	**2 (South-Central, n = 6)**	**3 (South, n = 6)**	**Deeper Portion of Basin (n = 2)**
Mercury, Unfiltered (µg/L)	0.0106 (0.00731 - 0.0139)	0.0693 (0.0106 - 0.155)	0.0546 (0.0087 - 0.0957)	0.0217 (0.00961 - 0.0608)	0.0724 (0.0347 - 0.110)
Mercury, Filtered (µg/L)	0.00410 (0.00357 - 0.00463)	0.00999 (0.00427 - 0.0142)	0.00952 (0.00458 - 0.0147)	0.00483 (0.00358 - 0.00693)	0.00879 (0.00588 - 0.0117)
Methylmercury, Unfiltered (µg/L)	0.000807 (0.000788 - 0.000825)	0.000954 (0.000613 - 0.00171)	0.000817 (0.000702 - 0.00106)	0.000782 (0.000652 - 0.000918)	0.000908 (0.000735 - 0.00108)
Methylmercury, Filtered (µg/L)	0.000544 (0.000532 - 0.000566)	0.000481 (0.000419 - 0.000649)	0.000458 (0.000413 - 0.000506)	0.000456 (0.000413 - 0.000491)	0.000554 (0.000470 - 0.000638)
Total Alkalinity (mg/L)	31.8	32.2 (31.8 - 33.9)	32.2 (31.8 - 33.9)	31.8	38.2 (31.8 - 44.5)
DOC (mg/L)	16 (15 - 16)	16 (16 - 17)	16 (16 - 17)	16	17 (16 - 18)
Total Hardness (mg/L)	47 (46 - 48)	37 (36 - 38)	38 (34 - 46)	44 (40 - 50)	46 (40 - 52)
TDS (mg/L)	119 (112 - 125)	59.6 (45 - 72.5)	65.0 (45 - 82.5)	94.2 (72.5 - 115)	57.5 (52.5 - 62.5)
TSS (mg/L)	5.8 (<4 - 9.5)	8.4 (<4 - 22)	7.0 (<4 - 15)	6.2 (<4 - 12)	6.0 (4 - 8)
DO (mg/L)	5.83 (2.16 - 9.50)	5.85 (1.86 - 9.31)	7.37 (2.25 - 10.3)	6.07 (2.93 - 10.4)	1.31 (0.16 - 2.45)
ORP (mV)	277 (268 - 286)	279 (257 - 304)	259 (197 - 287)	245 (200 - 277)	160 (72.8 - 248)
pH	6.76 (6.50 - 7.01)	6.63 (6.30 - 6.92)	6.90 (6.44 - 7.24)	6.69 (6.45 - 7.14)	6.41 (6.40 - 6.41)
Specific Conductance (mS/cm)	0.120 (0.119 - 0.120)	0.133 (0.123 - 0.144)	0.129 (0.117 - 0.145)	0.119 (0.116 - 0.122)	0.157 (0.126 - 0.188)
Temperature (˚C)	24.8 (23.1 - 26.4)	24.3 (22.8 - 25.9)	25.1 (22.9 - 27.1)	24.8 (23.2 - 26.9)	22.1 (20.9 - 23.2)
Turbidity (NTU)	12.5 (9.2 - 15.8)	12.1 (6.3 - 26.7)	12.1 (5.4 - 26.8)	10.1 (8.6 - 11.5)	17.8 (9.0 - 26.6)

Notes:
˚C - degree Celsius
DO - dissolved oygen
DOC - dissolved organic carbon
mg/L - milligram per liter
mV - millivolt
mS/cm - milliSiemens per centimeter
n - number of samples
NTU - nephelometric turbidity units
ORP - oxidation-reduction potential
TDS - total dissolved solids
TSS - total suspended solids
µg/L - microgram per liter
< - less than the reporting limit
Round Pond - samples OU2R-SW-101 to -102
Transect 1 - samples OU2B-SW-101 to -105
Transect 2 - samples OU2B-SW-201 to -205
Transect 3 - samples OU2B-SW-301 to -304
Data presented as average concentrations with ranges of concentrations in parentheses, where applicable.

PREPARED/DATE: AES 08/26/2009
CHECKED BY/DATE: JAB 09/02/2009

TABLE 4-3

SHALLOW SURFACE WATER ANALYTICAL RESULTS, 2009 - SUMMARY STATISTICS
Updated RI Addendum
Olin McIntosh OU-2

n=11	Minimum Concentration	Maximum Concentration	Average Concentration	Standard Deviation
FIXED BASE LABORATORY ANALYSIS:				
Alkalinity, Total (as $CaCO_3$) - SM 2320B, mg/L	31.8	33.9	32.0	0.633
Dissolved Organic Carbon - SM 5310B, mg/L	15	17	16	0.54
Hardness, Total - SM 2340C, mg/L	34	46	40	4.6
Mercury - EPA 1631, µg/L				
Mercury, Unfiltered	0.00731	0.0879	0.0239	0.0259
Mercury, Filtered	0.00357	0.0116	0.00574	0.00297
Methylmercury - EPA 1630, µg/L				
Methylmercury, Unfiltered	0.000734	0.00119	0.000831	0.000132
Methylmercury, Filtered	0.000413	0.000532	0.000452	0.0000362
Total Dissolved Solids - SM 2540C, mg/L	45	112	69.3	21.9
Total Suspended Solids - SM 2540D, mg/L	<4	16	6.8	4.2
FIELD PARAMETERS:				
Dissolved Oxygen - EPA 360.1, mg/L	2.45	10.4	8.40	2.44
Oxidation-Reduction Potential - 2580A, mV	197	292	252	30.7
pH - EPA 150.1, pH Units	6.41	7.24	6.90	0.249
Specific Conductance - EPA 120.1, mS/cm	0.120	0.145	0.127	0.00906
Temperature - EPA 170.1, ˚C	23.2	27.1	25.7	1.14
Turbidity - EPA 180.1, NTU	5.4	9.8	8.1	1.4

Notes:
˚C - degrees Celsius
$CaCO_3$ - calcium carbonate
EPA - Environmental Protection Agency Analytical Method
mg/L - milligram per liter
mS/cm - milliSiemens per centimeter
mV - millivolt
n - number of samples
NTU - nephelometric turbidity unit
SM - standard method
µg/L - microgram per liter
< - result less than the Reporting Limit

PREPARED BY/DATE: AES 08/31/09
CHECKED BY/DATE: JAB 09/03/09

TABLE 4-4

DEEP SURFACE WATER ANALYTICAL RESULTS, 2009 - SUMMARY STATISTICS
Updated RI Addendum
Olin McIntosh OU-2

n=11	Minimum Concentration	Maximum Concentration	Average Concentration	Standard Deviation
FIXED BASE LABORATORY ANALYSIS:				
Alkalinity, Total (as $CaCO_3$) - SM 2320B, mg/L	31.8	44.5	33.1	3.82
Dissolved Organic Carbon - SM 5310B, mg/L	16	18	16	0.67
Hardness, Total - SM 2340C, mg/L	34	52	42	6.4
Mercury - EPA 1631, µg/L				
Mercury, Unfiltered	0.0139	0.155	0.0706	0.0442
Mercury, Filtered	0.00444	0.0147	0.00988	0.00392
Methylmercury - EPA 1630, µg/L				
Methylmercury, Unfiltered	0.000613	0.00171	0.000873	0.000317
Methylmercury, Filtered	0.000413	0.000649	0.000508	0.0000757
Total Dissolved Solids - SM 2540C, mg/L	55	125	82.0	23.8
Total Suspended Solids - SM 2540D, mg/L	<4	22	7.1	6.4
FIELD PARAMETERS:				
Dissolved Oxygen - EPA 360.1, mg/L	0.16	9.16	3.42	2.55
Oxidation-Reduction Potential - A2580A, mV	72.8	304	255	63.3
pH - EPA 150.1, pH Units	6.30	7.04	6.52	0.204
Specific Conductance - EPA 120.1, mS/cm	0.116	0.188	0.131	0.0212
Temperature - EPA 170.1, ˚C	20.9	25.2	23.2	1.08
Turbidity - EPA 180.1, NTU	10.5	26.8	16.1	6.97

Notes:
˚C - degrees Celsius
$CaCO_3$ - calcium carbonate
EPA - Environmental Protection Agency Analytical Method
mg/L - milligram per liter
mS/cm - milliSiemens per centimeter
mV - millivolt
n - number of samples
NTU - nephelometric turbidity unit
SM - standard method
µg/L - microgram per liter
< - result less than the reporting limit

PREPARED BY/DATE: AES 08/31/09
CHECKED BY/DATE: JAB 09/03/09

TABLE 4-5

SURFACE WATER SUMMARY STATISTICS, 2006-2009
Updated RI Addendum
Olin McIntosh OU-2

	2006 Baseline Study, n = 13				2008 Year 1 Study, n =20				2009 Year 2 Study, n =22			
	Minimum Concentration	Maximum Concentration	Average Concentration	Standard Deviation	Minimum Concentration	Maximum Concentration	Average Concentration	Standard Deviation	Minimum Concentration	Maximum Concentration	Average Concentration	Standard Deviation
FIXED BASE LABORATORY ANALYSIS:												
Alkalinity - EPA 310.1, SM 2320B, mg/L	35.9	42.1	38.9	1.63	53.5	58	54.3	1.34	31.8	44.5	32.6	2.74
Dissolved Organic Carbon - SM 5310B, SW846 9060, mg/	2.5	13	5.4	3.3	4.3	18	15	3.9	15	18	16	0.61
Hardness, Total - EPA 130.2, SM 2340C, mg/L	56	64	60	2.1	66	80	74	4.4	34	52	41	5.6
Mercury - SW846 7470, µg/L												
Mercury, Unfiltered	<0.2	0.329	*	*	0.0443	0.909	0.246	0.195	0.00731	0.155	0.0473	0.0427
Mercury, Filtered	<0.2	<0.2	--	--	0.00858	0.0249	0.0147	0.00433	0.00357	0.0147	0.00781	0.00400
Methylmercury - EPA 1630, µg/L												
Methylmercury, Unfiltered	0.000239	0.000970	0.000484	0.000168	0.00191	0.00553	0.00302	0.000886	0.000613	0.00171	0.000852	0.000238
Methylmercury, Filtered	0.000108	0.000396	0.000234	0.0000686	0.000586	0.00342	0.000980	0.000673	0.000413	0.000649	0.000480	0.0000645
Sulfate, Total - SW846 9038, mg/L	28.9	35.1	30.6	1.79	NA	NA	NA	NA	NA	NA	NA	NA
Sulfide, Total - SW846 9030A, mg/L	<1	4.4	1.3	1.4	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids EPA 160.1, SM 2540C, mg/L	120	164	141	13.2	280	445	395	36.8	45	125	75.7	23.3
Total Suspended Solids - EPA 160.2, SM 2540D, mg/L	6	48	16	13	< 4	23	12	5.4	<4	22	7.0	5.3
FIELD PARAMETERS:												
Dissolved Oxygen - EPA 360.1, mg/L	4.25	10.6	7.04	2.33	0.68	12.9	7.84	3.81	0.16	10.4	5.91	3.53
Oxidation-Reduction Potential - A2580A, mV	140	215	190	19.4	-52.1	427	198	189	72.8	304	254	48.6
pH - EPA 150.1, pH Units	6.78	8.73	7.40	0.573	6.69	8.81	7.66	0.676	6.30	7.24	6.71	0.295
Specific Conductance - EPA 120.1, mS/cm	2.40	3.77	2.96	0.512	0.453	0.763	0.682	0.089	0.116	0.188	0.129	0.0161
Temperature - EPA 170.1, ˚C	21.8	29.6	25.3	2.1	26.6	31.9	28.6	1.37	20.9	27.1	24.5	1.69
Turbidity - EPA 180.1, NTU	11.2	74.1	23.2	16.5	< 0.1	23.8	9.50	6.19	5.4	26.8	12.1	6.38

Notes:
˚C - degrees Celsius
EPA - Environmental Protection Agency Analytical Method
mg/L - milligram per liter
mS/cm - milliSiemens per centimeter
mV - millivolt
n - number of samples
NTU - nephelometric turbidity units
SM - standard method
µg/L - microgram per liter
NA - not analyzed
< - result less than the reporting limit
-- Average and standard deviation not calculated because all samples were non-detect at a detection limit of approximately 0.2 µg/L.
* Average and standard deviation not calculated because only 2 samples out of 13 indicated concentrations above the reporting limit.

PREPARED BY/DATE: AES 08/28/2009
CHECKED BY/DATE: JAB 09/08/2009

TABLE 4-6

SURFACE WATER DATA SUMMARY BY TRANSECT, SHOWING AVERAGE AND RANGES OF CONCENTRATIONS - BASELINE, YEAR 1, AND YEAR 2
Updated RI Addendum
Olin McIntosh OU-2

Transect	Round Pond			1 (Central)		
Year	2006	2008	2009	2006	2008	2009
n	1	2	2	5	6	6
Mercury, Unfiltered (µg/L)	<0.2	0.0639 (0.0443 - 0.0834)	0.0106 (0.00731 - 0.0139)	<0.2	0.191 (0.0914 - 0.292)	0.0693 (0.0106 - 0.155)
Mercury, Filtered (µg/L)	<0.2	0.00974 (0.00858 - 0.0109)	0.00410 (0.00357 - 0.00463)	<0.2	0.0133 (0.0109 - 0.0183)	0.00999 (0.00427 - 0.0142)
Methylmercury, Unfiltered (µg/L)	0.000239	0.00519 (0.00484 - 0.00553)	0.000807 (0.000788 - 0.000825)	0.000490 (0.000435 - 0.000514)	0.00270 (0.00228 - 0.00308)	0.000954 (0.000613 - 0.00171)
Methylmercury, Filtered (µg/L)	0.000108	0.00284 (0.00225 - 0.00342)	0.000544 (0.000532 - 0.000566)	0.000262 (0.000209 - 0.000396)	0.000839 (0.000679 - 0.00096)	0.000481 (0.000419 - 0.000649)
Total Alkalinity (mg/L)	39	55.8	31.8 (31.8 - 31.8)	38.7 (37.4 - 39)	54.6 (53.5 - 58)	32.2 (31.8 - 33.9)
DOC (mg/L)	5.4	18	16 (15 - 16)	6.5 (2.9 - 13)	10.3 (4.3 - 16)	16 (16 - 17)
Total Hardness (mg/L)	61	80	47 (46 - 48)	60 (58 - 64)	73.7 (70 - 78)	37 (36 - 38)
TDS (mg/L)	120	304 (280 - 328)	119 (112 - 125)	148 (136 - 164)	418 (400 - 445)	59.6 (45 - 72.5)
TSS (mg/L)	16	13 (8 - 18)	5.8 (<4 - 9.5)	15 (6 - 34)	11 (7 - 13)	8.4 (<4 - 22)
DO (mg/L)	5.1	5.32 (2.85 - 7.78)	5.83 (2.16 - 9.50)	6.16 (4.25 - 9.64)	6.83 (0.68 - 11.2)	5.85 (1.86 - 9.31)
ORP (mV)	176	40.2 (38.7 - 41.6)	277 (268 - 286)	183 (140 - 215)	-2.17 (-52.1 - 38.2)	279 (257 - 304)
pH	6.96	7.25 (7.12 - 7.38)	6.76 (6.50 - 7.01)	7.64 (6.79 - 8.73)	8.01 (7.29 - 8.70)	6.63 (6.30 - 6.92)
Specific Conductance (mS/cm)	2.40	0.473 (0.453 - 0.493)	0.120 (0.119 - 0.120)	3.36 (2.67 - 3.77)	0.656 (0.631 - 0.689)	0.133 (0.123 - 0.144)
Temperature (˚C)	25.8	27.7 (26.8 - 28.5)	24.8 (23.1 - 26.4)	25.0 (21.8 - 29.6)	29.0 (26.6 - 31.9)	24.3 (22.8 - 25.9)
Turbidity (NTU)	74.1	8.4 (4.0 - 12.8)	12.5 (9.2 - 15.8)	15.5 (11.2 - 20.1)	9.7 (4.3 - 18.8)	12.1 (6.3 - 26.7)

Transect	2 (South-Central)			3 (South)			Deeper Portion of the Basin
Year	2006	2008	2009	2006	2008	2009	2009
n	4	6	6	3	6	6	2
Mercury, Unfiltered (µg/L)	<0.2	0.256 (0.0942 - 0.360)	0.0546 (0.0087 - 0.0957)	0.210 (<0.2-0.329)	0.352 (0.0838-0.909)	0.0217 (0.00961 - 0.0608)	0.0724 (0.0347 - 0.110)
Mercury, Filtered (µg/L)	<0.2	0.0159 (0.0111 - 0.0227)	0.00952 (0.00458 - 0.0147)	<0.2	0.0166 (0.0114-0.0249)	0.00483 (0.00358 - 0.00693)	0.00879 (0.00588 - 0.0117)
Methylmercury, Unfiltered (µg/L)	0.000431 (0.000399 - 0.000480)	0.00271 (0.00236 - 0.00316)	0.000817 (0.000702 - 0.00106)	0.000625 (0.000354-0.000970)	0.00293 (0.00191-0.00403)	0.000782 (0.000652 - 0.000918)	0.000908 (0.000735 - 0.00108)
Methylmercury, Filtered (µg/L)	0.000227 (0.000148 - 0.000261)	0.000702 (0.000606 - 0.000858)	0.000458 (0.000413 - 0.000506)	0.000238 (0.000204-0.000295)	0.000781 (0.000586-0.000952)	0.000456 (0.000413 - 0.000491)	0.000554 (0.000470 - 0.000638)
Total Alkalinity (mg/L)	38.6 (35.9 - 42.1)	54.3 (53.5 - 55.8)	32.2 (31.8 - 33.9)	39.5 (37.4-40.6)	53.5	31.8	38.2 (31.8 - 44.5)
DOC (mg/L)	2.55 (<2 - 4.8)	16.5 (16 - 18)	16 (16 - 17)	4.5 (2.5-6.8)	15.8 (15-17)	16	17 (16 - 18)
Total Hardness (mg/L)	59 (56 - 60)	75.7 (70 - 80)	38 (34 - 46)	60 (58-61)	71.3 (66-78)	44 (40 - 50)	46 (40 - 52)
TDS (mg/L)	138 (136 - 144)	400 (385 - 410)	65.0 (45 - 82.5)	141 (124-160)	397 (360-435)	94.2 (72.5 - 115)	57.5 (52.5 - 62.5)
TSS (mg/L)	9.0 (6 - 14)	8.5 (<4 - 19)	7.0 (<4 - 15)	27 (8-48)	15 (7-23)	6.2 (<4 - 12)	6.0 (4 - 8)
DO (mg/L)	8.26 (4.64 - 10.6)	7.62 (0.78 - 12.9)	7.37 (2.25 - 10.3)	8.48	10.3 (7.82 - 12.7)	6.07 (2.93 - 10.4)	1.31 (0.16 - 2.45)
ORP (mV)	194 (191 - 197)	263 (46.5 - 405)	259 (197 - 287)	199 (196-205)	384 (326 - 427)	245 (200 - 277)	160 (72.8 - 248)
pH	7.29 (7.13 - 7.51)	7.29 (6.69 - 8.74)	6.90 (6.44 - 7.24)	7.31 (6.99-7.66)	7.83 (7.03 - 8.81)	6.69 (6.45 - 7.14)	6.41 (6.40 - 6.41)
Specific Conductance (mS/cm)	2.67 (2.61 - 2.80)	0.707 (0.613 - 0.760)	0.129 (0.117 - 0.145)	2.62	0.752 (0.738 - 0.763)	0.119 (0.116 - 0.122)	0.157 (0.126 - 0.188)
Temperature (˚C)	24.9 (23.2 - 26.7)	28.5 (27.2 - 30.6)	25.1 (22.9 - 27.1)	25.93 (25.54-26.13)	28.8 (27.6 - 29.9)	24.8 (23.2 - 26.9)	22.1 (20.9 - 23.2)
Turbidity (NTU)	17.4 (12.8 - 20.5)	7.7 (< 0.1 - 18.8)	12.1 (5.4 - 26.8)	26.9 (17.8-32.3)	11.4 (4.8 - 23.8)	10.1 (8.6 - 11.5)	17.8 (9.0 - 26.6)

Notes:
˚C - degree Celsius
DO - dissolved oxygen
DOC - dissolved organic carbon
mg/L - milligram per liter
mS/cm - milliSiemen per centimeter
mV - millivolt
n - number of samples
NTU - nephelometric turbidity unit
ORP - oxidation-reduction potential
TDS - total dissolved solids
TSS - total suspended solids
µg/L - microgram per liter
-- - not calculated due to non-detect mercury concentrations
Data presented as average concentrations with ranges of concentrations in parentheses, where applicable.
Round Pond - samples OU2R-SW-101 to -102
Transect 1 - samples OU2B-SW-101 to -105
Transect 2 - samples OU2B-SW-201 to -205
Transect 3 - samples OU2B-SW-301 to -304

PREPARED BY/DATE: RMR 10/15/09
CHECKED BY/DATE: AES 10/15/09

TABLE 4-7

AVERAGE TSS CONCENTRATIONS, SHALLOW AND DEEP, DECEMBER 12, 2008, THROUGH JANUARY 20, 2009
Updated RI Addendum
Olin McIntosh OU-2

		Average TSS Concentration (mg/L)		
Sample Location	**Sample Collection Depth[1]**	**First Half Rising Limb (December 12, 2008)**	**Second Half Rising Limb (December 13, 2008)**	**Gate Closed (January 20, 2009)**
D1	Top	86	70	6
	Bottom	154	58	12
A1	Top	112	56	12
	Bottom	72	57	12
B1	Top	60	50	9
	Bottom	50	51	11
B2	Top	95	43	15
	Bottom	106	44	11
B3	Top	34	48	14
	Bottom	32	35	9
C1	Top	16	46	11
	Bottom	17	46	9
C2	Top	39	39	12
	Bottom	99	38	10
C3	Top	22	36	9
	Bottom	31	39	13
C4	Top	24	41	6
	Bottom	17	32	5
C5	Top	16	45	14
	Bottom	14	34	9
C6	Top	32	37	10
	Bottom	43	38	9

	Average TSS Concentration (mg/L)		
Sample Transect	**First Half Rising Limb (December 12, 2008)**	**Second Half Rising Limb (December 13, 2008)**	**Gate Closed (January 20, 2009)**
D	120	64	9
A	92	56	12
B	63	45	12
C	31	39	10

Notes:
TSS - total suspended solids
mg/kg - milligram per kilogram
[1] Bottom sample collected at eight-tenths water depth, top sample collected at two-tenths water depth

PREPARED BY/DATE: HEF 2/10/10
CHECKED BY/DATE: JAB 2/11/10

TABLE 4-8

AVERAGE STORM EVENT TSS CONCENTRATIONS, SHALLOW AND DEEP - OCTOBER 15-21, 2009
Updated RI Addendum
Olin McIntosh OU-2

Average TSS Concentration (mg/L)			
Sample Location	**Sample Collection Depth[1]**	**Second Half Rising[2] Limb (October 15-18, 2009)**	**Plateau (October 19-21, 2009)**
D1	Top	10	10
	Bottom	14	14
A1	Top	10	8
	Bottom	13	16
B1	Top	7	8
	Bottom	9	13
B2	Top	13	12
	Bottom	13	14
B3	Top	12	11
	Bottom	14	14
C1	Top	10	12
	Bottom	13	13
C2	Top	10	11
	Bottom	15	14
C3	Top	13	13
	Bottom	17	12
C4	Top	6	5
	Bottom	11	7
C5	Top	8	22
	Bottom	10	11
C6	Top	13	13
	Bottom	15	13

Average TSS Concentration (mg/L)		
Sample Transect	**Second Half Rising Limb (October 15-18, 2009)**	**Plateau (October 19-21, 2009**
D	12	12
A	12	12
B	11	12
C	12	12

Notes:
TSS - total suspended solids
mg/L - milligram per liter
[1] - Bottom sample collected at eight-tenths water depth, top sample collected at two-tenths water depth
[2] - This event represented the second half of the rising limb of the hydrograph and the plateau of the flood event because water levels did not reurn to baseline conditions from the previous storm event in September 2009.

PREPARED BY/DATE: RDM 02/15/2010
CHECKED BY/DATE: AES 02/17/2010

TABLE 4-9

GATE OVERFLOW SAMPLING ANALYTICAL RESULTS
Updated RI Addendum - Including 2010 ESPP Results
Olin McIntosh OU-2

Basin Samples				
Event Date	**Gate Samples Event 1: November 2, 2009**			
Basin Elevation (ft NAVD 88)	10-11		8-9	6-7
Sample ID	OU2B-SW-GATE-1-110209	OU2B-SW-GATE-1-110209B	NS	NS
Mercury, unfiltered (µg/L)	0.0358	0.0384	NS	NS
Mercury, filtered (µg/L)	0.00508	0.00574	NS	NS
Methylmercury, unfiltered (µg/L)	NA[1]	NA[1]	NS	NS
Methylmercury, filtered (µg/L)	NA[1]	NA[1]	NS	NS
Total Dissolved Solids (mg/L)	652	NA	NS	NS
Total Suspended Solids (mg/L)	9.5	NA	NS	NS

Basin Samples							
Event Date	**Gate Samples Event 2: November 30, 2009 - December 2, 2009**						
Basin Elevation (ft NAVD 88)	10-11			8-9			6-7
Sample ID	OU2B-SW-GATE-1A-113009	OU2B-SW-GATE-1B-113009	NS	OU2B-SW-GATE-2A-120209	OU2B-SW-GATE-2B-120209	OU2B-SW-GATE-2C-120209	NS
Mercury, unfiltered (µg/L)	0.0551	0.0574	NS	0.0873	0.08	0.0835	NS
Mercury, filtered (µg/L)	0.00651	0.00589	NS	0.00711	0.00746	0.00765	NS
Methylmercury, unfiltered (µg/L)	0.000947	0.000838	NS	0.000837	0.00088	0.000765	NS
Methylmercury, filtered (µg/L)	0.000613	0.000693	NS	0.000581	0.000687	0.000486	NS
Total Dissolved Solids (mg/L)	110	NA	NS	67.5	NA	NA	NS
Total Suspended Solids (mg/L)	9.5	NA	NS	7.5	NA	NA	NS

Tombigbee River Samples				
Event Date	**Tombigbee River Samples Event 1: November 2, 2009**			
Basin Elevation (ft NAVD 88)	10-11		8-9	6-7
Sample ID	OU2B-SW-TBR-1-110209	OU2B-SW-TBR-1-110209B	NS	NS
Mercury, unfiltered (µg/L)	0.00507	0.00621	NS	NS
Mercury, filtered (µg/L)	0.00139	NA	NS	NS
Methylmercury, unfiltered (µg/L)	NA[1]	NA[1]	NS	NS
Methylmercury, filtered (µg/L)	NA[1]	NA[1]	NS	NS
Total Dissolved Solids (mg/L)	108	NA	NS	NS
Total Suspended Solids (mg/L)	65	NA	NS	NS

Basin Samples												
Event Date	**Gate Samples Event 3: January 12, 2010 - January 18, 2010**									**Gate Samples Event 4: March 9, 2010**		
Basin Elevation (ft NAVD 88)	10-11			8-9			6-7			8-9		
Sample ID	OU2B-SW-GATE-1A-011210	OU2B-SW-GATE-1B-011210	OU2B-SW-GATE-1C-011210	OU2B-SW-GATE-2A-011410	OU2B-SW-GATE-2B-011410	OU2B-SW-GATE-2C-011410	OU2B-SW-GATE-3A-011810	OU2B-SW-GATE-3B-011810	OU2B-SW-GATE-3C-011810	OU2B-SW-GATE-2A-030910	OU2B-SW-GATE-2B-030910	OU2B-SW-GATE-2C-030910
Mercury, unfiltered (µg/L)	0.0183	0.0185	0.0179	0.0194	0.018	0.0183	0.0296	0.0324	0.0314	0.0679	0.0700	0.0734
Mercury, filtered (µg/L)	0.00304	0.00346	0.00324	0.00368	0.00368	0.00361	0.00461	0.00464	0.00571	0.00795	0.00854	0.00938
Methylmercury, unfiltered (µg/L)	0.000246	0.000299	0.000348	0.000294	0.000284	0.000302	0.000343	0.000297	0.000334	0.000391	0.000362	0.000387
Methylmercury, filtered (µg/L)	0.000166	0.000251	0.000206	0.000177	0.000246	0.000207	0.000234	0.000204	0.000213	0.000198	0.000187	0.000162
Total Dissolved Solids (mg/L)	82.5	NA	NA	70	NA	NA	70	NA	NA	110	NA	NA
Total Suspended Solids (mg/L)	NA	NA	NA	NA	NA	NA	5.5	NA	NA	12.0	NA	NA

Basin Samples									
Event Date	**Gate Samples Event 5: June 2, 2010 - June 7, 2010**								
Basin Elevation (ft NAVD 88)	10-11			8-9			6-7		
Sample ID	OU2B-SW-GATE-1A-060210	OU2B-SW-GATE-1B-060210	OU2B-SW-GATE-1C-060210	OU2B-SW-GATE-2A-060410	OU2B-SW-GATE-2B-060410	OU2B-SW-GATE-2C-060410	OU2B-SW-GATE-3A-060710	OU2B-SW-GATE-3B-060710	OU2B-SW-GATE-3C-060710
Mercury, unfiltered (µg/L)	0.0735	0.0744	0.0765	0.115	0.109	0.110	0.125	0.119	0.134
Mercury, filtered (µg/L)	0.0101	0.012	0.0106	0.0116	0.0126	0.0127	0.0125	0.012	0.0143
Methylmercury, unfiltered (µg/L)	0.000811	0.000695	0.00071	0.000571	0.000602	0.000578	0.000452	0.000369	0.00039
Methylmercury, filtered (µg/L)	0.000292	0.000324	0.000267	0.000184	0.000227	0.000183	0.000184	0.000209	0.000153
Total Dissolved Solids (mg/L)	141	NA	NA	137	NA	NA	128	NA	NA
Total Suspended Solids (mg/L)	12.0	NA	NA	14.0	NA	NA	11.0	NA	NA

Notes:

1 - Misinterpretation of the chain-of-custody resulted in insufficient sample volume for methylmercury analysis.
ft NAVD88 - feet in the North American Vertical Datum of 1988
µg/L - microgram per liter
mg/L - milligram per liter
NA - sample was not anlyzed for this constituent.
NS - sample was not collected
Samples analyzed for mercury (filtered and unfiltered) and methylmercury (filtered and unfiltered) are collected in triplicate and are identified as A, B and C.

PRREPARED BY/DATE: MBR 09/09/2010
CHECKED BY/DATE: RMR 09/22/2010

TABLE 4-11

SEDIMENT DATA SUMMARY BY TRANSECT, SHOWING AVERAGE AND RANGES OF CONCENTRATIONS, 2009
Updated RI Addendum
Olin McIntosh OU-2

Analysis	Transect: Round Pond (n=6)	5 (North, n=10)	0 (Northeast, n=1)[1]	Deeper Portion of Basin (n=1)	4 (North-central, n=4)	1 (Central, n=14)	2 (South-central, n= 13)	3 (South, n=8)
Mercury, Total (mg/kg dw)	22.6 (14.1 - 32.1)	54.3 (24.7 - 112)	38.3	29.1	26.6 (18.9 - 35.7)	38.3 (22.6 - 77.6)	57.0 (7.1 - 116)	13.8 (2.01 - 20.9)
Methylmercury (mg/kg dw)	0.00562 (0.00451 - 0.00640)	0.0115 (0.00310 - 0.0238)	0.00487	0.00431	0.00944 (0.00286 - 0.0257)	0.00615 (0.00265 - 0.0212)	0.00721 (0.00219 - 0.0128)	0.00465 (0.00142 - 0.00756)
% Methylmercury	0.0265 (0.0140 - 0.0379)	0.0223 (0.0100 - 0.0736)	0.0127	0.0148	0.0442 (0.0116 - 0.136)	0.0187 (0.00763 - 0.0918)	0.0152 (0.00736 - 0.0425)	0.0406 (0.0161 - 0.0706)
AVS/SEM ratio	47.1 (27.0 - 69.9)	NA	32.0	80.4	40.5	57.0 (18.7 - 99.0)	67.0 (12.3 - 156)	27.4 (9.93 - 55.6)
Grain Size (%)								
Clay	48.0 (40.6 - 56.1)	38.6 (<0.01 - 54.9)	36	66	37.3 (25.6 - 54.8)	39.6 (32.9 - 54.9)	23.0 (9.4 - 35.6)	14.3 (2.7 - 28)
Silt	48.8 (41.6 - 57.2)	49.6 (44.6 - 56.1)	60.9	34	55.3 (36.4 - 70.8)	56.7 (44.9 - 64.4)	51.9 (34.2 - 66.8)	53.2 (13.2 - 68.4)
Sand	3.0 (1.7 - 6.3)	11.7 (0.1 - 50)	3.1	< 0.01	7.4 (1.4 - 15.6)	3.6 (0.2 - 14.5)	24.9 (2.6 - 56.2)	32.5 (4.3 - 84.1)
Gravel	< 0.01	0.1 (<0.01 - 0.6)	< 0.01	< 0.01	0.1 (<0.01 - 0.5)	0.2 (<0.01 - 2.7)	0.2 (<0.01 - 1.3)	< 0.01
Bulk Density (g/cm^3 dw)	1.13 (1.07 - 1.19)	NA	1.21	1.13	1.31	1.17 (0.921 - 1.32)	1.45 (1.13 - 2)	1.55 (1.38 - 1.77)
Percent Moisture	79.1 (77.4 - 81.4)	68.2 (<0.1 - 78)	70	79.6	76.0 (74.2 - 77.6)	71.7 (68.8 - 78.3)	52.3 (33.1 - 70.6)	40.1 (30.5 - 59.7)
Pesticides (mg/kg dw)								
4,4'-DDD	0.0438 J	NA	NA	NA	<0.0147	0.0541	0.172	0.259
4,4'-DDE	0.0509 J	NA	NA	NA	0.019	0.0839	0.191	0.480
4,4'-DDT	0.0292 J	NA	NA	NA	<0.0147	< 0.0252	0.0368	<0.0569
2,4'-DDD	0.0325 J	NA	NA	NA	0.0099	0.0394	0.233	0.336
2,4'-DDE	0.0652 J	NA	NA	NA	0.0311	0.128	0.507	1.60
2,4'-DDT	<0.0085	NA	NA	NA	<0.0074	<0.0126	<0.0067	<0.0284
DDTr	0.124	NA	NA	NA	0.0190	0.138	0.400	0.739
DDTR	0.222	NA	NA	NA	0.0600	0.305	1.14	2.68
Hexachlorobenzene (mg/kg dw)	NA	NA	NA	NA	0.0267 (0.0221 - 0.0313)	NA	2.49 (0.628 - 5.97)	4.45 (<0.0069 - 8.90)
Sulfate, Total (mg/kg dw)	< 2,200	NA	<1,660	< 2,440	NA	< 1,850	<1,650	NA
Sulfide, Total (mg/kg dw)	2,100	NA	1,600	3,300	NA	2,500 J	1,200 (800 - 1,600)	NA
TOC (mg/kg dw)	32,000 (29,000 - 39,000)	29,000 (12,600 - 53,600)	16,300	14,400	22,300 (2,630-60,500)	16,900 (10,700 - 57,700)	5,730 (644 - 10,600)	5,120 (1,550 - 11,200)
ORP (mV)	-372 (-382 - -360)	-380 (-397 - -352)	-393	-393	-433 (-440 - -423)	-381 (-417 - -314)	-365 (-419 - -296)	-361 (-410 - -165)
pH	6.75 (6.29 - 6.91)	6.75 (6.63 - 6.91)	7.20	6.55	7.36 (6.81 - 8.81)	6.84 (6.59 - 7.01)	7.00 (6.65 - 7.19)	6.93 (6.81 - 7.00)
Temperature (˚C)	23.3 (22.5 - 24.2)	24.5 (22.6 - 27.8)	22.9	24.4	26.1 (24.9 - 26.6)	25.2 (22.4 - 28.3)	25.4 (23.8 - 26.5)	25.9 (22.9 - 27.9)

Notes:

˚C - degree Celsius
AVS/SEM - ratio of acid-volatile sulfide to simultaneously extracted metals. One half of the reporting limit was used in this calculation when analytical results were less than the reporting limit.
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethylene
DDT - dichlorodiphenyltrichloroethane
DDTr - sum of 4,4'-isomers of DDD, DDE, and DDT. Zero was used in this calculation when analytical results were less than the reporting limit.
DDTR - sum of 4,4'-DDD; 4,4'-DDE; 4,4'-DDT, 2,4'-DDD; 2,4'-DDE; and 2,4'-DDT. Zero was used in this calculation when analytical results were less than the reporting limit.
dw - dry weight
g/cm^3 - gram per cubic centimeter
J - estimated concentration based on data quality evaluation or result between method detection limit and reporting detection limit
mg/kg - milligram per kilogram
mV - millivolt
n - number of samples analyzed for mercury
NA - not analyzed
ORP - oxidation-reduction potential
TOC - total organic carbon
% - percent
< - less than the reporting limit.
[1]Location between northern and north-central transect.
Round Pond - samples OU2R-SED-101 and 102
Transect 5 - samples OU2B-SED-501 and 502
Transect 0 - sample OU2B-SED-004
Deep hole - sample OU2B-SED-DH
Transect 4 - samples OU2B-SED-401 to 404
Transect 1 - samples OU2B-SED-101 to 106
Transect 2 - samples OU2B-SED-201 to 205
Transect 3 - samples OU2B-SED-301 to 304

PREPARED BY/DATE: RMR 9/2/09
CHECKED BY/DATE: AES 9/24/09

TABLE 4-12

SEDIMENT DATA SUMMARY BY TRANSECT, SHOWING AVERAGE AND RANGES OF CONCENTRATIONS
BASELINE, YEAR 1, AND YEAR 2 RESULTS
Updated RI Addendum
Olin McIntosh OU-2

	Transect									
	Round Pond			**5 (North)**		**0 (Northeast)**			**4 (North-central)**	
Analysis	**2006 (n = 5)**	**2008 (n = 6)**	**2009 (n=6)**	**2008 (n = 10)**	**2009 (n=10)**	**2006 (n = 1)**	**2008 (n=1)**	**2009 (n=1)**	**2008 (n = 4)**	**2009 (n=4)**
Mercury, Total (mg/kg dw)	8.27 (7.77 - 8.61)	21.1 (15.6-26.7)	22.6 (14.1 - 32.1)	56.8 (17.5 - 213)	54.3 (24.7 - 112)	25.8	37.8	38.3	21.5 (0.965 - 33.6)	26.6 (18.9 - 35.7)
Methylmercury (mg/kg dw)	0.0075 (0.0048 - 0.011)	0.00463 (0.00309-0.00715)	0.00562 (0.00451 - 0.00640)	0.00922 (0.00295 - 0.0234)	0.0115 (0.00310 - 0.0238)	0.00623	0.00517	0.00487	0.0056 (0.00281 - 0.00893)	0.00944 (0.00286 - 0.0257)
% Methylmercury	0.091 (0.06 - 0.14)	0.024 (0.014-0.046)	0.0265 (0.0140 - 0.0379)	0.022 (0.011 - 0.084)	0.0223 (0.0100 - 0.0736)	0.024	0.014	0.0127	0.090 (0.019 - 0.291)	0.0442 (0.0116 - 0.136)
AVS/SEM ratio	29.6 (25.8 - 34.1)	49.9 (43.3-57.4)	47.1 (27.0 - 69.9)	NA	NA	31.8	37.4	32.0	40.4	40.5
Grain Size (%)										
Clay	48.1 (38.8 - 54.8)	54.6 (48-57.4)	48.0 (40.6 - 56.1)	65.2 (50 - 79.5)	38.6 (<0.01 - 54.9)	63.9	62.8	36	54.6 (29.2 - 64.9)	37.3 (25.6 - 54.8)
Silt	45.1 (40.1 - 55.4)	34.5 (28.1-44.1)	48.8 (41.6 - 57.2)	27.5 (16.5 - 40.4)	49.6 (44.6 - 56.1)	34.4	35.5	60.9	32.5 (20.4 - 48.4)	55.3 (36.4 - 70.8)
Sand	6.8 (2.9 - 9.2)	10.9 (1.1-21.6)	3.0 (1.7 - 6.3)	6.2 (0.8 - 18)	11.7 (0.1 - 50)	1.7	1.6	3.1	10.3 (2.7 - 22.4)	7.4 (1.4 - 15.6)
Gravel	0	0	< 0.01	1.02 (0 - 7.6)	0.1 (<0.01 - 0.6)	0	0	< 0.01	2.63 (0 - 10.1)	0.1 (<0.01 - 0.5)
Bulk Density (g/cm^3 dw)	1.12 (0.996 - 1.31)	1.03 (0.839-1.26)	1.13 (1.07 - 1.19)	NA	NA	1.34	0.951	1.21	1.08	1.31
Percent Moisture	80 (79.3 - 80.4)	79.2 (76.6-80.7)	79.1 (77.4 - 81.4)	74.8 (67.6 - 80.3)	68.2 (<0.1 - 78)	71.3	54.6	70	64.5 (42.1 - 77.7)	76.0 (74.2 - 77.6)
Pesticides (mg/kg dw)										
4,4'-DDD	NA	<0.016	0.0438 J	NA	NA	NA	NA	NA	<0.015	<0.0147
4,4'-DDE	NA	0.0434	0.0509 J	NA	NA	NA	NA	NA	0.0185	0.019
4,4'-DDT	NA	<0.016	0.0292 J	NA	NA	NA	NA	NA	<0.015	<0.0147
2,4'-DDD	NA	NA	0.0325 J	NA	NA	NA	NA	NA	NA	0.0099
2,4'-DDE	NA	NA	0.0652 J	NA	NA	NA	NA	NA	NA	0.0311
2,4'-DDT	NA	NA	<0.0085	NA	NA	NA	NA	NA	NA	<0.0074
DDTr	NA	0.0434	0.124	NA	NA	NA	NA	NA	0.0185	0.019
DDTR	NA	NA	0.222	NA	NA	NA	NA	NA	NA	0.06
Hexachlorobenzene (mg/kg dw)	NA	NA	NA	NA	NA	NA	NA	NA	<1.48	0.0267 (0.0221 - 0.0313)
Sulfate, Total (mg/kg dw)	5,610 (4,390 - 6,500)	6,220 (5,050-7,310)	< 2,200	NA	NA	5,380 J	6,150	<1,660	6,540 (5,910 - 7,160)	NA
Sulfide, Total (mg/kg dw)	611 (<120 - 1,300 J)	2,620 (1,400-3,200)	2,100	NA	NA	1,400 J	1,700	1,600	2,150 (1,900 - 2,400)	NA
TOC (mg/kg dw)	37,800 (34,000 - 41,000)	28,000 (20,700-45,700)	32,000 (29,000 - 39,000)	29,300 (16,100 - 59,900)	29,000 (12,600 - 53,600)	14,000	16,100	16,300	19,300 (14,400 - 30,000)	22,308 (2,630 - 60,500)
ORP (mV)	-474 (-513 - -421)	-294 (-345 - -253)	-372 (-382 - -360)	-326 (-359 - -290)	-379.6 (-397 - -352)	-355	-297	-393	-382 (-396 - -369)	-433 (-440 - -423)
pH	6.84 (6.74 - 6.97)	6.75 (6.64-6.94)	6.75 (6.29 - 6.91)	6.88 (6.66 - 7.22)	6.75 (6.63 - 6.91)	6.98	7.15	7.20	6.69 (6.63 - 6.77)	7.36 (6.81 - 8.81)
Temperature (°C)	24.4 (24.3 - 24.7)	28.4 (26.4-31.1)	23.3 (22.5 - 24.2)	27.2 (24.0 - 32.1)	24.5 (22.6 - 27.8)	22.7	29.1	22.9	31.0 (26.7 - 33.8)	26.1 (24.9 - 26.6)

Notes:

AVS/SEM - ratio of acid-volatile sulfide to simultaneously extracted metals. One half of the reporting limit was used in this calculation when analytical results were less than the reporting limit.
°C - degree Celsius
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethylene
DDT - dichlorodiphenyltrichloroethane
DDTr - sum of 4,4'-isomers of DDD, DDE, and DDT. Zero was used in this calculation when analytical results were less than the reporting limit.
DDTR - sum of 4,4'-DDD; 4,4'-DDE; 4,4'-DDT, 2,4'-DDD; 2,4'-DDE; and 2,4'-DDT. Zero was used in this calculation when analytical results were less than the reporting limit.
dw - dry weight
g/cm^3 - gram per cubic centimeter
J - estimated concentration based on data qualilty evaluation or result between method detection limit and reporting detection limit
mg/kg - milligram per kilogram
mV - millivolt
n - number of samples analyzed for mercury
NA - not analyzed
ORP - oxidation-reduction potential
TOC - total organic carbon
% - percent
Round Pond - samples OU2R-SED-101 to 102
Transect 5 - samples OU2B-SED-501 to 502
Transect 0 - sample OU2B-SED-004
Deep hole - sample OU2B-SED-DH
Transect 4 - samples OU2B-SED-401 to 404
Transect 1 -samples OU2B-SED-101 to 106
Transect 2 -samples OU2B-SED-201 to 205
Transect 3 - samples OU2B-SED-301 to 304

TABLE 4-12

SEDIMENT DATA SUMMARY BY TRANSECT, SHOWING AVERAGE AND RANGES OF CONCENTRATIONS
BASELINE, YEAR 1, AND YEAR 2 RESULTS
Updated RI Addendum
Olin McIntosh OU-2

	Transect									
	Deeper Portion of Basin		1 (Central)			2 (South-central)			3 (South)	
Analysis	2009 (n=1)	2006 (n = 13)	2008 (n = 14)	2009 (n=14)	2006 (n = 13)	2008 (n = 13)	2009 (n=13)	2006 (n =8)	2008 (n = 8)	2009 (n=8)
Mercury, Total (mg/kg dw)	29.1	18.5 (10 - 32.9)	36 (21.8 - 99.4)	38.3 (22.6 - 77.6)	34.8 (7.04 - 95.3)	66.6 (7.98 - 172)	57.0 (7.1 - 116)	11.6 (6.45 - 27.1)	19.0 (3.46 - 37)	13.8 (2.01 - 20.9)
Methylmercury (mg/kg dw)	0.00431	0.00757 (0.00336 - 0.00969)	0.00599 (0.00294 - 0.0134)	0.00615 (0.00265 - 0.0212)	0.00703 (0.00345 - 0.0101)	0.00748 (0.00405 - 0.00983)	0.00721 (0.00219 - 0.0128)	0.00439 (0.0026 - 0.00544)	0.00496 (0.00206 J - 0.00717)	0.00465 (0.00142 - 0.00756)
% Methylmercury	0.0148	0.042 (0.019 - 0.055)	0.018 (0.009 - 0.038)	0.0187 (0.00763 - 0.0918)	0.025 (0.010 - 0.049)	0.018 (0.004 - 0.051)	0.0152 (0.00736 - 0.0425)	0.048 (0.012 - 0.074)	0.035 (0.017 - 0.069)	0.0406 (0.0161 - 0.0706)
AVS/SEM ratio	80.4	37.4 (9.56 - 99.0)	42 (20.3 - 63.3)	57.0 (18.7 - 99.0)	37.1 (15.6 - 92.4)	52.3 (28.8 - 78.2)	67.0 (12.3 - 156)	19.4 (9.09 - 32.1)	29.1 (14.2 - 41.8)	27.4 (9.93 - 55.6)
Grain Size (%)										
Clay	66	61.9 (48.1 - 67.9)	58.7 (46.8 - 73.6)	39.6 (32.9 - 54.9)	31.8 (22.4 - 61.8)	29.7 (13.8 - 47.1)	23.0 (9.4 - 35.6)	23.2 (12.4 - 31.7)	20.5 (5.3 - 29.6)	14.3 (2.7 - 28)
Silt	34	36.0 (30.3 - 48.3)	39.1 (25.7 - 45.9)	56.7 (44.9 - 64.4)	53.3 (36.6 - 70.3)	52.3 (29.1 - 59.5)	51.9 (34.2 - 66.8)	49.4 (18.3 - 64.5)	44.1 (11.1 - 57.4)	53.2 (13.2 - 68.4)
Sand	< 0.01	2.04 (0.9 - 3.6)	2.14 (0.7 - 7.3)	3.6 (0.2 - 14.5)	14.9 (1.6 - 31.9)	18.0 (2.3 - 43.7)	24.9 (2.6 - 56.2)	27.5 (11.3 - 67.4)	31.3 (2.3 - 81.2)	32.5 (4.3 - 84.1)
Gravel	< 0.01	0	0	0.2 (<0.01 - 2.7)	0	0	0.2 (<0.01 - 1.3)	0	1.6 (0 - 8.9)	< 0.01
Bulk Density (g/cm^3 dw)	1.13	1.11 (0.945 - 1.3)	1.06 (0.987 - 1.2)	1.17 (0.921 - 1.32)	1.34 (1.06 - 1.68)	1.26 (0.845 - 1.46)	1.45 (1.13 - 2)	1.5 (1.31 - 1.82)	1.15 (1.0 - 1.58)	1.55 (1.38 - 1.77)
Percent Moisture	79.6	76.8 (65.8 - 80)	56.1 (50.7 - 60.9)	71.7 (68.8 - 78.3)	53.1 (43.6 - 62.9)	40.0 (31.8 - 50.5)	52.3 (33.1 - 70.6)	45.7 (27.0 - 60.4)	34.7 (23.6 - 46.6)	40.1 (30.5 - 59.7)
Pesticides (mg/kg dw)										
4,4'-DDD	NA	NA	<0.014	0.0541	NA	0.11	0.172	NA	0.061	0.259
4,4'-DDE	NA	NA	<0.014	0.0839	NA	0.171	0.191	NA	0.181	0.48
4,4'-DDT	NA	NA	<0.014	< 0.0252	NA	0.0434	0.0368	NA	0.0214	<0.0569
2,4'-DDD	NA	NA	NA	0.0394	NA	NA	0.233	NA	NA	0.336
2,4'-DDE	NA	NA	NA	0.128	NA	NA	0.507	NA	NA	1.6
2,4'-DDT	NA	NA	NA	<0.0126	NA	NA	<0.0067	NA	NA	<0.0284
DDTr	NA	NA	<0.014	0.138	NA	0.324	0.400	NA	0.263	0.739
DDTR	NA	NA	NA	0.305	NA	NA	1.14	NA	NA	2.68
Hexachlorobenzene (mg/kg dw)	NA	NA	NA	NA	NA	2.92 (<0.979 - 7.29)	2.49 (0.628 - 5.97)	NA	18.7 (3.35 - 34.1)	4.45 (<0.0069 - 8.90)
Sulfate, Total (mg/kg dw)	< 2,440	7,950 (3,510 - 10,900)	5,870 (2,350 - 9,250)	< 1,850	2,420 (<861 J - 5,280 JL)	2,300 (<918 - 4,840)	<1,650	2,520 (1,310 J - 3,200 J)	719 (<677 - 1,330 J)	NA
Sulfide, Total (mg/kg dw)	3,300	1,700 (<72 J - 8,100 J)	2,090 (1,000 - 2,800)	2,500 J	531 (59 J - 1,500 JL)	700 (70 J - 1,000)	1,200 (800 - 1,600)	233 (<47 J - 500 J)	531 (<38 J - 1,100 J)	NA
TOC (mg/kg dw)	14,400	21,700 (17,000 - 34,000)	17,200 (13,800 - 31,200)	16,900 (10,700 - 57,700)	8,300 (5,500 - 15,000)	10,300 (6,610 - 15,400)	5,730 (644 - 10,600)	8,200 (2,800 - 14,000)	6,950 (2,220 J - 11,300)	5,120 (1,550 - 11,200)
ORP (mV)	-393	-339 (-504 - -117)	-394 (-458 - -280)	-381 (-417 - -314)	-324 (-419 - -197)	-389 (-459 - -332)	-365 (-419 - -296)	-316 (-525 - -146)	-322 (-329 - -307)	-361 (-410 - -165)
pH	6.55	6.86 (6.67 - 6.97)	6.78 (6.22 - 7.05)	6.84 (6.59 - 7.01)	6.90 (6.29 - 7.11)	6.76 (6.48 - 7.41)	7.00 (6.65 - 7.19)	6.92 (6.58 - 7.15)	7.14 (6.77 - 7.27)	6.93 (6.81 - 7.00)
Temperature (°C)	24.4	22.8 (18.9 - 25.5)	27.7 (23.4 - 31.3)	25.2 (22.4 - 28.3)	23.8 (22.5 - 31)	30.9 (28.8 - 35)	25.4 (23.8 - 26.5)	24.2 (23.2 - 26.7)	30.4 (29.4 - 32.5)	25.9 (22.9 - 27.9)

Notes:

AVS/SEM - ratio of acid-volatile sulfide to simultaneously extracted metals. One half of the reporting limit was used in this calculation when analytical results were less than the reporting limit.
°C - degree Celsius
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethylene
DDT - dichlorodiphenyltrichloroethane
DDTr - sum of 4,4'-isomers of DDD, DDE, and DDT. Zero was used in this calculation when analytical results were less than the reporting limit.
DDTR - sum of 4,4'-DDD; 4,4'-DDE; 4,4'-DDT, 2,4'-DDD; 2,4'-DDE; and 2,4'-DDT. Zero was used in this calculation when analytical results were less than the reporting limit.
dw - dry weight
g/cm^3 - gram per cubic centimeter
J - estimated concentration based on data quality evaluation or result between method detection limit and reporting detection limit
mg/kg - milligram per kilogram
mV - millivolt
n - number of samples analyzed for mercury
NA - not analyzed
ORP - oxidation-reduction potential
TOC - total organic carbon
% - percent
Round Pond - samples OU2R-SED-101 to 102
Transect 5 - samples OU2B-SED-501 to 502
Transect 0 - sample OU2B-SED-004
Deep hole - sample OU2B-SED-DH
Transect 4 - samples OU2B-SED-401 to 404
Transect 1 -samples OU2B-SED-101 to 106
Transect 2 -samples OU2B-SED-201 to 205
Transect 3 - samples OU2B-SED-301 to 304

PREPARED BY/DATE: RMR 09/25/09
CHECKED BY/DATE: JAB 09/28/09

TABLE 4-14

SEDIMENT TRAP ANALYTICAL SUMMARY, SHOWING AVERAGE AND RANGES OF CONCENTRATIONS
Updated RI Addendum
Olin McIntosh OU-2

Sample Collection Date	February 18-19, 2009	May 28, 2009	August 11-12, 2009	November 11-12, 2009	February 24-25, 2010
Duration (days)	135	99	77	93	105
Water Level Maintained? Depth (ft NAVD 88)[a]	No	6.0	5.2	6.0	6.0
Total Number of Traps Included in Analysis	9[b]	4[c]	8[d]	12	10[e]
Zone 1 North					
n	1	1	2	2	2
Mercury, Total (mg/kg, dw)	15.9	7.31	25.7 (18.5 - 32.9)	19 (16.2 - 21.8)	7.35 (3.5 - 11.2)
TOC (mg/kg)	67,900	21,800	20,500 (16,500 - 24,500)	24,200 (23,200 - 25,200)	NA[f]
Bulk Density (g/cm^3)	1.00	1.04	0.980 (0.960 - 1.00)	0.999 (0.997 - 1.00)	NR
Grain Size	Silt/Clay	Silt/Clay	Silt/Clay	Clay	NA
Percent Moisture	87.7	82.4	85.7 (85.0 - 86.3)	84.5 (81.4 - 87.6)	91.6 (90.6 - 92.6)
TSS (mg/L)	2,520	100	12,200 (820 - 23,600)	31,900 (790 - 63,000)	NR
Calculated Approximate Mass (g) per Jar per Day	0.2	4.2	8.1 (7.5 - 8.6)	5.6 (3.0 - 8.2)	1.3 (1.2 - 1.4)
Calculated Average Depth Accumulation (in) per Jar per Day	0.013	0.028	0.048 (0.040 - 0.056)	0.038 (0.031 - 0.046)	0.022 (0.019 - 0.025)
Zone 2 Central					
n	2	1	3	5	4
Mercury, Total (mg/kg, dw)	25.7 (11.9 - 39.4)	11.9	33.1 (26.4 - 43.3)	17.4 (6.67-26.8)	5.4 (1.3 - 12.1)
TOC (mg/kg)	153,000 (66,000 - 239,000)	38,600	26,600 (19,100 - 41,200)	28,900 (21,100 - 35,700)	41,700
Bulk Density (g/cm^3)	1.00	1.00	1.01 (0.999 - 1.03)	1.00 (0.992 - 1.01)	NR
Grain Size	NA	NA	Silt/Clay	Clay	NA
Percent Moisture	92.4 (90.4 - 94.4)	82.4	88.4 (87.4 - 89.3)	85.8 (81.6 - 88.4)	85.5 (81.1 - 91.5)
TSS (mg/L)	1,520 (1,340 - 1,700)	29,900	4,300 (720 - 6,910)	19,200 (1,870 - 49,600)	NR
Calculated Approximate Mass (g) per Jar per Day	0.9 (0.5-1.3)	0.6	7.5 (6.1 - 8.5)	4.2 (2.4 - 5.4)	2.3 (1.4 - 3.1)
Calculated Average Depth Accumulation (in) per Jar per Day	0.009 (0.007 - 0.011)	0.007	0.050 (0.040 - 0.057)	0.025 (0.015 - 0.004)	0.040 (0.014 - 0.083)
Zone 3 South					
n	6	2	3	5	4
Mercury, Total (mg/kg, dw)	18.9 (10.4 - 26)	7.46 (5.03 - 9.88)	24.8 (22.4 - 27.9)	8.40 (5.15 - 16.7)	3.0 (2.1 - 3.8)
TOC (mg/kg)	79,700 (54,800 - 147,000)	12,400 (5,080 - 19,700)	33,900 (25,100 - 40,500)	36,000 (27,600 - 48,800)	50,800 (43,300 - 56,400)
Bulk Density (g/cm^3)	1.00 (0.998 - 1.00)	0.967 (0.956 - 0.978)	1.01 (0.996 - 1.03)	1.02 (1.01 - 1.05)	NR
Grain Size	Silt/Clay	Silt/Clay	Silt/Clay	Clay	NA
Percent Moisture	86.8 (81.2 - 95.0)	77.7 (74.3 - 81.1)	88.4 (87.5 - 89.1)	86.1 (84.5 - 87.5)	84.3 (82.8 - 86.1)
TSS (mg/L)	21,800 (1,240 - 57,100)	1,130 (200 - 2,050)	1,910 (870 - 3,760)	9,920 (880 - 23,800)	NR
Calculated Approximate Mass (g) per Jar per Day	1.3 (0.4 - 2.0)	3.0 (2.9 - 3.1)	5.4 (4.4 - 6.5)	3.7 (2.5 - 5.8)	2.4
Calculated Average Depth Accumulation (in) per Jar per Day	0.011 (0.005 - 0.015)	0.020 (0.019 - 0.022)	0.036 (0.028 - 0.041)	0.022 (0.012 - 0.032)	0.032 (0.019 - 0.038)

Notes:
dw - dry weight
g - gram
g/cm^3 - gram per cubic centimeter
in - inch
mg/kg - milligram per kilogran
mg/L - milligram per lite
n - number of samples collected per zone per event
NA - not analyzed due to insufficient quantity of sampl
NR - Results not reported; data validation is ongoing.
TOC - total organic carbon
TSS - total suspended solids
Zone 1 (North) - samples ST15, ST31
Zone 2 (Central) - samples ST13, ST14, ST16, ST21, ST28, ST29, ST32, ST33
Zone 3 (South) - samples ST17, ST19, ST20, ST22, ST23, ST24, ST25, ST26, ST27, ST30
A statistical analysis could not be performed for the average mass/day/jar before and after the water in the Basin was maintained at 6 feet NAVD 88 because because the sediment accumulatio likely exceeded the capacity of the jar
a - Water level maintained at a minimum of the value listec
b - Samples were collected from 9 sediment traps in February 2009. Three sediment traps were on the Basin bottom and were not sampled.
c - Samples were collected from 4 sediment traps in May 2009. Four traps were designated as wind traps during this event (ST14, ST17, ST19, and ST32). Four sediment traps were on the Basin bottom and were not sampled.
d - Samples were collected from 8 sediment traps in August 2009. Four sedimnet traps were designated as wind study traps during this event (ST14, ST17, ST19, and ST32).
e - Samples were collected from 10 sediment traps in February 2010. One sediment trap was found on the Basin bottom. The jars from one sediment trap could not be retrieved.
f - Not analyzed due to insufficient sample volume

PREPARED BY/DATE: RMR 5/5/2010
CHECKED BY/DATE: KPH 5/6/2010

TABLE 4-15

COARSE SEDIMENT CORE MERCURY ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	Beginning Depth (ft)	Ending Depth (ft)	Sample Date	Sample ID:	Mercury (mg/kg)
SDCR-1	0	1.2	06/03/2009	SDCR-1-CA-060309	121
SDCR-1	1.2	2.3	06/03/2009	SDCR-1-CB-060309	29.6
SDCR-1	2.3	3.5	06/03/2009	SDCR-1-CC-060309	51.6
SDCR-1	2.3	3.5	06/03/2009	SDCR1-C-FD-060309	53.7
SDCR-1	3.5	4.6	06/03/2009	SDCR-1-CD-060309	115
SDCR-1	4.6	5.8	06/03/2009	SDCR-1-CE-060309	22.2
SDCR-1	5.8	6.96	06/03/2009	SDCR-1-CF-060309	0.166
SDCR-2[a]	0	1	09/24/2009	SDCR2-CA-092409	18.9
SDCR-2[a]	1	2	09/24/2009	SDCR2-CB-092409	19
SDCR-2	1.5	2	09/24/2009	SDCR2-CC-092409	23
SDCR-2	2	3	09/24/2009	SDCR2-CD-092409	42
SDCR-2	3	4	09/24/2009	SDCR2-CE-092409	18
SDCR-2	4	5	09/24/2009	SDCR2-CF-092409	0.17
SDCR-2	5	6	09/24/2009	SDCR2-CG-092409	0.38
SDCR-2	6	7	09/24/2009	SDCR2-CH-092409	0.07
SDCR-2	7	8	09/24/2009	SDCR2-CI-092409	0.06
SDCR-2	8	9	09/24/2009	SDCR2-CJ-092409	0.057
SDCR-2	9	10	09/24/2009	SDCR2-CK-092409	0.055
SDCR-3	0	1	09/27/2009	SDCR3-CA-092709	76
SDCR-3[a]	1	2	09/27/2009	SDCR3-CB-092709	2.79
SDCR-3	1.5	2	09/27/2009	SDCR3-CC-092709	5.2
SDCR-3	2	3	09/27/2009	SDCR3-CD-092709	0.53
SDCR-3	3	4	09/27/2009	SDCR3-CE-092709	0.5
SDCR-3	4	5	09/27/2009	SDCR3-CF-092709	0.13
SDCR-3	5	6	09/27/2009	SDCR3-CG-092709	0.19
SDCR-3	6	7	09/27/2009	SDCR3-CH-092709	0.13
SDCR-3	7	8	09/27/2009	SDCR3-CI-092709	0.07
SDCR-3	8	9	09/27/2009	SDCR3-CJ-092709	0.074
SDCR-3	9	10	09/27/2009	SDCR3-CK-092709	0.14
SDCR-4	0	1	09/27/2009	SDCR4-CA-092709	23
SDCR-4	1	2	09/27/2009	SDCR4-CB-092709	16
SDCR-4	2	3	09/27/2009	SDCR4-CC-092709	230
SDCR-4	3	4	09/27/2009	SDCR4-CD-092709	64
SDCR-4	4	5	09/27/2009	SDCR4-CE-092709	17
SDCR-4	5	6	09/27/2009	SDCR4-CF-092709	1.7
SDCR-4	6	7	09/27/2009	SDCR4-CG-092709	0.69
SDCR-4	7	8	09/27/2009	SDCR4-CH-092709	0.43
SDCR-4	8	9	09/27/2009	SDCR4-CI-092709	0.11
SDCR-5	0	1	09/27/2009	SDCR5-CA-092709	20
SDCR-5	1	2	09/27/2009	SDCR5-CB-092709	18
SDCR-5	2	3	09/27/2009	SDCR5-CC-092709	19
SDCR-5	3	4	09/27/2009	SDCR5-CD-092709	300
SDCR-5	4	5	09/27/2009	SDCR5-CE-092709	96
SDCR-5	5	6	09/27/2009	SDCR5-CF-092709	120
SDCR-5	6	7	09/27/2009	SDCR5-CG-092709	9
SDCR-5	7	8	09/27/2009	SDCR5-CH-092709	1
SDCR-5	8	9	09/27/2009	SDCR5-CI-092709	0.55

TABLE 4-15

COARSE SEDIMENT CORE MERCURY ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	Beginning Depth (ft)	Ending Depth (ft)	Sample Date	Sample ID:	Mercury (mg/kg)	
SDCR-6	0	1	09/27/2009	SDCR6-CA-092709	61	
SDCR-6	1	2	09/27/2009	SDCR6-CB-092709	52	
SDCR-6	2	3	09/27/2009	SDCR6-CC-092709	1.5	
SDCR-6	3	4	09/27/2009	SDCR6-CD-092709	1.7	
SDCR-6	4	5	09/27/2009	SDCR6-CE-092709	0.64	
SDCR-6	5	6	09/27/2009	SDCR6-CF-092709	0.49	
SDCR-6	6	7	09/27/2009	SDCR6-CG-092709	0.06	
SDCR-6	7	8	09/27/2009	SDCR6-CH-092709	0.073	
SDCR-7	0	1	09/27/2009	SDCR7-CA-092709	88	
SDCR-7	1	2	09/27/2009	SDCR7-CB-092709	2.6	
SDCR-7	2	3	09/27/2009	SDCR7-CC-092709	0.55	
SDCR-7	3	4	09/27/2009	SDCR7-CD-092709	0.16	
SDCR-7	4	5	09/27/2009	SDCR7-CE-092709	0.076	
SDCR-7	5	6	09/27/2009	SDCR7-CF-092709	0.018	JQ
SDCR-7	6	7	09/27/2009	SDCR7-CG-092709	0.063	
SDCR-7	7	8	09/27/2009	SDCR7-CH-092709	0.059	
SDCR-8[a]	0	1	09/28/2009	SDCR8-CA-092809	23	
SDCR-8[a]	1	2	09/28/2009	SDCR8-CB-092809	27	
SDCR-8	1.5	2	09/28/2009	SDCR8-CC-092809	39	
SDCR-8	2	3	09/28/2009	SDCR8-CD-092809	24	
SDCR-8	3	4	09/28/2009	SDCR8-CE-092809	15	
SDCR-8	4	5	09/28/2009	SDCR8-CF-092809	94	
SDCR-8	5	6	09/28/2009	SDCR8-CG-092809	440	
SDCR-8	6	7	09/28/2009	SDCR8-CH-092809	120	
SDCR-8	7	8	09/28/2009	SDCR8-CI-092809	120	
SDCR-8	8	9	09/28/2009	SDCR8-CJ-092809	230	
SDCR-8	9	10	09/28/2009	SDCR8-CK-092809	170	
SDCR-8	10	11	09/28/2009	SDCR8-CL-092809	63	
SDCR-9	0	1	09/26/2009	SDCR9-CA-092609	120	J
SDCR-9	1	2	09/26/2009	SDCR9-CB-092609	170	
SDCR-9	2	3	09/26/2009	SDCR9-CC-092609	15	
SDCR-9	3	4	09/26/2009	SDCR9-CD-092609	3.1	
SDCR-9	4	5	09/26/2009	SDCR9-CE-092609	0.25	
SDCR-9	5	6	09/26/2009	SDCR9-CF-092609	0.14	
SDCR-10	0	1	09/26/2009	SDCR10-CA-092609	19	
SDCR-10	1	2	09/26/2009	SDCR10-CB-092609	25	
SDCR-10	2	3	09/26/2009	SDCR10-CC-092609	24	
SDCR-10	3	4	09/26/2009	SDCR10-CD-092609	30	
SDCR-10	4	5	09/26/2009	SDCR10-CE-092609	2.6	J
SDCR-10	5	6	09/26/2009	SDCR10-CF-092609	0.35	
SDCR-11[a]	0	1	09/26/2009	SDCR11-CA-092609	90.3	
SDCR-11[a]	1	2	09/26/2009	SDCR11-CB-092609	23.1	
SDCR-11	1.5	2	09/26/2009	SDCR11-CC-092609	0.14	
SDCR-11	2	3	09/26/2009	SDCR11-CD-092609	0.13	J
SDCR-11	3	4	09/26/2009	SDCR11-CE-092609	1.3	
SDCR-11	4	5	09/26/2009	SDCR11-CF-092609	0.066	

TABLE 4-15

COARSE SEDIMENT CORE MERCURY ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	Beginning Depth (ft)	Ending Depth (ft)	Sample Date	Sample ID:	Mercury (mg/kg)
SDCR-12[a]	0	1	09/25/2009	SDCR12-CA-092509	33.3
SDCR-12[a]	1	2	09/25/2009	SDCR12-CB-092509	0.38
SDCR-12	1.5	2	09/25/2009	SDCR12-CC-092509	0.38
SDCR-12	2	3	09/25/2009	SDCR12-CD-092509	0.68
SDCR-12	3	4	09/25/2009	SDCR12-CE-092509	0.17
SDCR-12	4	5	09/25/2009	SDCR12-CF-092509	0.094
SDCR-12	5	6	09/25/2009	SDCR12-CG-092509	0.088
SDCR-13	0	1	09/26/2009	SDCR13-CA-092609	18
SDCR-13	1	2	09/26/2009	SDCR13-CB-092609	0.3
SDCR-13	2	3	09/26/2009	SDCR13-CC-092609	0.27
SDCR-13	3	4	09/26/2009	SDCR13-CD-092609	0.17
SDCR-13	4	5	09/26/2009	SDCR13-CE-092609	0.092

Notes:

[a]Value calculated as weighted avereage using fine section core data.

ft - feet

J - estimated; based on QC data

JQ - estimated; constituent was detected between the reporting limit and the method detection lim

mg/kg - milligrams per kilogram

PREPARED BY/DATE: KPH 01/24/2011

CHECKED BY/DATE: ELF 01/24/2011

TABLE 4-17

COARSE SEDIMENT CORE HEXACHLOROBENZENE ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	Beginning Depth (ft)	Ending Depth (ft)	Sample Date	Sample ID:	Hexachlorobenzene (mg/kg)	
SDCR-1	0	1.2	06/03/2009	SDCR-1-CA-060309	1.3	
SDCR-1	1.2	2.3	06/03/2009	SDCR-1-CB-060309	0.0153	J
SDCR-1	2.3	3.5	06/03/2009	SDCR-1-CC-060309	0.0055	
SDCR-1	2.3	3.5	06/03/2009	SDCR1-C-FD-060309	0.005	
SDCR-1	3.5	4.6	06/03/2009	SDCR-1-CD-060309	<0.0031	
SDCR-1	4.6	5.8	06/03/2009	SDCR-1-CE-060309	<0.0028	
SDCR-1	5.8	6.96	06/03/2009	SDCR-1-CF-060309	0.0036	
SDCR-2	0	1	09/24/2009	SDCR2-CA-092409	330	
SDCR-2	1	2	09/24/2009	SDCR2-CB-092409	320	
SDCR-2	1.5	2	09/24/2009	SDCR2-CC-092409	NA	
SDCR-2	2	3	09/24/2009	SDCR2-CD-092409	120	
SDCR-2	3	4	09/24/2009	SDCR2-CE-092409	9.9	
SDCR-2	4	5	09/24/2009	SDCR2-CF-092409	0.25	
SDCR-2	5	6	09/24/2009	SDCR2-CG-092409	0.46	
SDCR-2	6	7	09/24/2009	SDCR2-CH-092409	0.031	
SDCR-2	7	8	09/24/2009	SDCR2-CI-092409	<0.022	
SDCR-2	8	9	09/24/2009	SDCR2-CJ-092409	<0.022	
SDCR-2	9	10	09/24/2009	SDCR2-CK-092409	<0.022	
SDCR-3	0	1	09/27/2009	SDCR3-CA-092709	<0.034	
SDCR-3	1	2	09/27/2009	SDCR3-CB-092709	<0.035	
SDCR-3	1.5	2	09/27/2009	SDCR3-CC-092709	NA	
SDCR-3	2	3	09/27/2009	SDCR3-CD-092709	<0.0072	
SDCR-3	3	4	09/27/2009	SDCR3-CE-092709	<0.026	
SDCR-3	4	5	09/27/2009	SDCR3-CF-092709	<0.0068	
SDCR-3	5	6	09/27/2009	SDCR3-CG-092709	<0.025	
SDCR-3	6	7	09/27/2009	SDCR3-CH-092709	<0.025	
SDCR-3	7	8	09/27/2009	SDCR3-CI-092709	<0.024	
SDCR-3	8	9	09/27/2009	SDCR3-CJ-092709	<0.023	
SDCR-3	9	10	09/27/2009	SDCR3-CK-092709	<0.021	
SDCR-8	0	1	09/28/2009	SDCR8-CA-092809	<0.11	
SDCR-8	1	2	09/28/2009	SDCR8-CB-092809	0.11	
SDCR-8	1.5	2	09/28/2009	SDCR8-CC-092809	NA	
SDCR-8	2	3	09/28/2009	SDCR8-CD-092809	<0.051	
SDCR-8	3	4	09/28/2009	SDCR8-CE-092809	<0.048	
SDCR-8	4	5	09/28/2009	SDCR8-CF-092809	0.093	
SDCR-8	5	6	09/28/2009	SDCR8-CG-092809	0.62	
SDCR-8	6	7	09/28/2009	SDCR8-CH-092809	0.51	
SDCR-8	7	8	09/28/2009	SDCR8-CI-092809	0.29	
SDCR-8	8	9	09/28/2009	SDCR8-CJ-092809	<6.4	
SDCR-8	9	10	09/28/2009	SDCR8-CK-092809	<0.26	
SDCR-8	10	11	09/28/2009	SDCR8-CL-092809	NA	

Notes:
ft - feet
J - estimated; based on QC data
mg/kg - milligrams per kilogram
NA - not analyzed
< - less than the reporting limit

PREPARED BY/DATE: MBR 4/22/10
CHECKED BY/DATE: AWM 4/22/10

TABLE 4-18

COARSE SEDIMENT CORE DDTR ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	Beginning Depth (ft)	Ending Depth (ft)	Sample Date	Sample ID:	2,4'-DDD mg/kg	2,4'-DDE mg/kg	2,4'-DDT mg/kg	4,4'-DDD mg/kg	4,4'-DDE mg/kg	4,4'-DDT mg/kg	DDTR mg/kg	DDTr mg/kg
SDCR-3	0	1	09/27/2009	SDCR3-CA-092709	0.11	0.31	<0.034	0.44	<0.034	<0.034	0.86	0.44
SDCR-3	1	2	09/27/2009	SDCR3-CB-092709	<0.035	<0.035	<0.035	0.33	<0.035	<0.035	0.33	0.33
SDCR-3	1.5	2	09/27/2009	SDCR3-CC-092709	NA	NA	NA	NA	NA	NA	NA	NA
SDCR-3	2	3	09/27/2009	SDCR3-CD-092709	<0.0072	<0.0072	<0.0072	0.0041 JQ	<0.0072	<0.0072	0.0041	0.0041
SDCR-3	3	4	09/27/2009	SDCR3-CE-092709	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026
SDCR-3	4	5	09/27/2009	SDCR3-CF-092709	<0.0068	<0.0068	<0.0068	0.0023 JQ	<0.0068	<0.0068	0.0023	0.0023
SDCR-3	5	6	09/27/2009	SDCR3-CG-092709	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
SDCR-3	6	7	09/27/2009	SDCR3-CH-092709	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
SDCR-3	7	8	09/27/2009	SDCR3-CI-092709	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024
SDCR-3	8	9	09/27/2009	SDCR3-CJ-092709	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023
SDCR-3	9	10	09/27/2009	SDCR3-CK-092709	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021
SDCR-8	0	1	09/28/2009	SDCR8-CA-092809	<0.11	<0.11	<0.11	0.094 JQ	<0.11	<0.11	0.094	0.094
SDCR-8	1	2	09/28/2009	SDCR8-CB-092809	0.049 JQ	0.15	0.013 JQ	0.094	<0.05	<0.05	0.306	0.094
SDCR-8	1.5	2	09/28/2009	SDCR8-CC-092809	NA	NA	NA	NA	NA	NA	NA	NA
SDCR-8	2	3	09/28/2009	SDCR8-CD-092809	<0.051	0.23	<0.051	<0.051	<0.051	<0.051	0.23	<0.051
SDCR-8	3	4	09/28/2009	SDCR8-CE-092809	0.069	0.93	<0.048	0.42	0.58	<0.048	1.999	1
SDCR-8	4	5	09/28/2009	SDCR8-CF-092809	<0.048	1.5	<0.048	<0.048	<0.048	<0.048	1.5	<0.048
SDCR-8	5	6	09/28/2009	SDCR8-CG-092809	<0.39	2.3	<0.39	<0.39	2	<0.39	4.3	2
SDCR-8	6	7	09/28/2009	SDCR8-CH-092809	0.58	1.1	<0.24	<0.24	0.79	<0.24	2.47	0.79
SDCR-8	7	8	09/28/2009	SDCR8-CI-092809	0.53	1.6	0.12 JQ	<0.25	1	<0.25	3.25	1
SDCR-8	8	9	09/28/2009	SDCR8-CJ-092809	<6.4	17	<6.4	2.2 JQ	15	<6.4	34.2	17.2
SDCR-8	9	10	09/28/2009	SDCR8-CK-092809	0.48	1.1	<0.26	0.56	1.1	<0.26	3.24	1.66
SDCR-8	10	11	09/28/2009	SDCR8-CL-092809	0.088 J	0.48 J	<0.065 J	0.093 J	0.36 J	<0.065 J	1.021	0.453
SDCR-9	0	1	09/26/2009	SDCR9-CA-092609	0.6 J	0.96 J	<0.13	<0.13	<0.13	<0.13	1.56	<0.13
SDCR-9	1	2	09/26/2009	SDCR9-CB-092609	0.55	0.4	0.038 JQ	0.0048 JQ	<0.045	0.021 JQ	1.01	0.0258
SDCR-9	2	3	09/26/2009	SDCR9-CC-092609	0.0087 JQ	<0.0091	<0.0091	0.016	<0.0091	<0.0091	0.0247	0.016
SDCR-9	3	4	09/26/2009	SDCR9-CD-092609	<0.0080	<0.0080	<0.0080	0.021	<0.008	<0.0080	0.021	0.021
SDCR-9	4	5	09/26/2009	SDCR9-CE-092609	<0.0077	<0.0077	<0.0077	0.0032 JQ	<0.0077	<0.0077	0.0032	0.0032
SDCR-9	5	6	09/26/2009	SDCR9-CF-092609	<0.0074 J	<0.0074 J	<0.0074 J	<0.0074 J	<0.0074 J	<0.0074 J	<0.0074	<0.0074
SDCR-13	0	1	09/26/2009	SDCR13-CA-092609	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051
SDCR-13	1	2	09/26/2009	SDCR13-CB-092609	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
SDCR-13	2	3	09/26/2009	SDCR13-CC-092609	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012
SDCR-13	3	4	09/26/2009	SDCR13-CD-092609	<0.037	<0.037	<0.037	<0.037	<0.037	<0.037	<0.037	<0.037
SDCR-13	4	5	09/26/2009	SDCR13-CE-092609	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016

Notes:

DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethylene
DDT - dichlorodiphenyltrichloroethane
DDTR - sum of 2,4' and 4,4' isomers
DDTr - sum of 4,4' isomers
ft - feet

J - estimated; based on QC data
JQ - estimated; constituent was detected between the reporting limit and the method detection limit
mg/kg - milligrams per kilogram
NA - not analyzed
< - less than the reporting limit

PREPARED BY/DATE: MBR 4/22/10
CHECKED BY/DATE: AWM 4/22/10

TABLE 4-20

FINE SEDIMENT CORE ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	Beginning Depth (in)	Ending Depth (in)	Sample Date	Sample ID:	Mercury mg/kg	Methylmercury mg/kg	Percent Methylmercury	Percent Moisture %	Percent Solids %	Total Organic Carbon (TOC) mg/kg
SDCR-1	0	2.4	06/03/2009	SDCR-1-FA-060309	46.7	0.00672	0.01%	NA	NA	10700
SDCR-1	2.4	4.8	06/03/2009	SDCR-1-FB-060309	128	0.00675	0.01%	NA	NA	4330
SDCR-1	4.8	9.6	06/03/2009	SDCR-1-FC-060309	96.6	0.00254	0.00%	NA	NA	5100
SDCR-1	9.6	14.4	06/03/2009	SDCR-1-FD-060309	36.6	0.00482	0.01%	NA	NA	3410
SDCR-1	14.4	21.6	06/03/2009	SDCR-1-FE-060309	17.6	0.00148	0.01%	NA	NA	1320
SDCR-2	0	2	09/23/2009	SDCR2-FSA-092309	2.5	0.00136	0.05%	27	73	3300
SDCR-2	2	4	09/23/2009	SDCR2-FSB-092309	7.7	0.00117	0.02%	23	77	1600 JQ
SDCR-2	4	8	09/23/2009	SDCR2-FSC-092309	28	0.0167	0.06%	33	67	5900
SDCR-2	8	12	09/23/2009	SDCR2-FSD-092309	24	0.0132	0.06%	37	63	3100
SDCR-2	12	18	09/23/2009	SDCR2-FSE-092309	15	0.00405	0.03%	30	70	2500
SDCR-3	0	2	09/23/2009	SDCR3-FSA-092309	29	0.00373	0.01%	67	33	14000
SDCR-3	2	4	09/23/2009	SDCR3-FSB-092309	110	0.00566	0.01%	58	42	14000
SDCR-3	4	8	09/23/2009	SDCR3-FSC-092309	0.41 (A)	0.0131	--	61	39	9000
SDCR-3	8	12	09/23/2009	SDCR3-FSD-092309	30	0.00818	0.03%	60	40	14000
SDCR-3	12	18	09/23/2009	SDCR3-FSE-092309	0.37 J	0.000308	0.08%	54	46	13000
SDCR-8	0	2	09/24/2009	SDCR8-FSA-092409	24	0.00446	0.02%	78	22	23000
SDCR-8	2	4	09/24/2009	SDCR8-FSB-092409	26	0.00436	0.02%	76	24	21000
SDCR-8	4	8	09/24/2009	SDCR8-FSC-092409	26	0.00321	0.01%	72	28	22000
SDCR-8	8	12	09/24/2009	SDCR8-FSD-092409	18	0.00313	0.02%	68	32	20000
SDCR-8	12	18	09/24/2009	SDCR8-FSE-092409	15	0.00271	0.02%	74	26	19000
SDCR-11	0	2	09/25/2009	SDCR11-FSA-092509	33	0.00579	0.02%	79	21	31000
SDCR-11	2	4	09/25/2009	SDCR11-FSB-092509	40	0.0068	0.02%	73	27	25000
SDCR-11	4	8	09/25/2009	SDCR11-FSC-092509	36	0.00589	0.02%	70	30	24000
SDCR-11	8	12	09/25/2009	SDCR11-FSD-092509	200	0.014	0.01%	66	34	16000
SDCR-11	12	18	09/25/2009	SDCR11-FSE-092509	46 J	0.00369	0.01%	61	39	18000
SDCR-12	0	2	09/25/2009	SDCR12-FSA-092509	12	0.00324	0.03%	85	15	38000
SDCR-12	2	4	09/25/2009	SDCR12-FSB-092509	17	0.00282	0.02%	78	22	34000
SDCR-12	4	8	09/25/2009	SDCR12-FSC-092509	19	0.00189	0.01%	77	23	33000
SDCR-12	8	12	09/25/2009	SDCR12-FSD-092509	67	0.006	0.01%	74	26	27000
SDCR-12	12	18	09/25/2009	SDCR12-FSE-092509	0.38	0.000222 JB	0.06%	67	33	21000

Notes:
(A) - anomalous data point
in - inch
mg/kg - milligram per kilogram
% - percent
J - estimated; based on QC data
JB - estimated; possibly biased high or false positive based on blank data
JQ - estimated; constituent was detected between the reporting limit and the method detection limit
NA - not analyzed

PREPARED BY/DATE: RMR 4/5/2010
CHECKED BY/DATE: AES 4/5/2010

TABLE 4-21

POREWATER ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	Beginning Depth (in.)	Ending Depth (in.)	Sample Date	Sample ID:	Dissolved Organic Carbon mg/L		Mercury µg/L		Methylmercury µg/L		Percent Methylmercury
SDCR-1	0	2	9/23/2009	SDPW1-0-2-0909	NA		23.3 (A)		0.00673		0.03%
SDCR-1	2	4	9/23/2009	SDPW1-2-4-0909	NA		4.7		0.00359		0.08%
SDCR-1	4	8	9/23/2009	SDPW1-4-8-0909	(B)		1.93		0.00495		0.26%
SDCR-1	8	12	9/23/2009	SDPW1-8-12-0909	NA		1.49		0.00157		0.11%
SDCR-1	12	18	9/23/2009	SDPW1-12-18-0909	NA		0.687		0.00264		0.38%
SDCR-1	0	4	10/26/2009	SDPW1-0-4-0909	31	J	NA		NA		--
SDCR-1	4	8	9/23/2009	SDPW1-4-8-0909	26		1.93		0.00495		0.26%
SDCR-1	8	18	10/26/2009	SDPW1-8-18-0909	37	J	NA		NA		--
SDCR-2	0	2	9/23/2009	SDPW2-0-2-0909	NA		10.5 (A)		0.00426		--
SDCR-2	2	4	9/23/2009	SDPW2-2-4-0909	NA		0.942		0.00218		0.23%
SDCR-2	4	8	9/23/2009	SDPW2-4-8-0909	(B)		1.34		0.00427		0.32%
SDCR-2	8	12	9/23/2009	SDPW2-8-12-0909	NA		0.672		0.00409		0.61%
SDCR-2	12	18	9/23/2009	SDPW2-12-18-0909	NA		0.642		0.00559		0.87%
SDCR-2	0	4	10/26/2009	SDPW2-0-4-0909	42		NA		NA		--
SDCR-2	4	8	9/23/2009	SDPW2-4-8-0909	20		(B)		(B)		--
SDCR-2	8	18	10/26/2009	SDPW2-8-18-0909	19		NA		NA		--
SDCR-3	0	2	9/23/2009	SDPW3-0-2-0909	NA		0.107		0.000652		0.61%
SDCR-3	2	4	9/23/2009	SDPW3-2-4-0909	NA		0.3		0.000823		0.27%
SDCR-3	4	8	9/23/2009	SDPW3-4-8-0909	(B)	J	0.176		0.000932		0.53%
SDCR-3	8	12	9/23/2009	SDPW3-8-12-0909	NA		0.221		0.0036		1.63%
SDCR-3	12	18	9/23/2009	SDPW3-12-18-0909	NA		0.038		0.000456		1.20%
SDCR-3	0	4	10/26/2009	SDPW3-0-4-0909	33		NA		NA		--
SDCR-3	4	8	9/23/2009	SDPW3-4-8-0909	31	J	(B)		(B)		--
SDCR-3	8	18	10/26/2009	SDPW3-8-18-0909	42		NA		NA		--
SDCR-8	0	2	9/24/2009	SDPW8-0-2-0909	NA		0.067		0.00123		1.84%
SDCR-8	2	4	9/24/2009	SDPW8-2-4-0909	NA		0.0667		0.000584		0.88%
SDCR-8	4	8	9/24/2009	SDPW8-4-8-0909	(B)		0.0843		0.000725		0.86%
SDCR-8	8	12	9/24/2009	SDPW8-8-12-0909	NA		0.0894		0.000959		1.07%
SDCR-8	12	18	9/24/2009	SDPW8-12-18-0909	NA		0.0499		0.000409		0.82%
SDCR-8	0	4	10/26/2009	SDPW8-0-4-0909	120		NA		NA		--
SDCR-8	4	8	9/24/2009	SDPW8-4-8-0909	150		(B)		(B)		--
SDCR-8	8	18	10/26/2009	SDPW8-8-18-0909	85		NA		NA		--
SDCR-11	0	2	9/25/2009	SDPW11-0-2-0909	NA		0.105	J	0.000861		0.82%
SDCR-11	2	4	9/25/2009	SDPW11-2-4-0909	NA		0.05	J	0.000625		1.25%
SDCR-11	4	8	9/25/2009	SDPW11-4-8-0909	(B)		0.0491	J	0.000687	J	1.40%
SDCR-11	8	12	9/25/2009	SDPW11-8-12-0909	NA		10.3 (A)	J	0.00312		--
SDCR-11	12	18	9/25/2009	SDPW11-12-18-0909	NA		0.741	J	0.00178		0.24%
SDCR-11	0	4	10/26/2009	SDPW11-0-4-0909	61		NA		NA		--
SDCR-11	4	8	9/25/2009	SDPW11-4-8-0909	36		(B)		(B)		--
SDCR-11	8	18	10/26/2009	SDPW11-8-18-0909	48		NA		NA		--

TABLE 4-21

POREWATER ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	Beginning Depth (in.)	Ending Depth (in.)	Sample Date	Sample ID:	Dissolved Organic Carbon mg/L	Mercury µg/L		Methylmercury µg/L	Percent Methylmercury
SDCR-12	0	2	9/25/2009	SDPW12-0-2-0909	NA	0.0254		0.000636	2.50%
SDCR-12	2	4	9/25/2009	SDPW12-2-4-0909	NA	0.0137		0.000436	3.18%
SDCR-12	4	8	9/25/2009	SDPW12-4-8-0909	(B)	0.0173		0.000179	1.03%
SDCR-12	8	12	9/25/2009	SDPW12-8-12-0909	NA	0.307	J	0.00105	0.34%
SDCR-12	12	18	9/25/2009	SDPW12-12-18-0909	NA	0.0101		0.000121	1.20%
SDCR-12	0	4	10/26/2009	SDPW12-0-4-0909	54	NA		NA	--
SDCR-12	4	8	9/25/2009	SDPW12-4-8-0909	55	(B)		(B)	--
SDCR-12	8	18	10/26/2009	SDPW12-8-18-0909	62	NA		NA	--

Notes:
(A) - anomalous data points
(B) - data presented in alternate location within table
in- inch
µg/l - micrograms per liter
mg/l - milligrams per liter
J - estimated; based on QC data
JB - estimated; possibly biased high or false positive based on blank data
NA - not analyzed

PREPARED BY/DATE: RMR 4/5/2010
CHECKED BY/DATE: AES 4/5/2010

TABLE 4-22

POREWATER AND FINE SEDIMENT CORE ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	Beginning Depth (in)	Ending Depth (in)	Sediment Core Mercury mg/kg		Sediment Core Methylmercury mg/kg		Porewater Mercury µg/L		Porewater Methylmercury µg/L	
SDCR-1	0	2	46.7		0.00672		23.3 (A)		0.00673	
SDCR-1	2	4	128		0.00675		4.7		0.00359	
SDCR-1	4	8	96.6		0.00254		1.93		0.00495	
SDCR-1	8	12	36.6		0.00482		1.49		0.00157	
SDCR-1	12	18	17.6		0.00148		0.687		0.00264	
SDCR-2	0	2	2.5		0.00136		10.5 (A)		0.00426	
SDCR-2	2	4	7.7		0.00117		0.942		0.00218	
SDCR-2	4	8	28		0.0167		1.34		0.00427	
SDCR-2	8	12	24		0.0132		0.672		0.00409	
SDCR-2	12	18	15		0.00405		0.642		0.00559	
SDCR-3	0	2	29		0.00373		0.107		0.000652	
SDCR-3	2	4	110		0.00566		0.3		0.000823	
SDCR-3	4	8	0.41 (A)		0.0131		0.176		0.000932	
SDCR-3	8	12	30		0.00818		0.221		0.0036	
SDCR-3	12	18	0.37	J	0.000308		0.038		0.000456	
SDCR-8	0	2	24		0.00446		0.067		0.00123	
SDCR-8	2	4	26		0.00436		0.0667		0.000584	
SDCR-8	4	8	26		0.00321		0.0843		0.000725	
SDCR-8	8	12	18		0.00313		0.0894		0.000959	
SDCR-8	12	18	15		0.00271		0.0499		0.000409	
SDCR-11	0	2	33		0.00579		0.105	J	0.000861	
SDCR-11	2	4	40		0.0068		0.05	J	0.000625	
SDCR-11	4	8	36		0.00589		0.0491	J	0.000687	J
SDCR-11	8	12	200		0.014		10.3 (A)	J	0.00312	
SDCR-11	12	18	46	J	0.00369		0.741	J	0.00178	
SDCR-12	0	2	12		0.00324		0.0254		0.000636	
SDCR-12	2	4	17		0.00282		0.0137		0.000436	
SDCR-12	4	8	19		0.00189		0.0173		0.000179	
SDCR-12	8	12	67		0.006		0.307	J	0.00105	
SDCR-12	12	18	0.38		0.000222	JB	0.0101		0.000121	

Notes:
(A) - anomalous data points
in - inch
µg/L - micrograms per liter
mg/kg - milligram per kilogram
J - estimated; based on QC data
JB - estimated; possibly biased high or false positive based on blank data

PREPARED BY/DATE: AWM 4/22/10
CHECKED BY/DATE: LMS 4/22/10

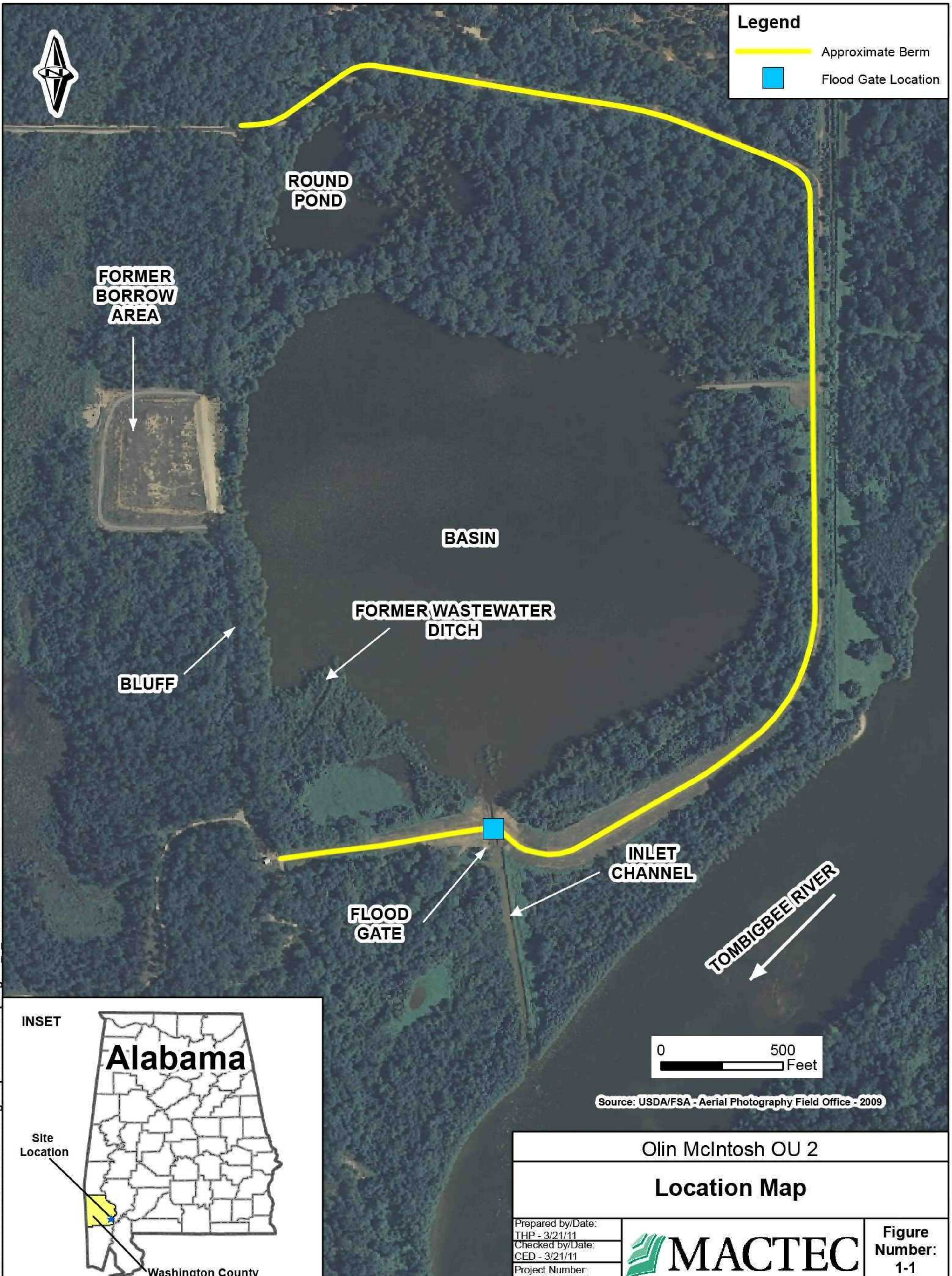
TABLE 4-23

28-DAY BIOACCUMULATION STUDY
COMPARISON OF BASELINE AND YEAR 1 RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Corbicula Sample ID	*Corbicula* Mercury Tissue Concentration (mg/kg wet weight)		*Corbicula* Methylmercury Tissue Concentration (mg/kg		Percentage Methylmercury in *Corbicula Tissue*		Associated Sediment Sample Location	Sediment Mercury Concentration (mg/kg)		Sediment Methylmercury Concentration (mg/kg)	
	2006	**2008**	**2006**	**2008**	**2006**	**2008**		**2006**	**2008**	**2006**	**2008**
Pre-placement Average	0.034	0.033	0.011	0.00515	32%	16%	-		-	–	-
CAGE1	0.4	0.25	0.12	0.104	30%	42%	OU2B-SED-104D	19.8	50.8	0.00903	0.00775
CAGE2	0.27	0.8	0.05	0.0931	19%	12%	OU2B-SED-202D	19.8	104	0.00491	0.00851
CAGE3	0.35	0.9	0.04	0.0813	11%	9%	OU2B-SED-201C	51.8	50.3	0.00804	0.00983
CAGE4	0.27	0.56	0.11	0.0782	41%	14%	OU2B-SED-302C	27.1	3.46	0.00328	0.00206
CAGE5	0.28	0.29	0.11	0.0830	39%	29%	OU2B-SED-004C	25.8	37.8	0.00623	0.00517
Average Concentration	0.27	0.47	0.0735	0.0741				28.9	49.4	0.00630	0.00666

Notes:
mg/kg - milligram per kilogram
% - percent
Results for sediment locations ending in "D" are an average of the five discrete samples collected at that location.

PREPARED BY/DATE: AES 4/20/10
CHECKED BY/DATE: MBR 4/21/10

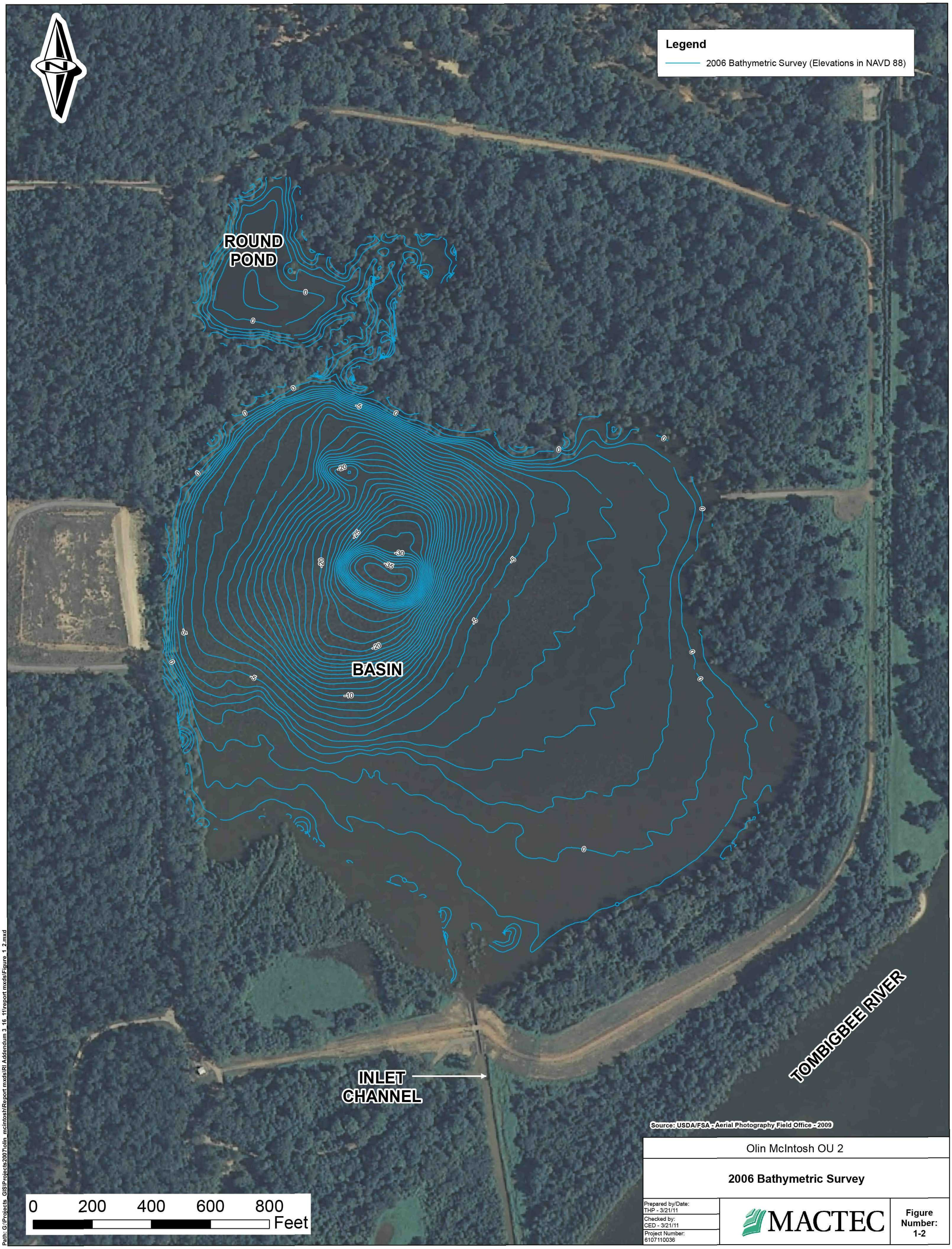


Olin McIntosh OU 2

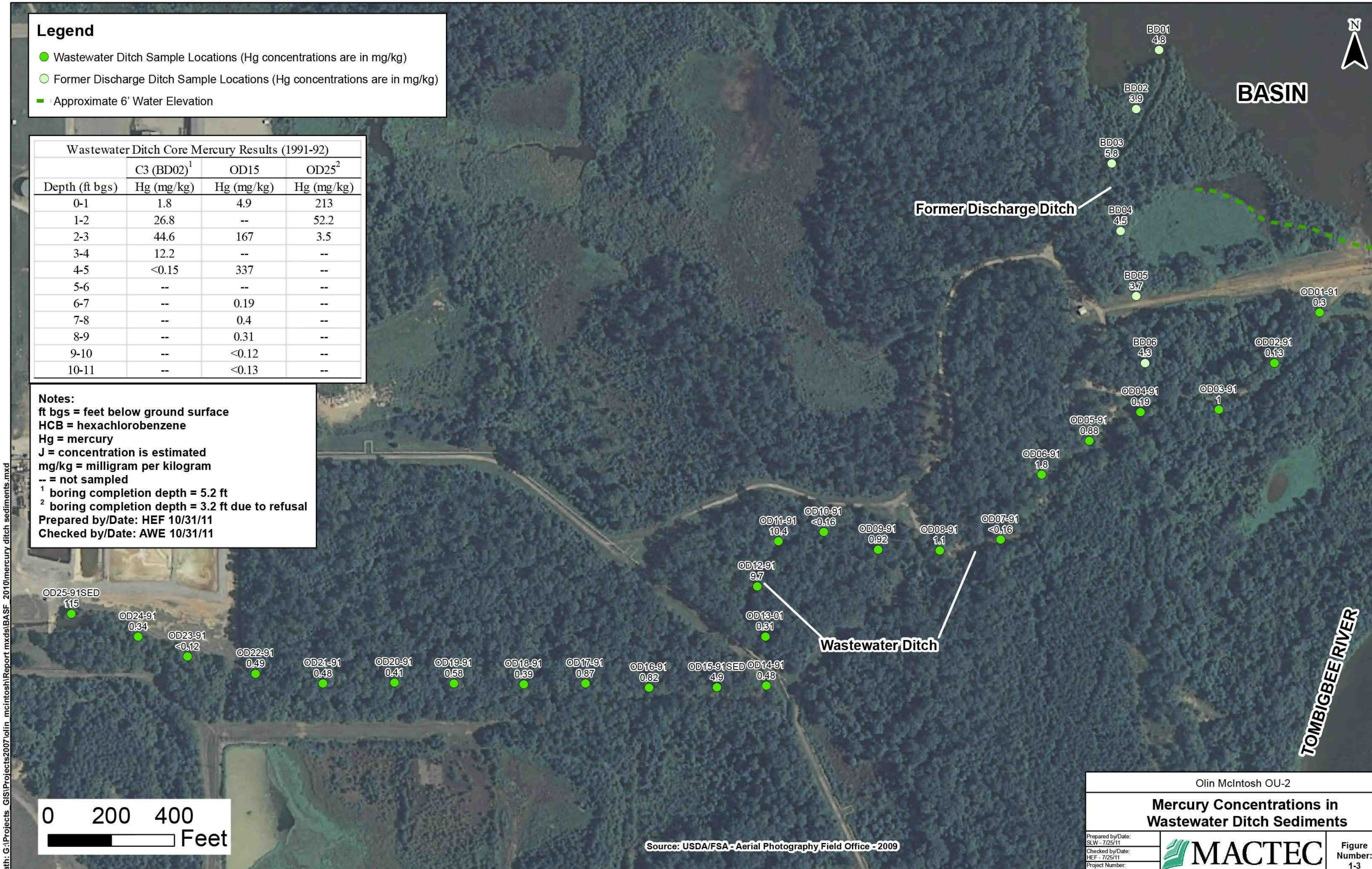
Location Map

Prepared by/Date: THP - 3/21/11	MACTEC	Figure Number: 1-1
Checked by/Date: CED - 3/21/11		
Project Number: 6107110036		

Path: C:\Documents and Settings\thparks\Desktop\Figure 1 1.mxd



Path: G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\RI Addendum 3_16_11\report mxds\Figure_1_2.mxd



Wastewater Ditch Core Mercury Results (1991-92)

	C3 (BD02)[1]	OD15	OD25[2]
Depth (ft bgs)	Hg (mg/kg)	Hg (mg/kg)	Hg (mg/kg)
0-1	1.8	4.9	213
1-2	26.8	--	52.2
2-3	44.6	167	3.5
3-4	12.2	--	--
4-5	<0.15	337	--
5-6	--	--	--
6-7	--	0.19	--
7-8	--	0.4	--
8-9	--	0.31	--
9-10	--	<0.12	--
10-11	--	<0.13	--

Notes:
ft bgs = feet below ground surface
HCB = hexachlorobenzene
Hg = mercury
J = concentration is estimated
mg/kg = milligram per kilogram
-- = not sampled
[1] boring completion depth = 5.2 ft
[2] boring completion depth = 3.2 ft due to refusal
Prepared by/Date: HEF 10/31/11
Checked by/Date: AWE 10/31/11

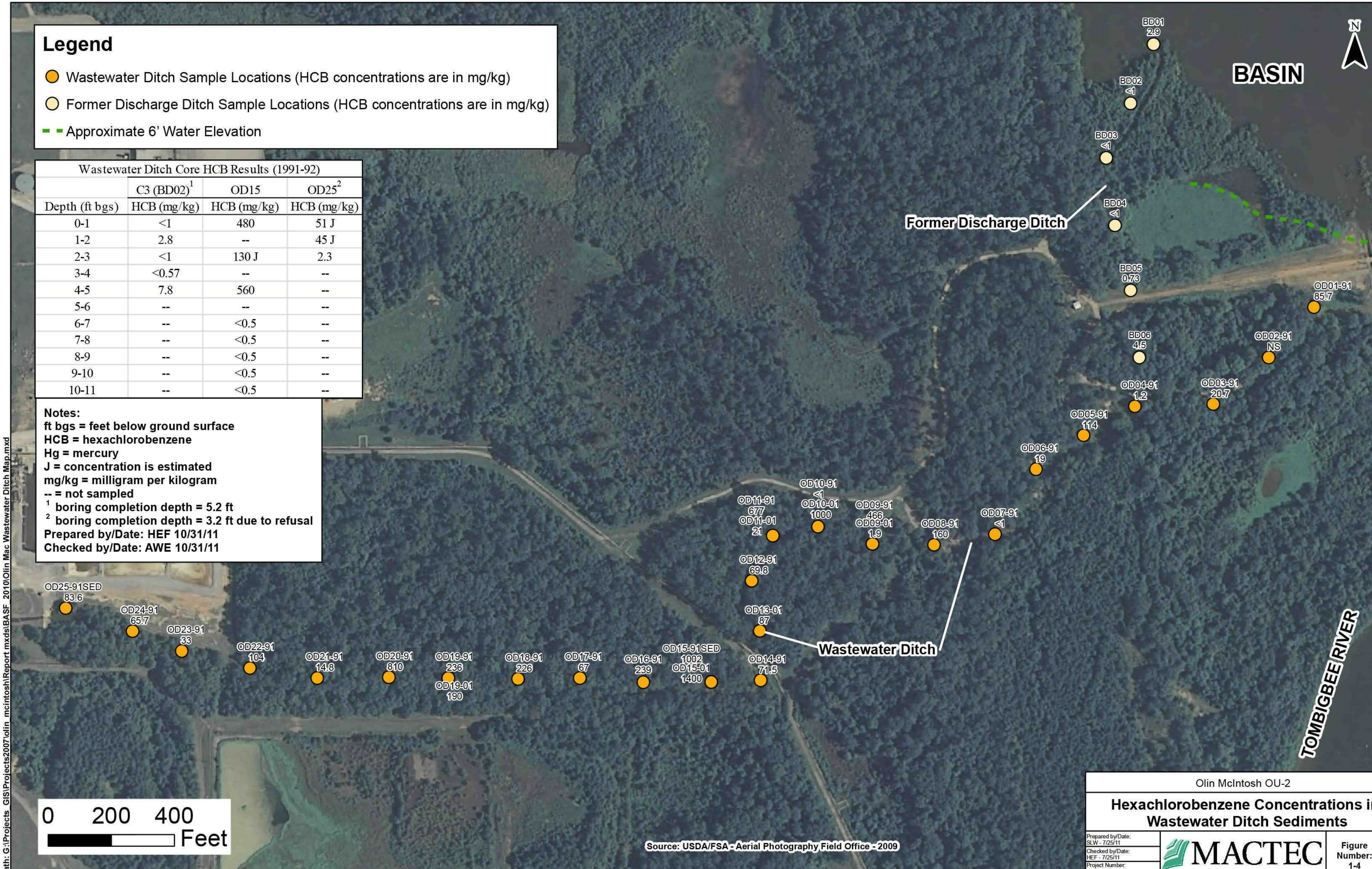
Olin McIntosh OU-2

Mercury Concentrations in Wastewater Ditch Sediments

Prepared by/Date: SLW - 7/25/11
Checked by/Date: HEF - 7/25/11
Project Number: 6107110036

MACTEC

Figure Number: 1-3



Legend

- Wastewater Ditch Sample Locations (HCB concentrations are in mg/kg)
- Former Discharge Ditch Sample Locations (HCB concentrations are in mg/kg)
- Approximate 6' Water Elevation

Wastewater Ditch Core HCB Results (1991-92)

	C3 (BD02)[1]	OD15	OD25[2]
Depth (ft bgs)	HCB (mg/kg)	HCB (mg/kg)	HCB (mg/kg)
0-1	<1	480	51 J
1-2	2.8	--	45 J
2-3	<1	130 J	2.3
3-4	<0.57	--	--
4-5	7.8	560	--
5-6	--	--	--
6-7	--	<0.5	--
7-8	--	<0.5	--
8-9	--	<0.5	--
9-10	--	<0.5	--
10-11	--	<0.5	--

Notes:
ft bgs = feet below ground surface
HCB = hexachlorobenzene
Hg = mercury
J = concentration is estimated
mg/kg = milligram per kilogram
-- = not sampled
[1] boring completion depth = 5.2 ft
[2] boring completion depth = 3.2 ft due to refusal
Prepared by/Date: HEF 10/31/11
Checked by/Date: AWE 10/31/11

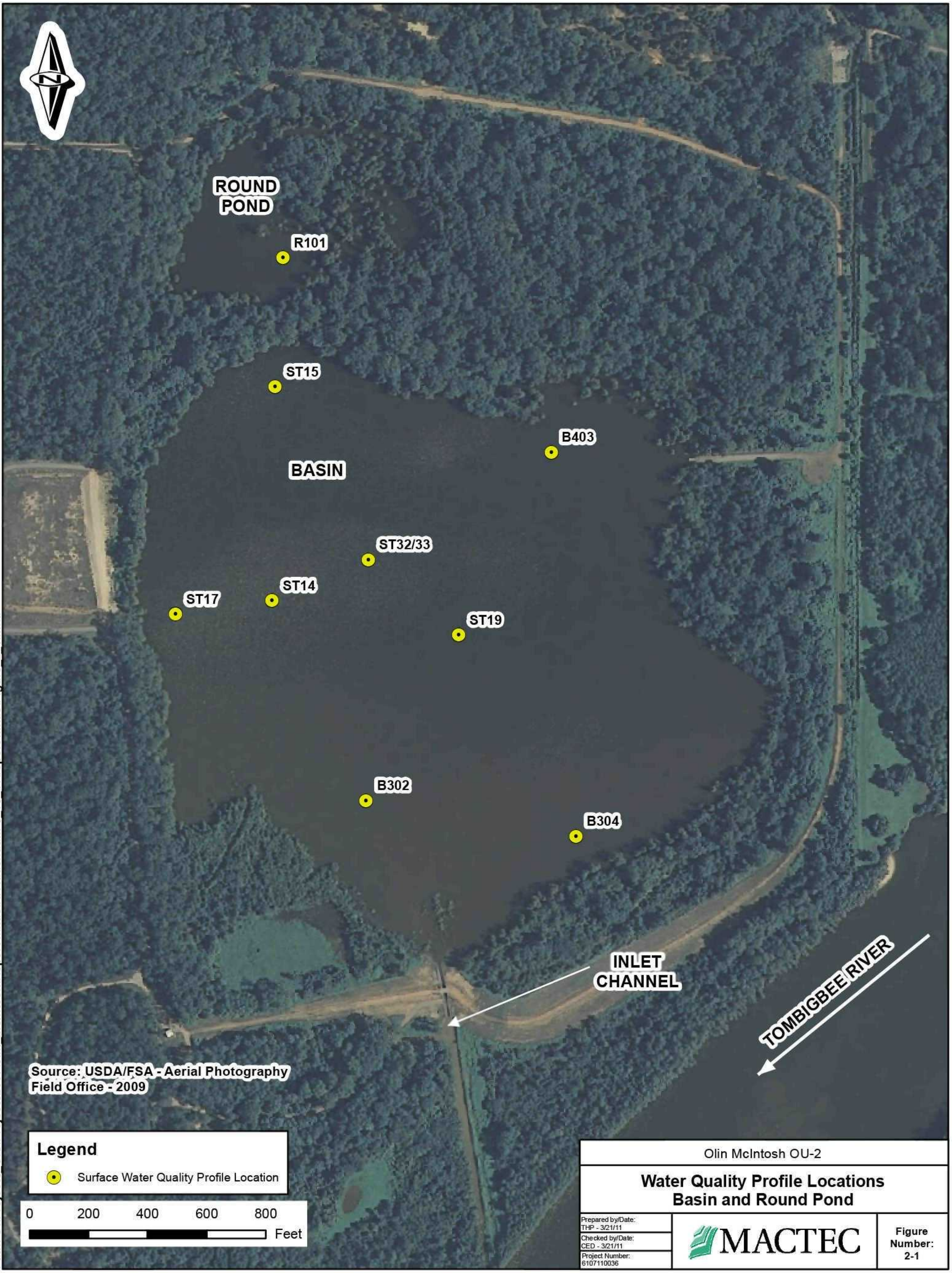
Olin McIntosh OU-2

Hexachlorobenzene Concentrations in Wastewater Ditch Sediments

Prepared by/Date: SLW - 7/25/11
Checked by/Date: HEF - 7/25/11
Project Number: 6107110036

MACTEC

Figure Number: 1-4

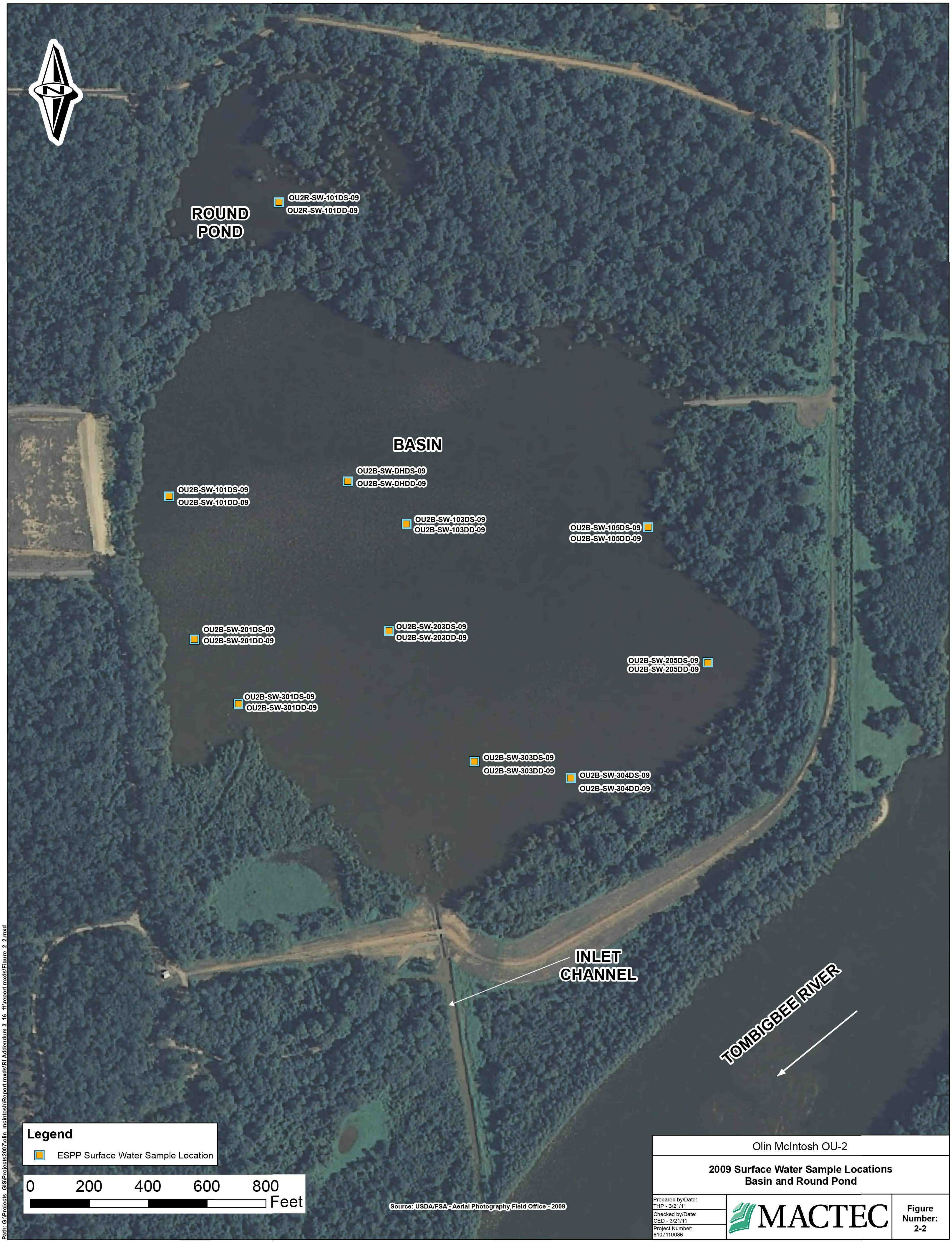


Olin McIntosh OU-2

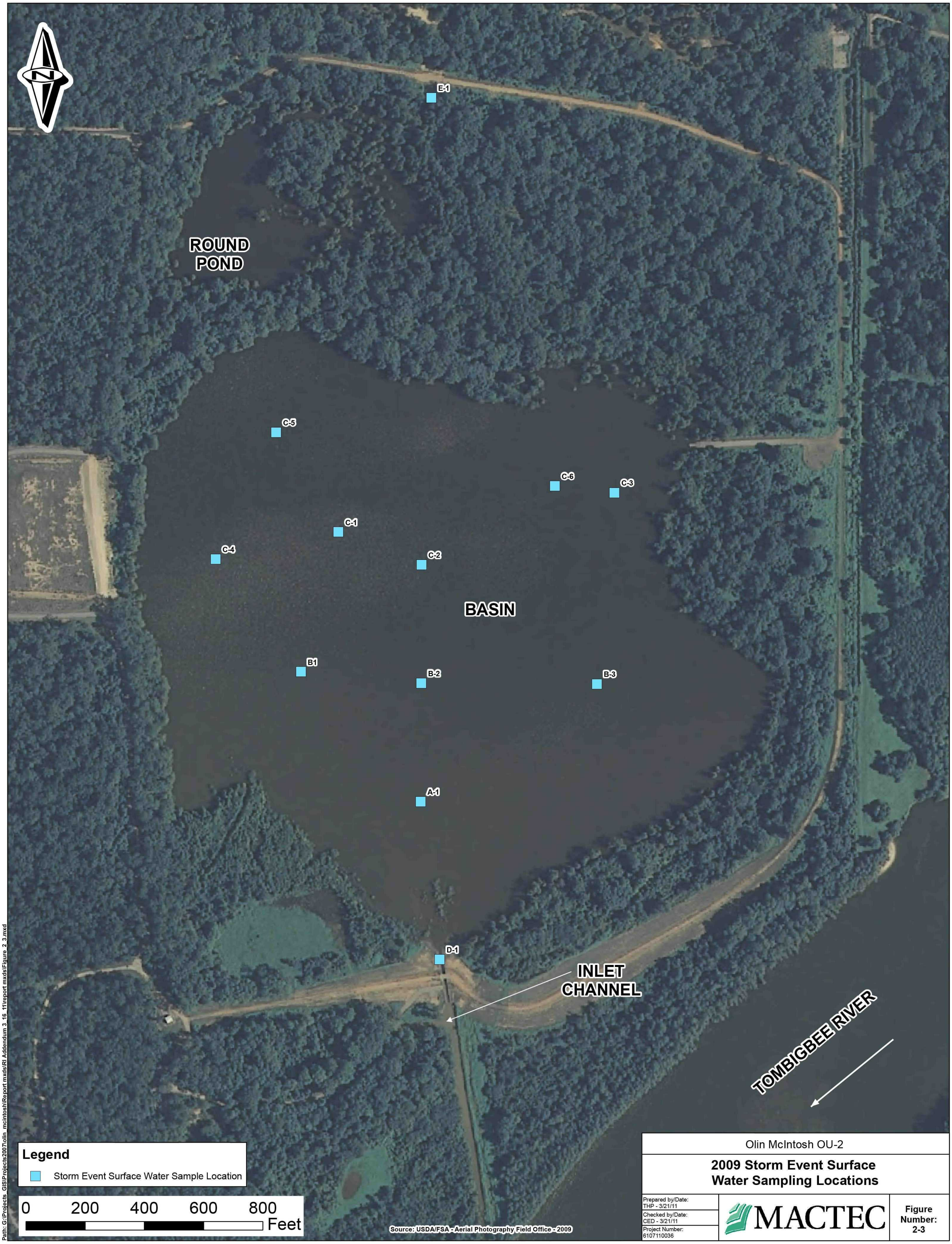
Water Quality Profile Locations
Basin and Round Pond

Figure Number: 2-1

Path: G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\RI Addendum 3_16_11\report mxds\Figure_2_1.mxd



Path: G:\Projects GIS\Projects2007\olin mcintosh\Report mxds\RI Addendum 3 16 11\report mxds\Figure 2 2.mxd



Olin McIntosh OU-2

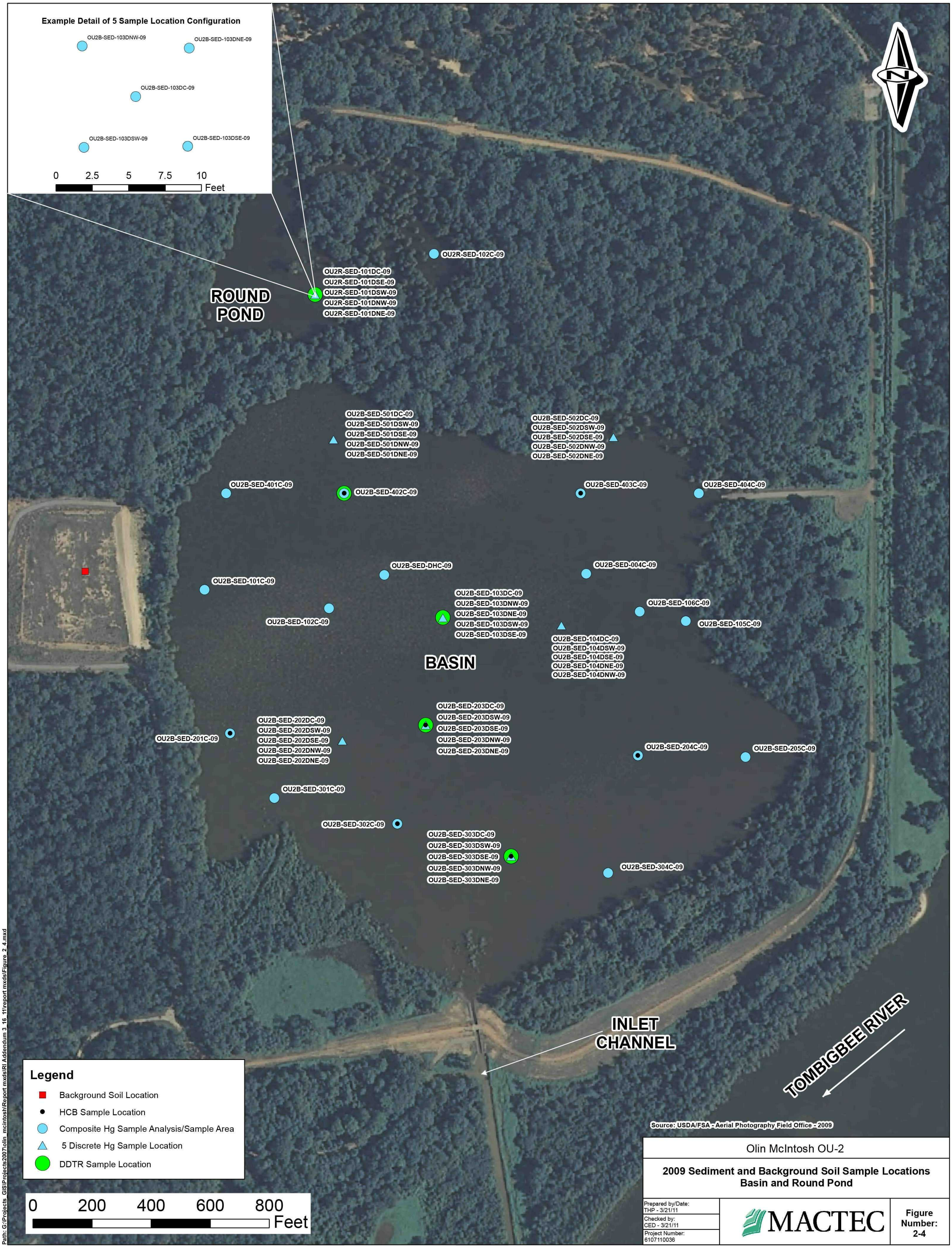
2009 Storm Event Surface Water Sampling Locations

Prepared by/Date: THP - 3/21/11
Checked by/Date: CED - 3/21/11
Project Number: 6107110036

MACTEC

Figure Number: 2-3

Path: G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\RI Addendum 3_16_11\report mxds\Figure 2_3.mxd



Olin McIntosh OU-2

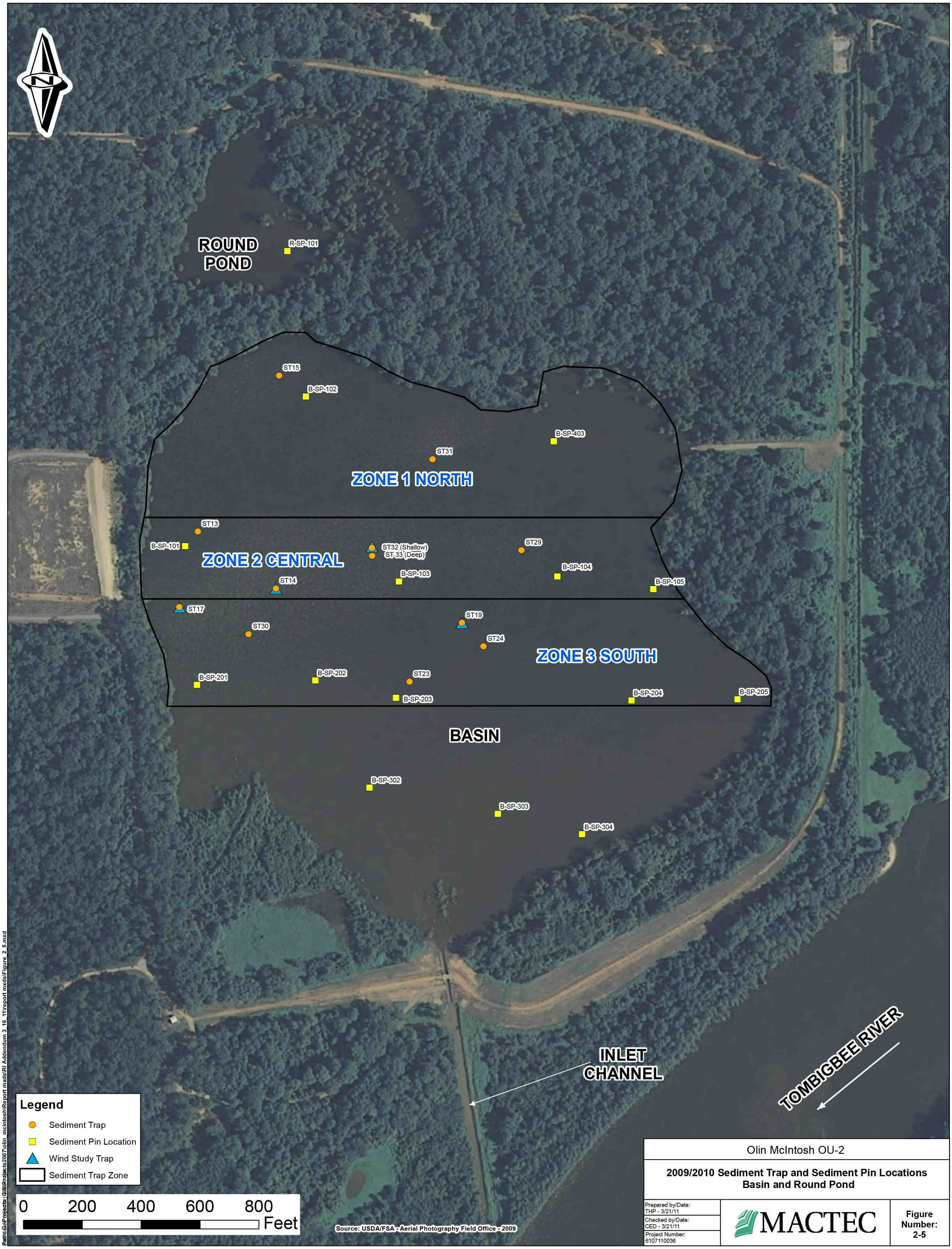
2009 Sediment and Background Soil Sample Locations Basin and Round Pond

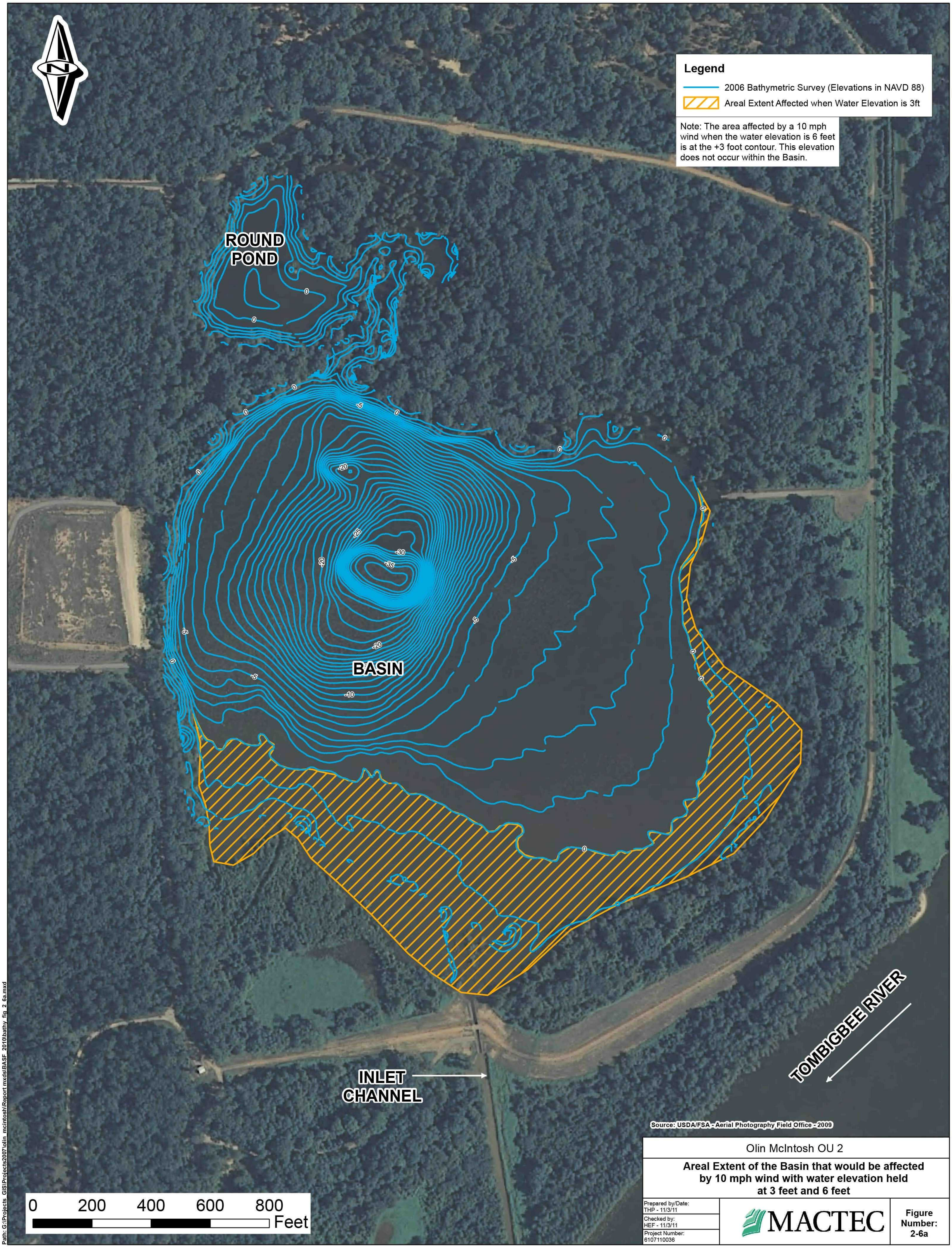
Prepared by/Date: THP - 3/21/11
Checked by: CED - 3/21/11
Project Number: 6107110036

MACTEC

Figure Number: 2-4

Path: G:\Projects_GIS\Projects\2007\olin_mcintosh\Report mxds\RI Addendum 3_16_11\report mxds\Figure_2_4.mxd


N
ROUND POND
R-SP-101
ST15
B-SP-102
B-SP-403
ST31
ZONE 1 NORTH
ST13
B-SP-101
ST32 (Shallow)
ST 33 (Deep)
ST29
ZONE 2 CENTRAL
B-SP-104
ST14
B-SP-103
B-SP-105
ST17
ST19
ST30
ST24
ZONE 3 SOUTH
B-SP-201
B-SP-202
ST23
B-SP-203
B-SP-204
B-SP-205
BASIN
B-SP-302
B-SP-303
B-SP-304
INLET CHANNEL
TOMBIGBEE RIVER
Legend
Sediment Trap
Sediment Pin Location
Wind Study Trap
Sediment Trap Zone
0 200 400 600 800
Feet
Source: USDA/FSA - Aerial Photography Field Office - 2009
Olin McIntosh OU-2
2009/2010 Sediment Trap and Sediment Pin Locations
Basin and Round Pond
Prepared by/Date: THP - 3/21/11
Checked by/Date: CED - 3/21/11
Project Number: 6107110036
MACTEC
Figure Number: 2-5



Olin McIntosh OU 2

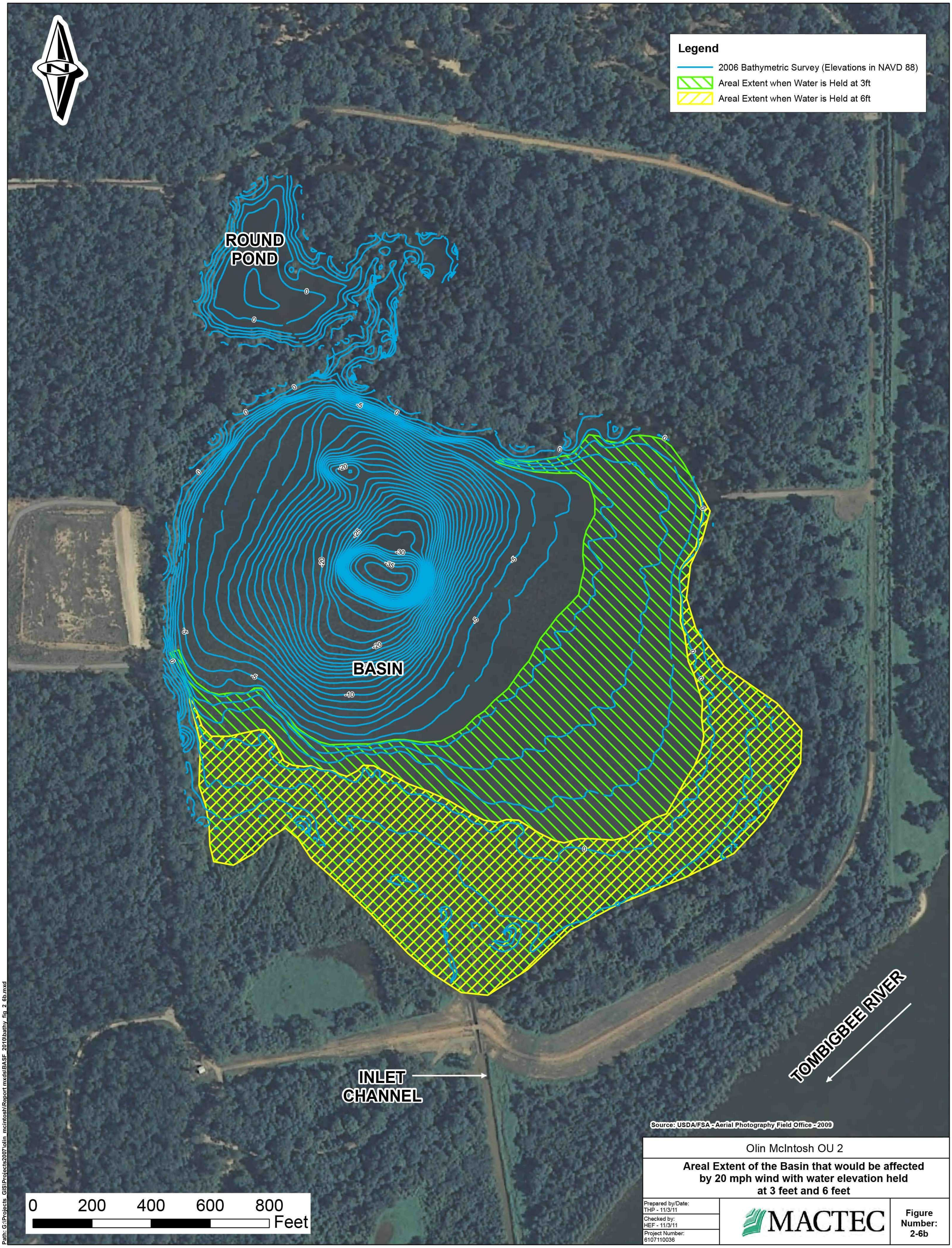
Areal Extent of the Basin that would be affected by 10 mph wind with water elevation held at 3 feet and 6 feet

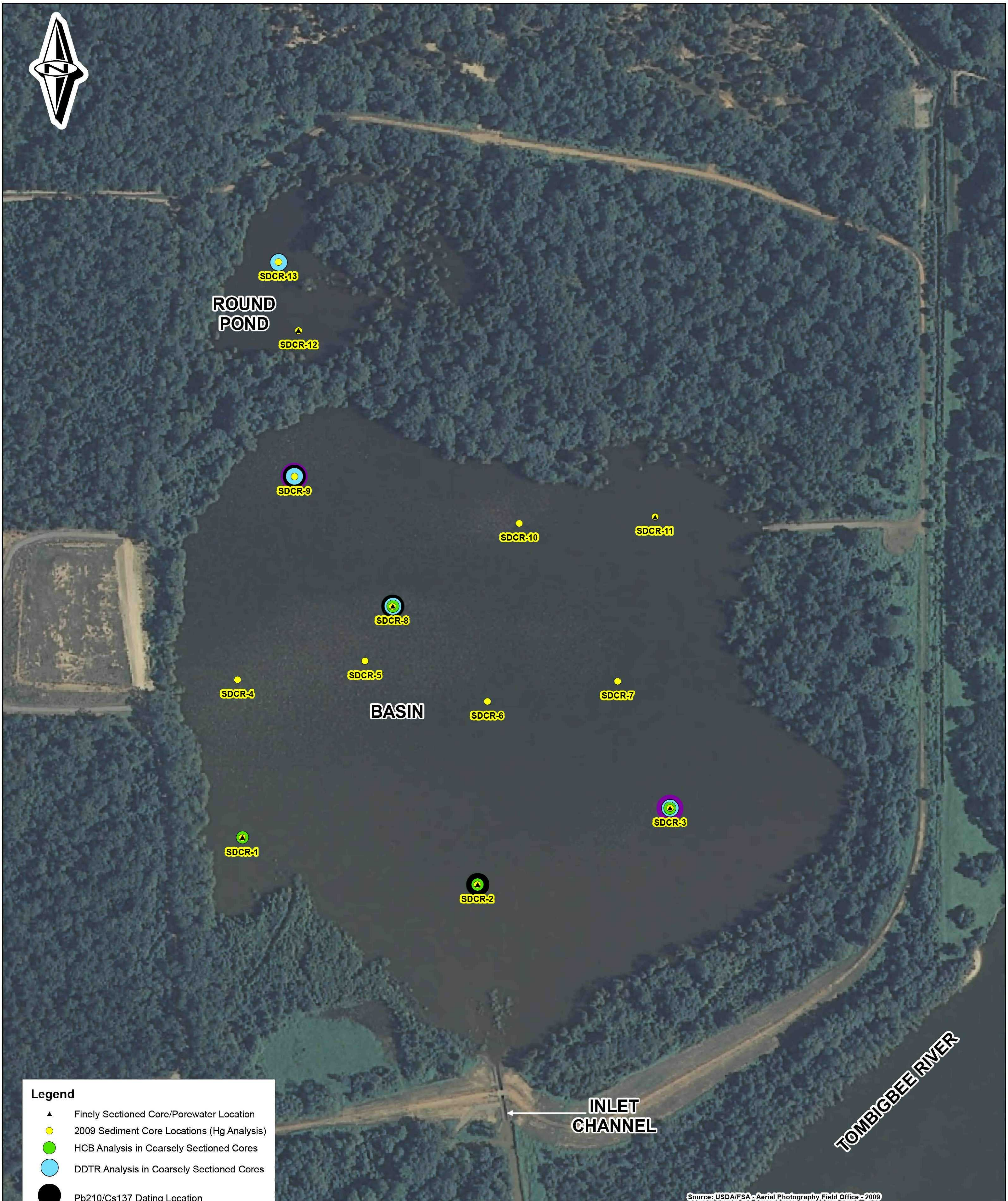
Prepared by/Date: THP - 11/3/11
Checked by: HEF - 11/3/11
Project Number: 6107110036

MACTEC

Figure Number: 2-6a

Path: G:\Projects_GIS\Projects2007\olin mcintosh\Report mxds\BASF_2010\bathy_fig_2_6a.mxd


N
Legend
2006 Bathymetric Survey (Elevations in NAVD 88)
Areal Extent when Water is Held at 3ft
Areal Extent when Water is Held at 6ft
ROUND POND
BASIN
INLET CHANNEL
TOMBIGBEE RIVER
Source: USDA/FSA - Aerial Photography Field Office - 2009
0 200 400 600 800 Feet
Path: G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\BASF_2010bathy_fig_2_6b.mxd
Olin McIntosh OU 2
Areal Extent of the Basin that would be affected by 20 mph wind with water elevation held at 3 feet and 6 feet
Prepared by/Date: THP - 11/3/11
Checked by: HEF - 11/3/11
Project Number: 6107110036
MACTEC
Figure Number: 2-6b

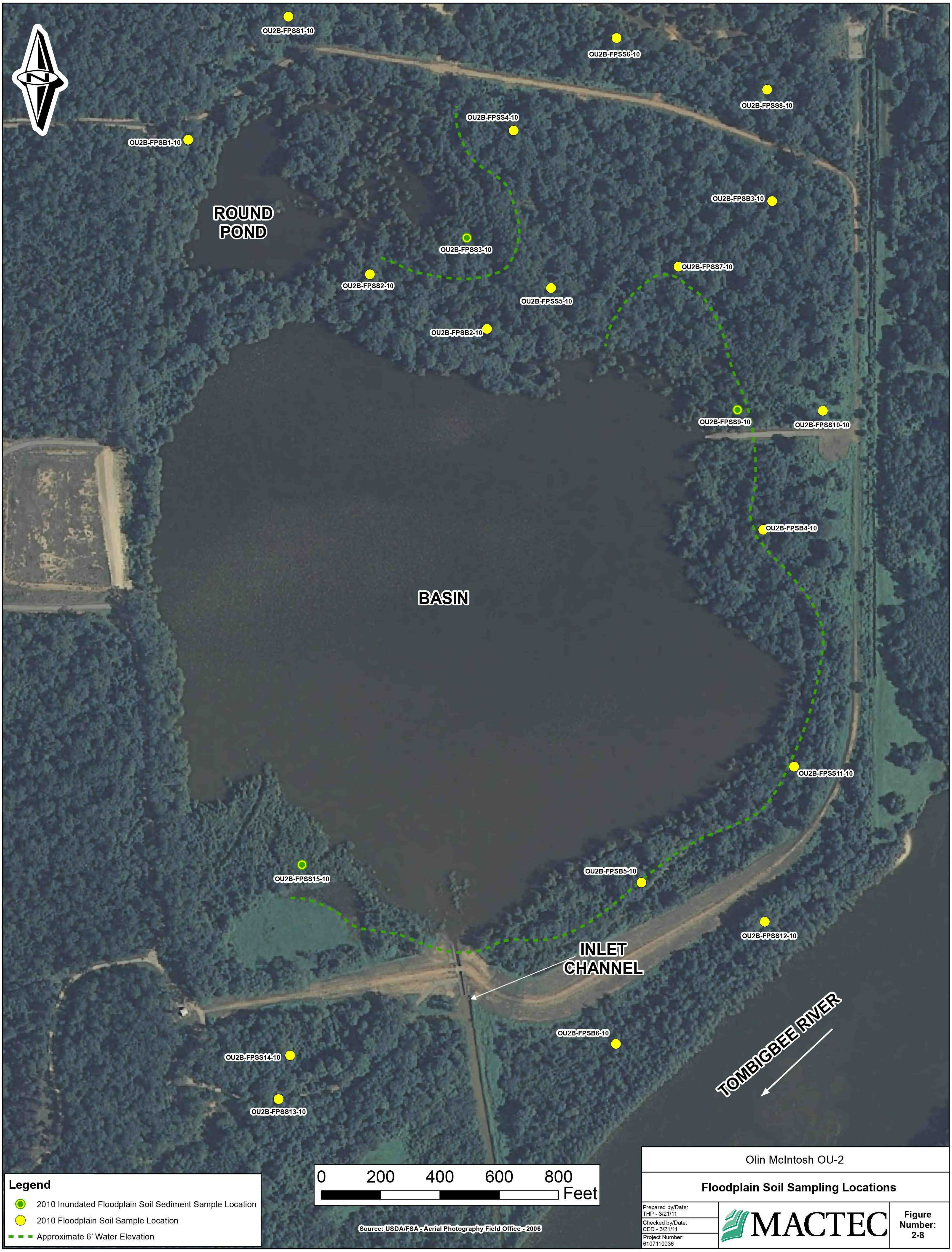


Olin McIntosh OU 2

Sediment Core and Porewater Collection Locations

Prepared by/Date: THP - 3/21/11 Checked by: CED - 3/21/11 Project Number: 6107110036	MACTEC	**Figure Number: 2-7**

Path: G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\RI Addendum 3_16_11\report mxds\Figure_2_7.mxd



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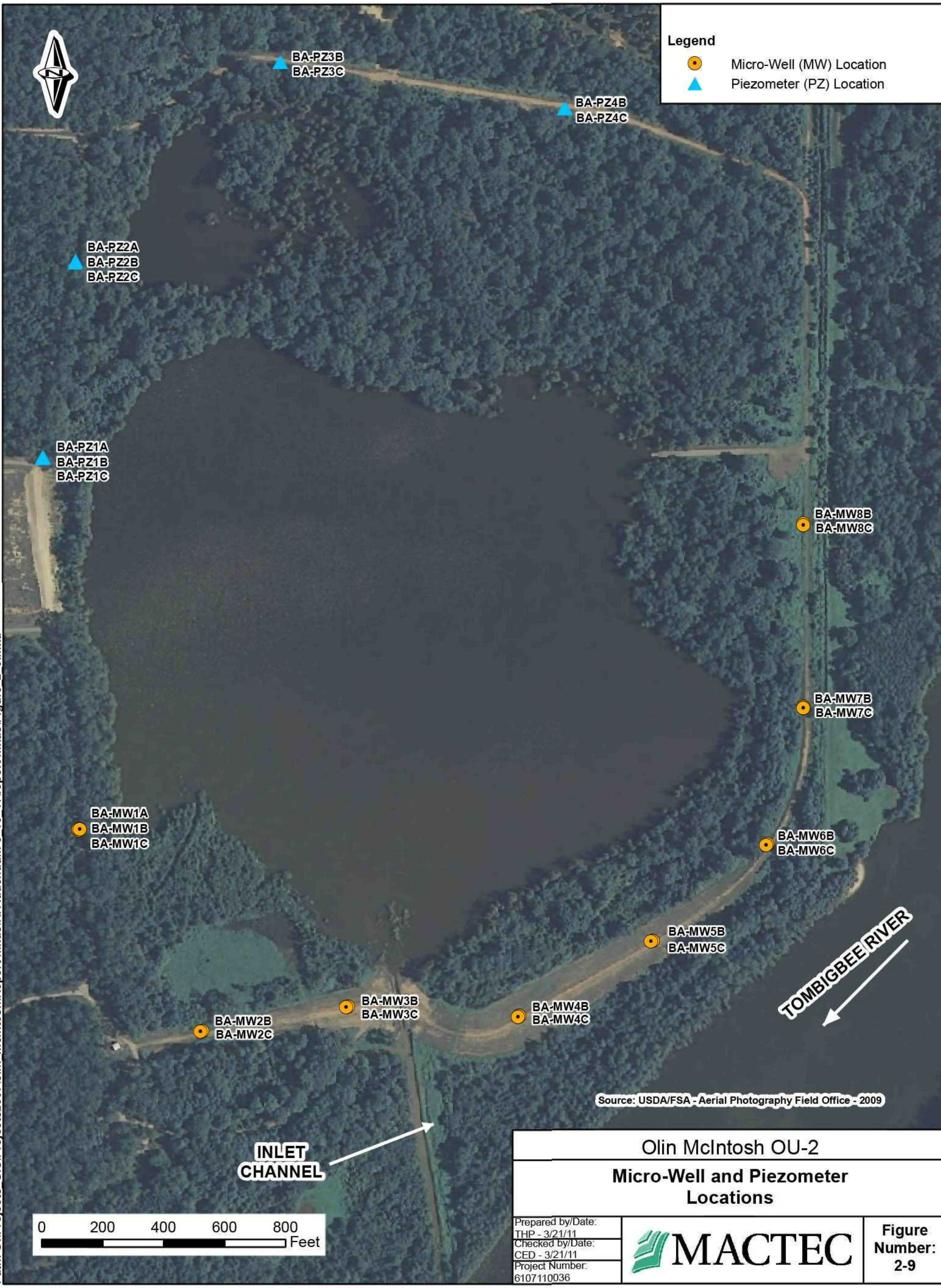
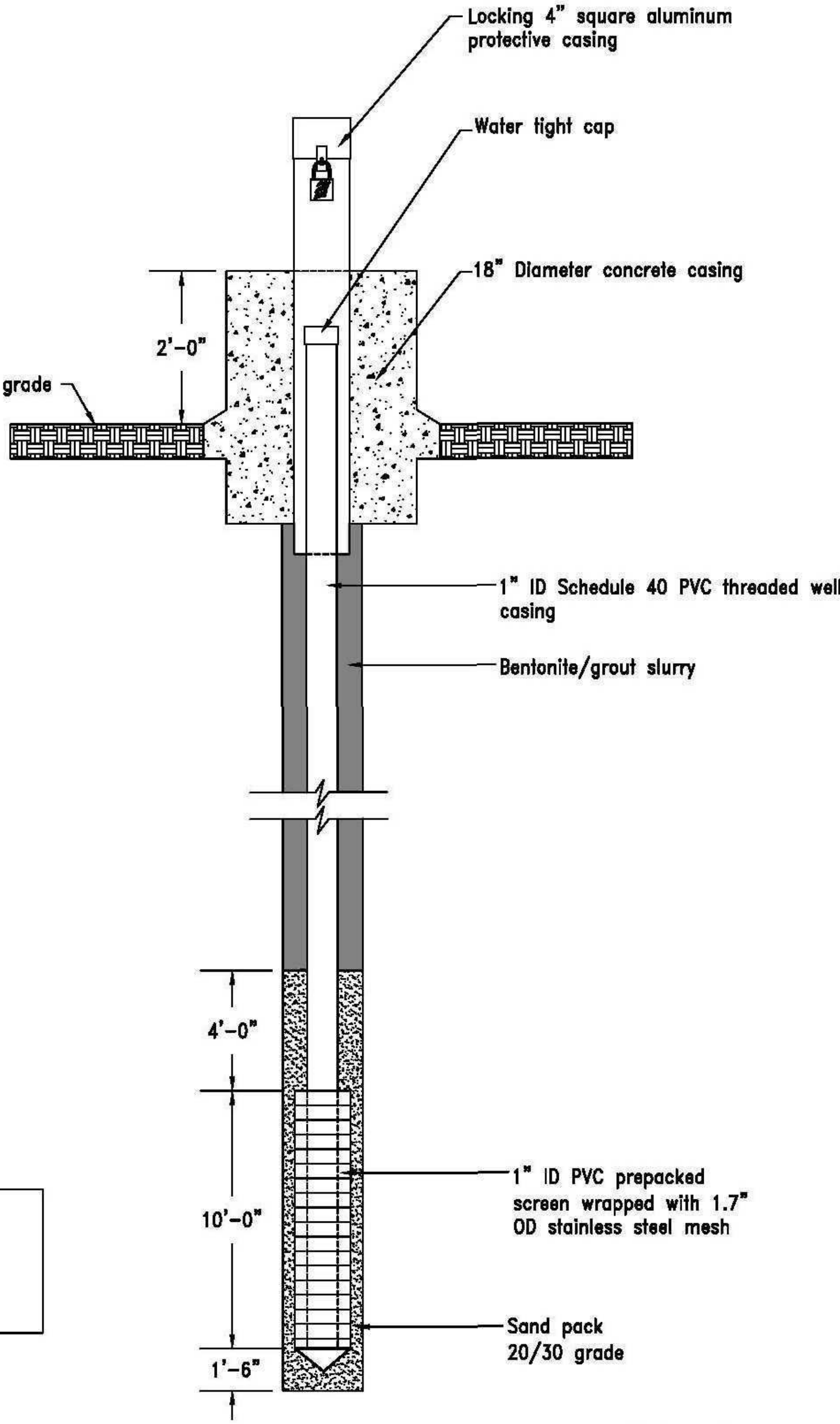


Path: G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\RI Addendum 3_16_11\report mxds\Figure_2_9.mxd



LEGEND

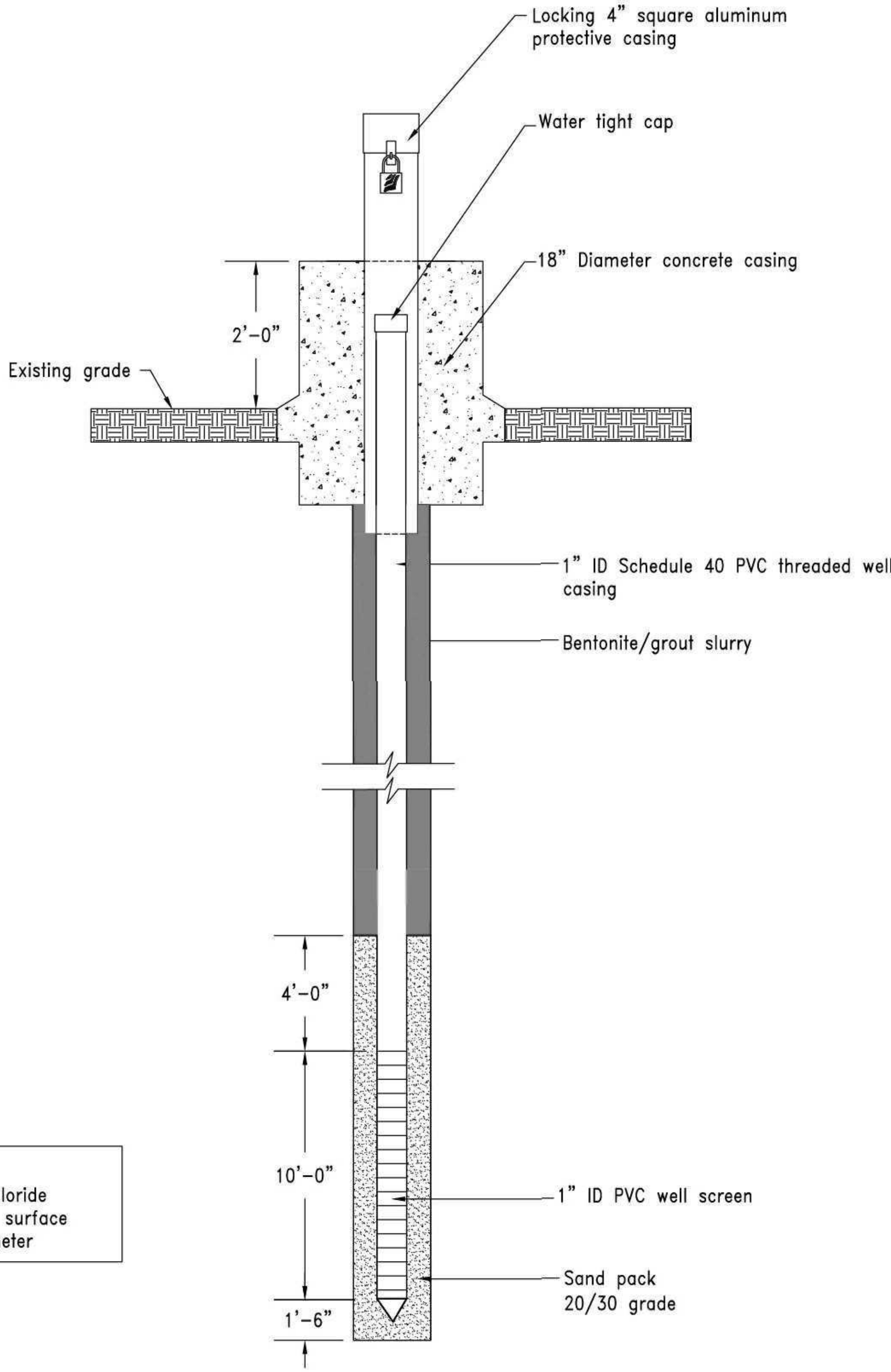
PVC	Polyvinyl chloride
bls	Below land surface
ID	Inside diameter
OD	Outside diameter

NOT TO SCALE

OLIN-OU2 McINTOSH, ALABAMA	MACTEC MACTEC Engineering and Consulting, Inc. 3200 TOWN POINT DRIVE, SUITE 100 KENNESAW, GEORGIA 30144 (770) 421-3400	MICRO-WELL CONSTRUCTION DETAIL JOB NO. 6107090036

PREPARED BY/DATE E.B. 2/13/09
CHECKED BY/DATE C.E.D. 2/16/09

Figure 2-10



LEGEND

PVC	Polyvinyl chloride
bls	Below land surface
ID	Inside diameter

NOT TO SCALE

OLIN-OU2
McINTOSH, ALABAMA

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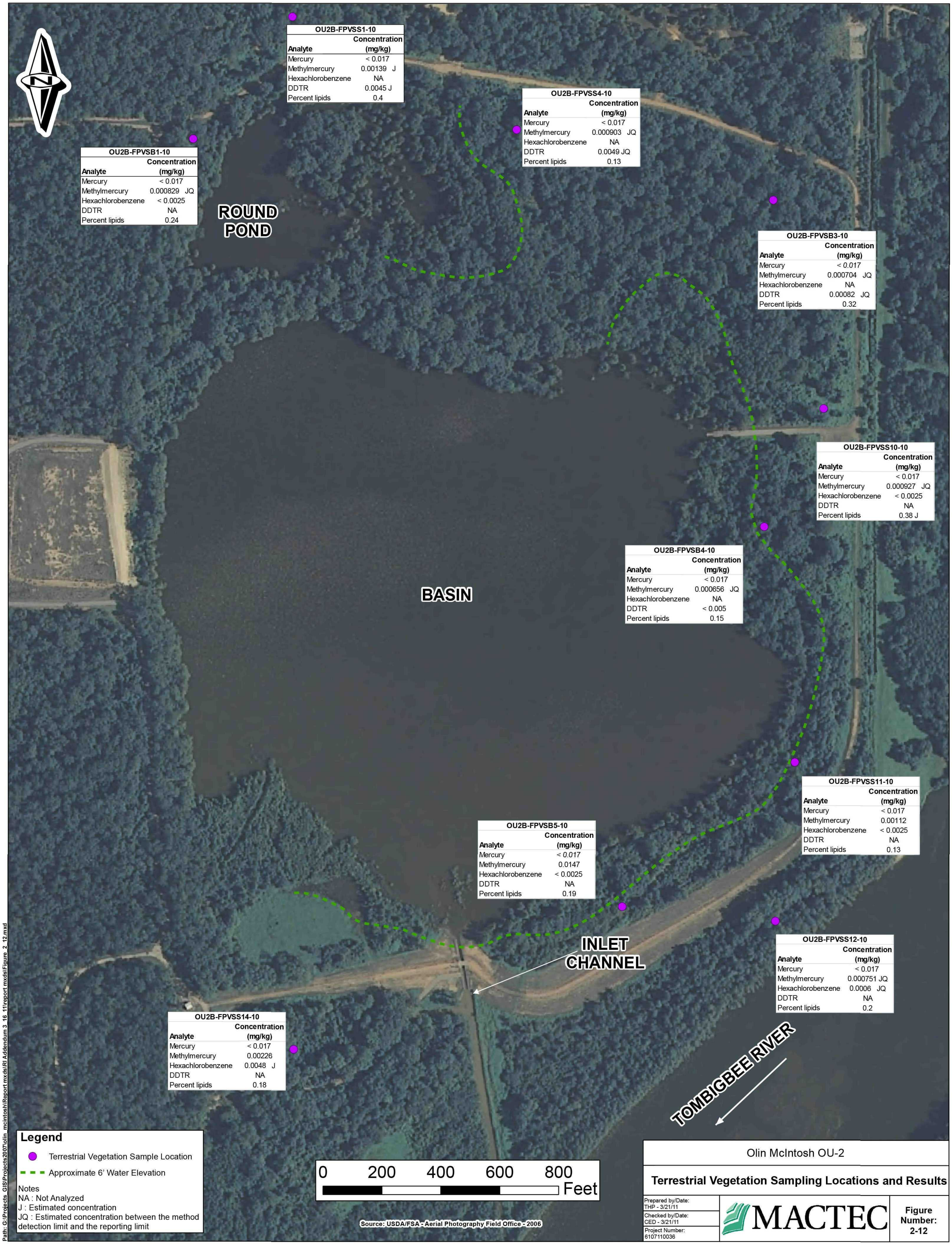
MACTEC Engineering and Consulting, Inc.
3200 TOWN POINT DRIVE, SUITE 100
KENNESAW, GEORGIA 30144 (770) 421-3400

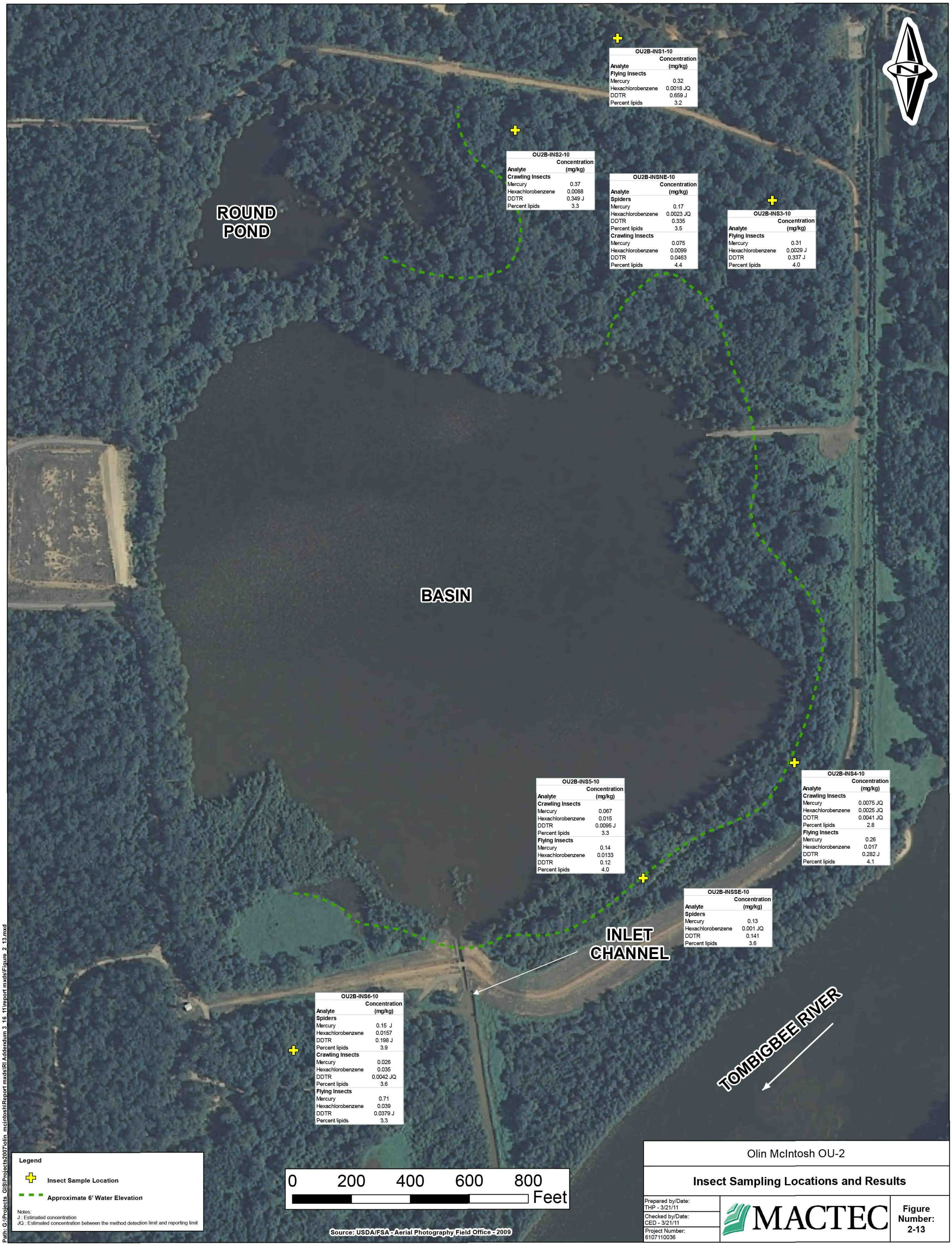
PIEZOMETER
CONSTRUCTION DETAIL

JOB NO. **6107090036**

Figure 2-11

PREPARED BY/DATE E.B. 2/13/09
CHECKED BY/DATE C.E.D. 2/16/09


OU2B-FPVSS1-10
Analyte | Concentration (mg/kg)
Mercury < 0.017
Methylmercury 0.00139 J
Hexachlorobenzene NA
DDTR 0.0045 J
Percent lipids 0.4
OU2B-FPVSS4-10
Analyte | Concentration (mg/kg)
Mercury < 0.017
Methylmercury 0.000903 JQ
Hexachlorobenzene NA
DDTR 0.0049 JQ
Percent lipids 0.13
OU2B-FPVSB1-10
Analyte | Concentration (mg/kg)
Mercury < 0.017
Methylmercury 0.000829 JQ
Hexachlorobenzene < 0.0025
DDTR NA
Percent lipids 0.24
ROUND POND
OU2B-FPVSB3-10
Analyte | Concentration (mg/kg)
Mercury < 0.017
Methylmercury 0.000704 JQ
Hexachlorobenzene NA
DDTR 0.00082 JQ
Percent lipids 0.32
OU2B-FPVSS10-10
Analyte | Concentration (mg/kg)
Mercury < 0.017
Methylmercury 0.000927 JQ
Hexachlorobenzene < 0.0025
DDTR NA
Percent lipids 0.38 J
OU2B-FPVSB4-10
Analyte | Concentration (mg/kg)
Mercury < 0.017
Methylmercury 0.000656 JQ
Hexachlorobenzene NA
DDTR < 0.005
Percent lipids 0.15
BASIN
OU2B-FPVSS11-10
Analyte | Concentration (mg/kg)
Mercury < 0.017
Methylmercury 0.00112
Hexachlorobenzene < 0.0025
DDTR NA
Percent lipids 0.13
OU2B-FPVSB5-10
Analyte | Concentration (mg/kg)
Mercury < 0.017
Methylmercury 0.0147
Hexachlorobenzene < 0.0025
DDTR NA
Percent lipids 0.19
INLET CHANNEL
OU2B-FPVSS12-10
Analyte | Concentration (mg/kg)
Mercury < 0.017
Methylmercury 0.000751 JQ
Hexachlorobenzene 0.0006 JQ
DDTR NA
Percent lipids 0.2
OU2B-FPVSS14-10
Analyte | Concentration (mg/kg)
Mercury < 0.017
Methylmercury 0.00226
Hexachlorobenzene 0.0048 J
DDTR NA
Percent lipids 0.18
TOMBIGBEE RIVER
Legend
Terrestrial Vegetation Sample Location
Approximate 6' Water Elevation
Notes
NA : Not Analyzed
J : Estimated concentration
JQ : Estimated concentration between the method detection limit and the reporting limit
0 200 400 600 800
Feet
Source: USDA/FSA - Aerial Photography Field Office - 2006
Olin McIntosh OU-2
Terrestrial Vegetation Sampling Locations and Results
Prepared by/Date: THP - 3/21/11
Checked by/Date: CED - 3/21/11
Project Number: 6107110036
MACTEC
Figure Number: 2-12
Path: G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\RI Addendum 3_16_11\report mxds\Figure_2_12.mxd



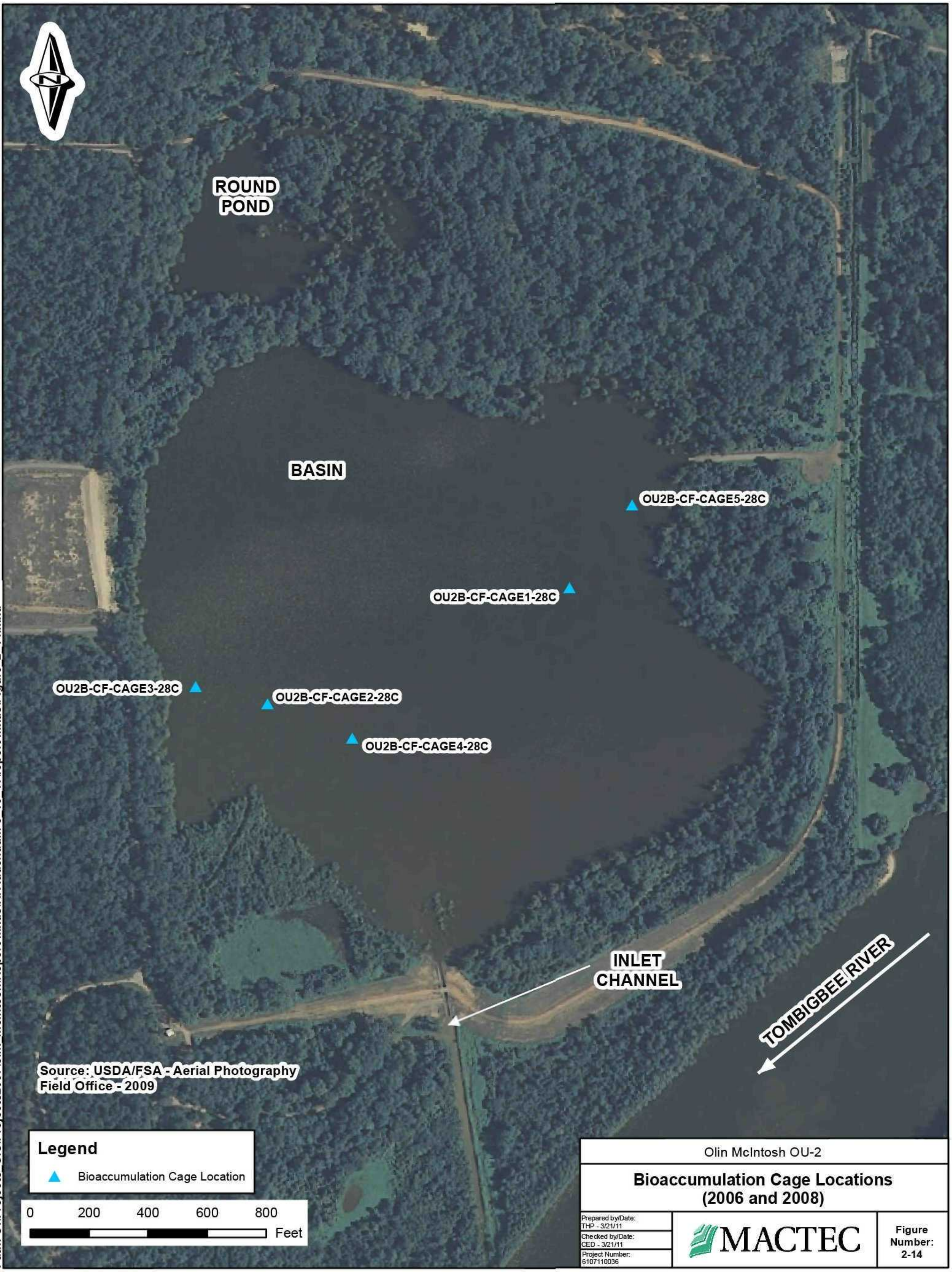
Olin McIntosh OU-2

Insect Sampling Locations and Results

Prepared by/Date: THP - 3/21/11
Checked by/Date: CED - 3/21/11
Project Number: 6107110036

MACTEC

Figure Number: 2-13



Olin McIntosh OU-2

Bioaccumulation Cage Locations (2006 and 2008)

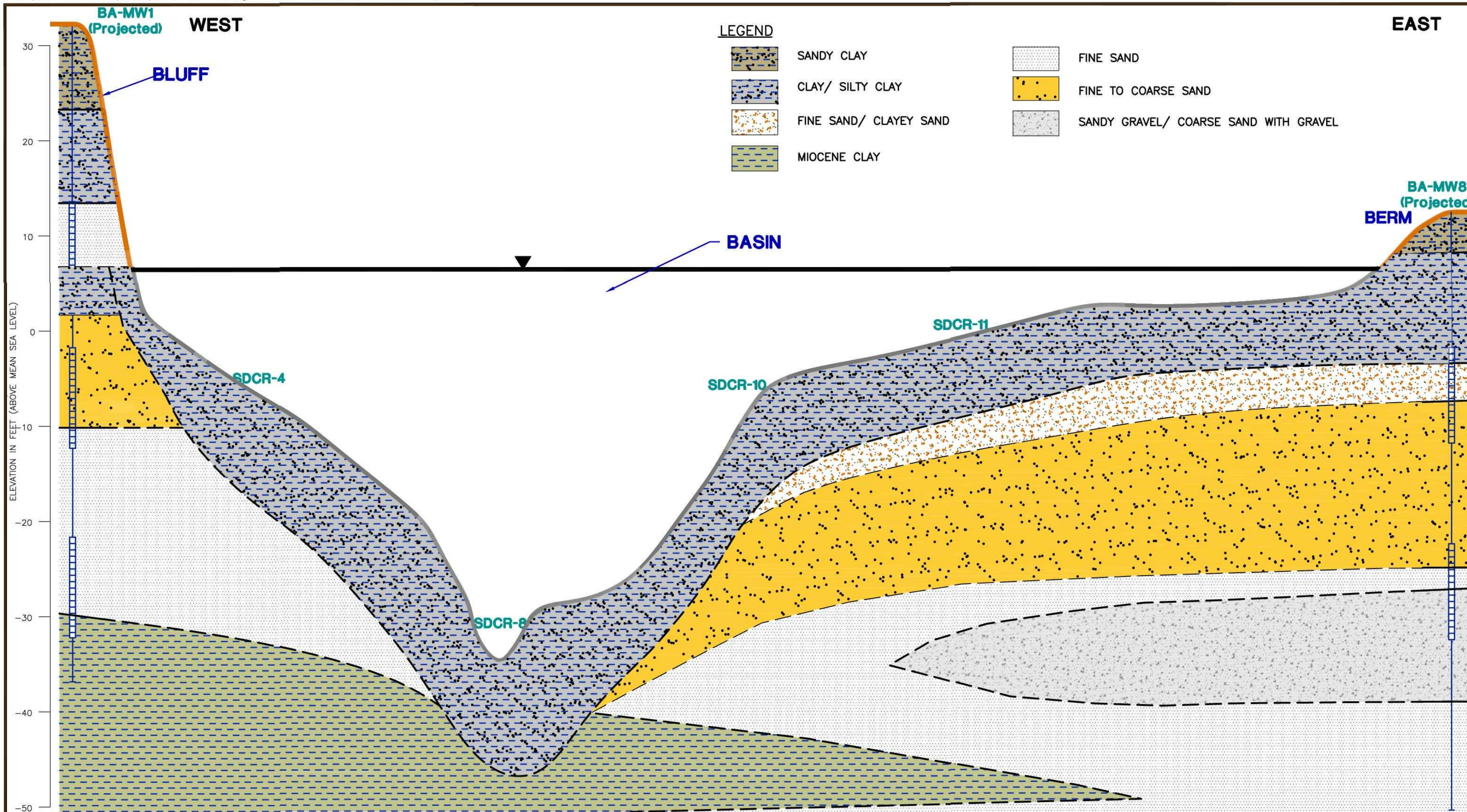
Prepared by/Date: THP - 3/21/11
Checked by/Date: CED - 3/21/11
Project Number: 6107110036

MACTEC

Figure Number: 2-14

Path: G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\RI Addendum 3_16_11\report mxds\Figure_2_14.mxd

J:\OLIN_MCINTOSH\2009\XSECT-102009.dwg - A-A 03/31/2011 1:23pm tgladsto



OLIN McINTOSH OU-2
McINSTOSH, AL

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MACTEC Engineering and Consulting, Inc.
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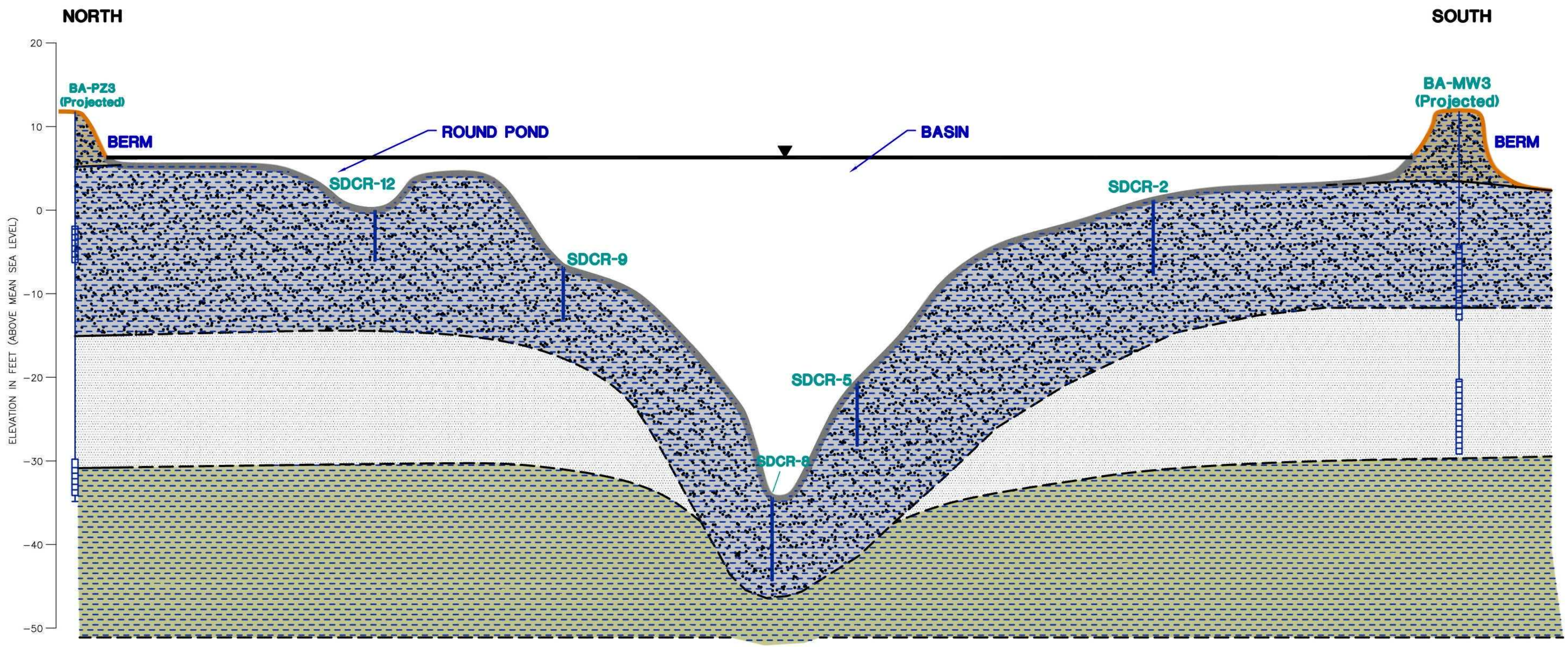
KENNESAW, GEORGIA 30144 (770) 421-3400

GEOLOGIC
CROSS SECTION
WEST-EAST

JOB NO. 6107-09-0036

FIGURE 3-1

DRAWNED BY/DATE T.G. 1/13/2010
PREPARED BY/DATE F.K.M. 1/13/2010
CHECKED BY/DATE C.E.D. 1/13/2010



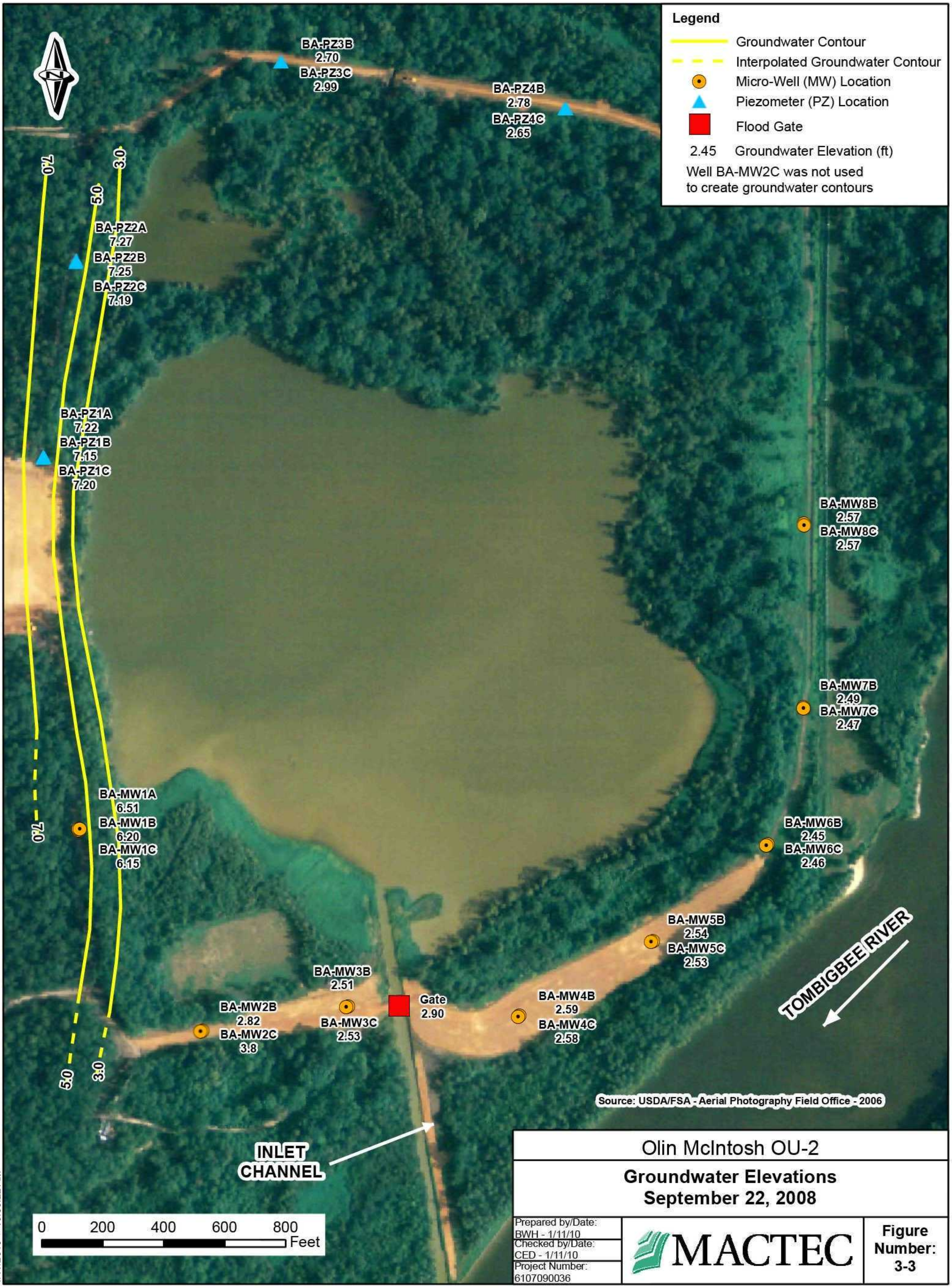
LEGEND

- SANDY CLAY
- CLAY/ SILTY CLAY
- FINE SAND
- MIOCENE CLAY

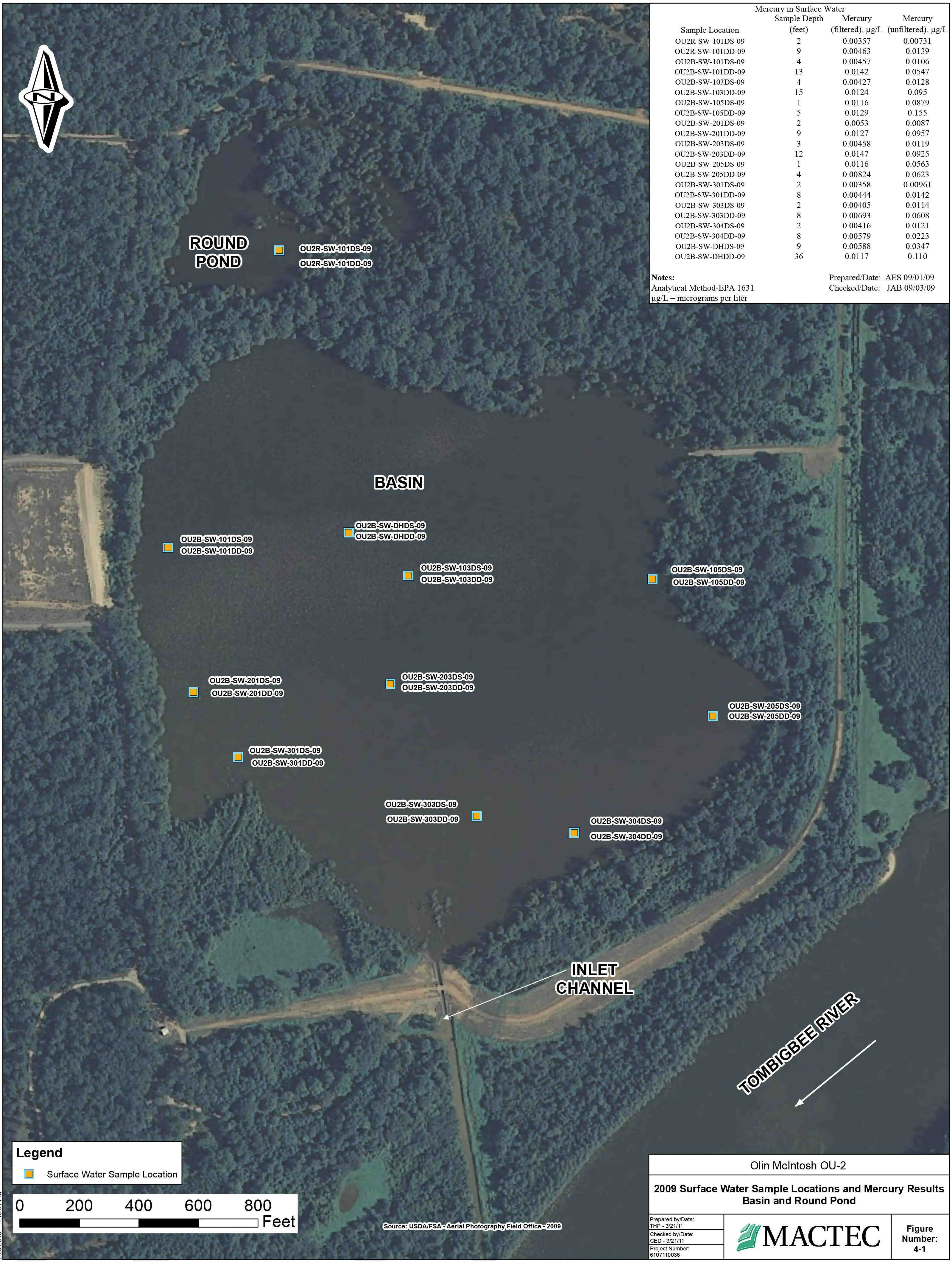
10 (FEET)
0
260 (FEET)

OLIN McINTOSH OU-2 McINSTOSH, AL	MACTEC MACTEC Engineering and Consulting, Inc. 3200 TOWN POINT DRIVE, SUITE 100 KENNESAW, GEORGIA 30144 (770) 421-3400	GEOLOGIC CROSS SECTION NORTH-SOUTH JOB NO. 6107-09-0036 FIGURE 3-2

DRAWNED BY/DATE T.G. 1/13/2010
PREPARED BY/DATE F.K.M. 1/13/2010
CHECKED BY/DATE C.E.D. 1/13/2010



Map Document: (G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\Groundwater Report mxds\figure3-4.mxd)
1/11/2010 -- 10:50:22 AM



Mercury in Surface Water

Sample Location	Sample Depth (feet)	Mercury (filtered), µg/L	Mercury (unfiltered), µg/L
OU2R-SW-101DS-09	2	0.00357	0.00731
OU2R-SW-101DD-09	9	0.00463	0.0139
OU2B-SW-101DS-09	4	0.00457	0.0106
OU2B-SW-101DD-09	13	0.0142	0.0547
OU2B-SW-103DS-09	4	0.00427	0.0128
OU2B-SW-103DD-09	15	0.0124	0.095
OU2B-SW-105DS-09	1	0.0116	0.0879
OU2B-SW-105DD-09	5	0.0129	0.155
OU2B-SW-201DS-09	2	0.0053	0.0087
OU2B-SW-201DD-09	9	0.0127	0.0957
OU2B-SW-203DS-09	3	0.00458	0.0119
OU2B-SW-203DD-09	12	0.0147	0.0925
OU2B-SW-205DS-09	1	0.0116	0.0563
OU2B-SW-205DD-09	4	0.00824	0.0623
OU2B-SW-301DS-09	2	0.00358	0.00961
OU2B-SW-301DD-09	8	0.00444	0.0142
OU2B-SW-303DS-09	2	0.00405	0.0114
OU2B-SW-303DD-09	8	0.00693	0.0608
OU2B-SW-304DS-09	2	0.00416	0.0121
OU2B-SW-304DD-09	8	0.00579	0.0223
OU2B-SW-DHDS-09	9	0.00588	0.0347
OU2B-SW-DHDD-09	36	0.0117	0.110

Notes:
Analytical Method-EPA 1631
µg/L = micrograms per liter

Prepared/Date: AES 09/01/09
Checked/Date: JAB 09/03/09

Olin McIntosh OU-2

2009 Surface Water Sample Locations and Mercury Results
Basin and Round Pond

Prepared by/Date: THP - 3/21/11
Checked by/Date: CED - 3/21/11
Project Number: 6107110036

MACTEC

Figure Number: 4-1

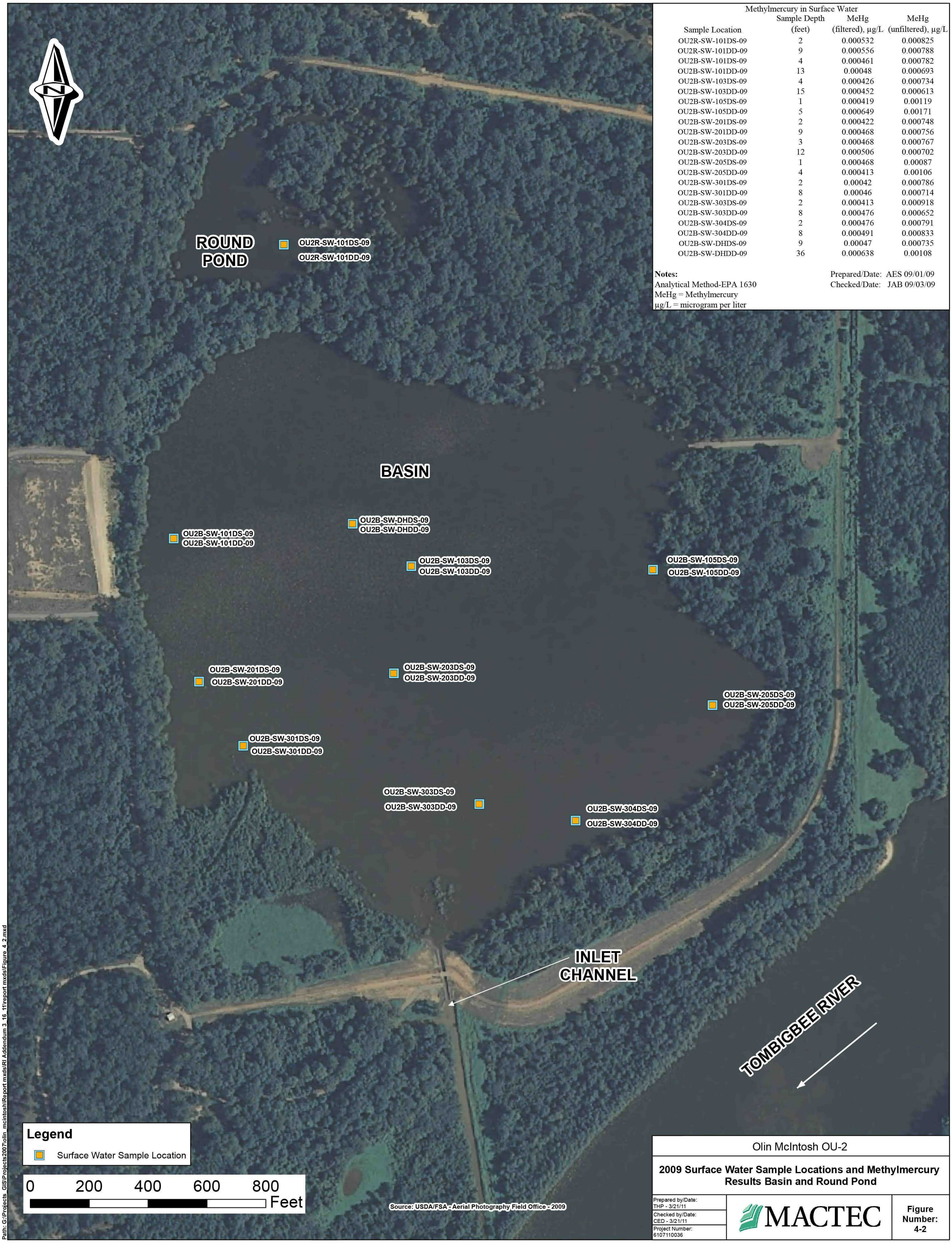
Map Document: (G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\ESPP Baseline report2009\mxds\Figure4-1.mxd)
2/25/2010 -- 1:13:51 PM

Methylmercury in Surface Water

Sample Location	Sample Depth (feet)	MeHg (filtered), µg/L	MeHg (unfiltered), µg/L
OU2R-SW-101DS-09	2	0.000532	0.000825
OU2R-SW-101DD-09	9	0.000556	0.000788
OU2B-SW-101DS-09	4	0.000461	0.000782
OU2B-SW-101DD-09	13	0.00048	0.000693
OU2B-SW-103DS-09	4	0.000426	0.000734
OU2B-SW-103DD-09	15	0.000452	0.000613
OU2B-SW-105DS-09	1	0.000419	0.00119
OU2B-SW-105DD-09	5	0.000649	0.00171
OU2B-SW-201DS-09	2	0.000422	0.000748
OU2B-SW-201DD-09	9	0.000468	0.000756
OU2B-SW-203DS-09	3	0.000468	0.000767
OU2B-SW-203DD-09	12	0.000506	0.000702
OU2B-SW-205DS-09	1	0.000468	0.00087
OU2B-SW-205DD-09	4	0.000413	0.00106
OU2B-SW-301DS-09	2	0.00042	0.000786
OU2B-SW-301DD-09	8	0.00046	0.000714
OU2B-SW-303DS-09	2	0.000413	0.000918
OU2B-SW-303DD-09	8	0.000476	0.000652
OU2B-SW-304DS-09	2	0.000476	0.000791
OU2B-SW-304DD-09	8	0.000491	0.000833
OU2B-SW-DHDS-09	9	0.00047	0.000735
OU2B-SW-DHDD-09	36	0.000638	0.00108

Notes:
Analytical Method-EPA 1630
MeHg = Methylmercury
µg/L = microgram per liter

Prepared/Date: AES 09/01/09
Checked/Date: JAB 09/03/09



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Olin McIntosh OU-2

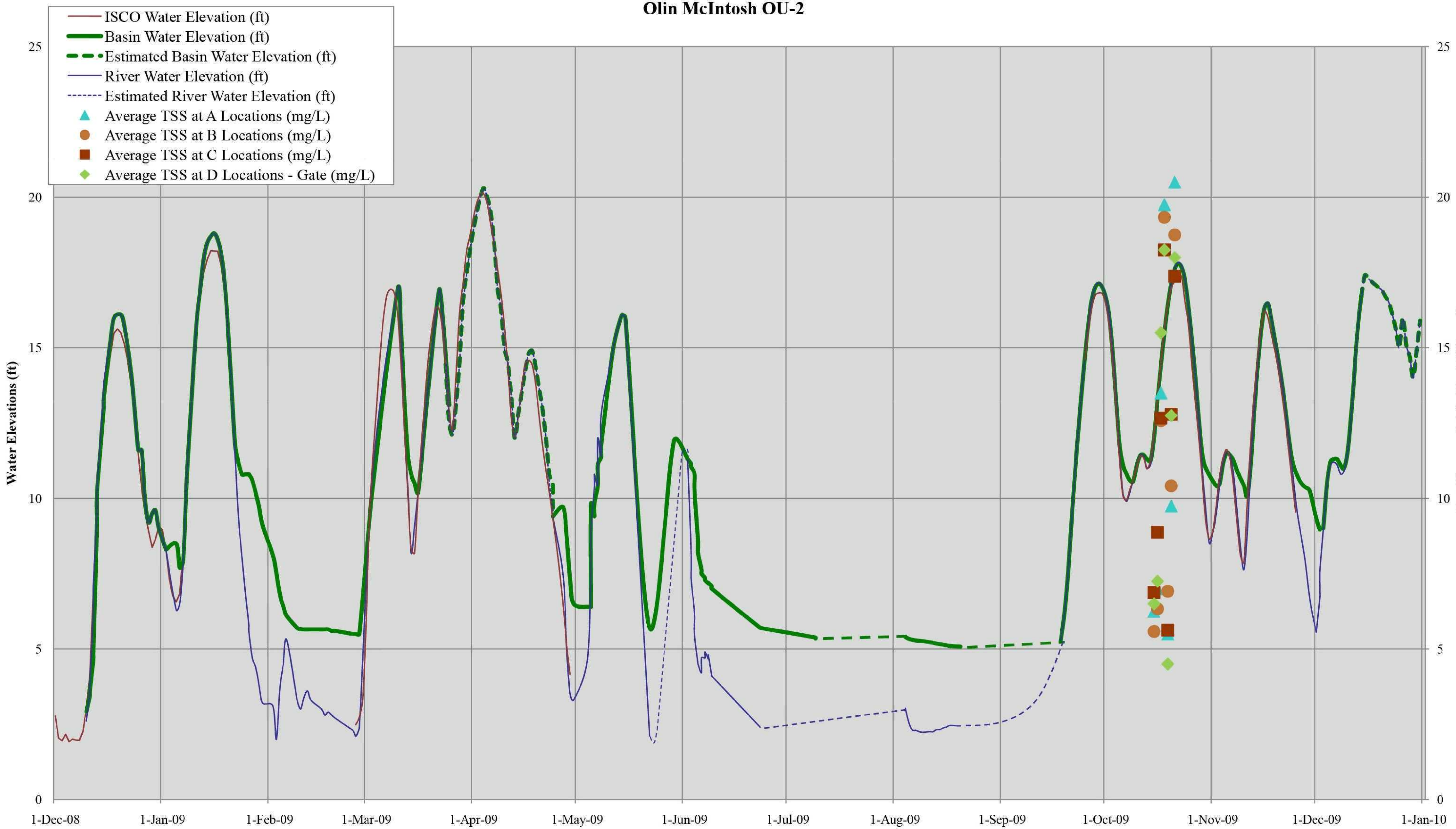
2009 Surface Water Sample Locations and Methylmercury Results Basin and Round Pond

Prepared by/Date: THP - 3/21/11
Checked by/Date: CED - 3/21/11
Project Number: 6107110036

MACTEC

Figure Number: 4-2

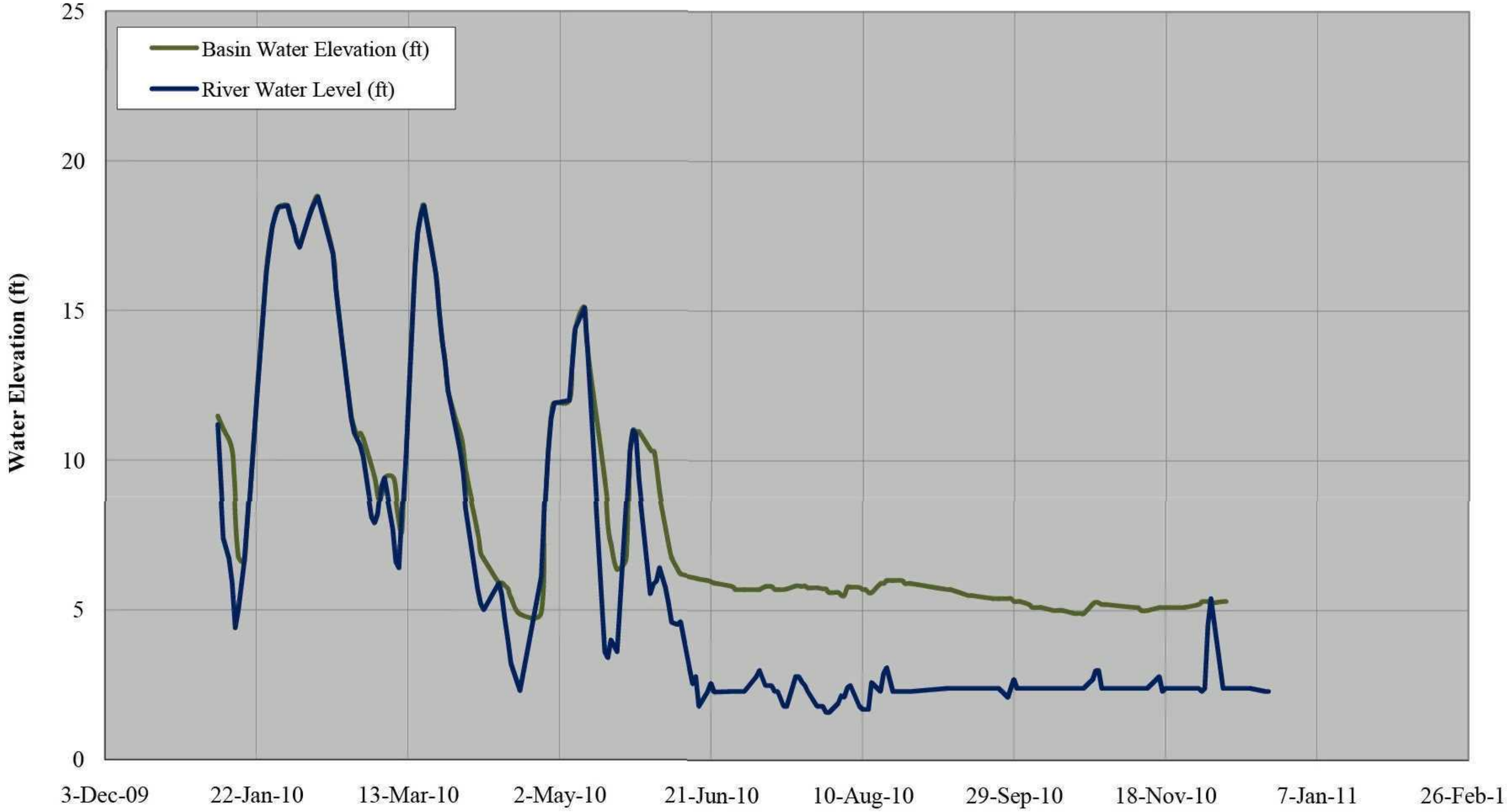
Figure 4-3a
2009 Water Elevations and Storm Event Average TSS Results
Updated RI Addendum
Olin McIntosh OU-2



100035.01

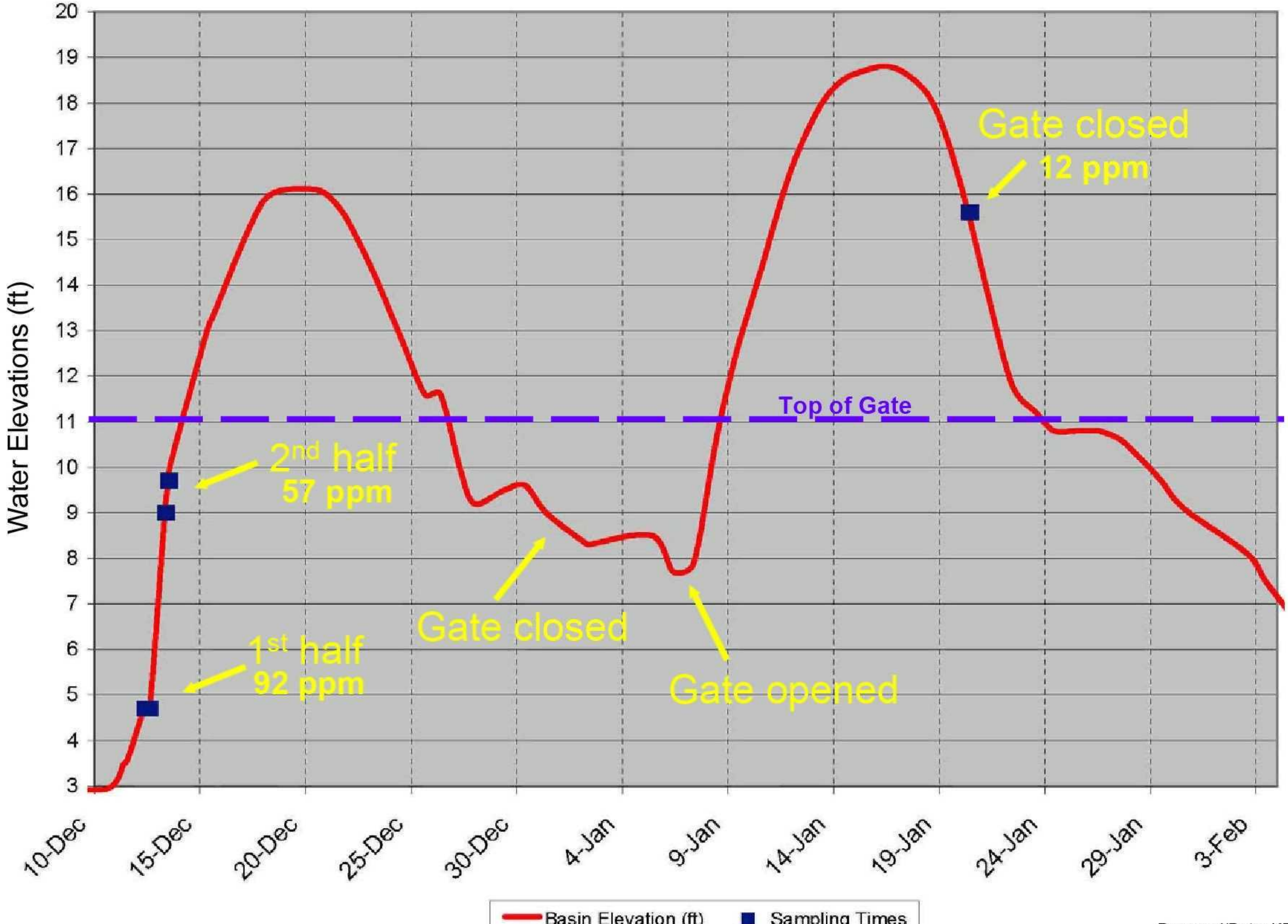
Prepared/Date: KPW 3/15/2010
Checked/Date: AWM 3/17/2010

Figure 4-3b
2010 Water Elevations (January 9 through December 22, 2010)
Updated RI Addendum
Olin McIntosh OU-2



Prepared By: KPH 3/29/11
Checked By: ELF 3/31/11

Figure 4-3• •Sample Dates at A-1 and Average TSS, Dec 08 to Jan 09 Storm Event

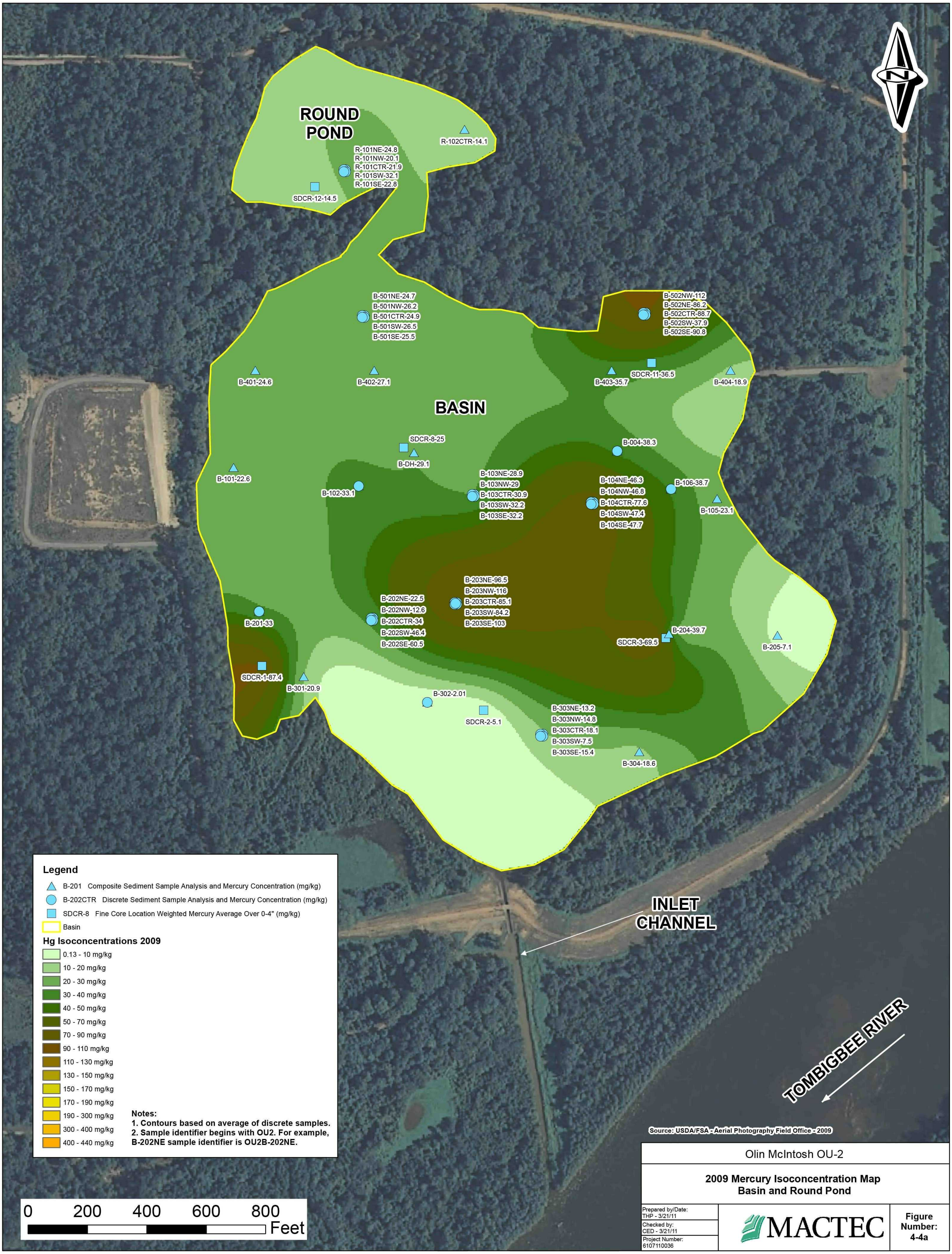


Note: ■ May denote multiple sampling times within a day

Prepared/Date: KPW 3/5/2009

Checked/Date: HEF 3/5/2009

100035.01



Olin McIntosh OU-2

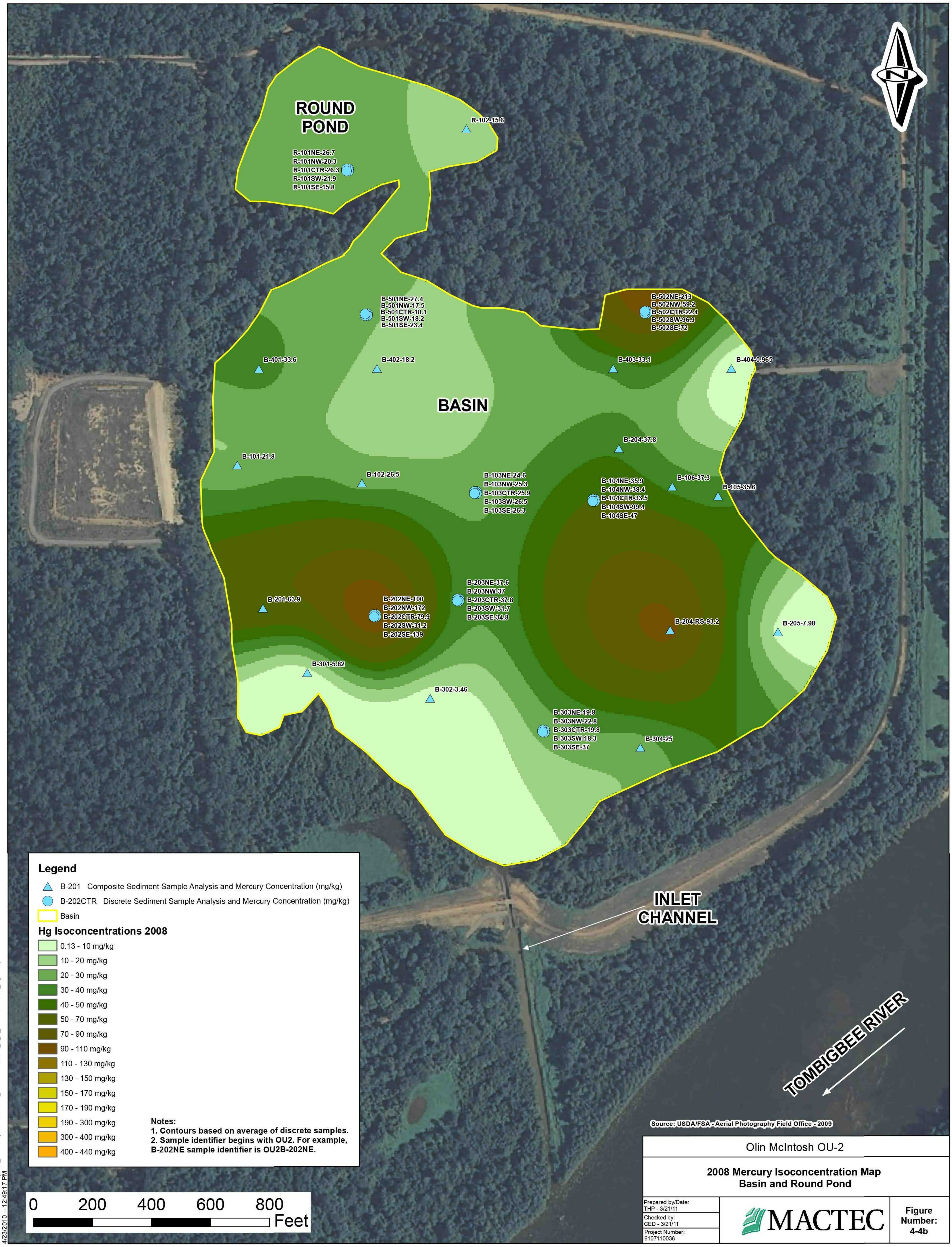
2009 Mercury Isoconcentration Map
Basin and Round Pond

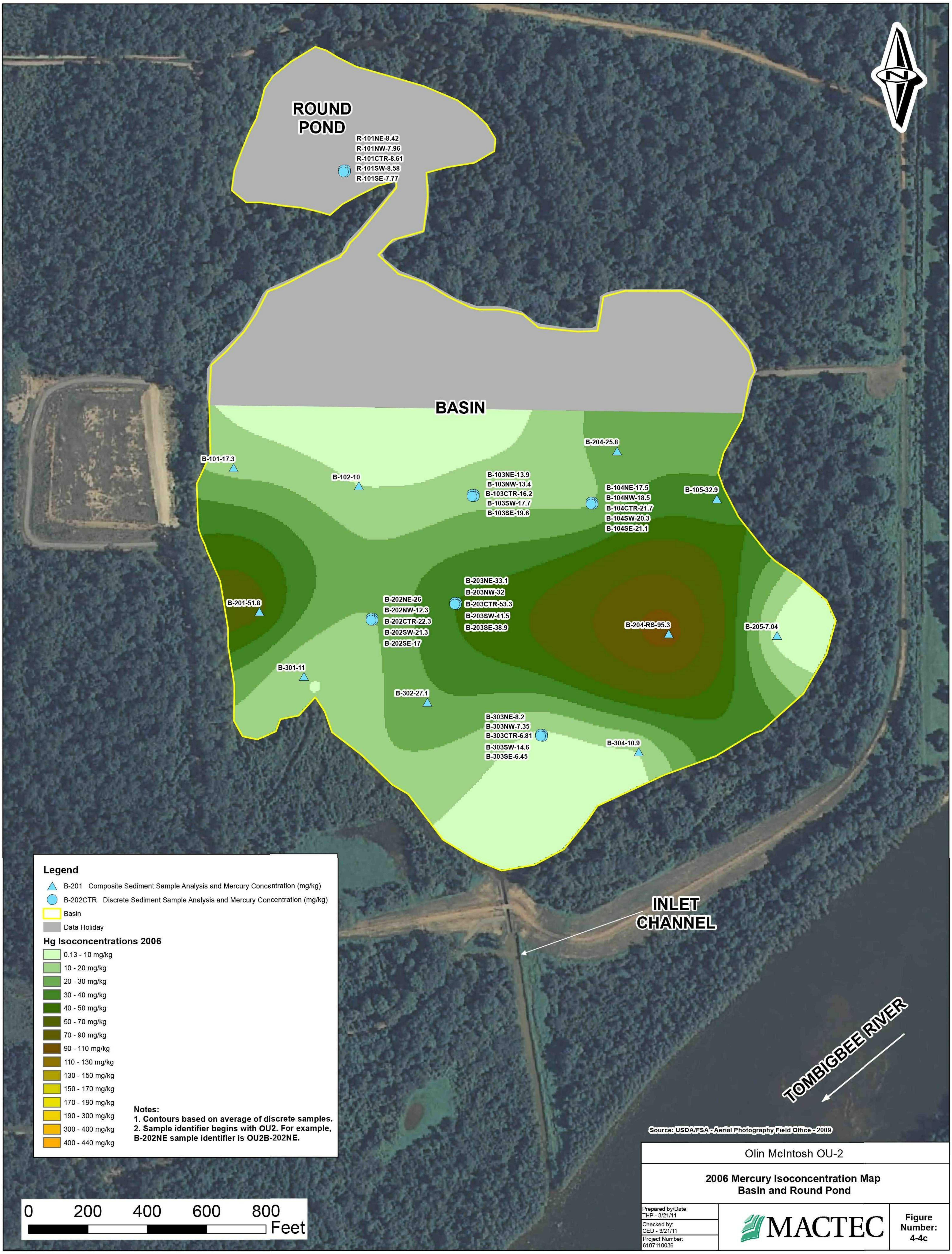
Prepared by/Date: THP - 3/21/11
Checked by: CED - 3/21/11
Project Number: 6107110036

MACTEC

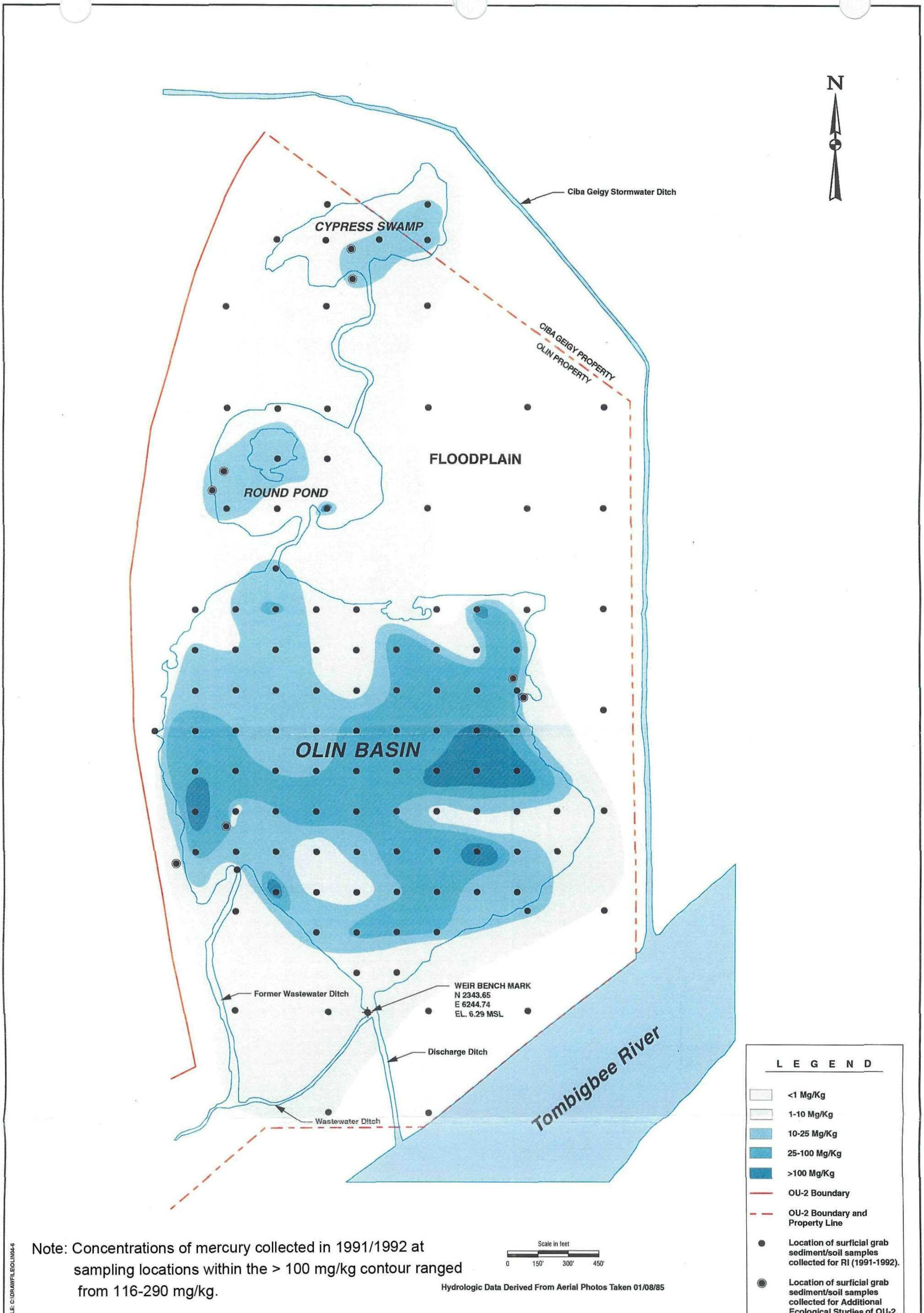
Figure Number: 4-4a

Path: G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\RI Addendum 3_16_11\report mxds\Figure_4_4a.mxd


ROUND POND
R-102-15.6
R-101NE-26.7
R-101NW-20.3
R-101CTR-26.3
R-101SW-21.9
R-101SE-15.8
B-501NE-27.4
B-501NW-17.5
B-501CTR-18.1
B-501SW-18.2
B-501SE-23.4
B-502NE-213
B-502NW-59.2
B-502CTR-22.4
B-502SW-96.9
B-502SE-72
B-401-33.6
B-402-18.2
B-403-33.1
B-404-0.965
BASIN
B-204-37.8
B-101-21.8
B-102-26.5
B-103NE-24.6
B-103NW-25.3
B-103CTR-25.9
B-103SW-26.5
B-103SE-26.3
B-104NE-35.9
B-104NW-38.4
B-104CTR-33.5
B-104SW-99.4
B-104SE-47
B-106-37.3
B-105-35.6
B-203NE-37.6
B-203NW-37
B-203CTR-37.8
B-203SW-31.7
B-203SE-34.8
B-201-63.9
B-202NE-100
B-202NW-172
B-202CTR-79.9
B-202SW-31.2
B-202SE-139
B-204-RS-93.2
B-205-7.98
B-301-5.82
B-302-3.46
B-303NE-19.8
B-303NW-22.8
B-303CTR-19.8
B-303SW-18.3
B-303SE-37
B-304-25
INLET CHANNEL
TOMBIGBEE RIVER
Legend
B-201 Composite Sediment Sample Analysis and Mercury Concentration (mg/kg)
B-202CTR Discrete Sediment Sample Analysis and Mercury Concentration (mg/kg)
Basin
Hg Isoconcentrations 2008
0.13 - 10 mg/kg
10 - 20 mg/kg
20 - 30 mg/kg
30 - 40 mg/kg
40 - 50 mg/kg
50 - 70 mg/kg
70 - 90 mg/kg
90 - 110 mg/kg
110 - 130 mg/kg
130 - 150 mg/kg
150 - 170 mg/kg
170 - 190 mg/kg
190 - 300 mg/kg
300 - 400 mg/kg
400 - 440 mg/kg
Notes:
1. Contours based on average of discrete samples.
2. Sample identifier begins with OU2. For example, B-202NE sample identifier is OU2B-202NE.
0 200 400 600 800
Feet
Source: USDA/FSA - Aerial Photography Field Office - 2009
Olin McIntosh OU-2
2008 Mercury Isoconcentration Map
Basin and Round Pond
Prepared by/Date: THP - 3/21/11
Checked by: CED - 3/21/11
Project Number: 6107110036
MACTEC
Figure Number: 4-4b
Map Document: (G:\Projects_GIS\Projects2007\olin_mcintosh\recont_3_9_10\mxds\2008_Hg.mxd)
4/23/2010 -- 12:49:17 PM



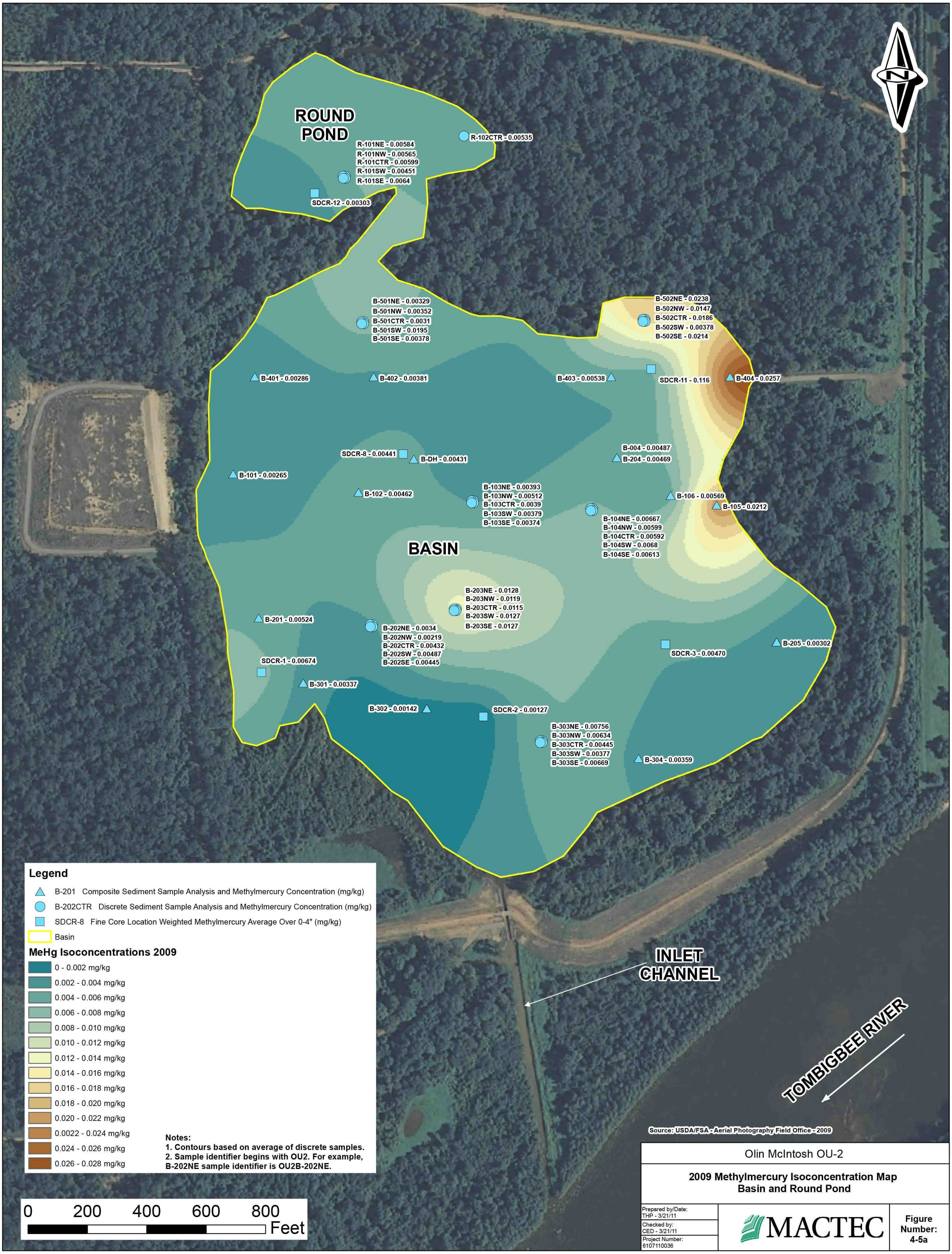
Path: G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\RI Addendum 3_16_11\report mxds\Figure_4_4c.mxd



Note: Concentrations of mercury collected in 1991/1992 at sampling locations within the > 100 mg/kg contour ranged from 116-290 mg/kg.

RI/FS McINTOSH PLANT SITE Olin CHEMICALS CHARLESTON, TENNESSEE	Woodward-Clyde Engineering & sciences applied to the earth & its environment Baton Rouge, Louisiana SCALE: 1" = 450'	DRAWN BY: D.OLSON CHKD. BY: W.BEAL	DATE: 11/02/94 DATE: 11/03/94	1991 DISTRIBUTION OF MERCURY IN OU-2	FILE NO. 93N063C FIG. NO. 4-4d

Source: WCC, 1994. Additional Ecological Studies of OU-2. Volumes 1 and 2. McIntosh Plant Site, Olin Corporation, McIntosh, Alabama November.



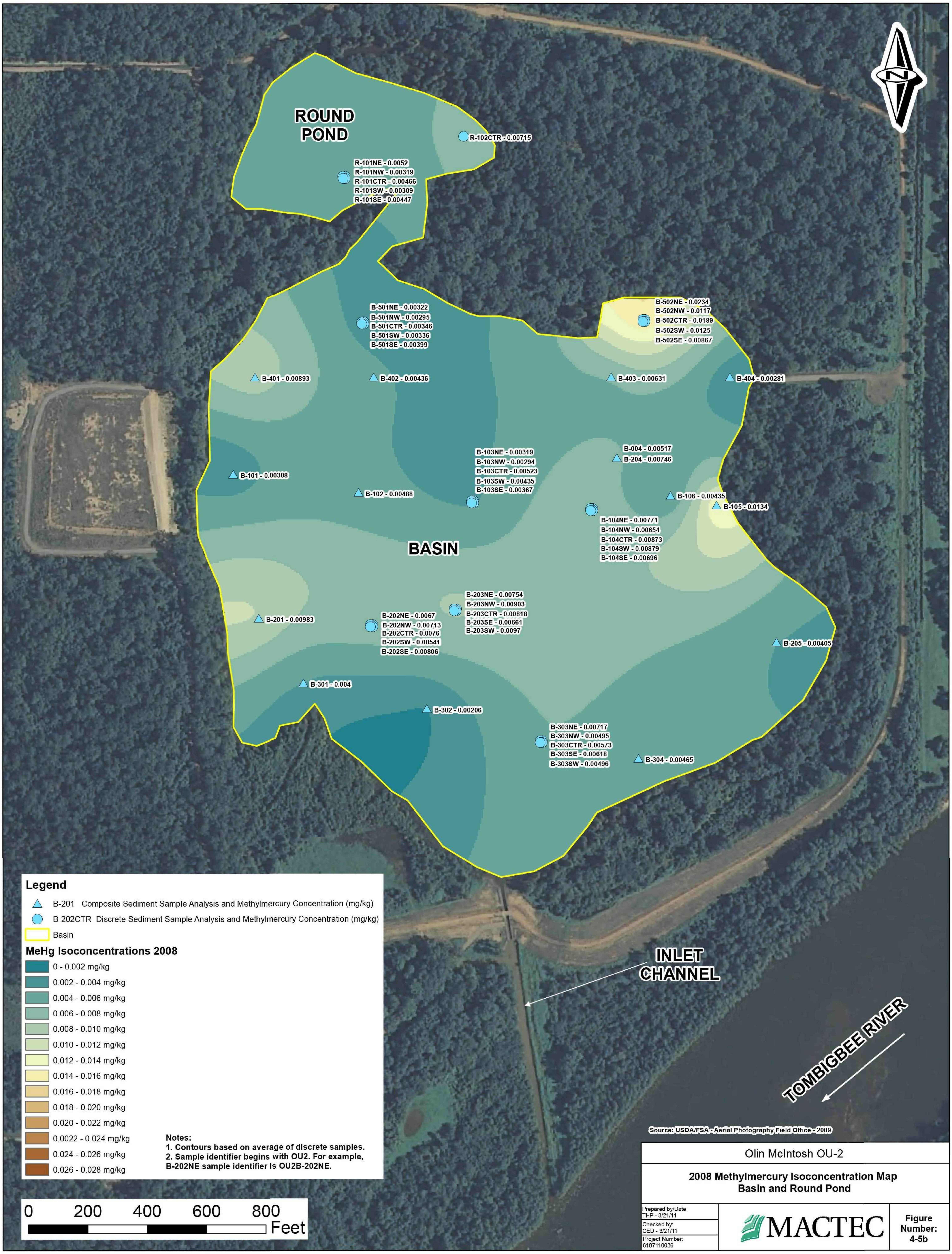
Olin McIntosh OU-2

2009 Methylmercury Isoconcentration Map Basin and Round Pond

Prepared by/Date: THP - 3/21/11
Checked by: CED - 3/21/11
Project Number: 6107110036

MACTEC

Figure Number: 4-5a



Olin McIntosh OU-2

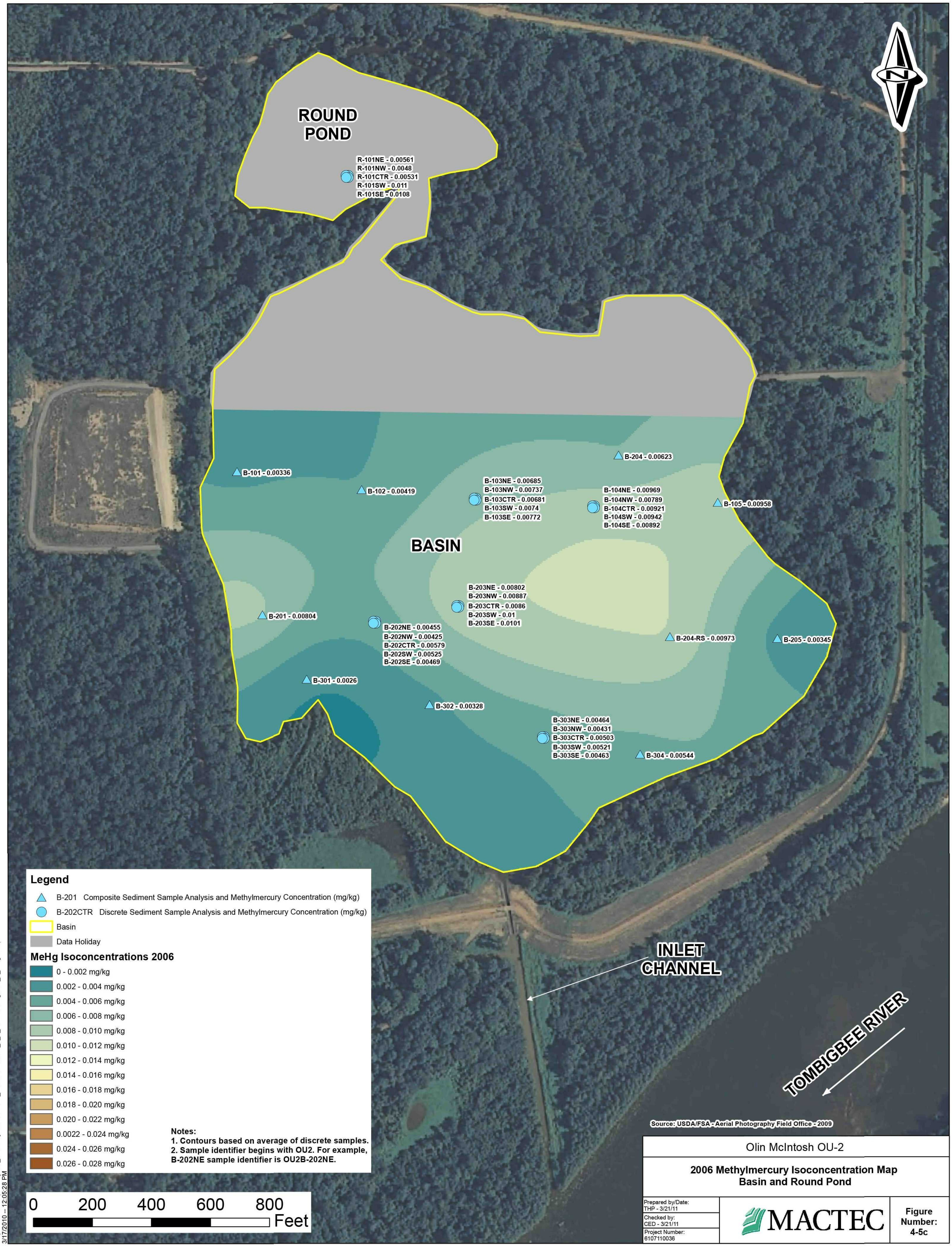
2008 Methylmercury Isoconcentration Map
Basin and Round Pond

Prepared by/Date: THP - 3/21/11
Checked by: CED - 3/21/11
Project Number: 6107110036

MACTEC

Figure Number: 4-5b

Path: G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\RI Addendum 3_16_11\report mxds\Figure_4_5b.mxd



Map Document: (G:\Projects_GIS\Projects2007\olin_mcintosh\recont_3_9_10\mxds\Figure4_4_MHg.mxd)
3/17/2010 -- 12:05:28 PM

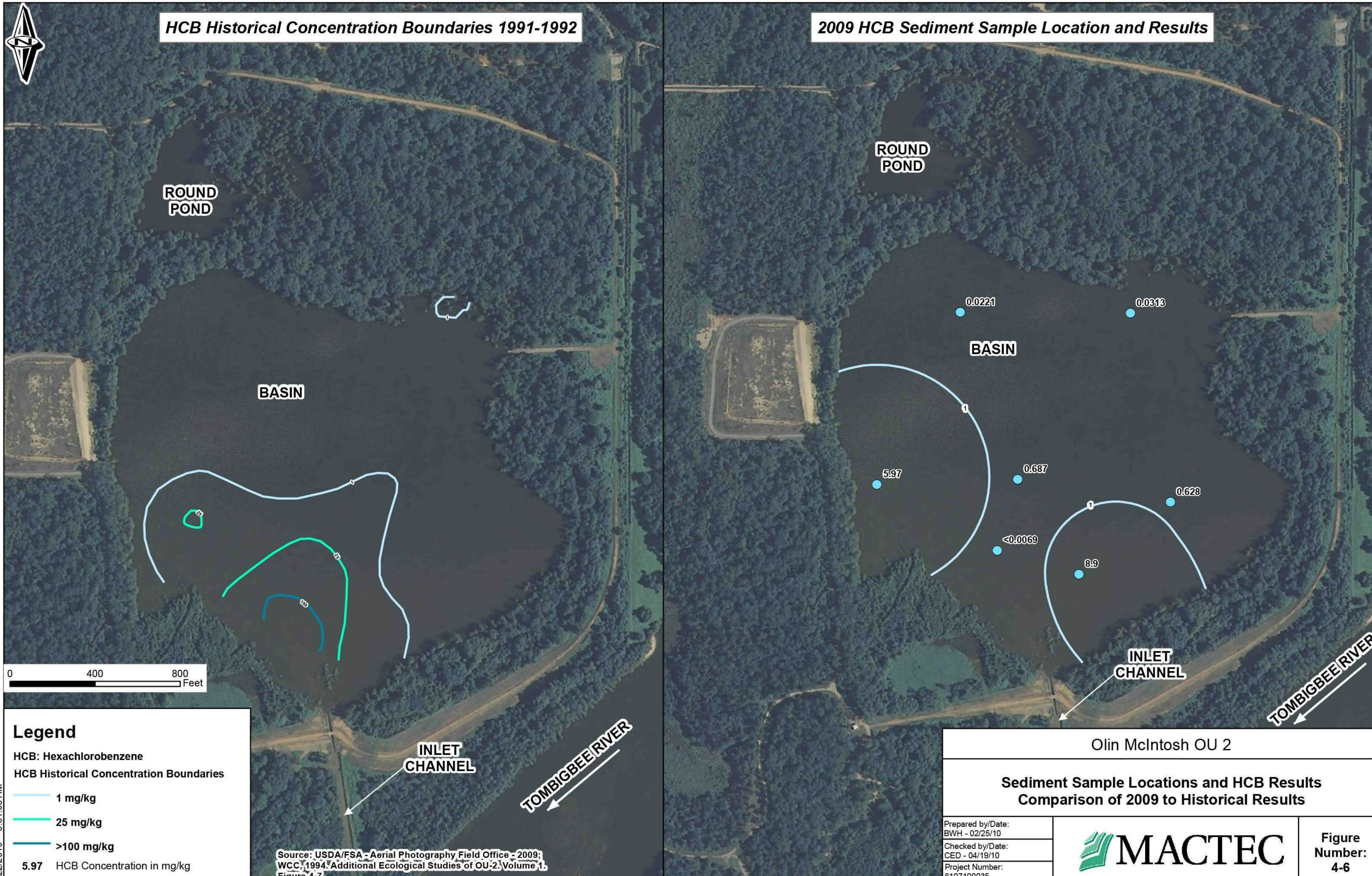
Olin McIntosh OU-2

2006 Methylmercury Isoconcentration Map
Basin and Round Pond

Prepared by/Date: THP - 3/21/11
Checked by: CED - 3/21/11
Project Number: 6107110036

MACTEC

Figure Number: 4-5c



Olin McIntosh OU 2

Sediment Sample Locations and HCB Results
Comparison of 2009 to Historical Results

Prepared by/Date: BWH - 02/25/10
Checked by/Date: CED - 04/19/10
Project Number: 6107100035

MACTEC

Figure Number: 4-6

Map Document: (G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\ESPP Baseline report2009\mxds\report_mxds_041510\Figure4_5_Historic_Contour.mxd)
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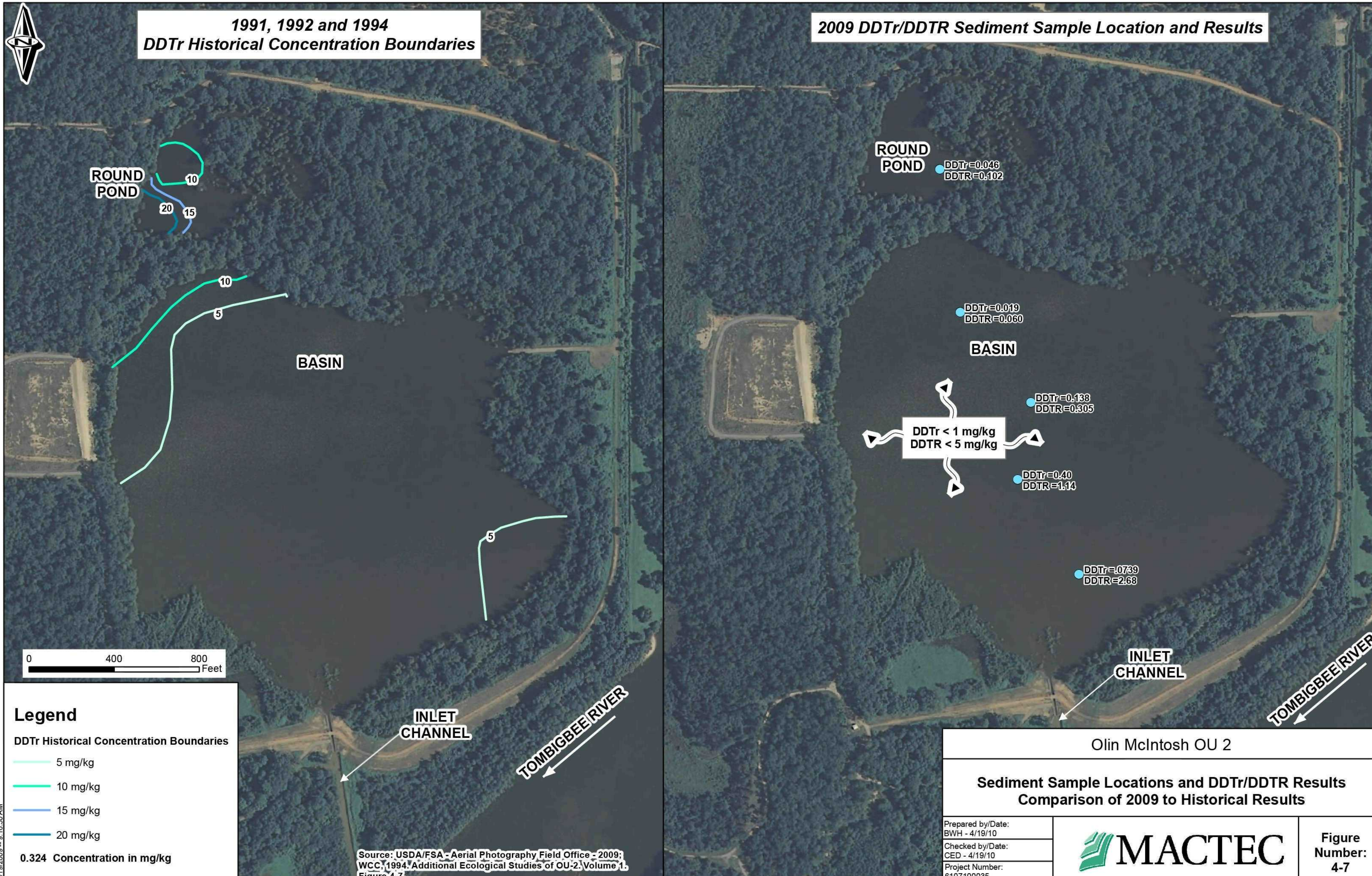
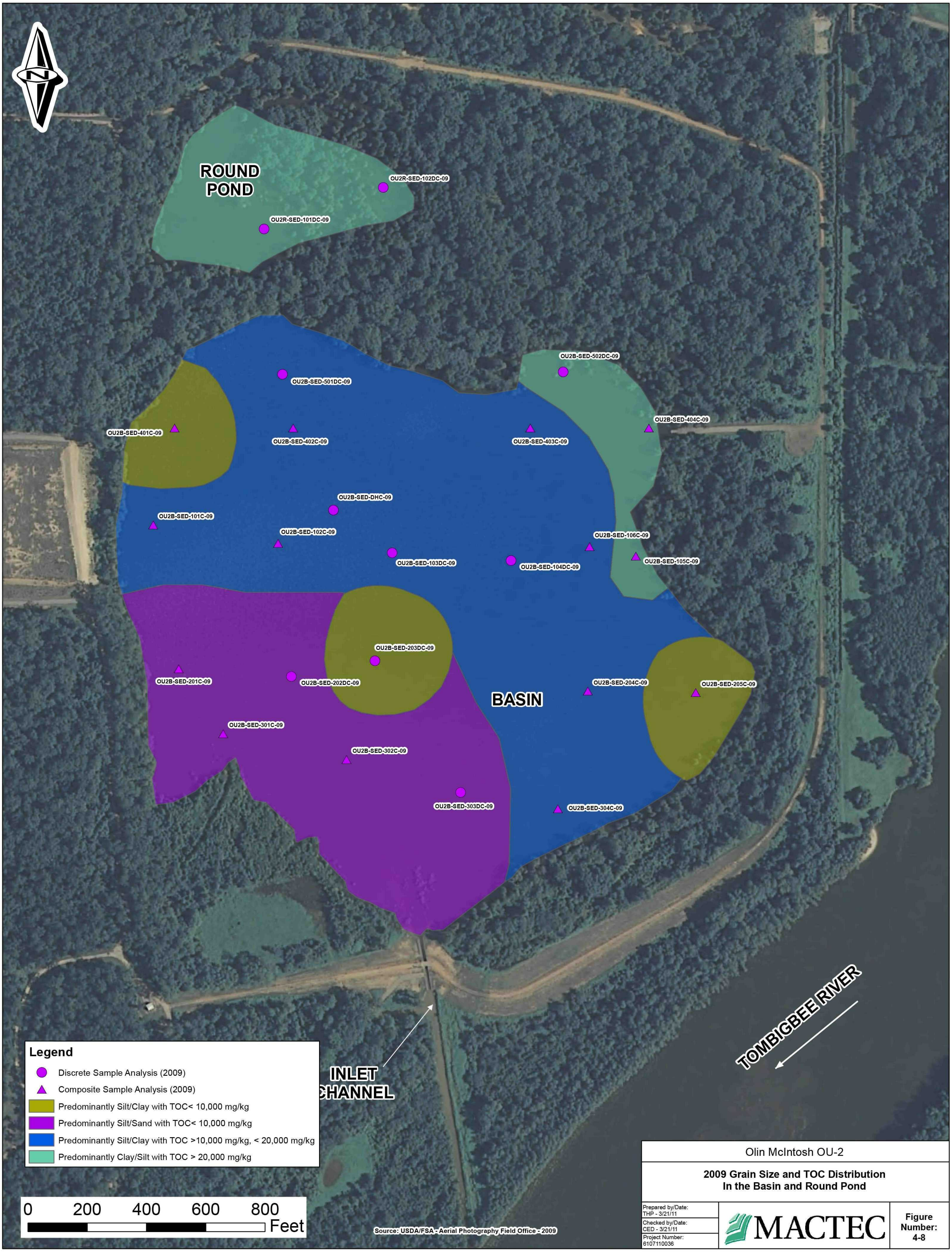


Olin McIntosh OU 2

Sediment Sample Locations and DDTr/DDTR Results
Comparison of 2009 to Historical Results

Prepared by/Date: BWH - 4/19/10	MACTEC	Figure Number: 4-7
Checked by/Date: CED - 4/19/10		
Project Number: 6107100035		

Map Document: (G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\ESPP Baseline report\2009\mxds\Figure4_6_Historic_Contour.mxd)
11/19/2009 -- 9:16:30 AM



Olin McIntosh OU-2

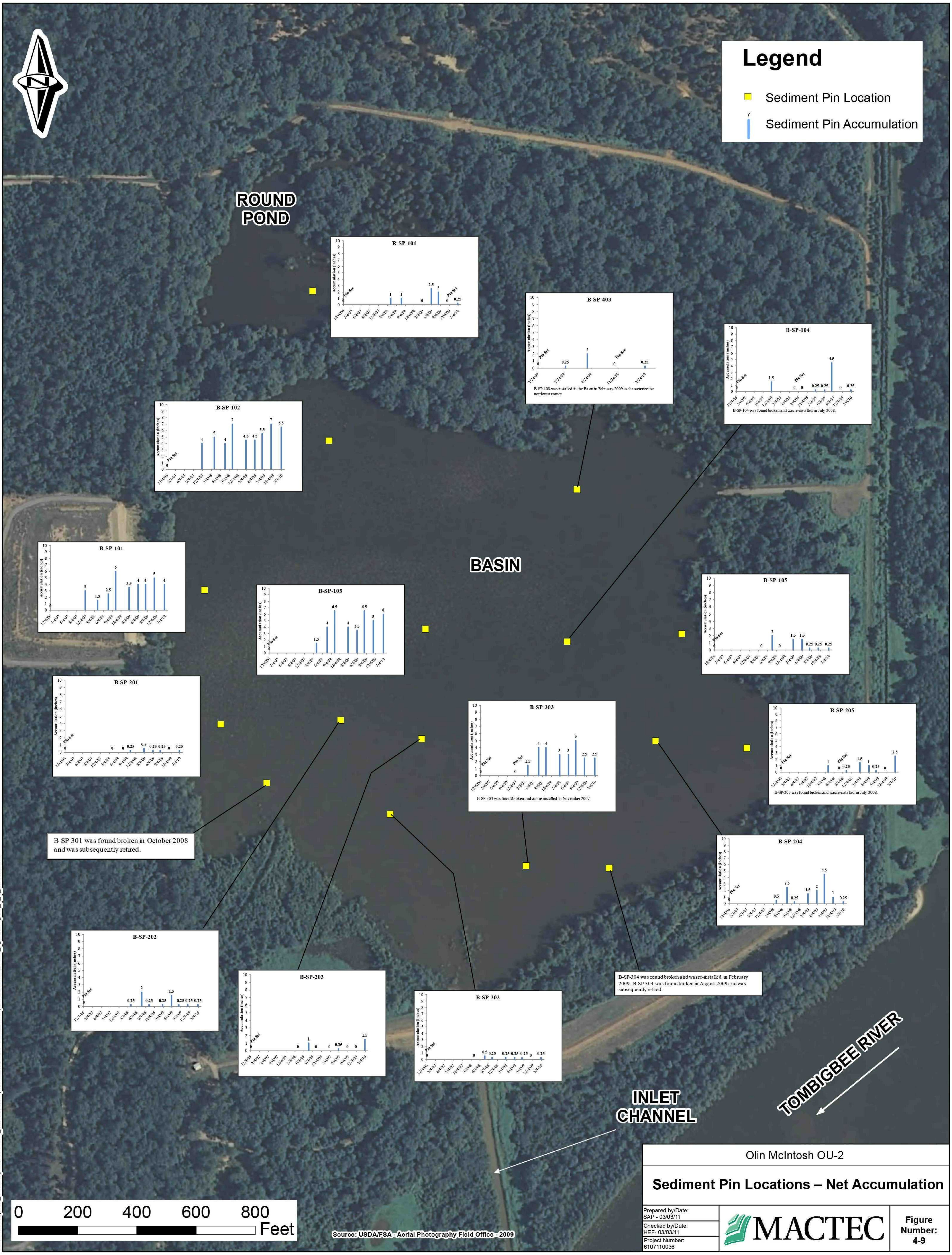
2009 Grain Size and TOC Distribution In the Basin and Round Pond

Prepared by/Date: THP - 3/21/11
Checked by/Date: CED - 3/21/11
Project Number: 6107110036

MACTEC

Figure Number: 4-8

Path: G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\RI Addendum 3_16_11\report mxds\Figure_4_8.mxd



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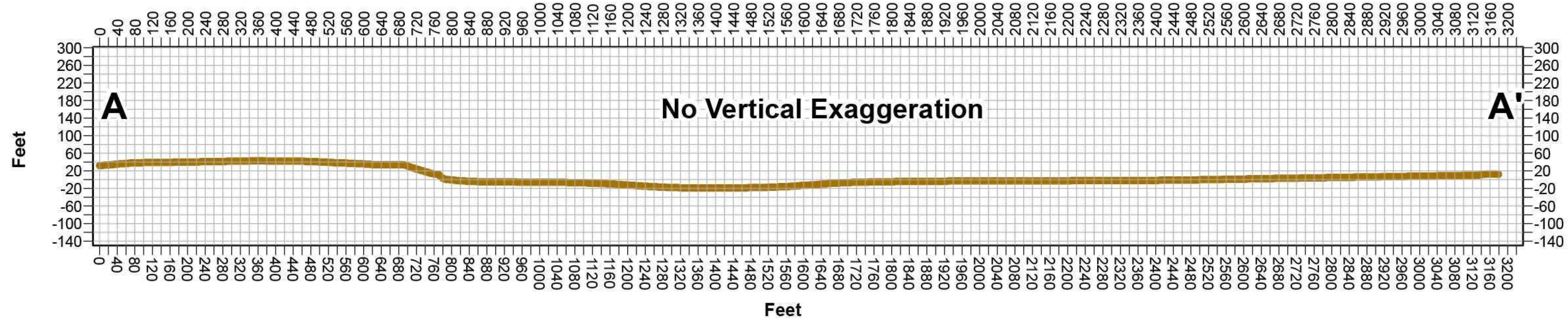
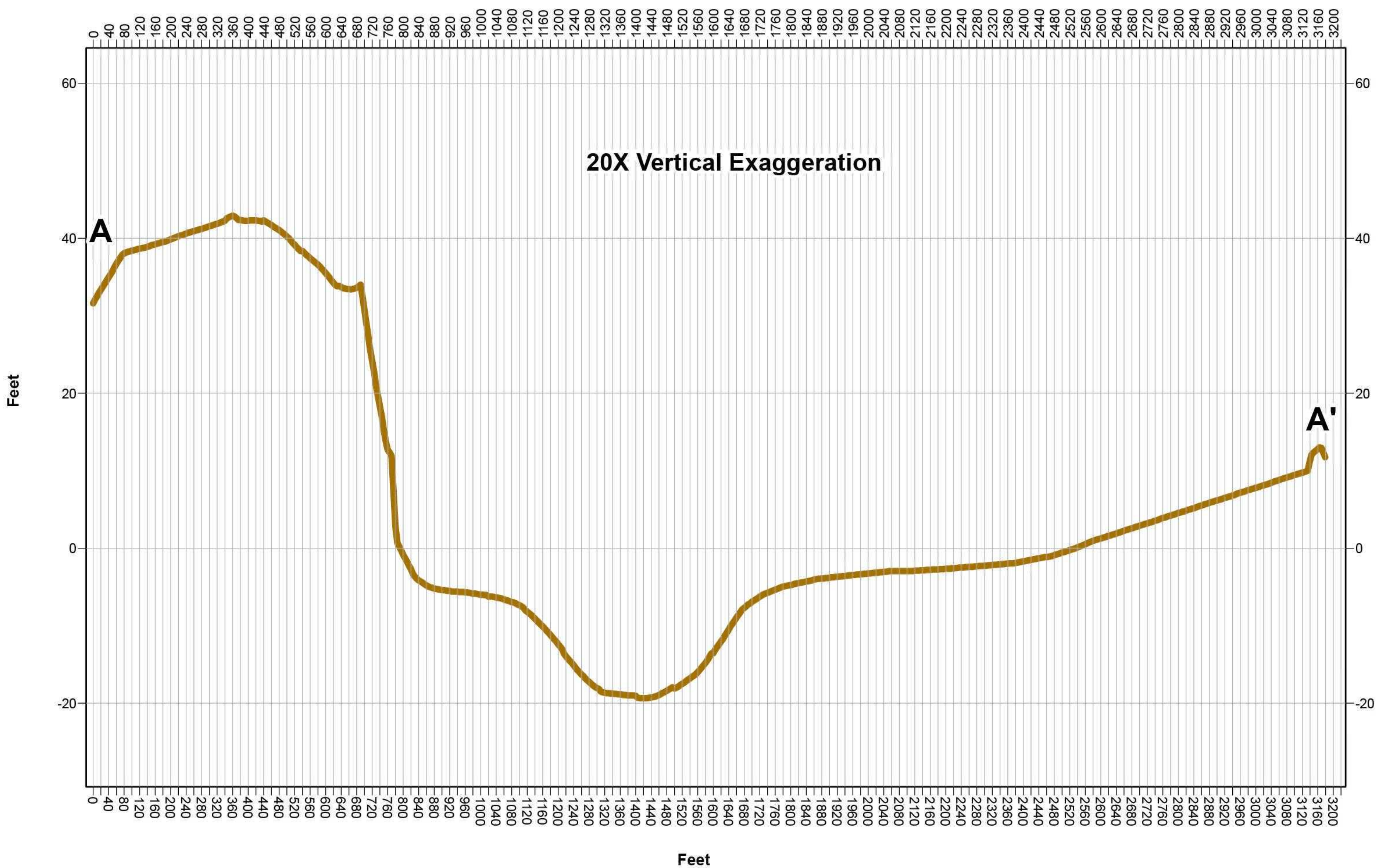
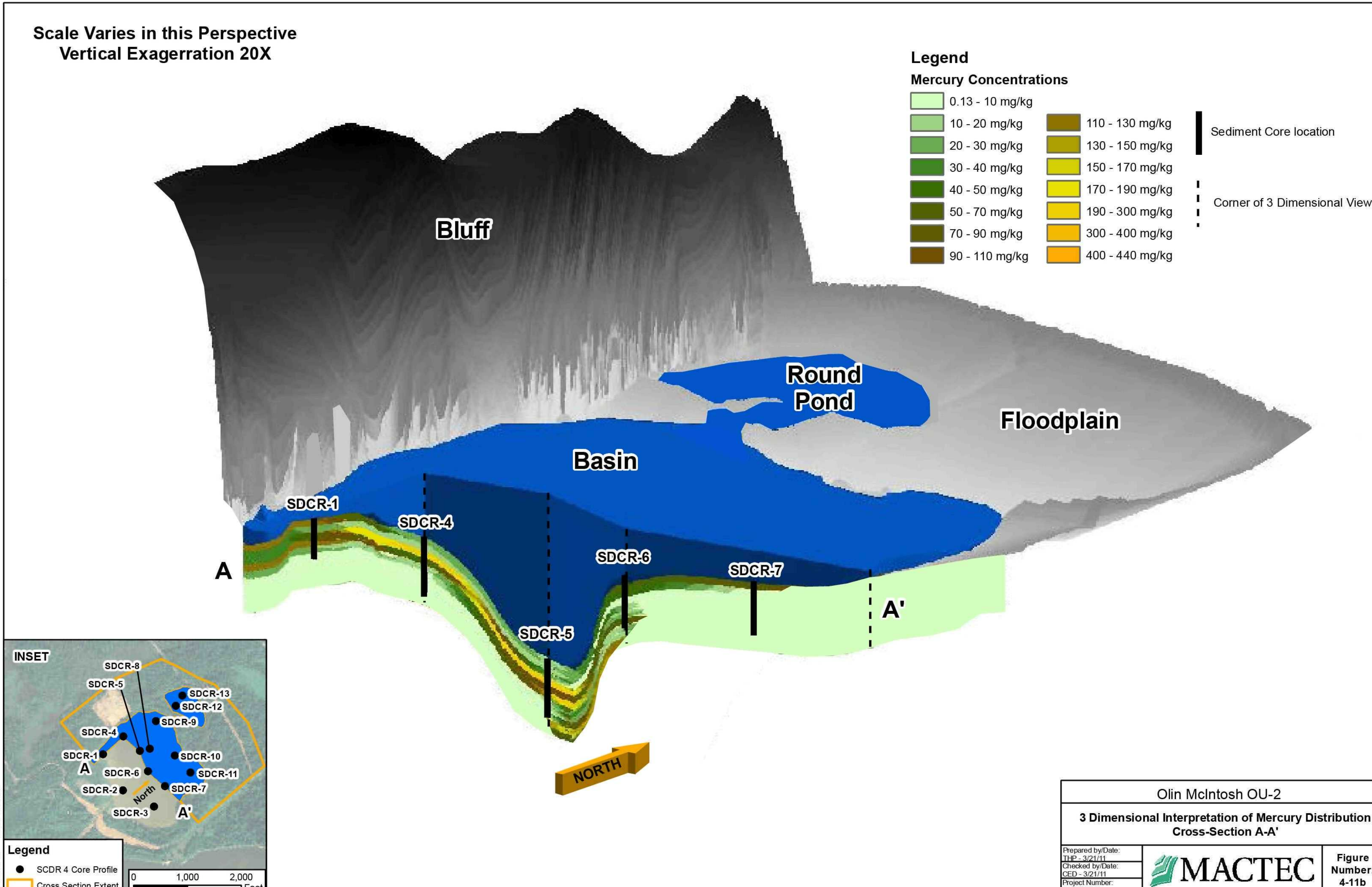




Olin McIntosh OU-2

Cross Section A - A'
Zero Vertical Exaggeration VS.
20X Vertical Exaggeration

Prepared by/Date: THP - 4/7/11 Checked by/Date: HEF - 4/7/11 Project Number: 6107110036	MACTEC	**Figure Number: 4-11a**



Olin McIntosh OU-2

3 Dimensional Interpretation of Mercury Distribution Cross-Section A-A'

Prepared by/Date: THP - 3/21/11
Checked by/Date: CED - 3/21/11
Project Number: 6107110036

MACTEC

Figure Number: 4-11b

Map Document: (G:\Projects_GIS\Projects2007\olin_mcintosh\sed_core_results\X_sect\mxds\fig_4_14a.mxd)
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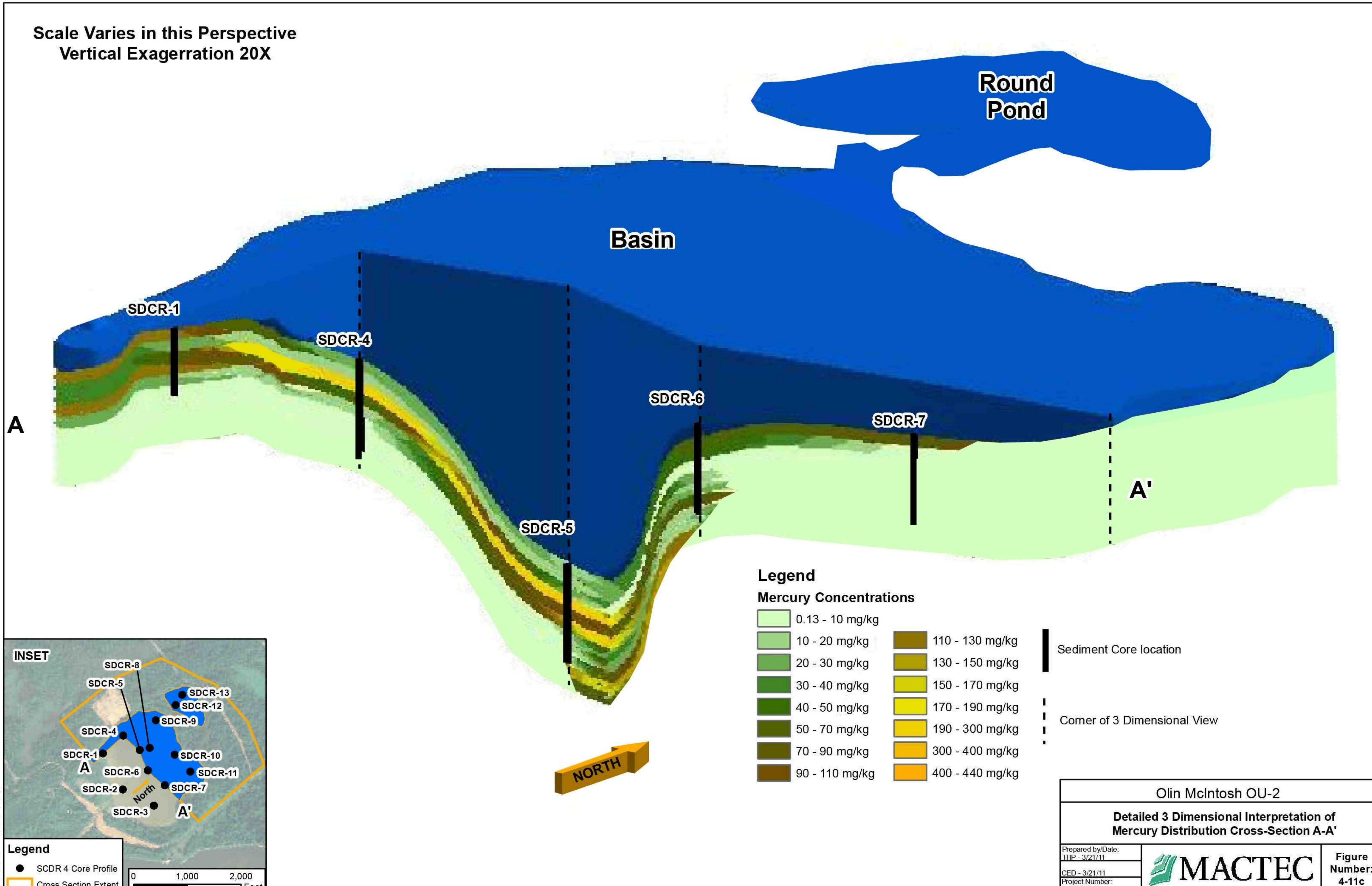

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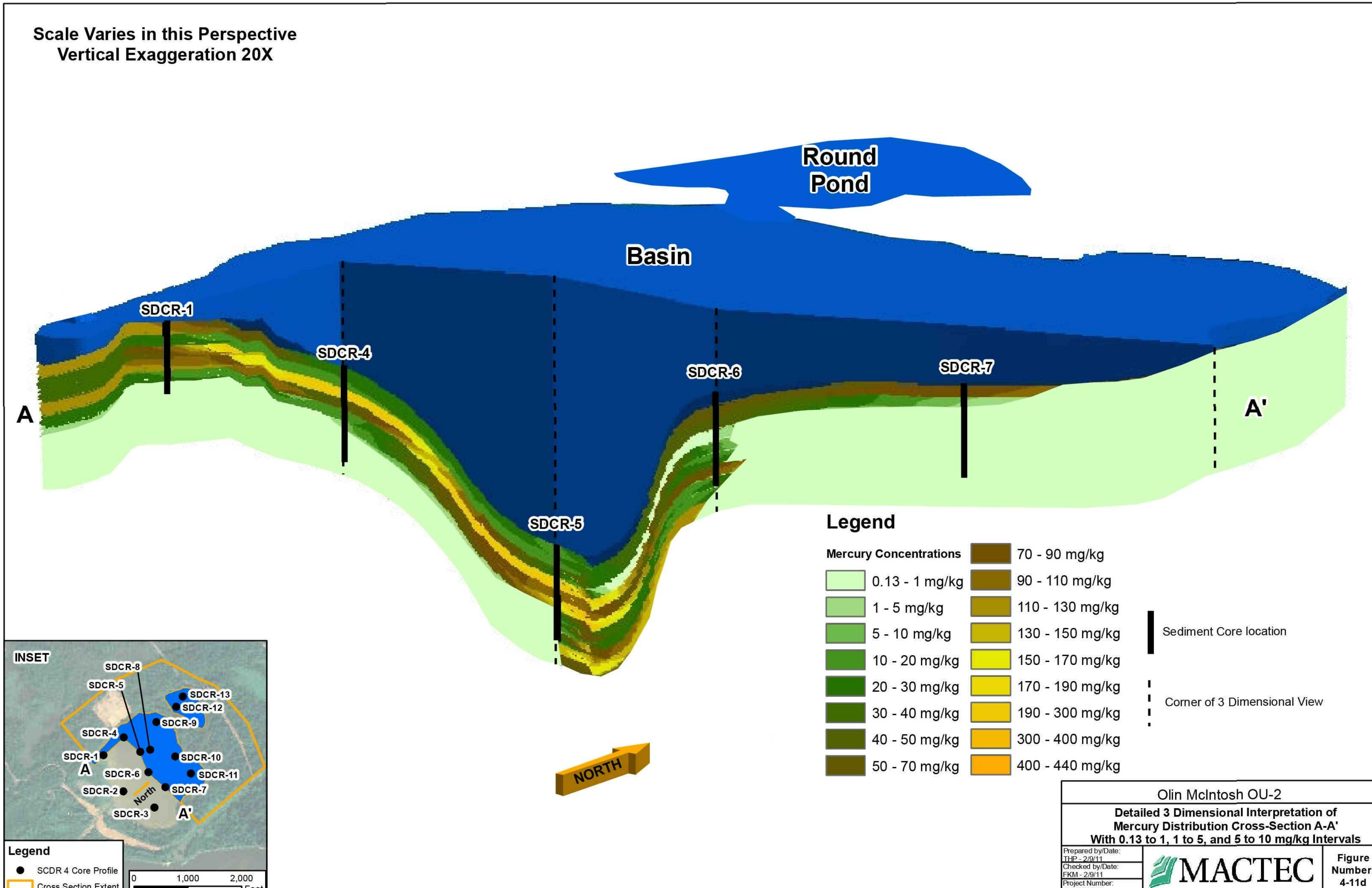
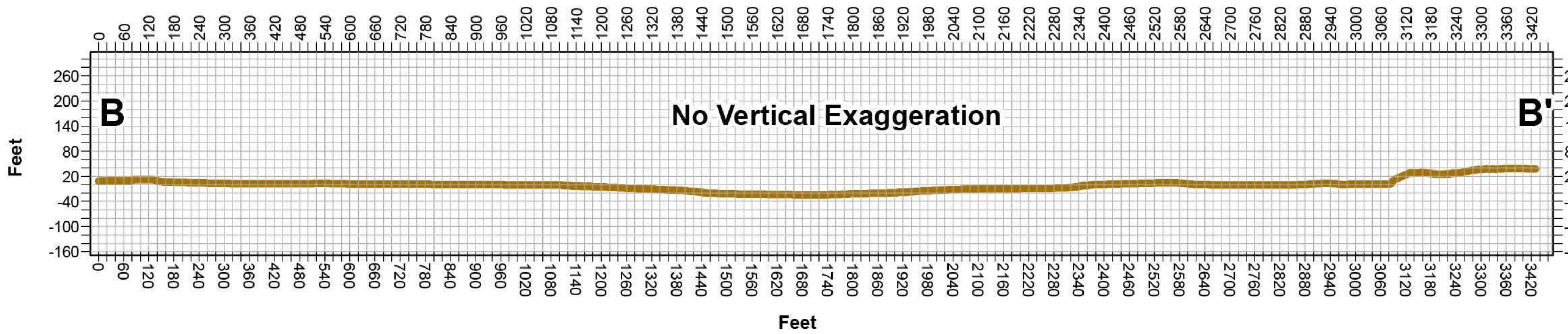


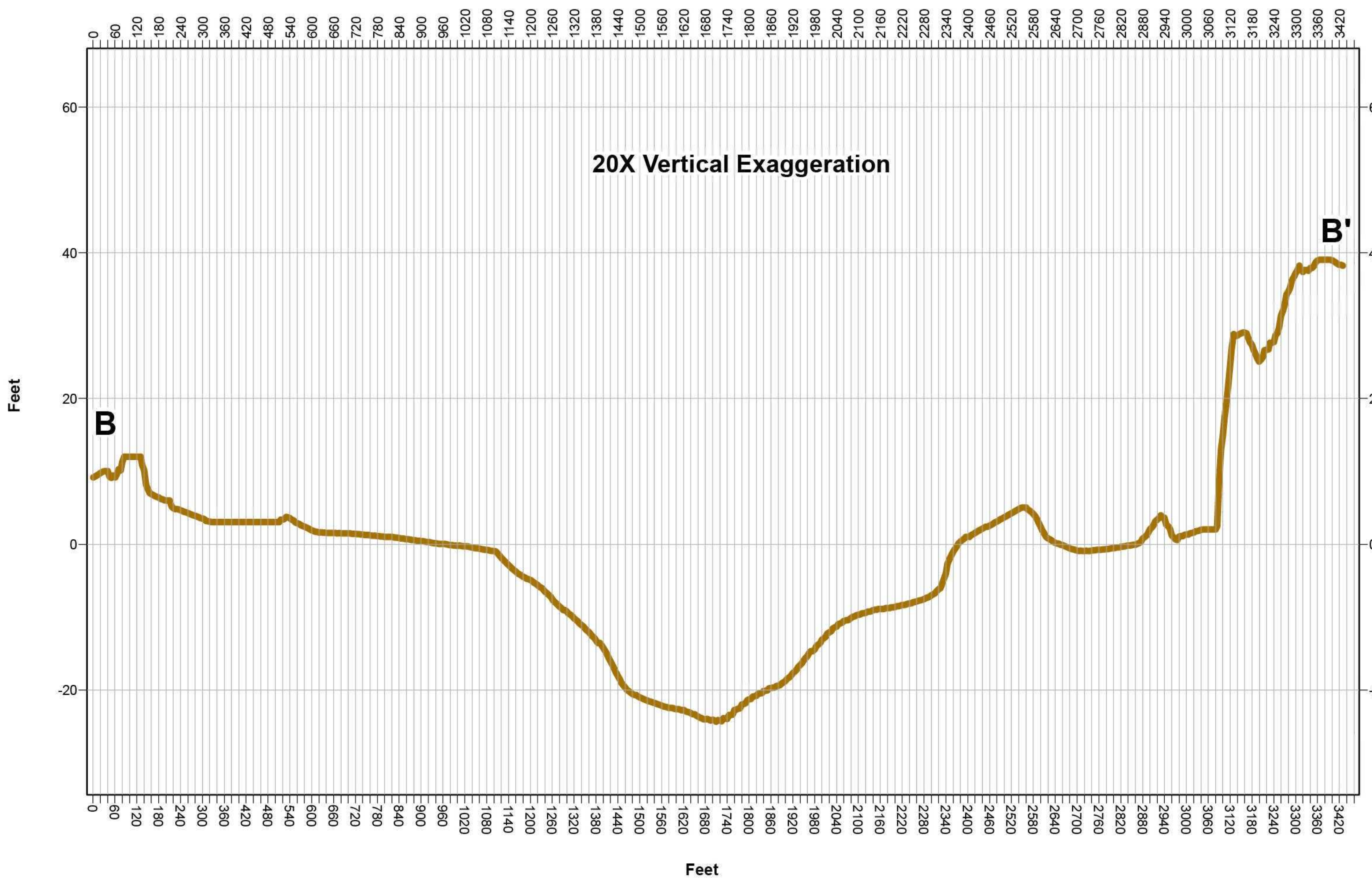
Olin McIntosh OU-2

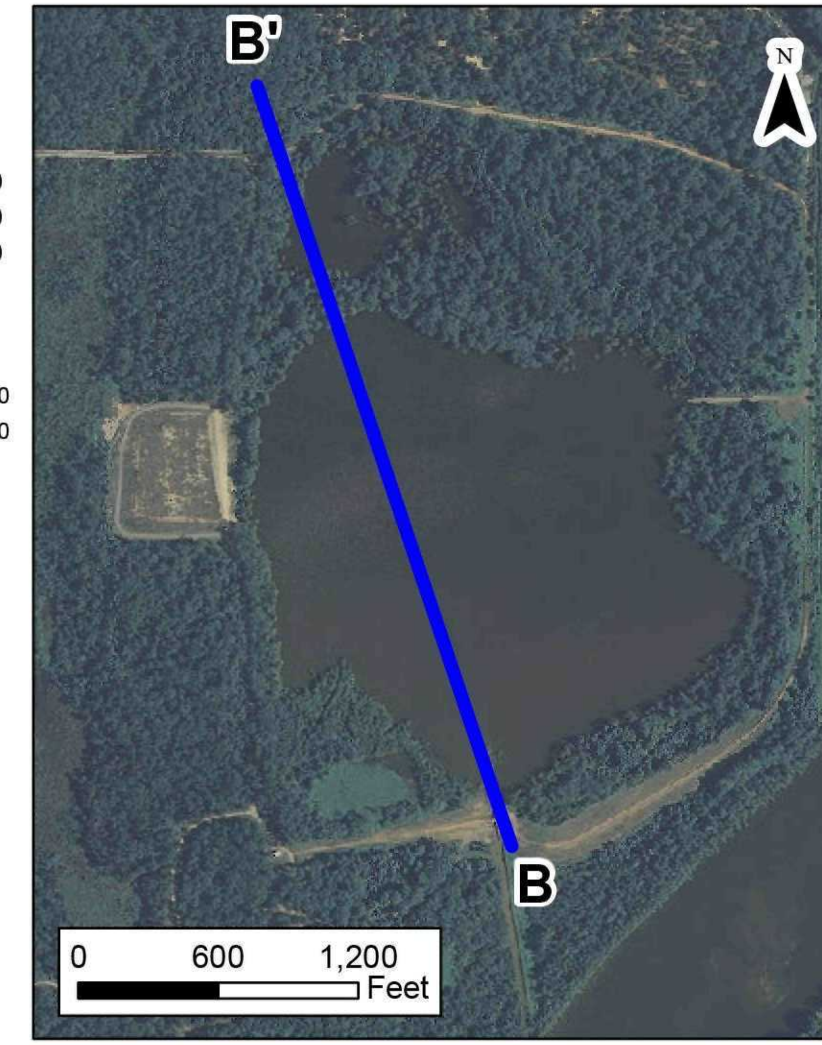
Detailed 3 Dimensional Interpretation of Mercury Distribution Cross-Section A-A' With 0.13 to 1, 1 to 5, and 5 to 10 mg/kg Intervals

Prepared by/Date: THP - 2/9/11 Checked by/Date: FKM - 2/9/11 Project Number: 6107090036	MACTEC	Figure Number: 4-11d

Path: G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\RI Addendum 3_16_11\report mxds\Figure_4_11d.mxd







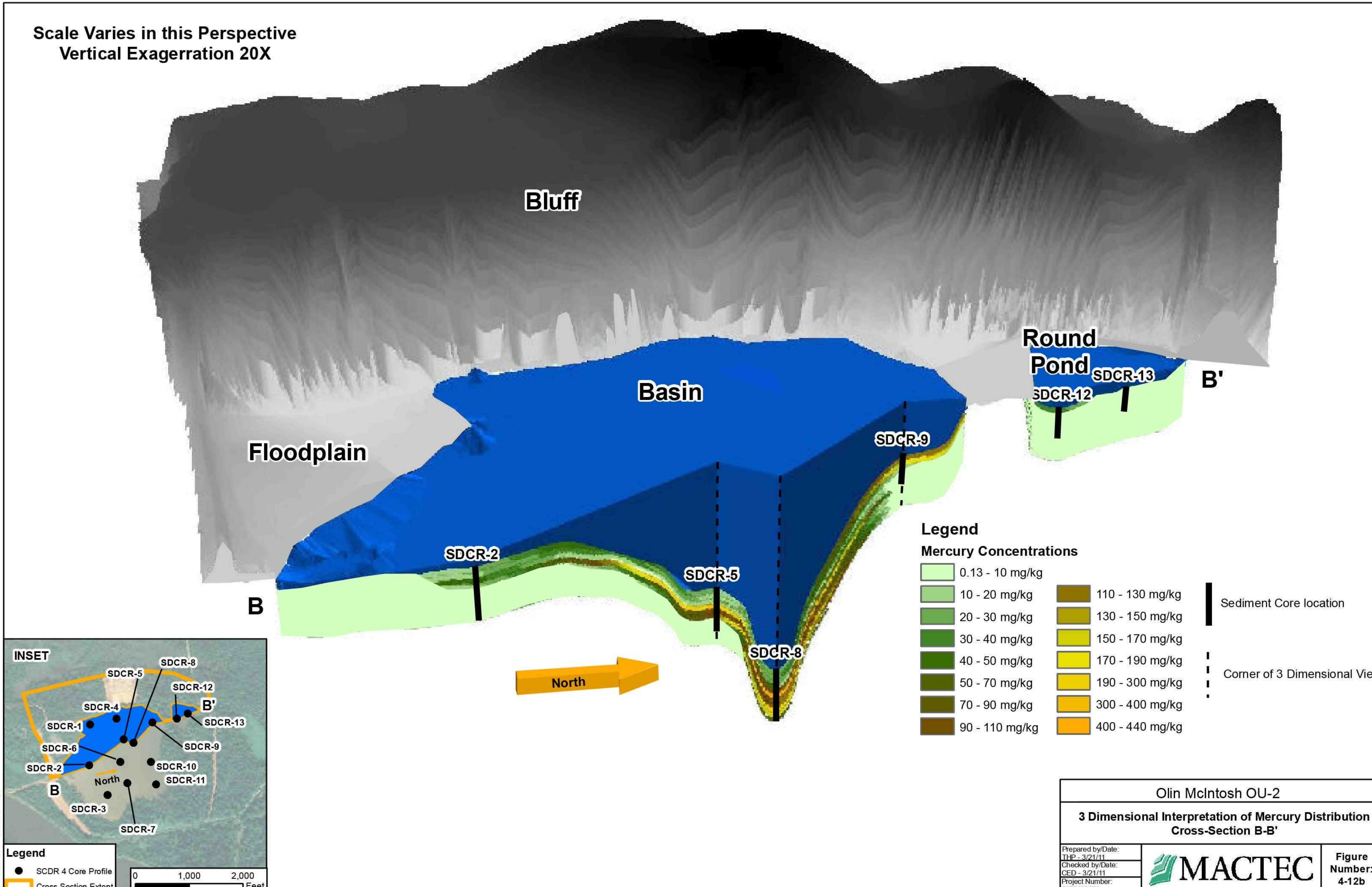
Olin McIntosh OU-2

Cross Section B - B'
Zero Vertical Exaggeration VS.
20X Vertical Exaggeration

Prepared by/Date: THP - 4/7/11
Checked by/Date: HEF - 4/7/11
Project Number: 6107110036

MACTEC

Figure Number: 4-12a



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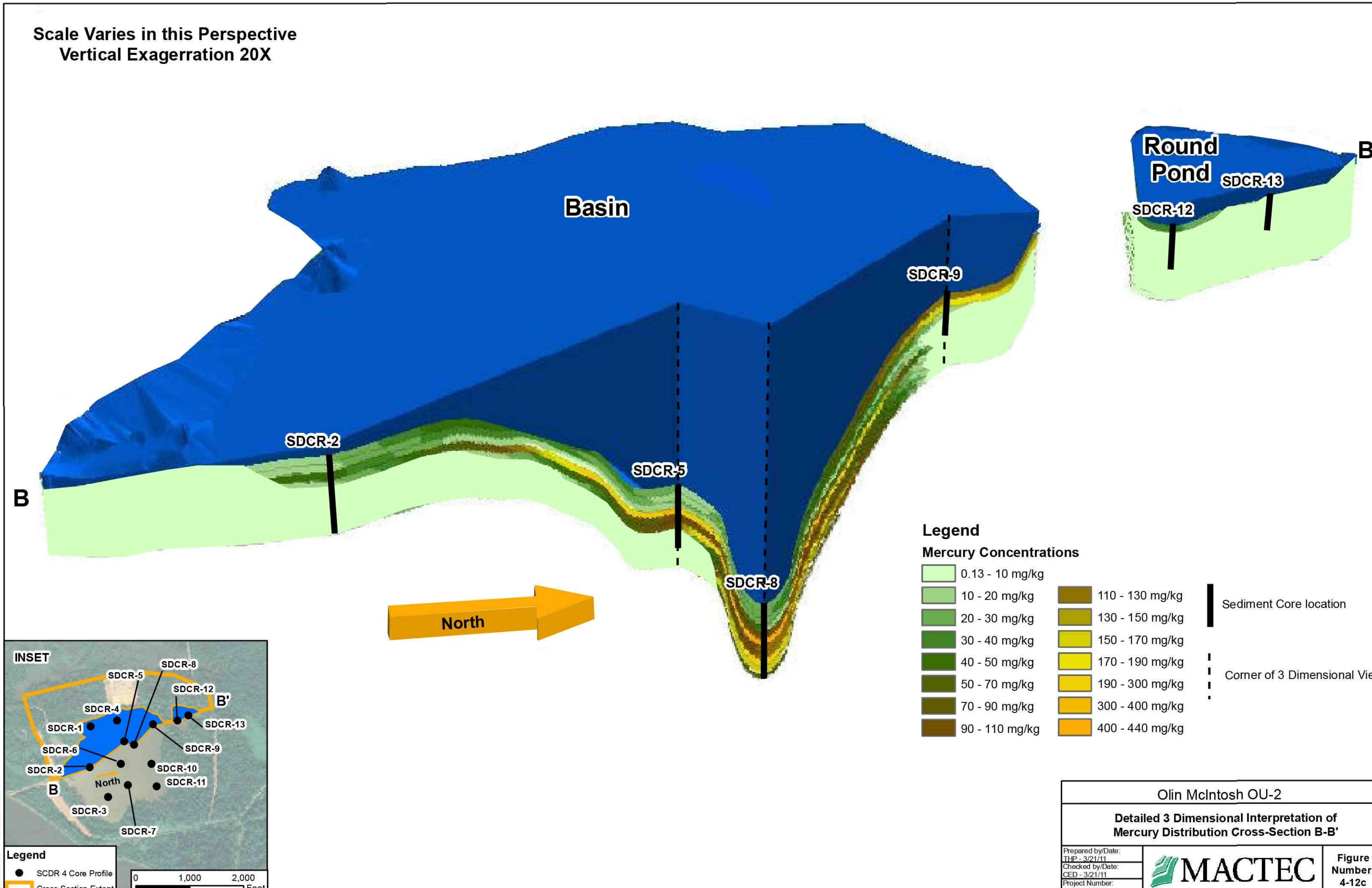

Olin McIntosh OU-2

Detailed 3 Dimensional Interpretation of Mercury Distribution Cross-Section B-B'

Prepared by/Date: THP - 3/21/11
Checked by/Date: CED - 3/21/11
Project Number: 6107110036

MACTEC

Figure Number: 4-12c

Map Document: (G:\Projects_GIS\Projects2007\olin_mcintosh\sed_core_results\X_sect\mxds\fig_4_14b.mxd)
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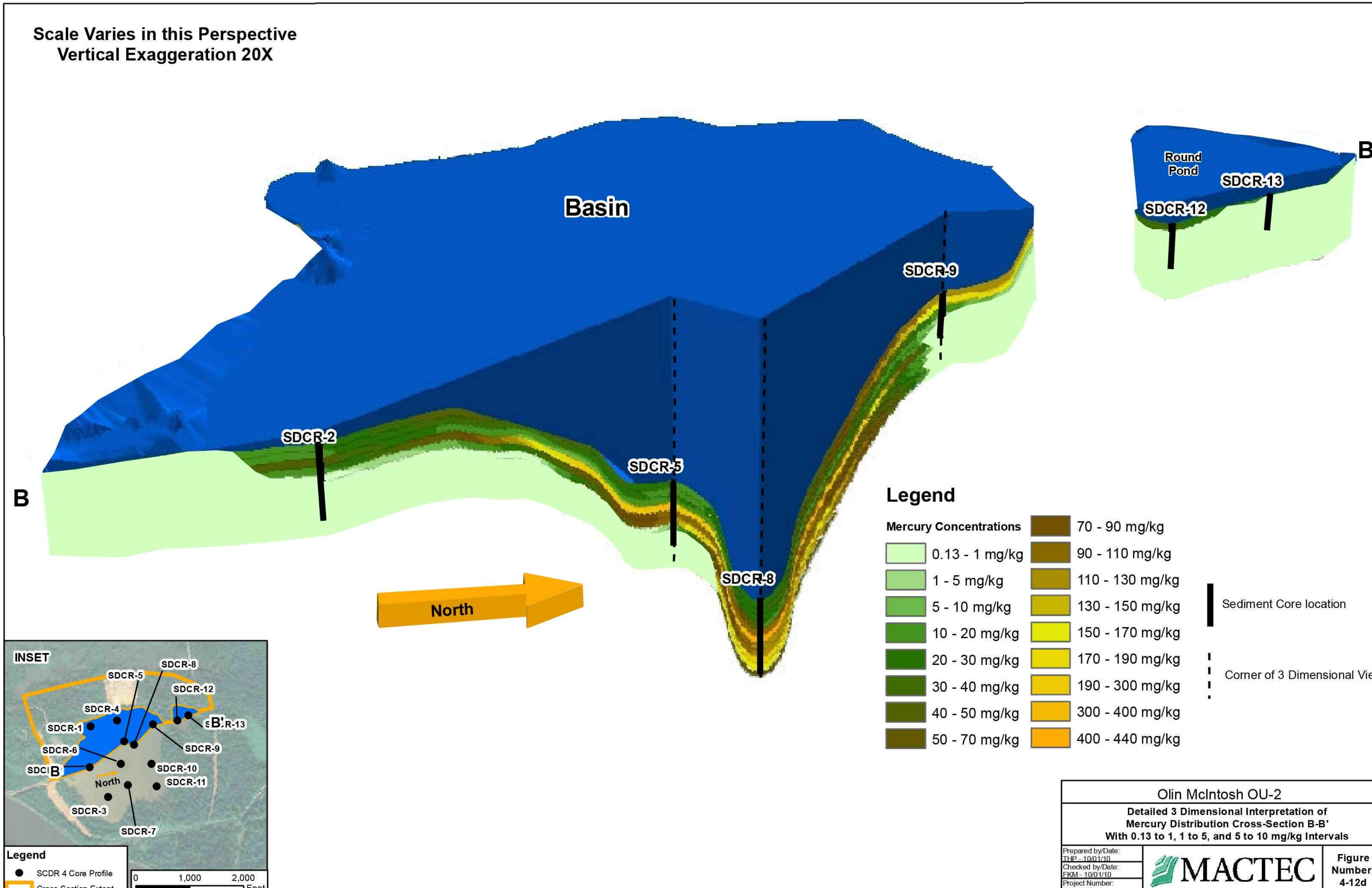

Olin McIntosh OU-2

Detailed 3 Dimensional Interpretation of Mercury Distribution Cross-Section B-B' With 0.13 to 1, 1 to 5, and 5 to 10 mg/kg Intervals

Prepared by/Date: THP - 10/01/10
Checked by/Date: FKM - 10/01/10
Project Number: 6107100036

MACTEC

Figure Number: 4-12d

Path: G:\Projects_GIS\Projects2007\olin_mcintosh\Report mxds\RI Addendum 3_16_11\report mxds\Figure_4_12d.mxd

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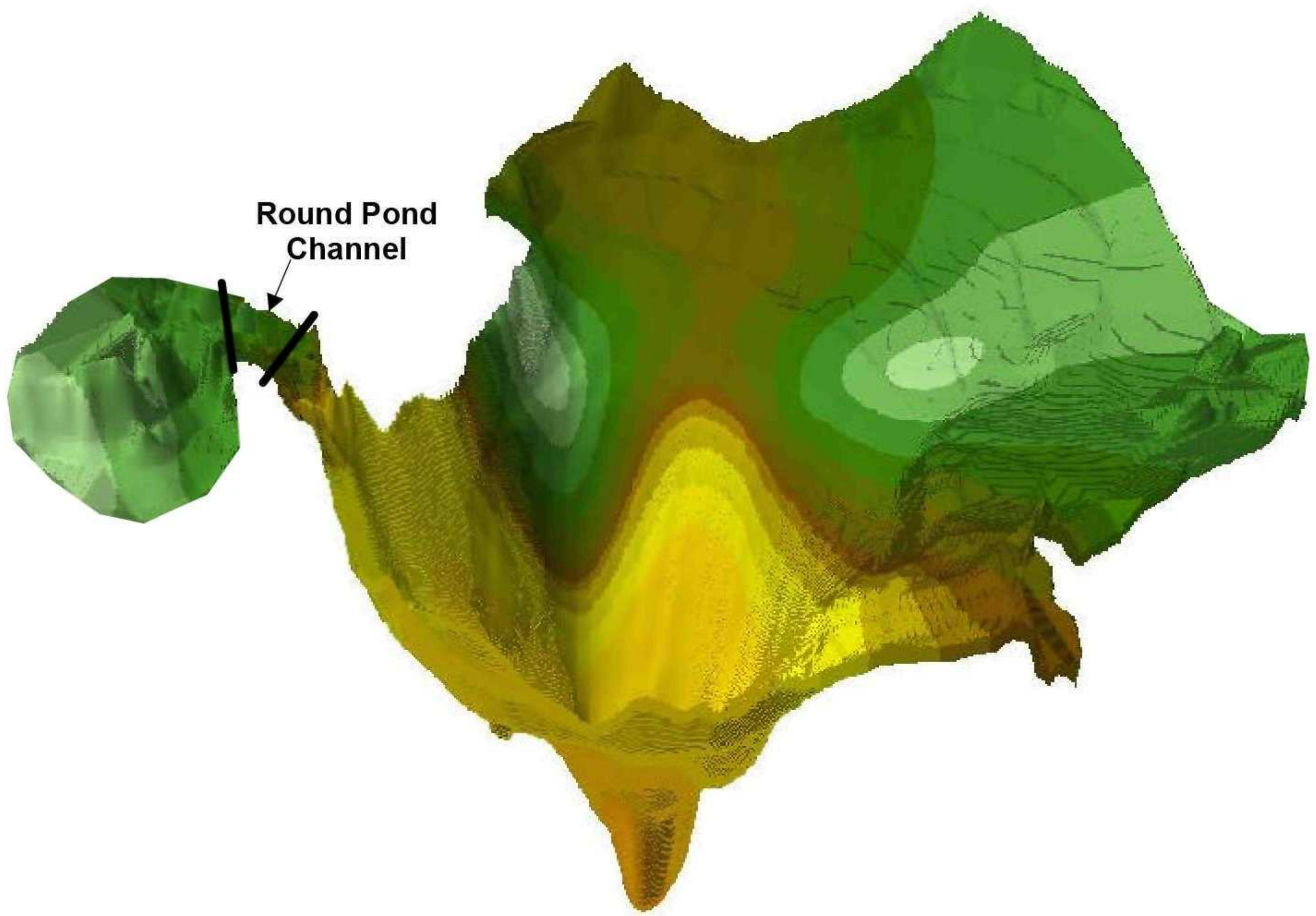
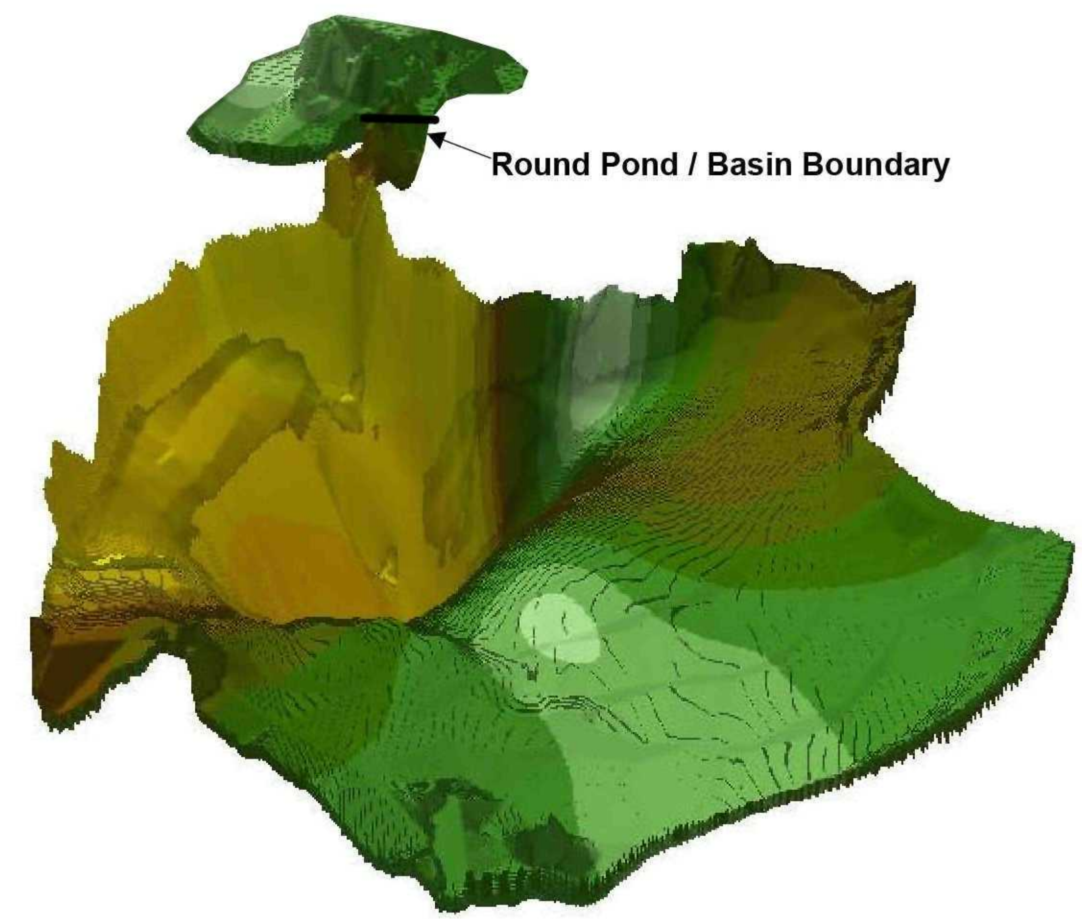
Viewing West to East



Viewing South to North



Scale Varies in these Perspectives
Vertical Exaggeration 40X

Legend

Mercury Concentrations

- 0.13 - 10 mg/kg
- 10 - 20 mg/kg
- 20 - 30 mg/kg
- 30 - 40 mg/kg
- 40 - 50 mg/kg
- 50 - 70 mg/kg
- 70 - 90 mg/kg
- 90 - 110 mg/kg
- 110 - 130 mg/kg
- 130 - 150 mg/kg
- 150 - 170 mg/kg
- 170 - 190 mg/kg
- 190 - 300 mg/kg
- 300 - 400 mg/kg
- 400 - 440 mg/kg

Olin McIntosh OU-2

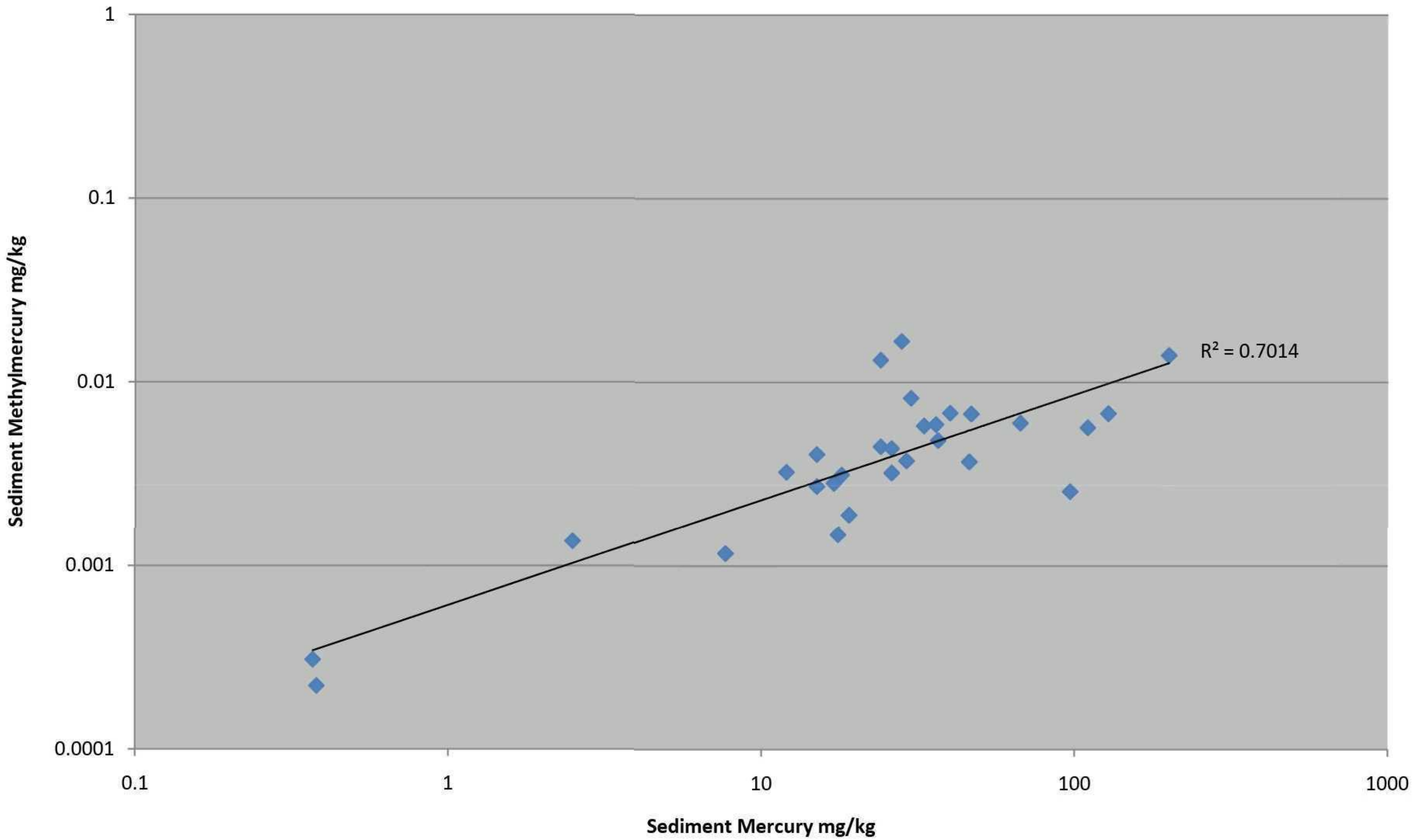
3-D Interpretation Maximum Mercury Concentration At Depth Detected

Prepared by/Date: THP - 3/21/11
CED - 3/21/11
Project Number: 6107110036

MACTEC

Figure Number: 4-13

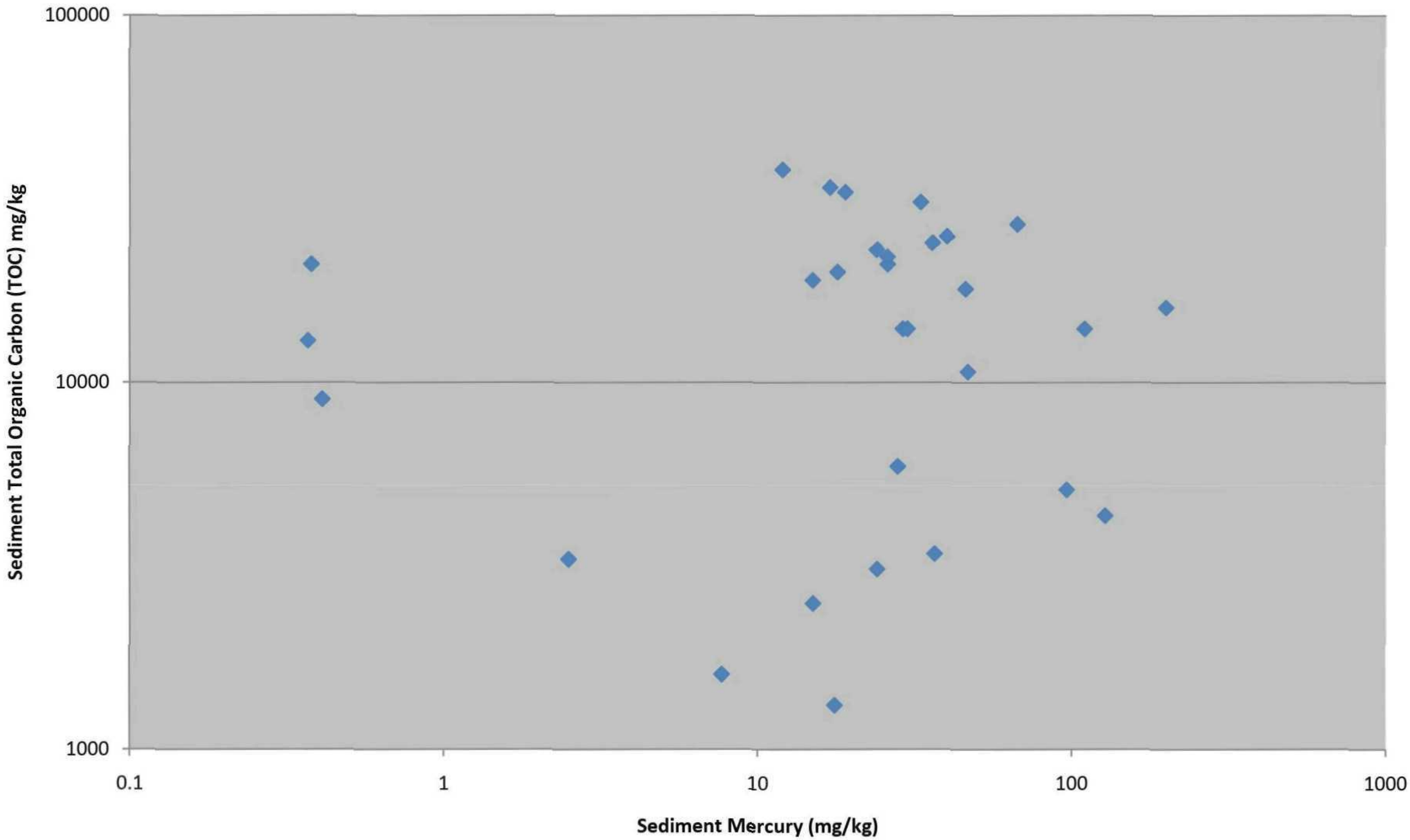
Figure 4-14
Mercury vs. Methylmercury Concentrations in Fine Cores



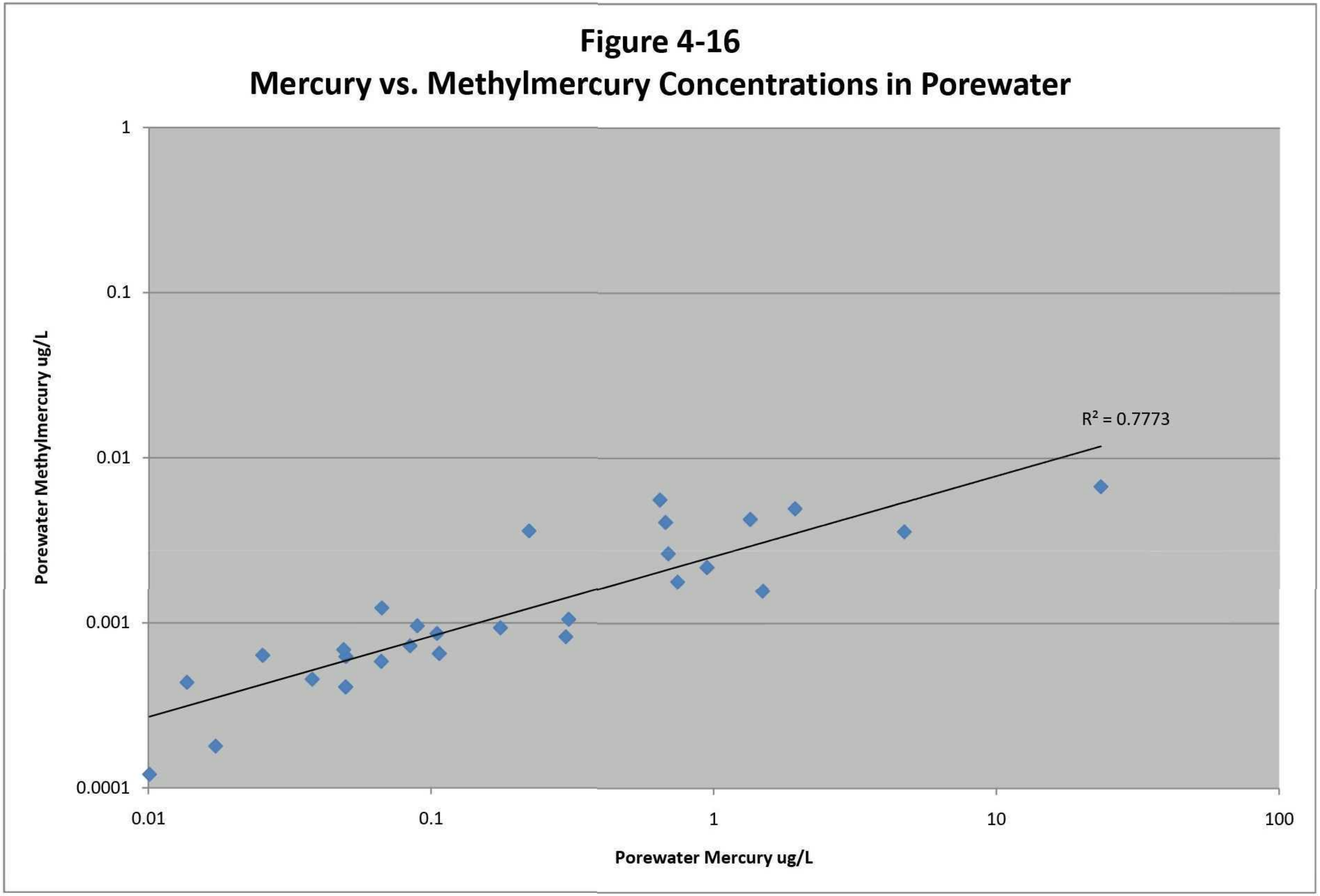
Note: Data points flagged anomalous (A) in Table 4-15 were not included

Prepared/Date: NTG 04/23/2010
Checked/Date: KPW 04/24/2010

Figure 4-15
Mercury vs. TOC Concentrations in Fine Cores

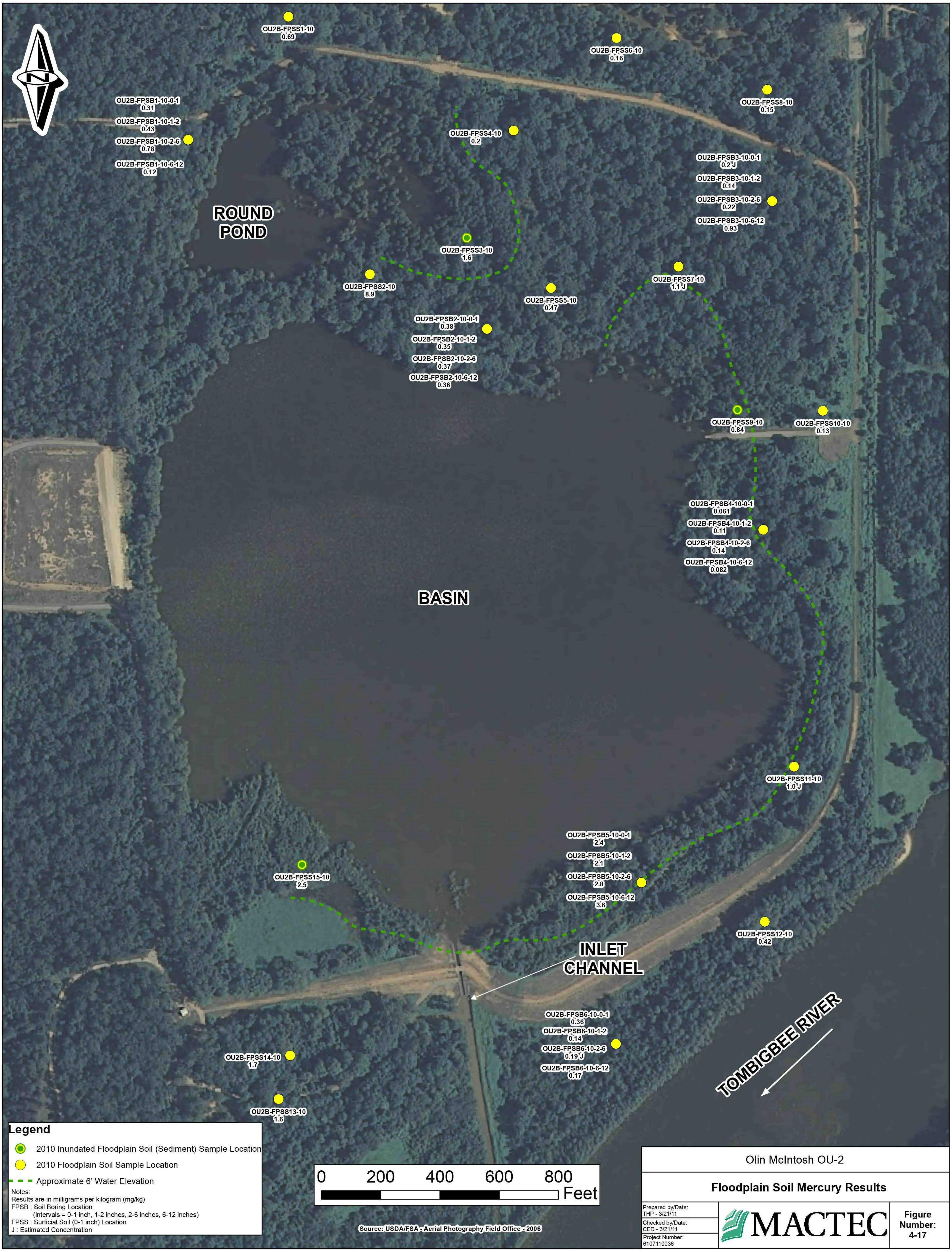


Prepared/Date: NTG 04/23/2010
Checked/Date: KPW 04/24/2010

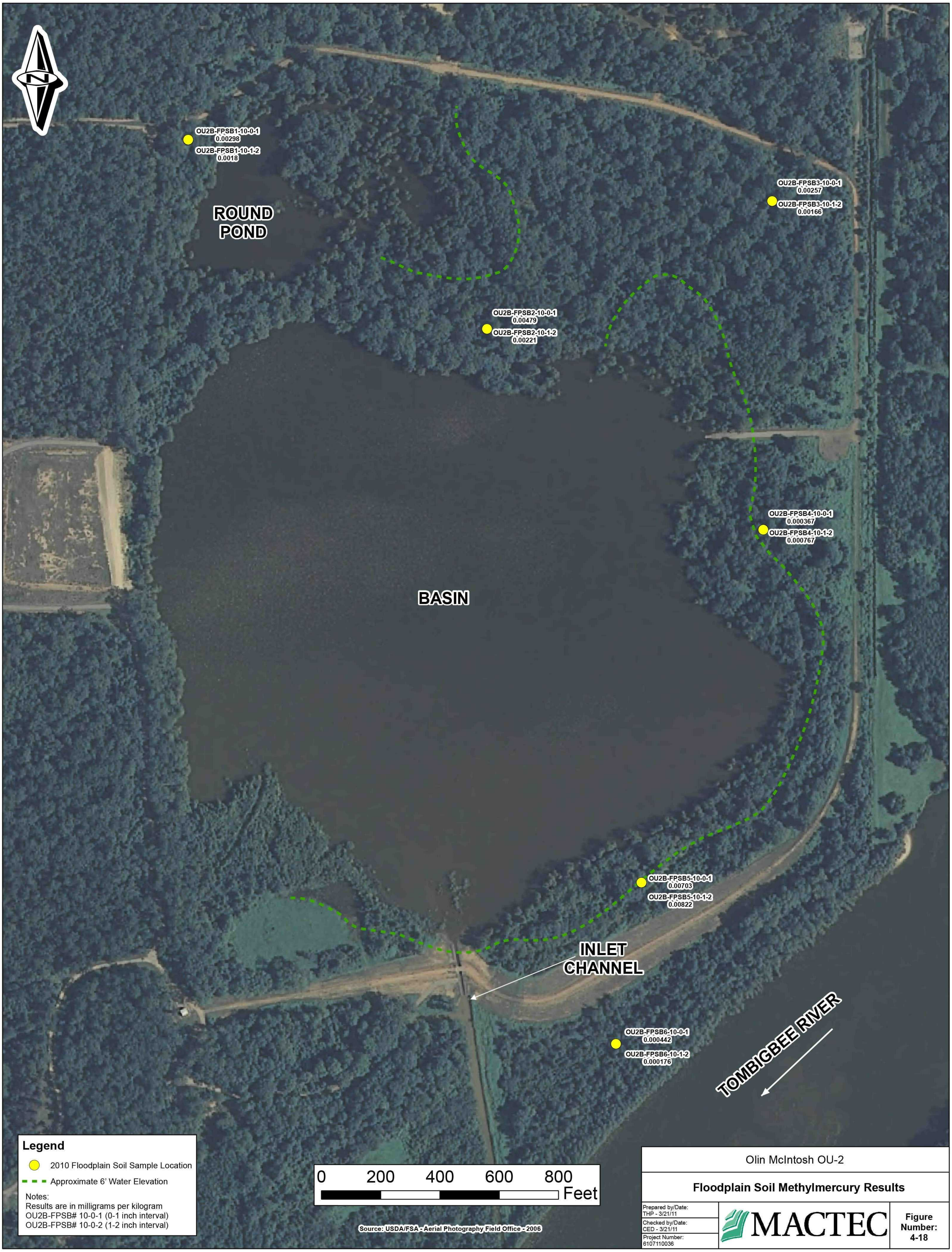


Note: Data points flagged anomalous (A) in Table 4-16 were not included

Prepared/Date: NTG 04/23/2010
Checked/Date: KPW 04/24/2010



N
OU2B-FPSS1-10
0.69
OU2B-FPSS6-10
0.16
OU2B-FPSS8-10
0.15
OU2B-FPSB1-10-0-1
0.31
OU2B-FPSB1-10-1-2
0.43
OU2B-FPSB1-10-2-6
0.78
OU2B-FPSB1-10-6-12
0.12
OU2B-FPSS4-10
0.2
OU2B-FPSB3-10-0-1
0.2 J
OU2B-FPSB3-10-1-2
0.14
OU2B-FPSB3-10-2-6
0.22
OU2B-FPSB3-10-6-12
0.93
ROUND POND
OU2B-FPSS3-10
1.6
OU2B-FPSS2-10
8.9
OU2B-FPSS5-10
0.47
OU2B-FPSS7-10
1.1 J
OU2B-FPSB2-10-0-1
0.38
OU2B-FPSB2-10-1-2
0.35
OU2B-FPSB2-10-2-6
0.37
OU2B-FPSB2-10-6-12
0.36
OU2B-FPSS9-10
0.84
OU2B-FPSS10-10
0.13
OU2B-FPSB4-10-0-1
0.061
OU2B-FPSB4-10-1-2
0.11
OU2B-FPSB4-10-2-6
0.14
OU2B-FPSB4-10-6-12
0.082
BASIN
OU2B-FPSS11-10
1.0 J
OU2B-FPSB5-10-0-1
2.4
OU2B-FPSB5-10-1-2
2.1
OU2B-FPSB5-10-2-6
2.8
OU2B-FPSB5-10-6-12
3.6
OU2B-FPSS15-10
2.5
OU2B-FPSS12-10
0.42
INLET CHANNEL
OU2B-FPSB6-10-0-1
0.36
OU2B-FPSB6-10-1-2
0.14
OU2B-FPSB6-10-2-6
0.19 J
OU2B-FPSB6-10-6-12
0.17
TOMBIGBEE RIVER
OU2B-FPSS14-10
1.7
OU2B-FPSS13-10
1.6
Legend
2010 Inundated Floodplain Soil (Sediment) Sample Location
2010 Floodplain Soil Sample Location
Approximate 6' Water Elevation
Notes:
Results are in milligrams per kilogram (mg/kg)
FPSB : Soil Boring Location
(intervals = 0-1 inch, 1-2 inches, 2-6 inches, 6-12 inches)
FPSS : Surficial Soil (0-1 inch) Location
J : Estimated Concentration
0 200 400 600 800
Feet
Source: USDA/FSA - Aerial Photography Field Office - 2006
Olin McIntosh OU-2
Floodplain Soil Mercury Results
Prepared by/Date:
THP - 3/21/11
Checked by/Date:
CED - 3/21/11
Project Number:
6107110036
MACTEC
Figure Number:
4-17



Olin McIntosh OU-2

Floodplain Soil Methylmercury Results

Prepared by/Date: THP - 3/21/11
Checked by/Date: CED - 3/21/11
Project Number: 6107110036

MACTEC

Figure Number: 4-18

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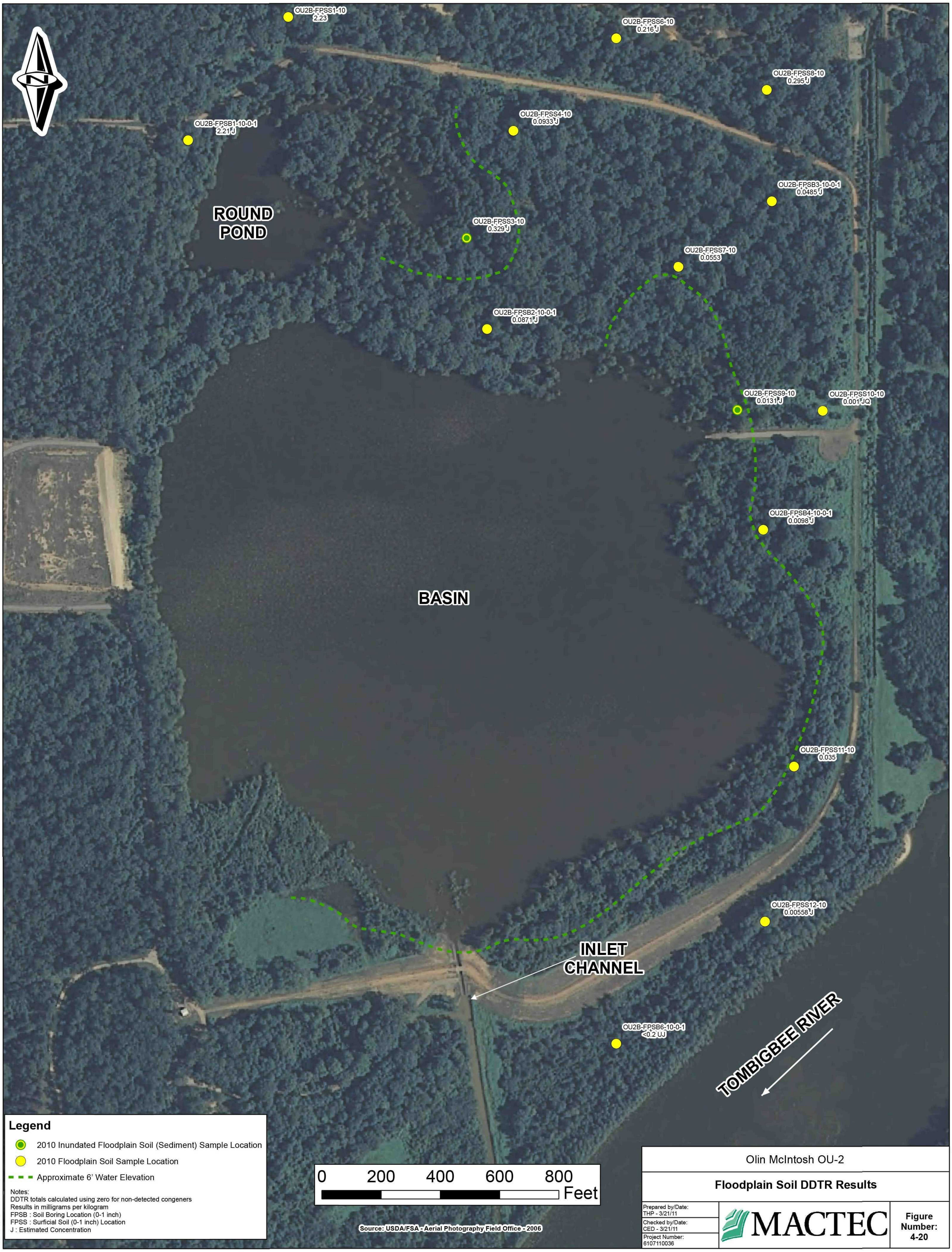

Olin McIntosh OU-2

Floodplain Soil DDTR Results

Prepared by/Date: THP - 3/21/11
Checked by/Date: CED - 3/21/11
Project Number: 6107110036

MACTEC

Figure Number: 4-20

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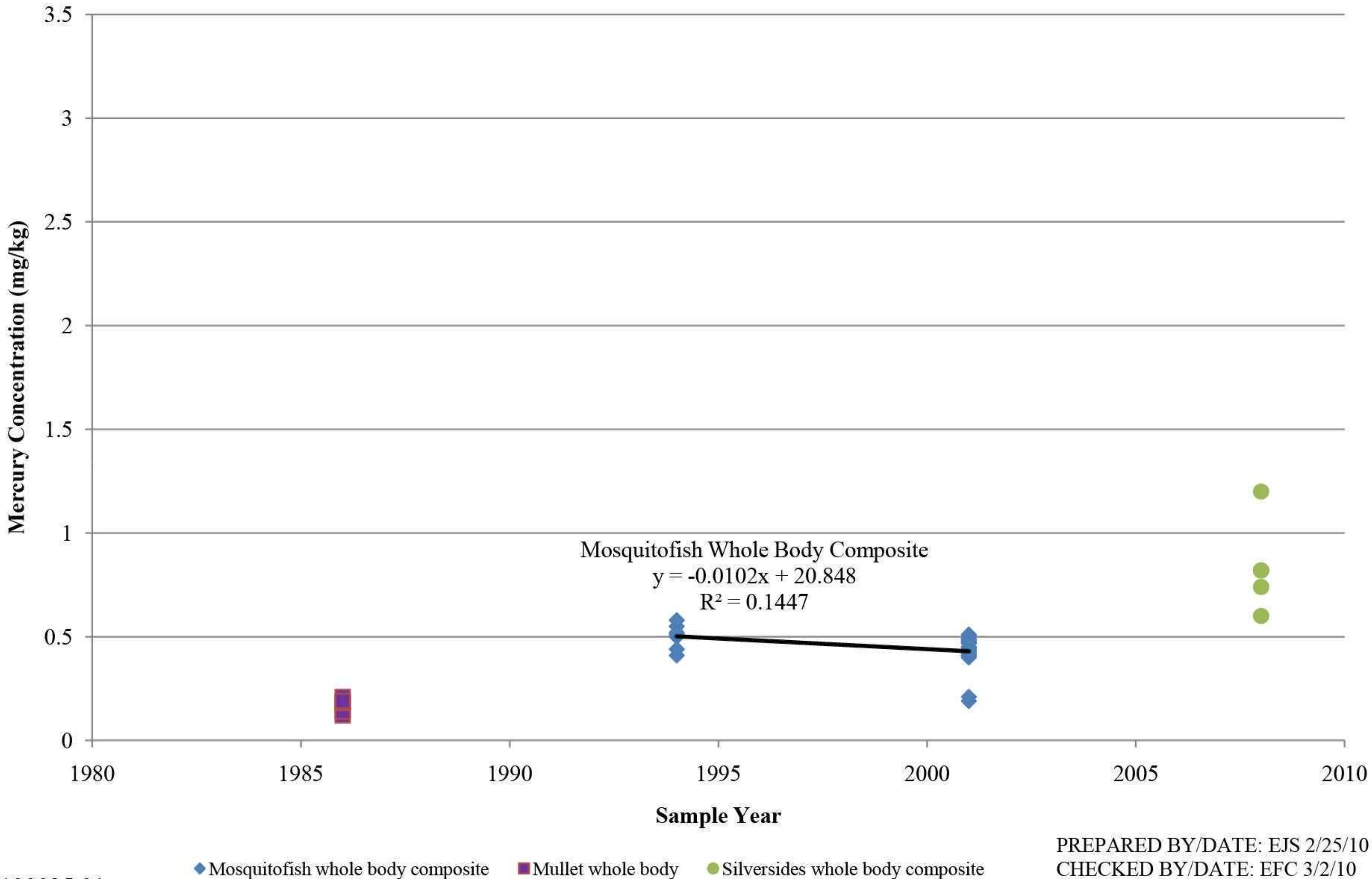
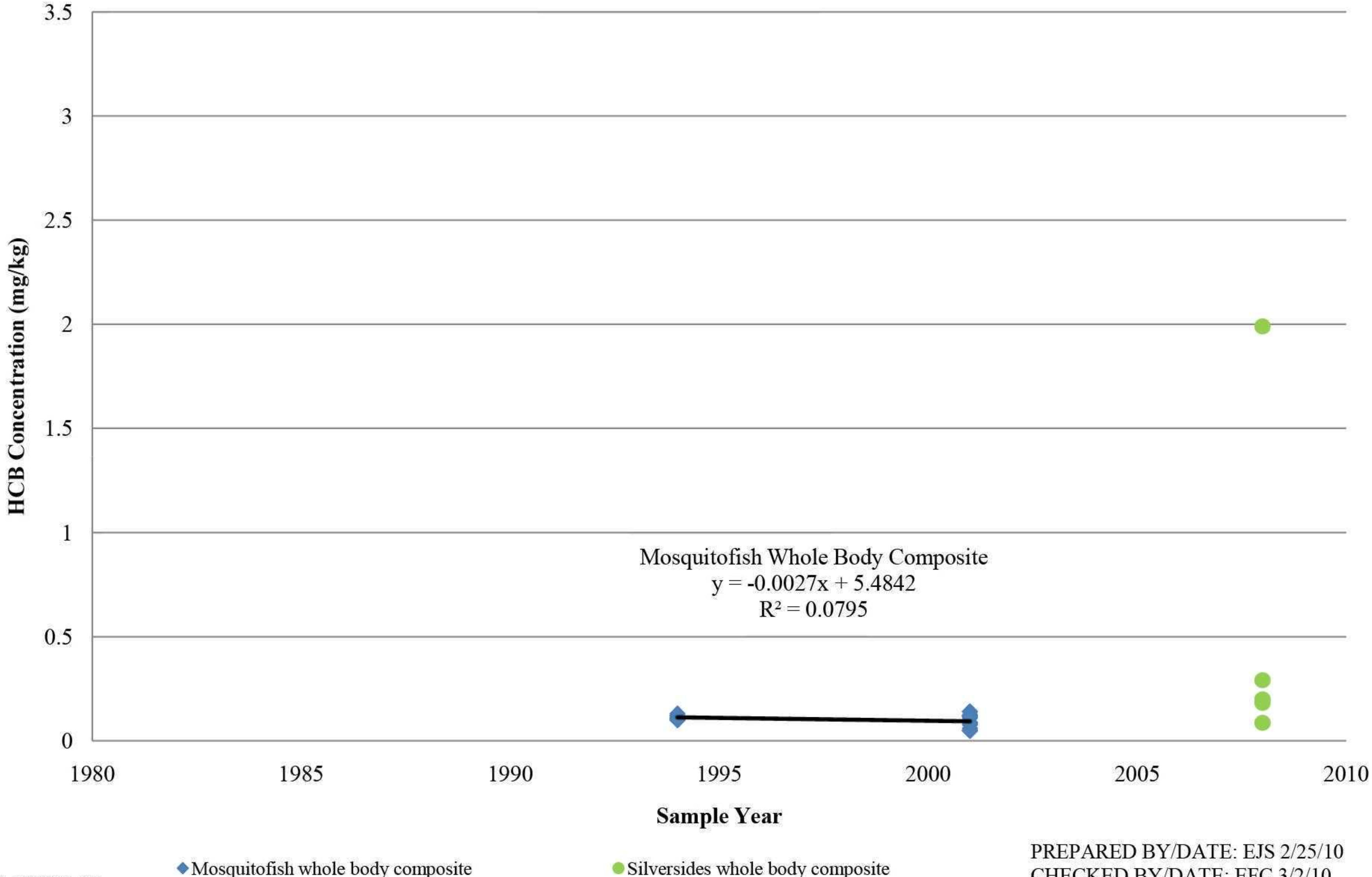
Figure 4-21
Basin Lower Trophic Level Fish Tissue Mercury Concentrations Over Time
(Pre-Berm to Post-Berm)



PREPARED BY/DATE: EJS 2/25/10
CHECKED BY/DATE: EFC 3/2/10

100035.01

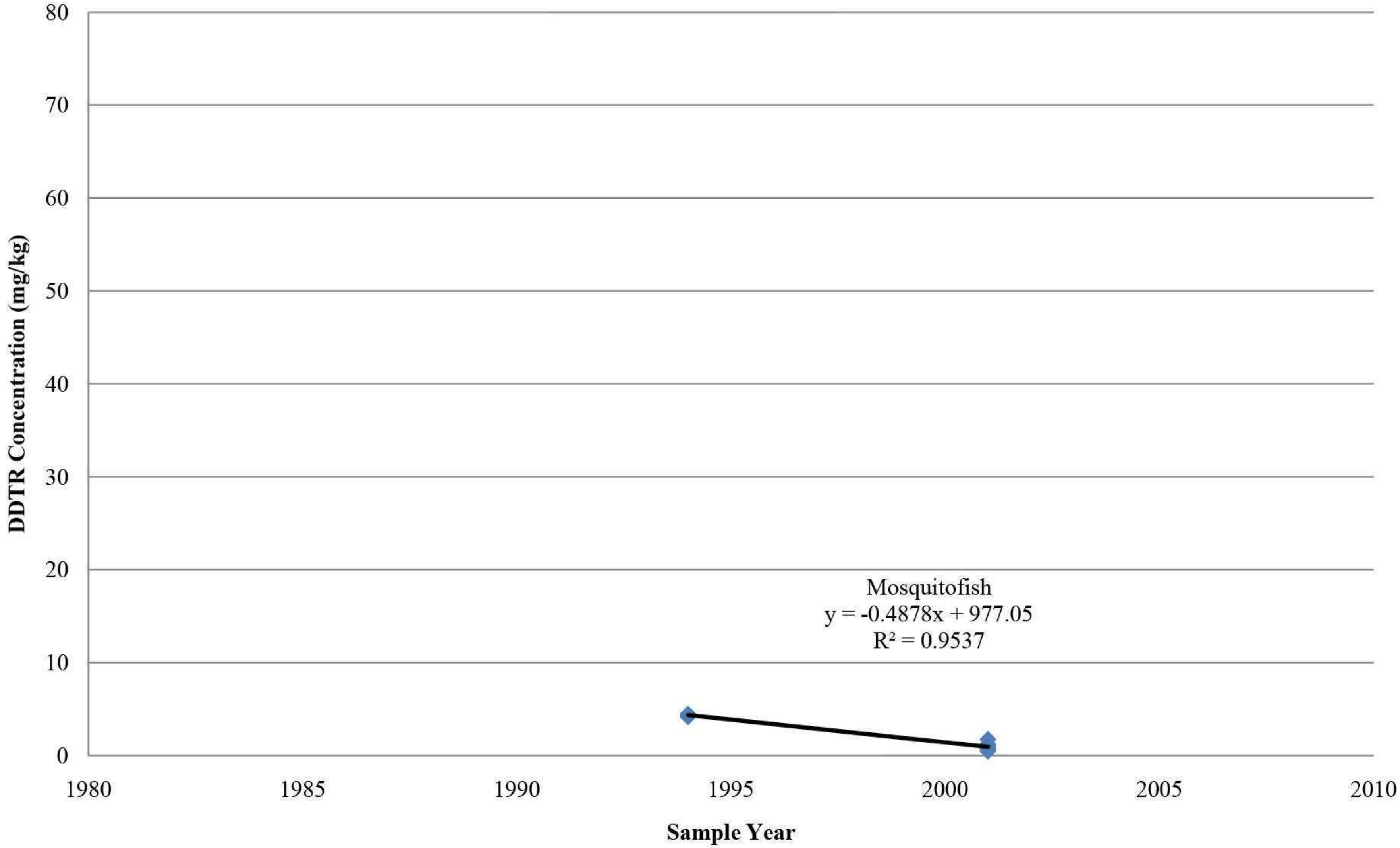
Figure 4-22
Basin Lower Trophic Level Fish Tissue HCB Concentrations Over Time
(Pre-Berm to Post-Berm)



100035.01

PREPARED BY/DATE: EJS 2/25/10
CHECKED BY/DATE: EFC 3/2/10

Figure 4-23
Basin Lower Trophic Level FishTissue DDTR Concentrations Over Time
(Pre-Berm to Post-Berm)

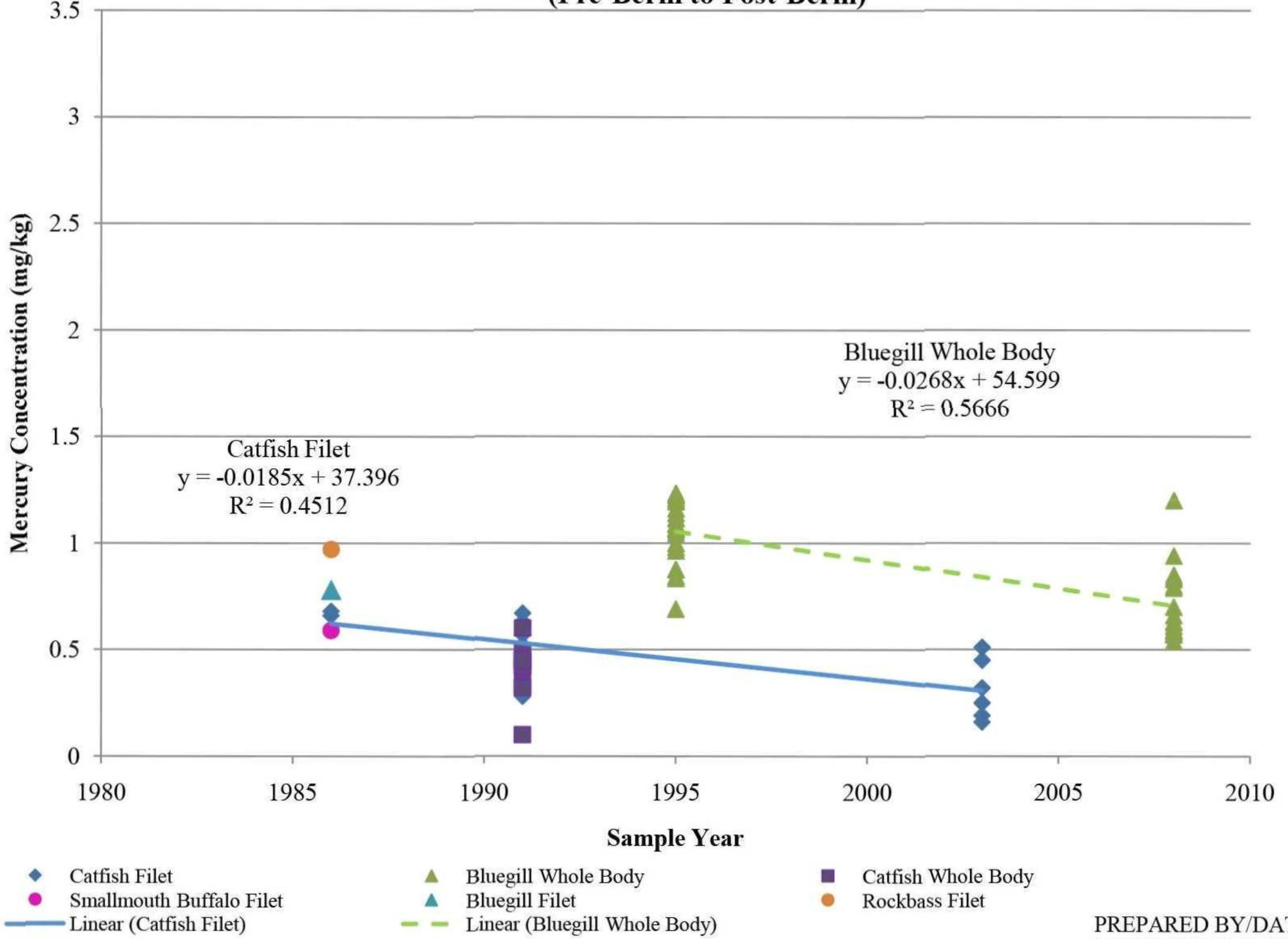


DDTR - Sum of 2',4'- and 4',4'- isomers of DDT, DDD and DDE

PREPARED BY/DATE: EJS 2/25/10
CHECKED BY/DATE: EFC 3/2/10

100035.01

Figure 4-24
Basin Middle Trophic Level Fish Tissue Mercury Concentrations Over Time
(Pre-Berm to Post-Berm)



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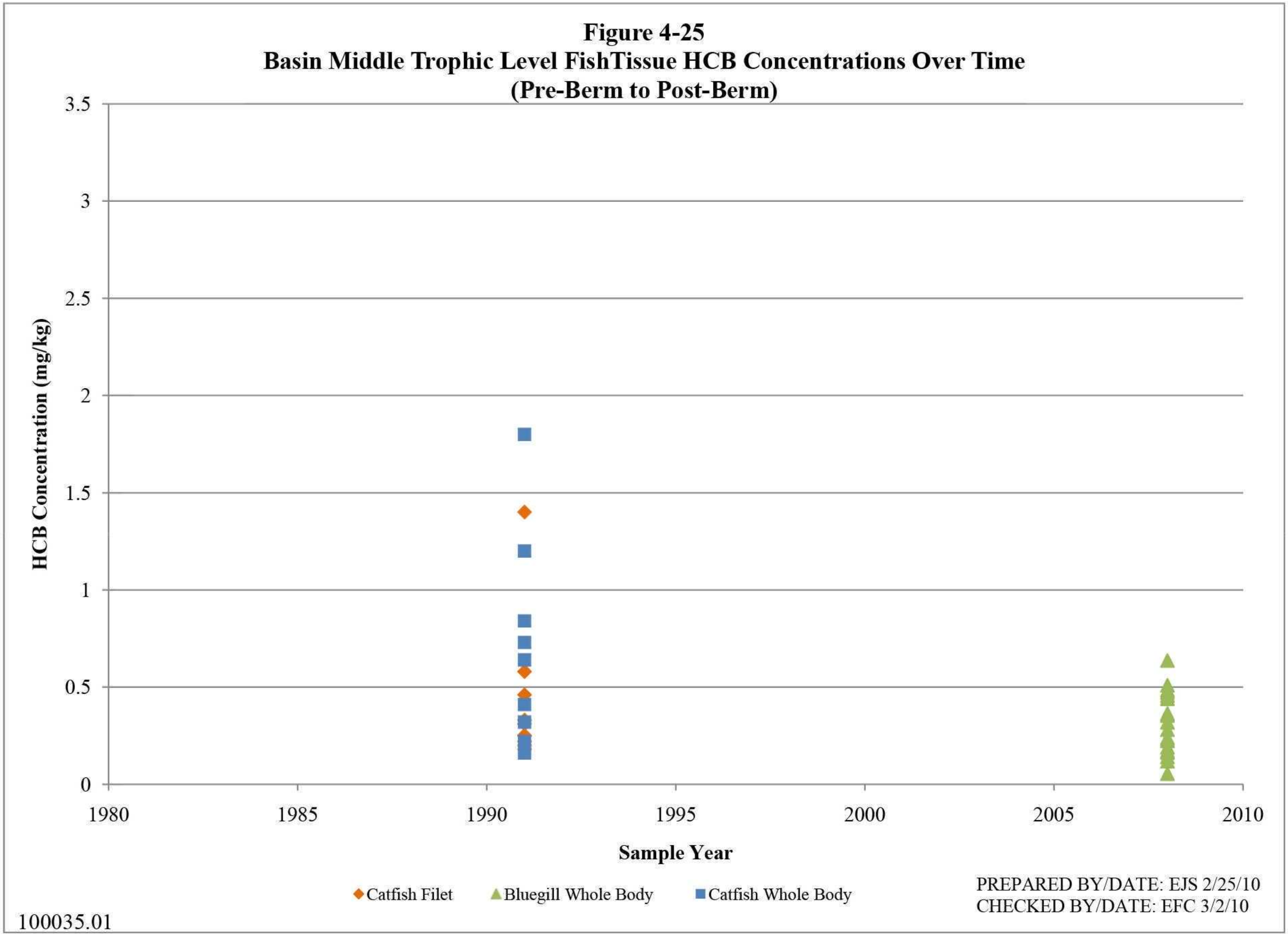
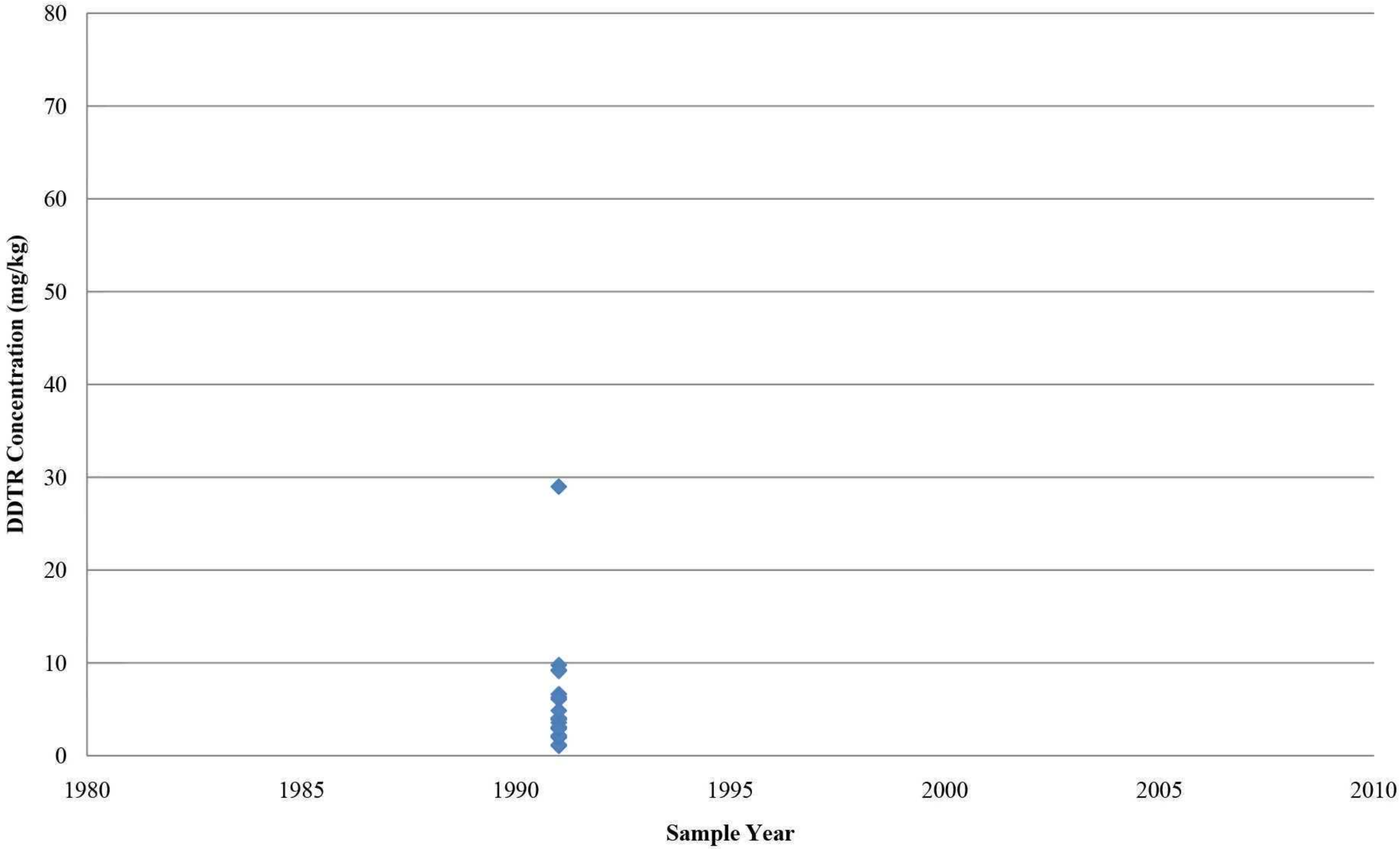


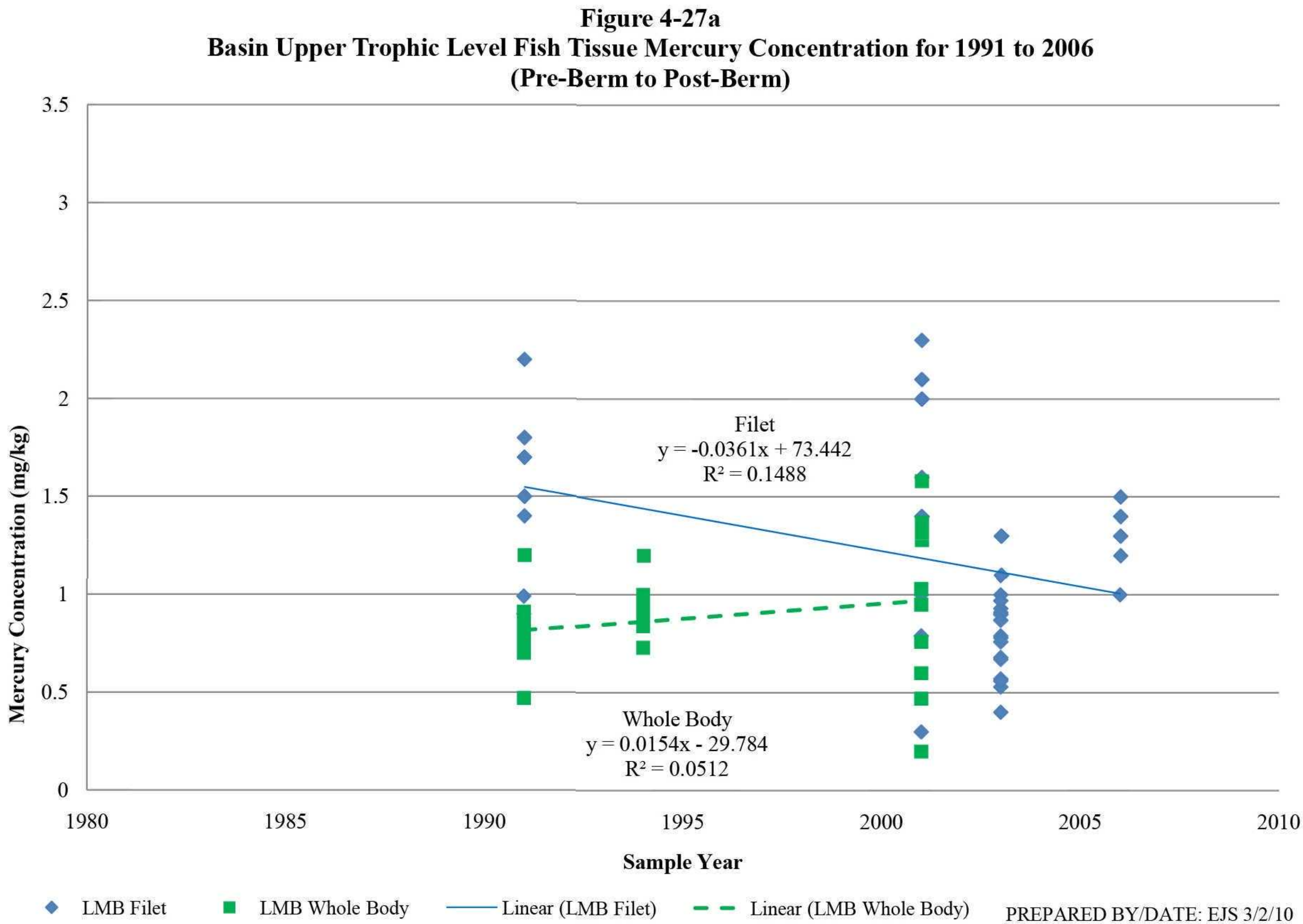
Figure 4-25
Basin Middle Trophic Level FishTissue HCB Concentrations Over Time
(Pre-Berm to Post-Berm)
3.5
3
2.5
2
1.5
1
0.5
0
HCB Concentration (mg/kg)
1980
1985
1990
1995
2000
2005
2010
Sample Year
Catfish Filet
Bluegill Whole Body
Catfish Whole Body
PREPARED BY/DATE: EJS 2/25/10
CHECKED BY/DATE: EFC 3/2/10
100035.01

Figure 4-26
Basin Middle Trophic Level Fish Tissue DDTR Concentrations
(Pre-Berm)



DDTR - Sum of 2',4'- and 4',4'- isomers of DDT, DDD and DDE
100035.01

PREPARED BY/DATE: EJS 2/25/10
CHECKED BY/DATE: EFC 3/2/10



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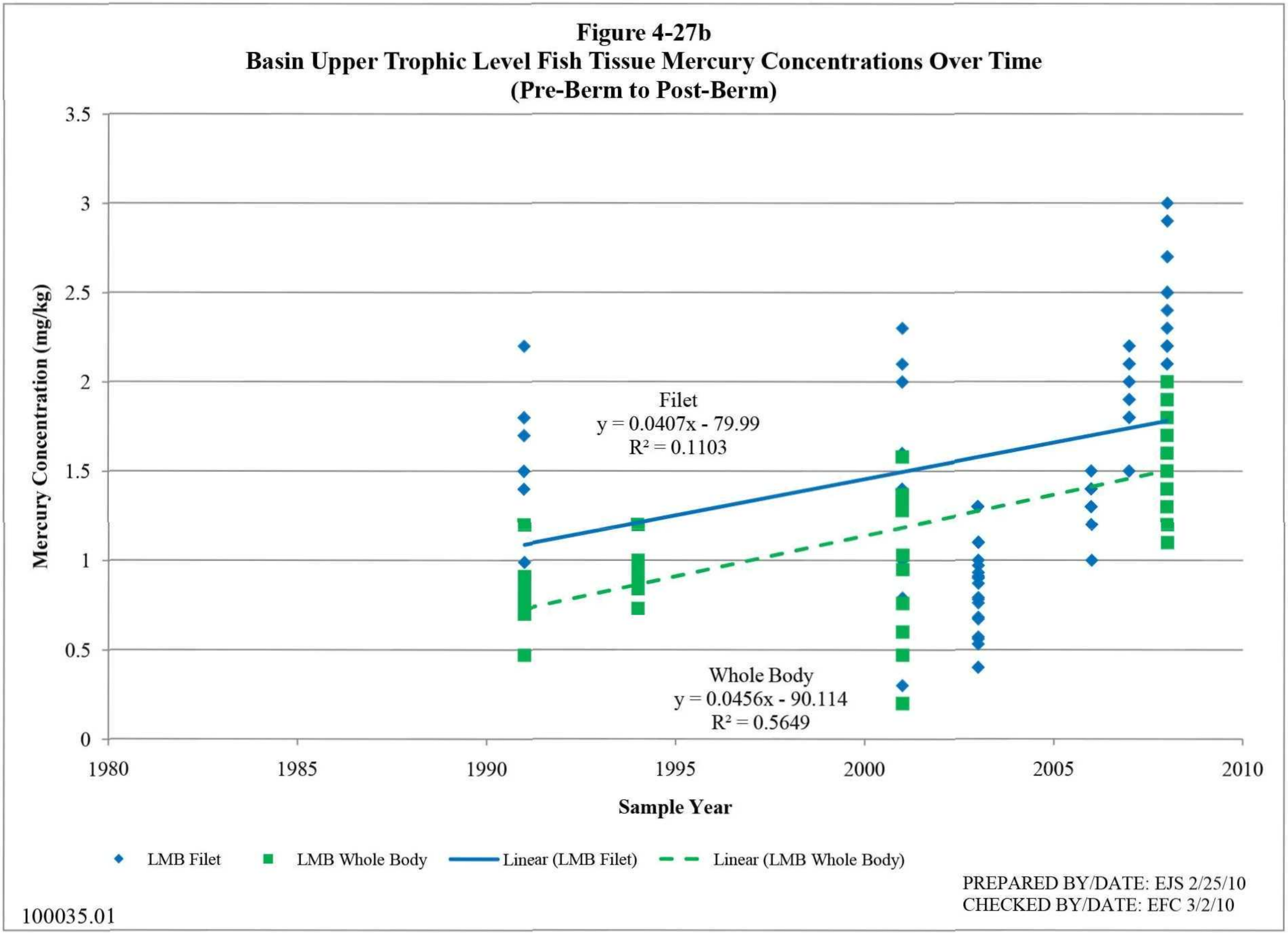
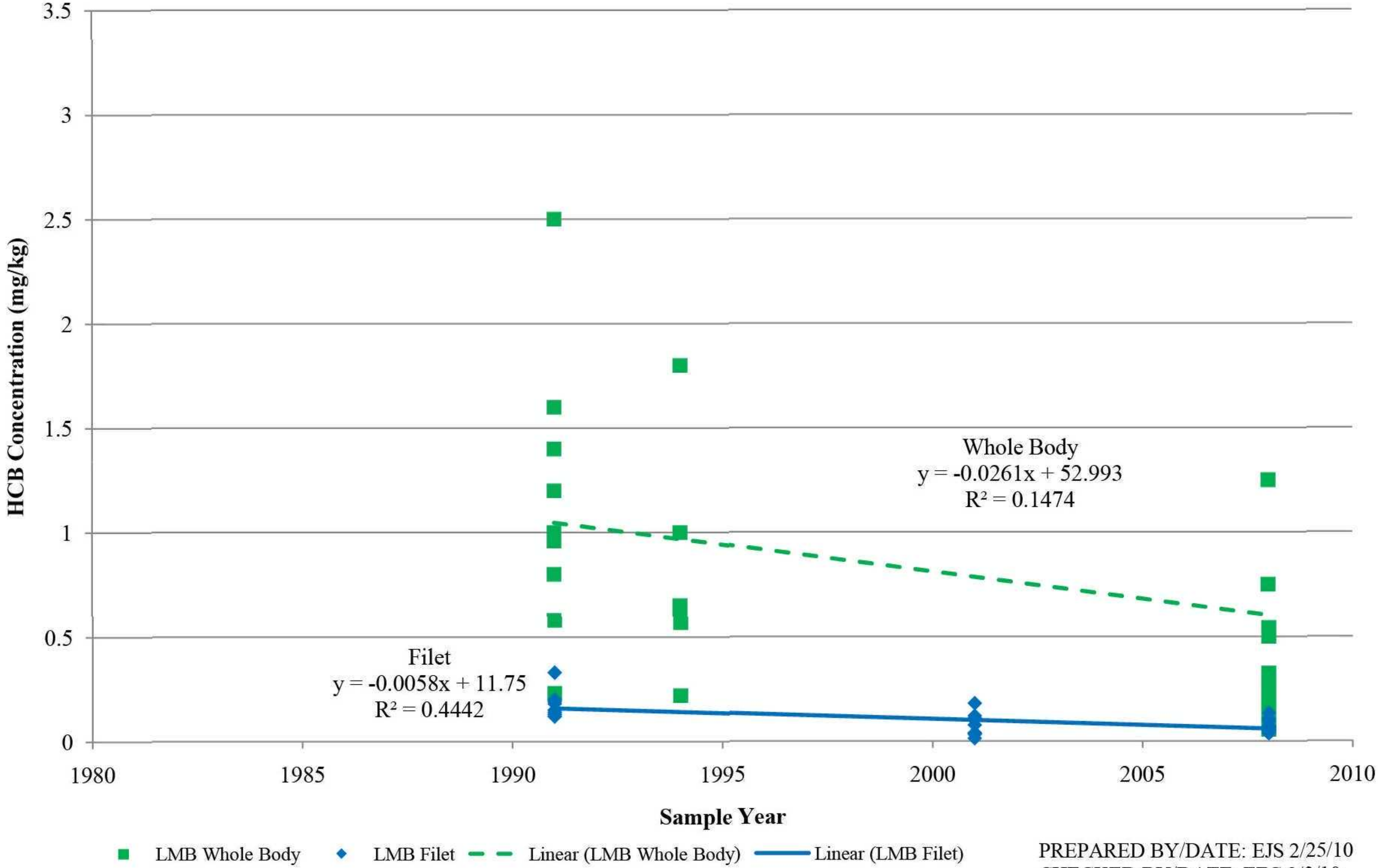


Figure 4-27b
Basin Upper Trophic Level Fish Tissue Mercury Concentrations Over Time
(Pre-Berm to Post-Berm)
Mercury Concentration (mg/kg)
3.5
3
2.5
2
1.5
1
0.5
0
1980
1985
1990
1995
2000
2005
2010
Sample Year
Filet
y = 0.0407x - 79.99
R² = 0.1103
Whole Body
y = 0.0456x - 90.114
R² = 0.5649
LMB Filet
LMB Whole Body
Linear (LMB Filet)
Linear (LMB Whole Body)
PREPARED BY/DATE: EJS 2/25/10
CHECKED BY/DATE: EFC 3/2/10
100035.01

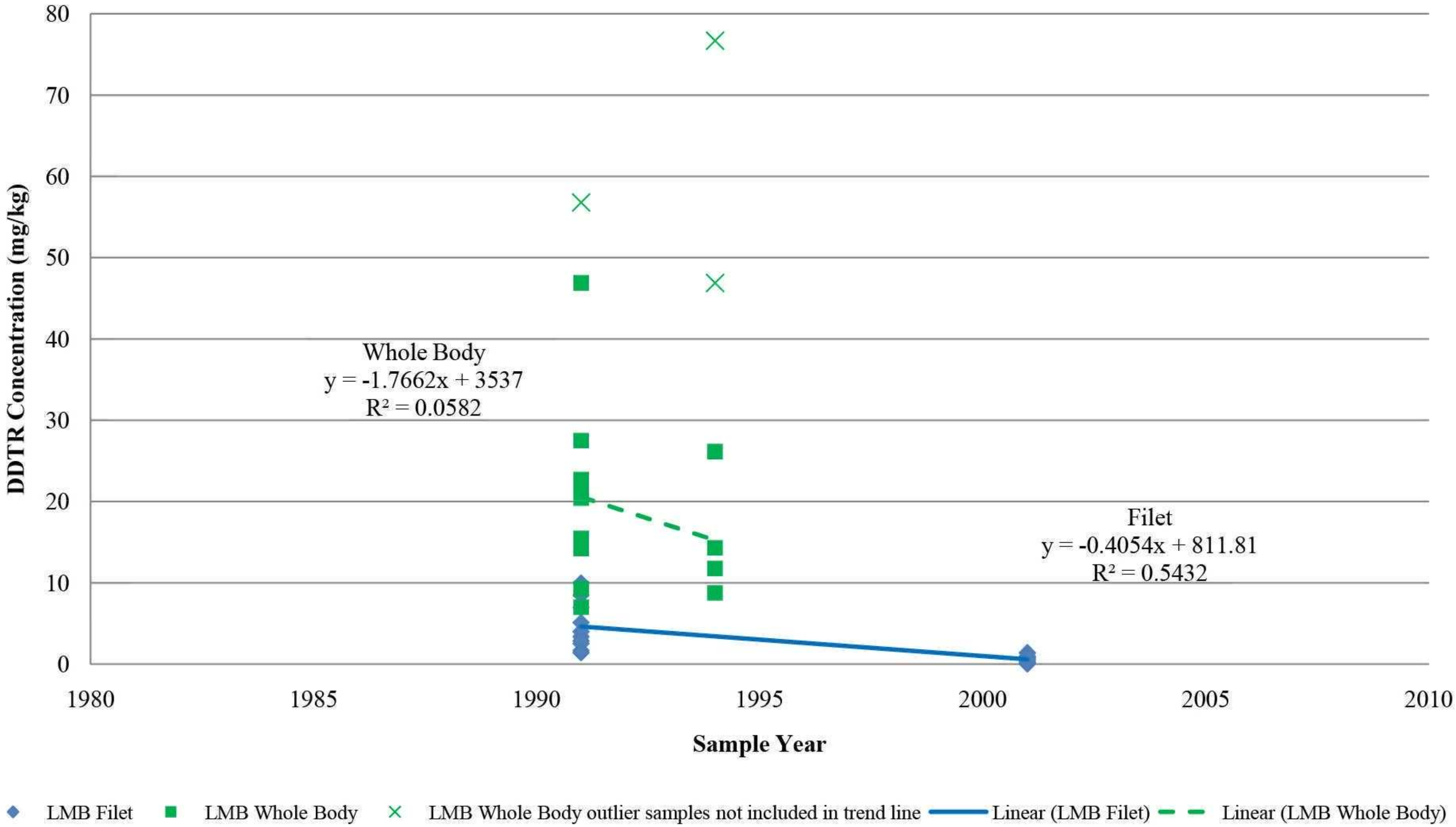
Figure 4-28
Basin Upper Trophic Level Fish Tissue HCB Concentrations Over Time
(Pre-Berm to Post-Berm)



PREPARED BY/DATE: EJS 2/25/10
CHECKED BY/DATE: EFC 3/2/10

100035.01

Figure 4-29
Basin Upper Trophic Level DDTR Fish Tissue Concentrations Over Time
(Pre-Berm to Post-Berm)



Notes: DDTR - Sum of 2',4'- and 4',4'- isomers of DDT, DDD and DDE

PREPARED BY/DATE: EJS 2/25/10
CHECKED BY DATE: EFC 3/2/10

100035.01

APPENDIX A

DEBRIS EVALUATION (EVANS-HAMILTON, INC.)

Data Report

Sidescan Survey of Olin Basin, Alabama

November 18, 2009

Prepared For:

MACTEC

Prepared by:

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East Cape Consulting

And

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Senior Project Scientist

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DATA REPORT
Sidescan Survey of Olin Basin, Alabama

1.0 Overview

Evans-Hamilton, Inc. (EHI) was contracted by MACTEC to perform a bathymetric survey of a basin at Olin Chemical Plant in McIntosh, AL (Figure 1). The purpose of the survey was to establish an accurate baseline from which future changes in the sediment bed elevation may be assessed. To that end, coverage of the entire Basin bed was acquired using a multi-beam (interferometric), swath bathymetry system. The swath system provided hundreds of soundings per square meter of sediment bed which enables future change assessments to be based on actual soundings and not potential interpolation artifacts. Details of the trip, as well as a summary of the data and interpretations, are described in the bathymetric survey data report (Data Report Bathymetry Survey, McIntosh, Alabama, November 2006, EHI Project No. 5578).

EHI was subsequently contracted by MACTEC to analyze sidescan data, collected in conjunction with the interferometric swath bathymetry data, in order to determine the nature of potential debris on the bottom of the Basin. This report presents the post-processing and QA/QC details for the sidescan analysis, and provides an assessment on the nature and location of potential bottom debris.

2.0 Data Collection and Processing

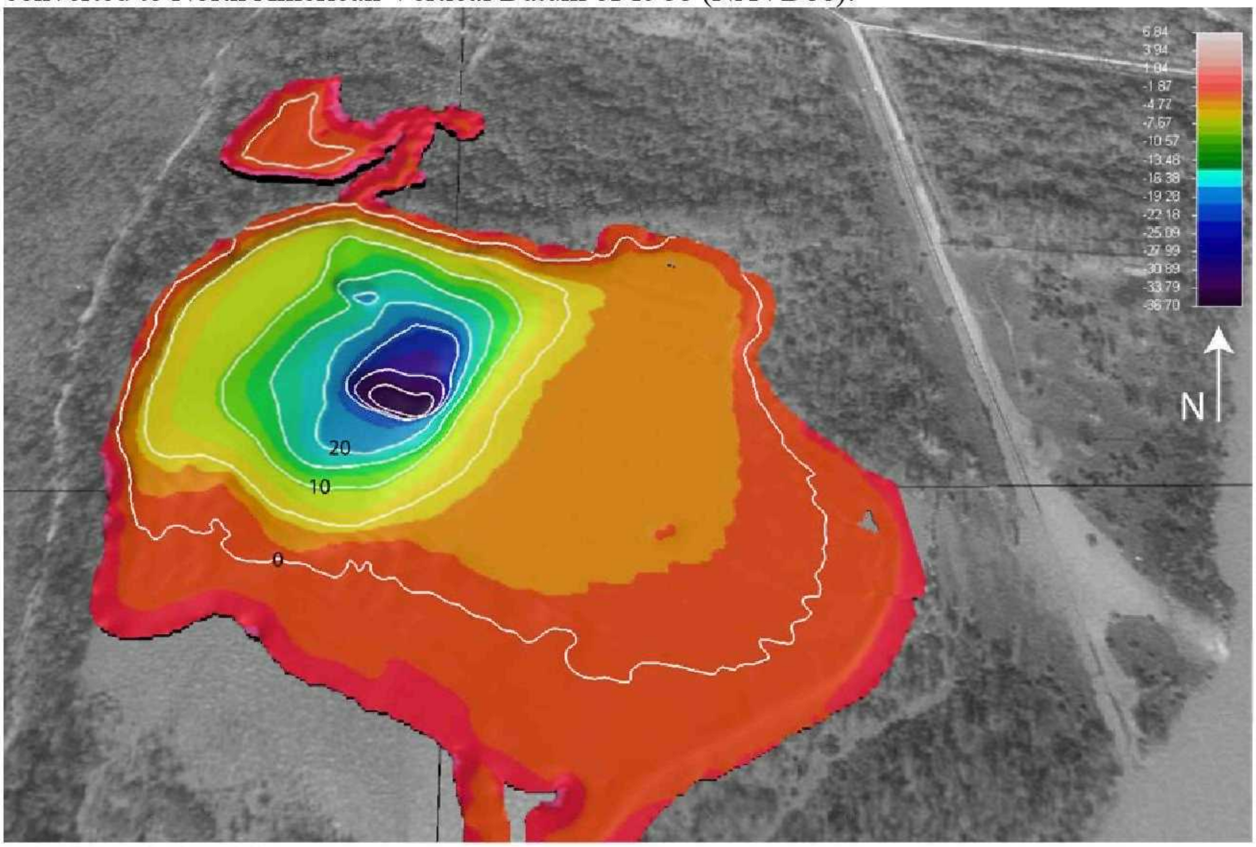
Detailed field collection and subsequent post-processing of swath interferometric bathymetry data was previously reported in the bathymetric survey data report (Data Report Bathymetry Survey, McIntosh, Alabama, November 2006, EHI Project No. 5578). Co-registered backscatter from the bathymetry was used to generate sidescan imagery for this project. A brief summary of data collection, QA/QC, and post-processing of the bathymetry data is provided below.

2.1 Data Collection

Swath bathymetry was collected 14-16 November 2006 from a 6-m workboat fitted with a bow mounted transducer and a removable enclosure for the acquisition computers. Bathymetric coverage was obtained across the Basin as well as Round Pond and the adjacent stream leading to Round Pond (Figure 1). Sidescan data were subsequently extracted from the backscatter of the bathymetry data. Mapping the bathymetry of the adjacent Round Pond required running multiple overlapping and short swath interferometric survey lines, many of which included tight vessel turns. While these data are suitable for bathymetric analysis, the associated backscatter data suffers from inevitable turning artifacts, and thus is unsuitable for sidescan analysis. Accordingly, only data from the Basin is presented in this report. Bathymetry and sidescan data were collected using an interferometric swath sonar system (SwathPlus 234 kHz) integrated with an Ixsea Octans motion sensor that removed the effect of vessel motion in real-time. Dual-channel RTK GPS (Trimble 4700) provided horizontal and vertical control. Hypack software developed by Coastal Oceanographics was used to navigate survey track lines and log vertical tide correction files.

2.2 Control and Datums

Geodesy controls utilized the North American Datum of 1983 (NAD 83), Alabama State Plane West (meters) for horizontal and the Geoid 2003 model for vertical. Elevations were converted to North American Vertical Datum of 1988 (NAVD88).



-- depths in US feet, NAVD88
-- water level 4.51 ft, NAVD88 on 16 November 2006

Figure 1: Olin Basin and Round Pond bathymetry and contours (AL state plane, NAD83), overlain on aerial imagery. Depths shown in NAVD88, US feet. Courtesy EHI Project Report No. 5578.

2.3 Bathymetry Post-Processing

Post-processing using proprietary Sea Ltd. software, SwathPlus, corrected for errors associated with speed of sound variations and low-frequency vessel motion (portion not removed by motion sensor). Processed swath sonar files were then imported to Grid2000, a proprietary Sea Ltd. program, for data gridding. A nearest neighbor, weighted gridding algorithm determined depths at irregularly-spaced, 1-m grid nodes from swath soundings. These soundings were then despiked using a standard deviation threshold followed by gridding into a regularly-spaced, rectilinear grid using a kriging algorithm weighted for anisotropic data. These highly anisotropic soundings were then imported to the Fledermaus Professional Suite Version 6.4.1a for further quality control and assessment, and the edited grid soundings were then exported in ascii format as x, y, z (m, state plane and NAVD88, respectively).

3.0 Sidescan Post-processing

Post-processing of the co-registered backscatter data involved importing the raw SwathPlus files into SonarWiz.MAP4 (Chesapeake Technology, Inc). This software package does not require gridding of the amplitude data, allowing the resolution of bottom features as small as ~10 cm in length and/or width. During the survey, instrument malfunction resulted in far-range amplitude errors associated with the starboard SwathPlus transducer. These errors did not affect the bathymetry measurements, but rendered ~60 % of the far range of the starboard sidescan data unusable for sidescan analysis. Given that ~150% overlap was obtained during the original bathymetric mapping effort, sidescan data for most of the Basin could be obtained from the port transducer alone. Sidescan data from the starboard transducer were utilized only along the Basin edges, where the bathymetry naturally limited the range of the starboard transducer to the useable range. An area of 579,248.0 m^2 was mapped from approximately 20 million individual soundings (pings), with sidescan coverage of ~89% of the Basin bottom. During post-processing, a smoothing process can be applied, which averages adjacent soundings in order to produce a cleaner map (average smoothing of 300 pings). Smoothing reduces the resolution of the final mosaicked image. Accordingly, minimal smoothing was applied to the data during importation (< 10 pings) in order to maximize potential resolution. Layback corrections were not required as the sidescan data were collected simultaneously with the real-time georeferenced bathymetry data. Averaging was used during the mosaicking process. After importing, individual survey lines were trimmed where necessary to remove artifacts, and water column data was removed using a manual bottom tracker tool based on visual interpretation of the sonar data. Gain control was applied in order to enhance the resolution of the relatively small size of features found on the Basin bottom. The resulting sidescan mosaic was exported as a geotiff with a resolution of 20 cm per pixel, and the image was subsequently draped over the previously-processed interferometric bathymetry to provide a general view of the Basin bottom using IVS Fledermaus ver. 7.0d (Figure 2). A geotiff with a resolution of 20 cm per pixel and an E-size .tif image are also provided with this report.

Individual features interpreted as debris were identified as targets, and measurements (length and width) were measured for over 150 of the smaller features (<1 m) and over 30 of the larger (>1 m) features although many more targets were identified. Using the transducer attitude and range to target, estimates of individual feature heights were calculated from measurements of individual shadows. It should be noted that these measurements are estimates only, and the actual height above the bottom of individual features may exceed the values reported here. Examples of debris measurements are provided in plots of individual portions of seismic lines in Section 4.0 (below). Note that the seismic line figures show both the starboard and port transducer data, even though primarily only the port-side data were used in this report.

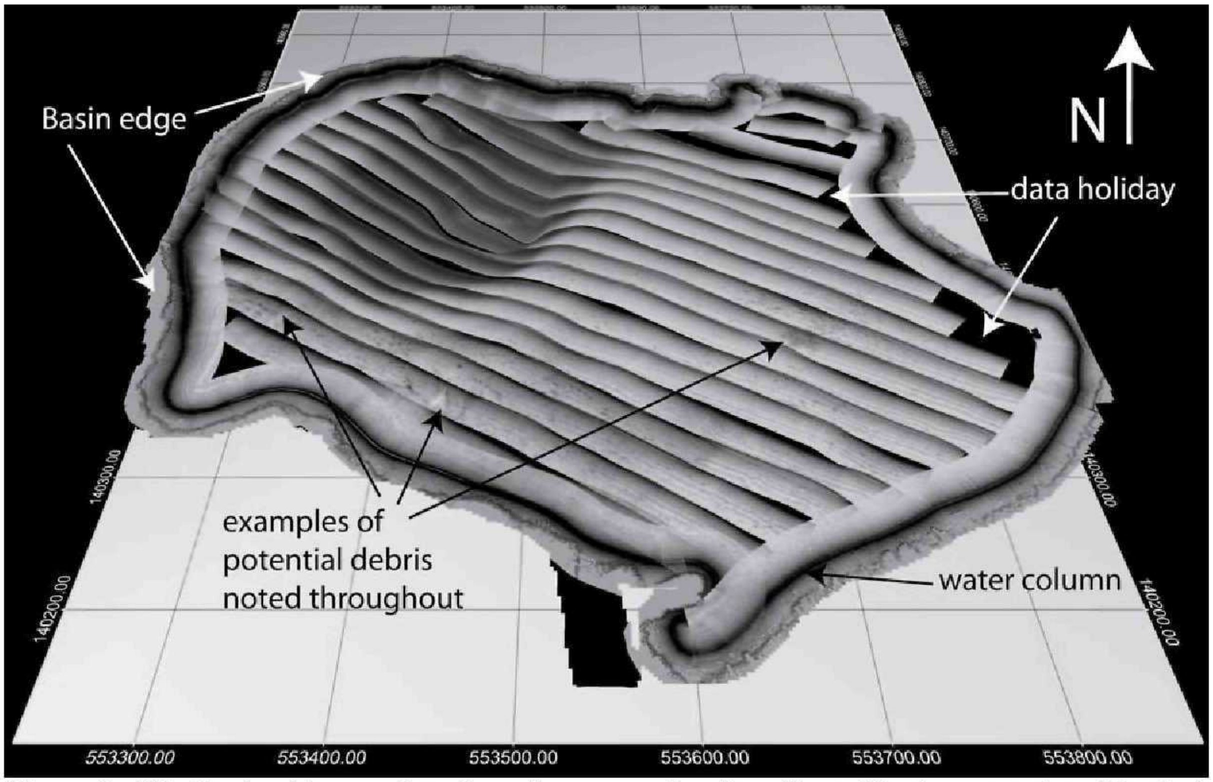


Figure 2: Olin Basin sidescan data draped over previously collected bathymetry data. Vertical exaggeration is 5x. Examples of the Basin edge, water column and potential debris are noted.

4.0 Interpretation

While mosaicking provides an easy way to quickly assess the overall size and nature of features identified in the sidescan record of the Basin, the approach risks obscuring or skewing smaller bottom features due in part to errors or artifacts inherent in the RTK-GPS horizontal and vertical control, as well as in the collection of the interferometric data itself. For the purposes of detailed interpretation, the mosaicked image was divided into four separate quadrants and is used to describe the general nature of the debris found on the Basin bottom (Figure 2). Individual survey line files were then used to quantitatively assess the size and potential nature of identified features (potential debris). The geotiff and E-size image included with this report provide an opportunity to examine the sidescan data at a resolution comparable to that of the individual lines. Given the extensive amount of features present on the Basin bed, an exhaustive list of positions of every potential piece of debris is not feasible. Rather, the report details the approximate location, size, density and, where possible, likely nature of features within each quadrant. Additional debris, such as stumps and tree limbs, has likely accumulated since the 2006 survey.

Overall, the sidescan data reveal that the Basin bed is covered in substantial amounts of debris. Close to the Basin edges, the features are significantly larger, up to 10's of meters in length and several meters in width, and likely are comprised of larger logs and stumps. Several of these features protrude from 10's of centimeters to up to a meter from the bottom. The shallower portion of the Basin (less than ~ -8 m water depth, NAVD88) has numerous smaller features, ranging from <1m to several meters in length, and up to a meter or more in width. The average length and/or width of these features is ~ 60 cm, with an average height above the Basin bed of less than 20 cm, and they are interpreted to be tree branches and/or other forest litter. The deeper portion of the Basin in the northwest is composed of significantly softer sediment, which absorbs the seismic energy and results in fewer apparent features. The features that are observed are approximately the same size as the larger features of the shallower environs described above; likely, tree branches and/or other forest litter. Smaller features might be buried in the softer sediments of the deeper Basin region, or may not reflect sufficient energy to be detectable in the sidescan record.

4.1 Northwest Quadrant

The northwest quadrant includes the northwest portion of the Basin edge and the deeper bathymetry of the Basin (depths of up to ~ -37 feet, NAVD88; Figure 3). From the Basin edge inward for ~30 meters several large features are evident, ranging from less than one meter to several meters in length and up to and over a meter in width. The features protrude from 10's of centimeters to up to a meter from the bottom, and are interpreted to be large logs or stumps. Farther out to depths of ~ -2 to -3 meters, abundant smaller features litter the Basin bed, ranging from ~ 20 cm to > 1 m in length and/or width, with an average height above the Basin bed of less than 20 cm. Average length is ~ 60 cm, and the features are interpreted to represent tree litter and debris from the adjacent forest (Figure 4, 5).

The majority of the northwest quadrant is comprised of the deeper bathymetry of the Basin. Only a few smaller features (< 60 cm length/width, < 20 cm height) are evident in the sidescan data. Softer sediment may absorb more of the backscatter energy, making detection difficult. The darker color indicates less returned energy, and thus a likely softer bottom (i.e. a transition to finer grained material). Smaller debris is also more likely to be quickly buried in softer sediments, resulting in little expression in the sidescan record. A few larger features are apparent, however, and are interpreted to likely be tree branches or other forest litter (Figure 5).

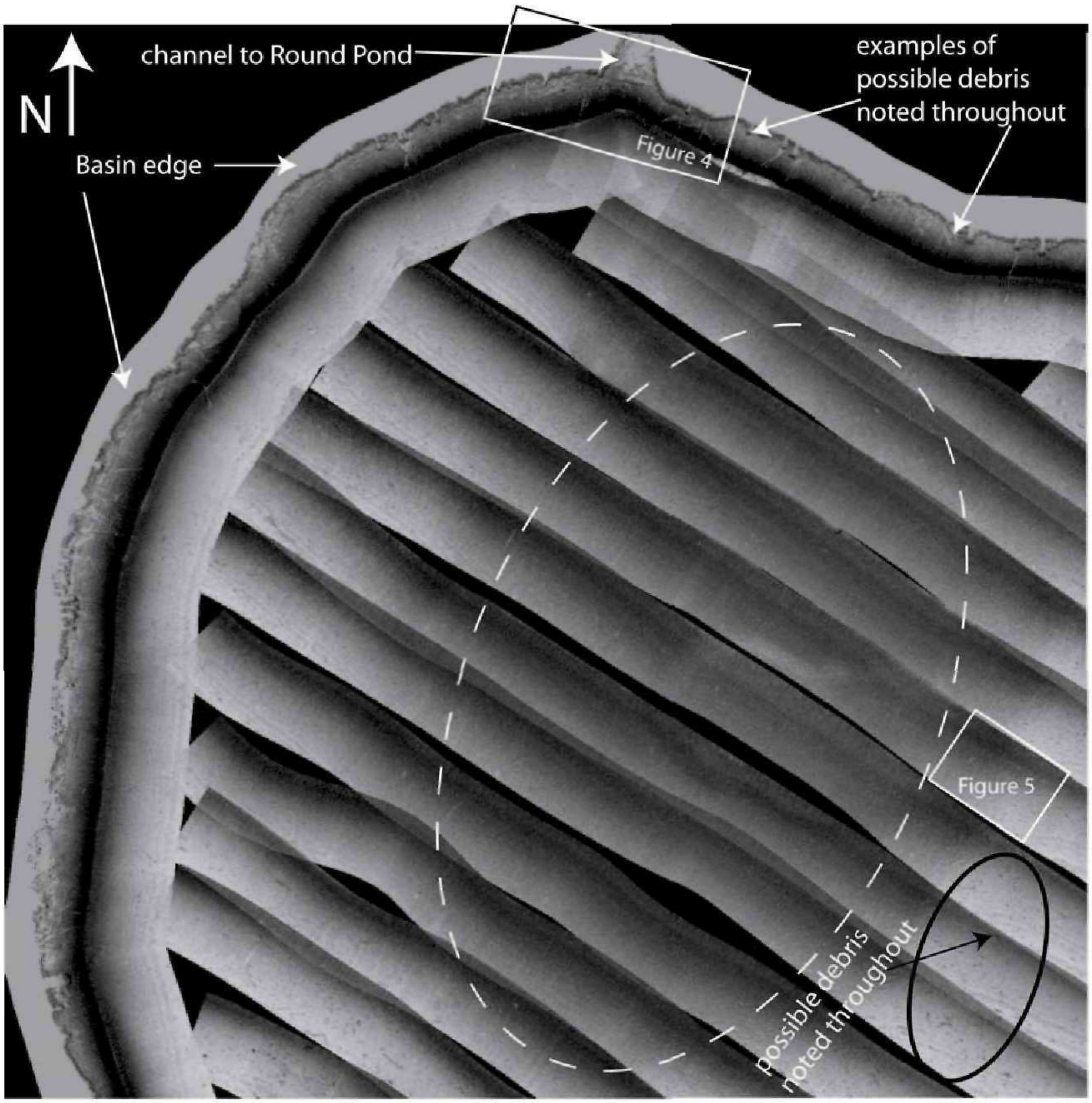


Figure 3: Northwest sidescan quadrant. Region of deeper bathymetry is noted by dashed white line. Outline boxes indicate the location of the detailed sidescan profiles shown in figures 4 and 5.

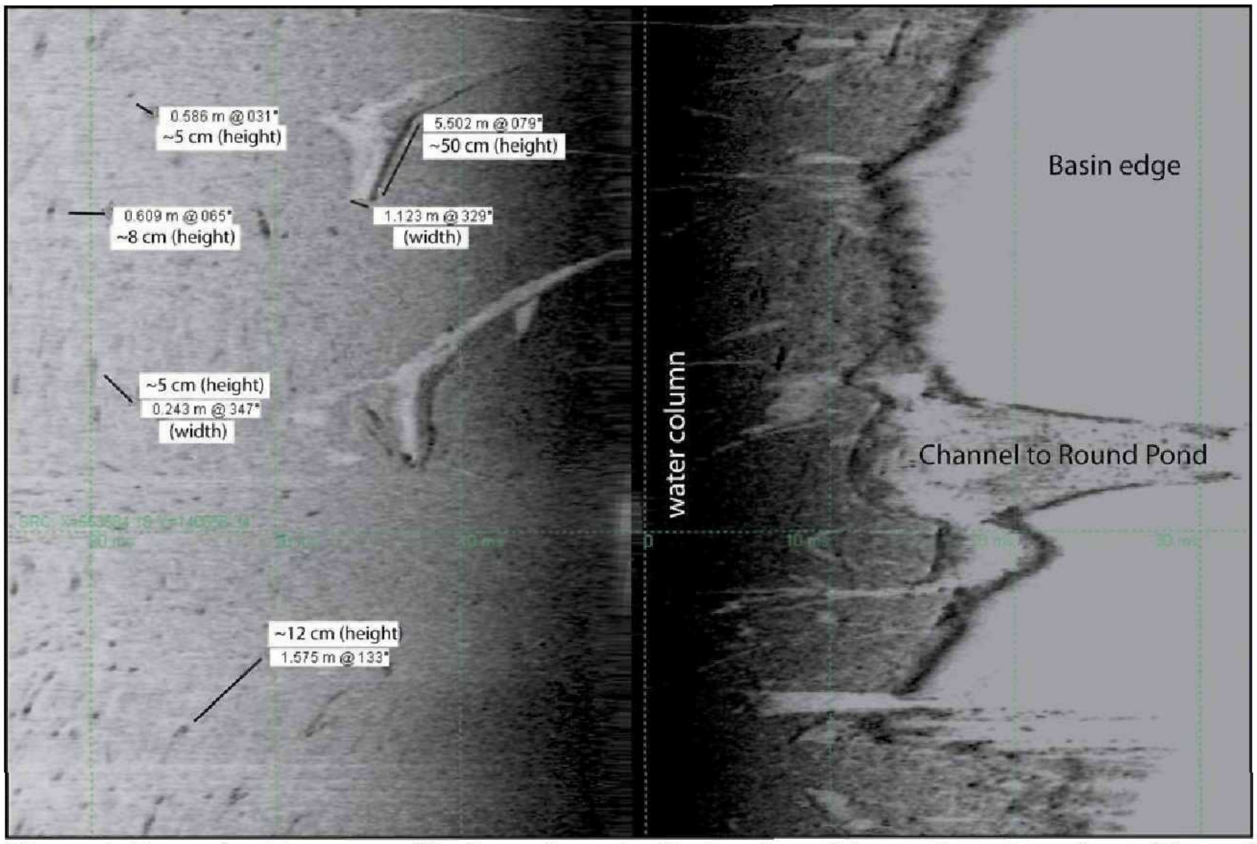


Figure 4: Example sidescan profile from along the Basin edge of the northwest quadrant. Sizes of various features have been noted on the profile. Except where noted, all sizes in the figure refer to estimated lengths of individual features. Only a few example features are labeled because numerous features are present.

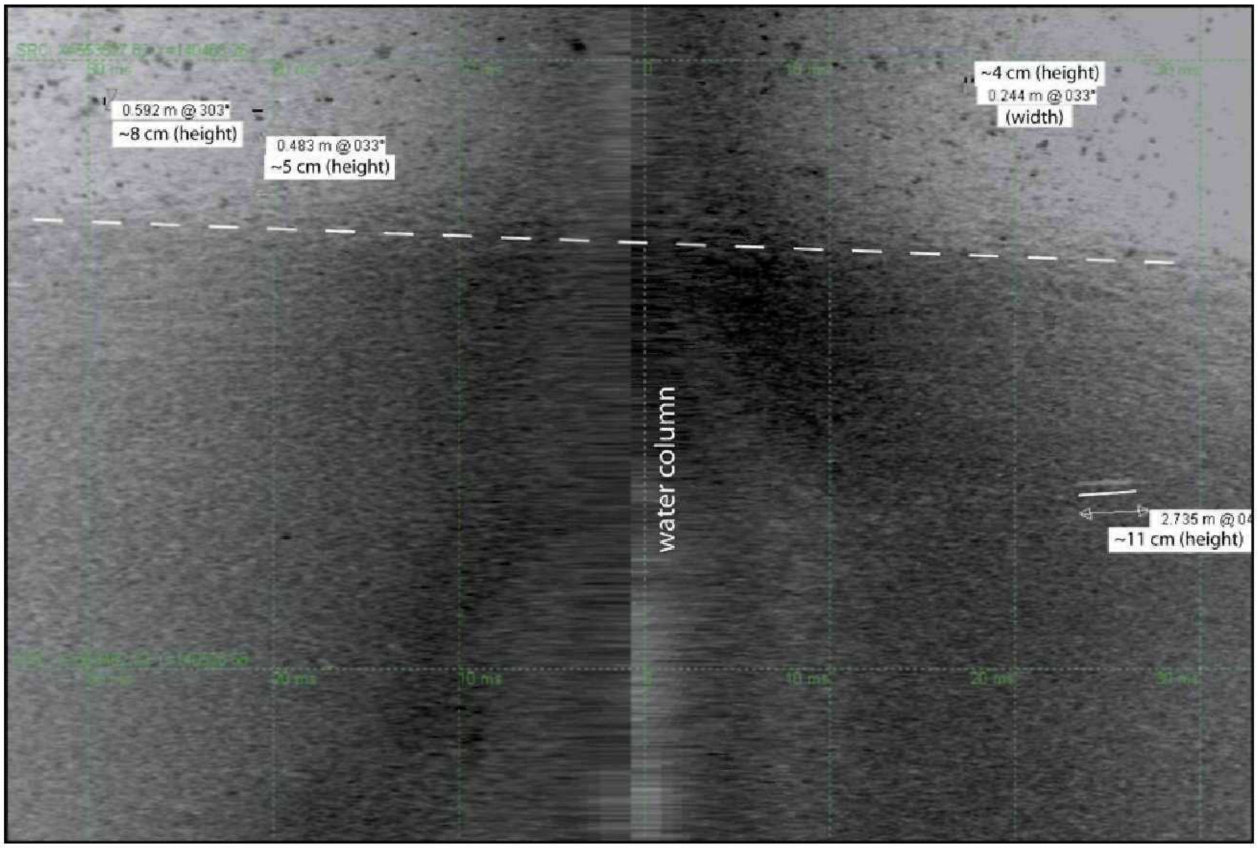


Figure 5: Example sidescan profile from the deeper portion of northwest quadrant. The transition from shallow to deep (lighter to darker) is noted by a dashed white line. Except where noted, all sizes in the figure refer to estimated lengths of individual features. Only a few example features are labeled because numerous features are present.

4.2 Northeast Quadrant

The northeast quadrant includes the northeastern portion of the Basin, including the Basin edge and shallow (< ~ -5 m water depths, NAVD88) regions (Figure 6). Similar to the northwest quadrant, from the Basin edge inward for ~30 meters several large features are evident, ranging from less than one meter to several meters in length and in excess of a meter in width. The larger features are interpreted to be large logs or stumps (Figure 7). Several of these features protrude from 10's of centimeters to up to a meter from the bottom. Farther out to depths of ~ -2 to -3 meters, abundant smaller features litter the Basin bed, ranging from ~ 20 cm to >1 m in length and/or width, with an average height above the Basin bed of less than 20 cm. Average length is ~ 60 cm, and the features are interpreted to represent tree branches and other debris from the adjacent forest (Figure 8).

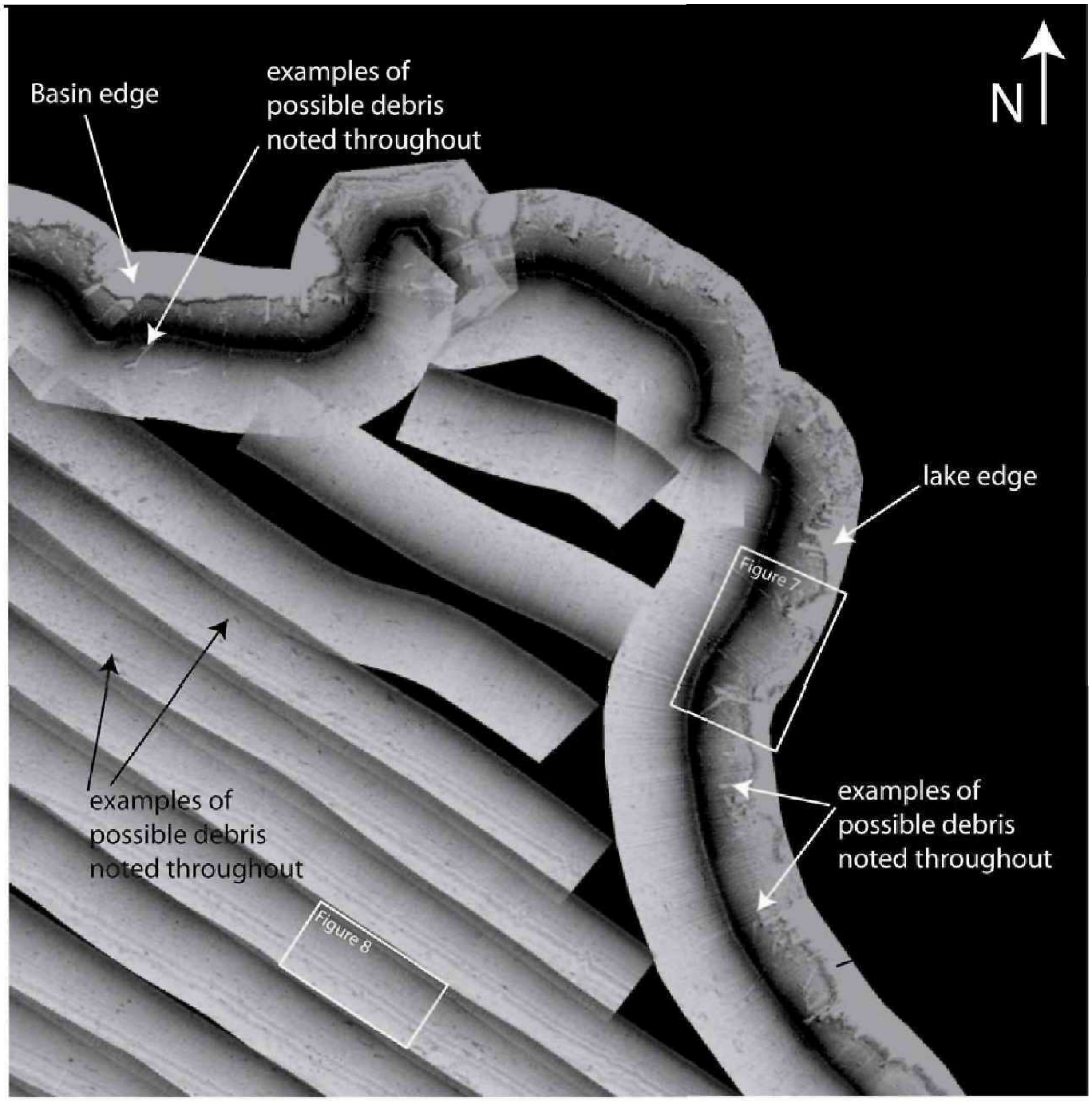


Figure 6: Northeastern sidescan quadrant. Outline boxes indicate the location of the detailed sidescan profiles shown in Figures 7 and 8.

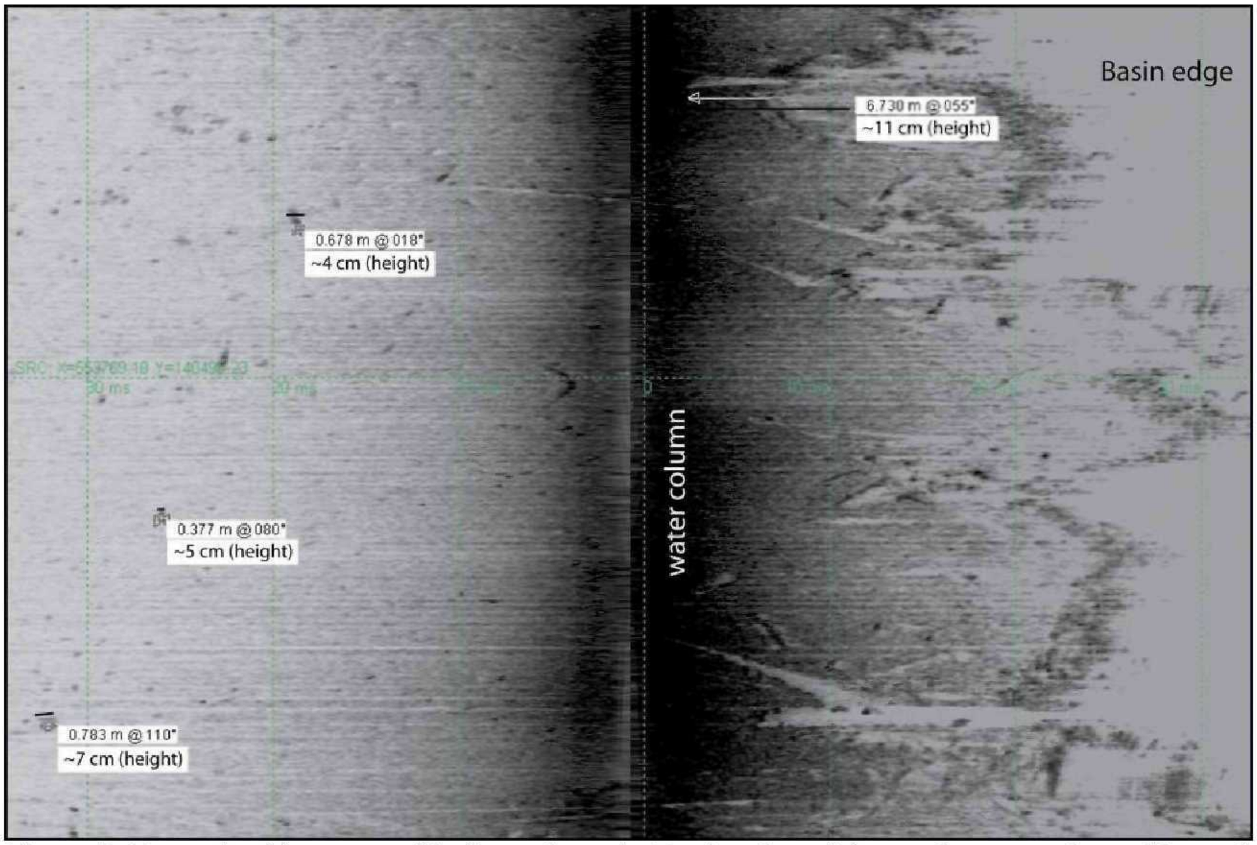


Figure 7: Example sidescan profile from along the Basin edge of the northeast quadrant. Sizes of various features have been noted on the profile. All sizes in the figure refer to estimated lengths of individual features. Only a few example features are labeled because numerous features are present.

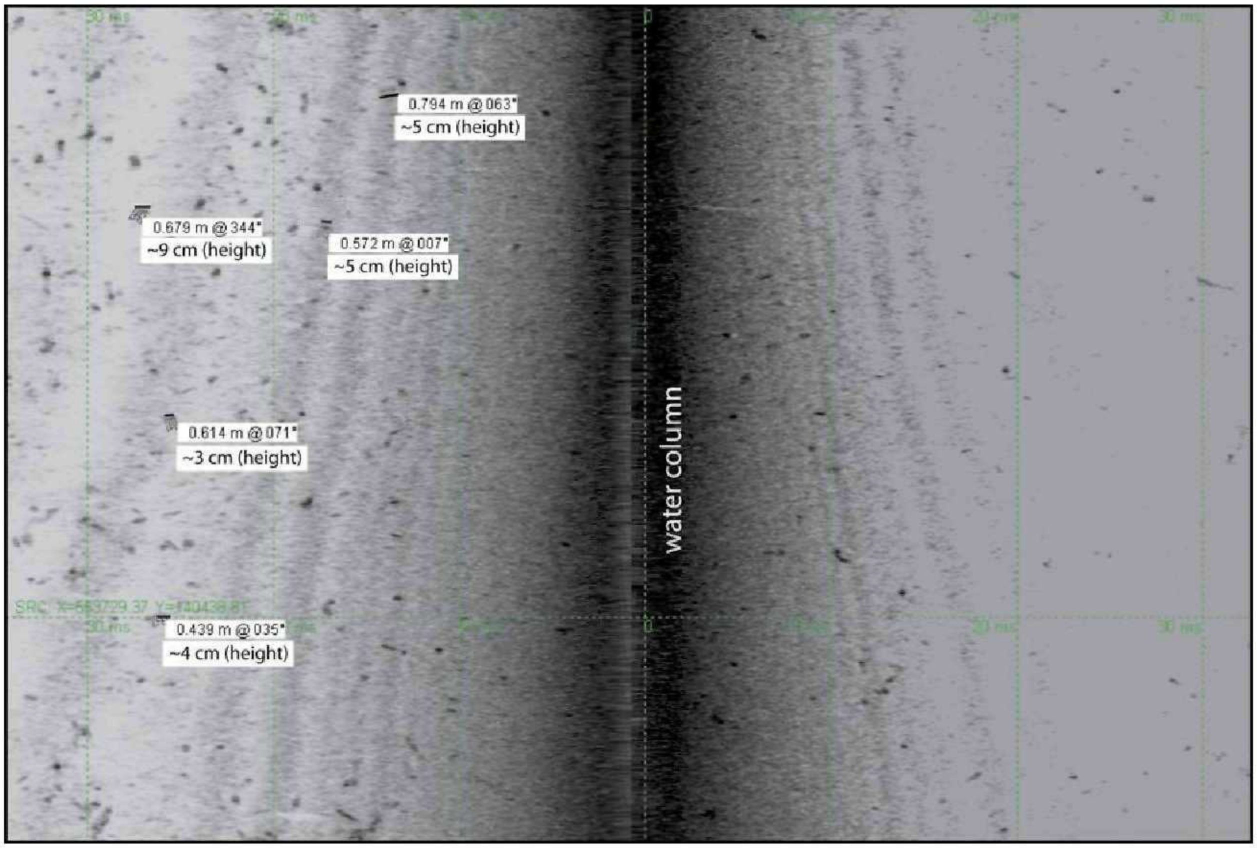


Figure 8: Example sidescan profile from the shallow region of the northeast quadrant. Sizes of various features have been noted on the profile. All sizes in the figure refer to estimated lengths of individual features. Only a few example features are labeled because numerous features are present.

4.3 Southwest Quadrant

The southwest quadrant includes the southwest portion of the Basin, including the Basin edge and shallow (< ~ -5 m water depths, NAVD88) regions (Figure 9). From the Basin edge inward for ~30 meters, several large features are evident, ranging from less than one meter to several meters in length and up to and over a meter in width. The larger features are interpreted to be large logs or stumps (Figure 10). Several of these features protrude from 10's of centimeters to up to a meter from the bottom. Compared to the rest of the Basin, however, fewer and smaller large debris is seen in the southwest quadrant. Farther out to depths of ~ -2 to -3 meters, abundant smaller features litter the Basin bed, ranging from ~ 20 cm to > 1 m in length and/or width, with an average height above the Basin bed of less than 20 cm. Average length is ~ 60 cm, and the features are interpreted to represent tree branches and other debris from the adjacent forest (Figure 11). This shallower region also contains a particularly large feature, noted by the dashed oval in Figures 9 & 12. Given its similar size to the features in observed near the Basin's edge, it is interpreted to be a large log or stump (Figure 12) protruding ~0.5 m from the Basin bed.

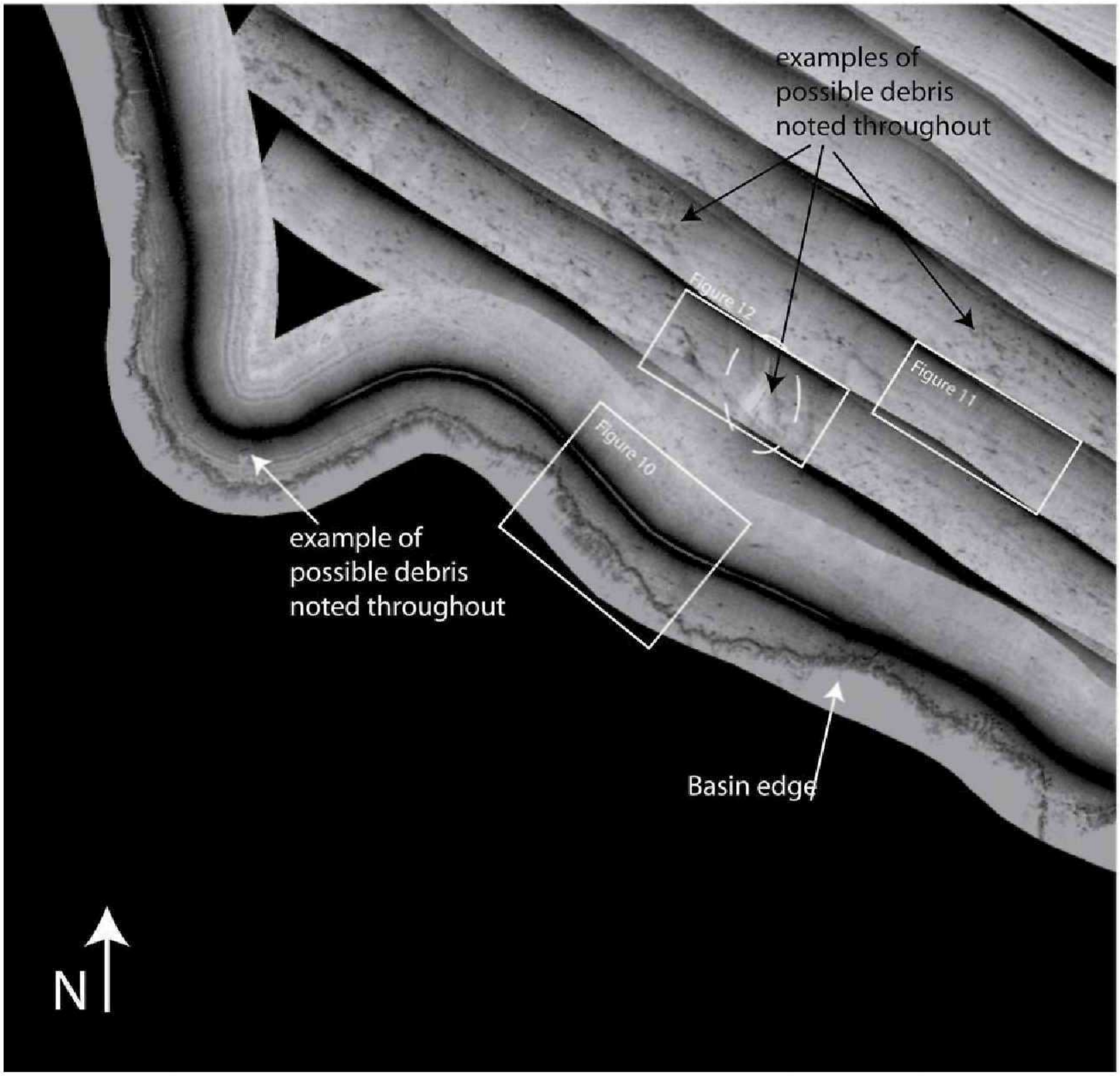


Figure 9: Southwest sidescan quadrant. A large feature located significantly farther from the Basin edge than features of similar size is noted by a dashed white oval. Outline boxes indicate the location of the detailed sidescan profiles shown in Figures 10, 11 and 12.

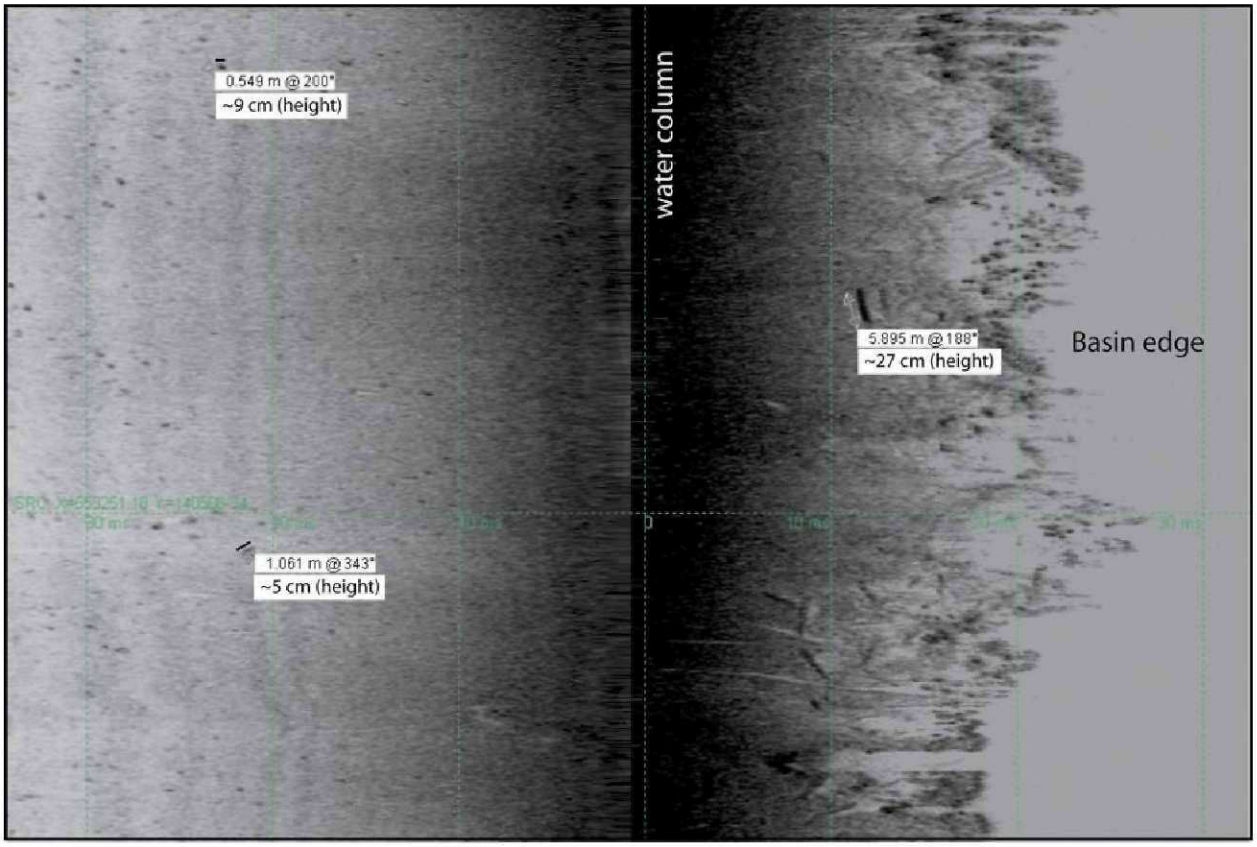


Figure 10: Example sidescan profile from along the Basin edge of the southwest quadrant. Sizes of various features have been noted on the profile. All sizes in the figure refer to estimated lengths of individual features. Only a few example features are labeled because numerous features are present.

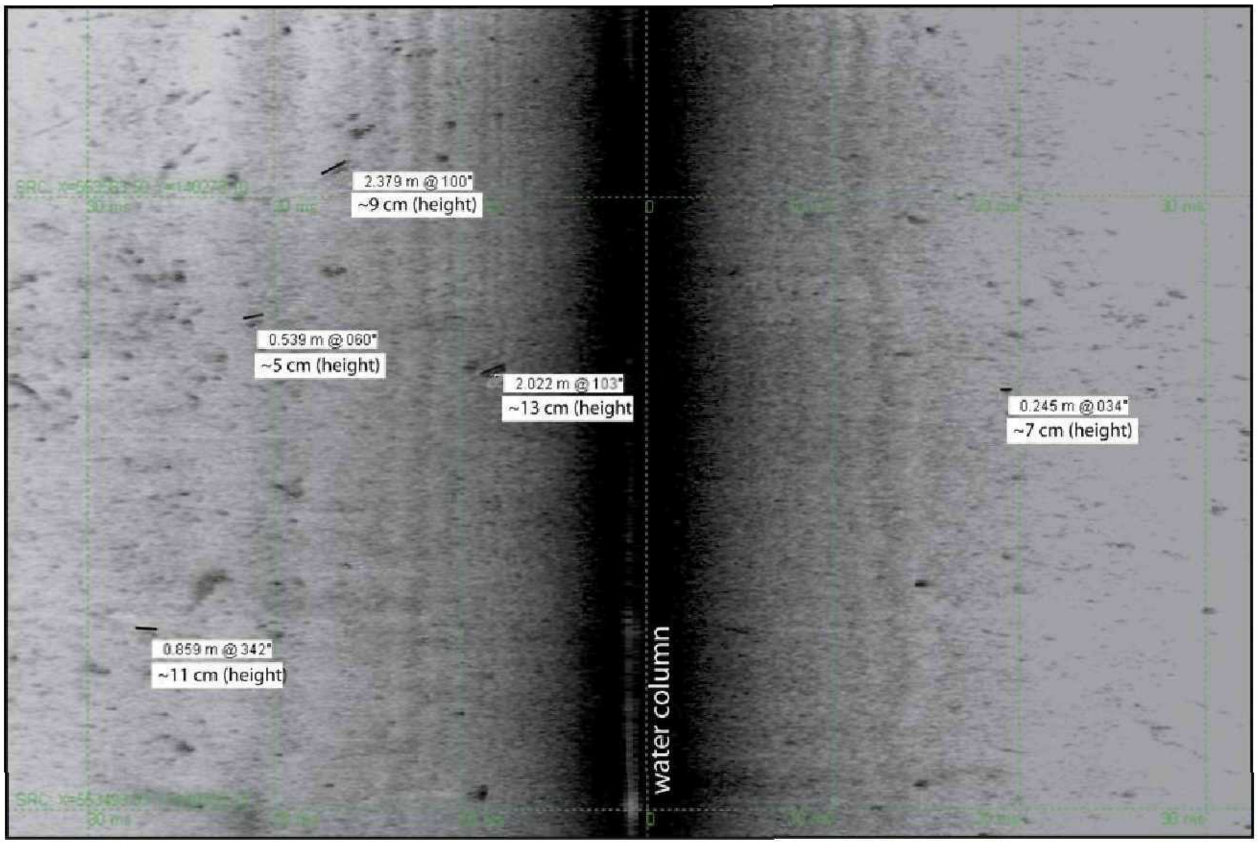


Figure 11: Example sidescan profile from the shallow region of the southwest quadrant. Sizes of various features have been noted on the profile. All sizes in the figure refer to estimated lengths of individual features. Only a few example features are labeled because numerous features are present.

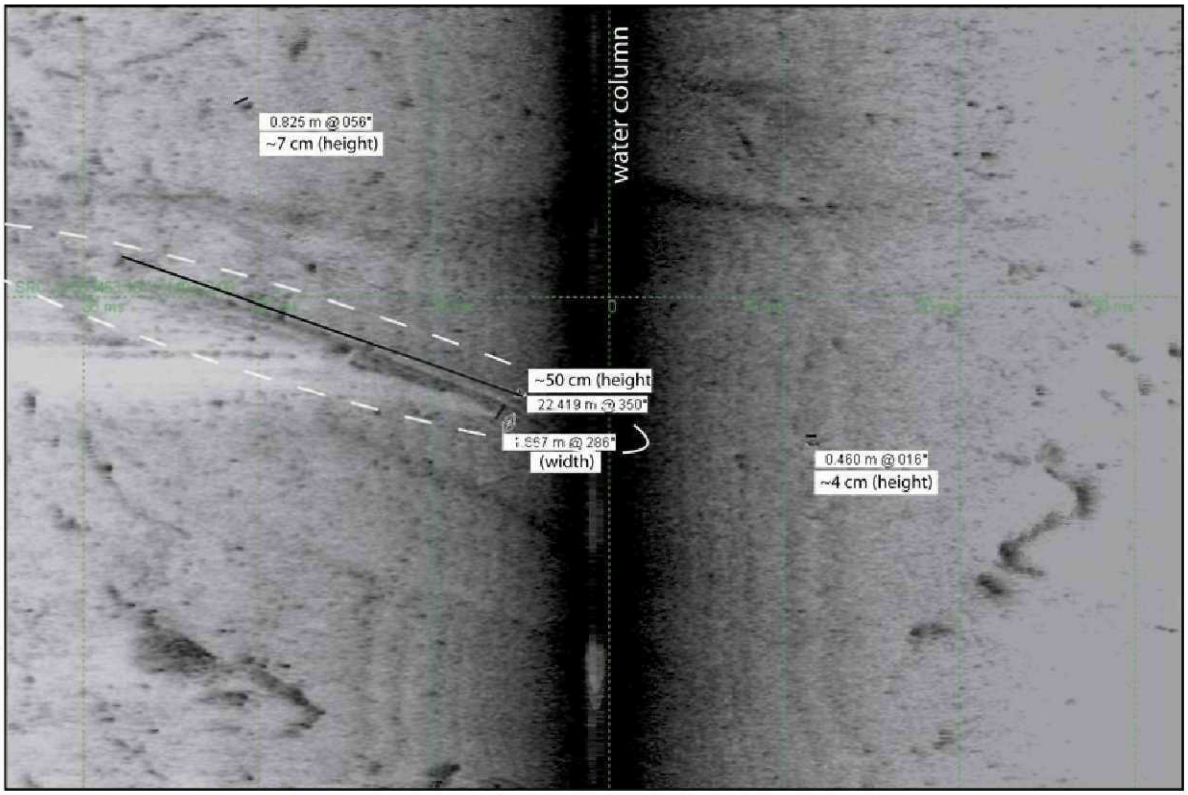


Figure 12: Example sidescan profile showing the large feature previously referred to in Figure 9 (dashed oval). Except where noted, all sizes in the figure refer to estimated lengths of individual features. Only a few example features are labeled because numerous features are present.

4.4 Southeast Quadrant

The southeast quadrant includes the southeast portion of the Basin, including the Basin edge and shallow (< ~ -5 m water depths, NAVD88) regions (Figure 13). Similar to the northeastern quadrant, from the Basin edge inward for ~30 meters several large features are evident, ranging from less than one meter to several meters in length and up to and over a meter in width. The larger features are interpreted to be large logs or stumps (Figure 14). Several of these features protrude from 10's of centimeters to up to a meter from the bottom. Farther out to depths of ~ -2 to -3 meters, abundant smaller features litter the Basin bed, ranging from ~ 20 cm to > 1 m in length and/or width, with an average height above the Basin bed of less than 20 cm. Average length is ~ 60 cm, and the features are interpreted to represent tree branches and other debris from the adjacent forest (Figure 15). A region particularly dense in small (< 30 cm length/width) features is outlined with a dashed circle in Figures 13 & 16. While this might represent a cluster of tree litter on the bottom, we suspect the features are a large growth of submerged aquatic vegetation (SAV) noted previously by the surveying group in 2006 (Figure 16).

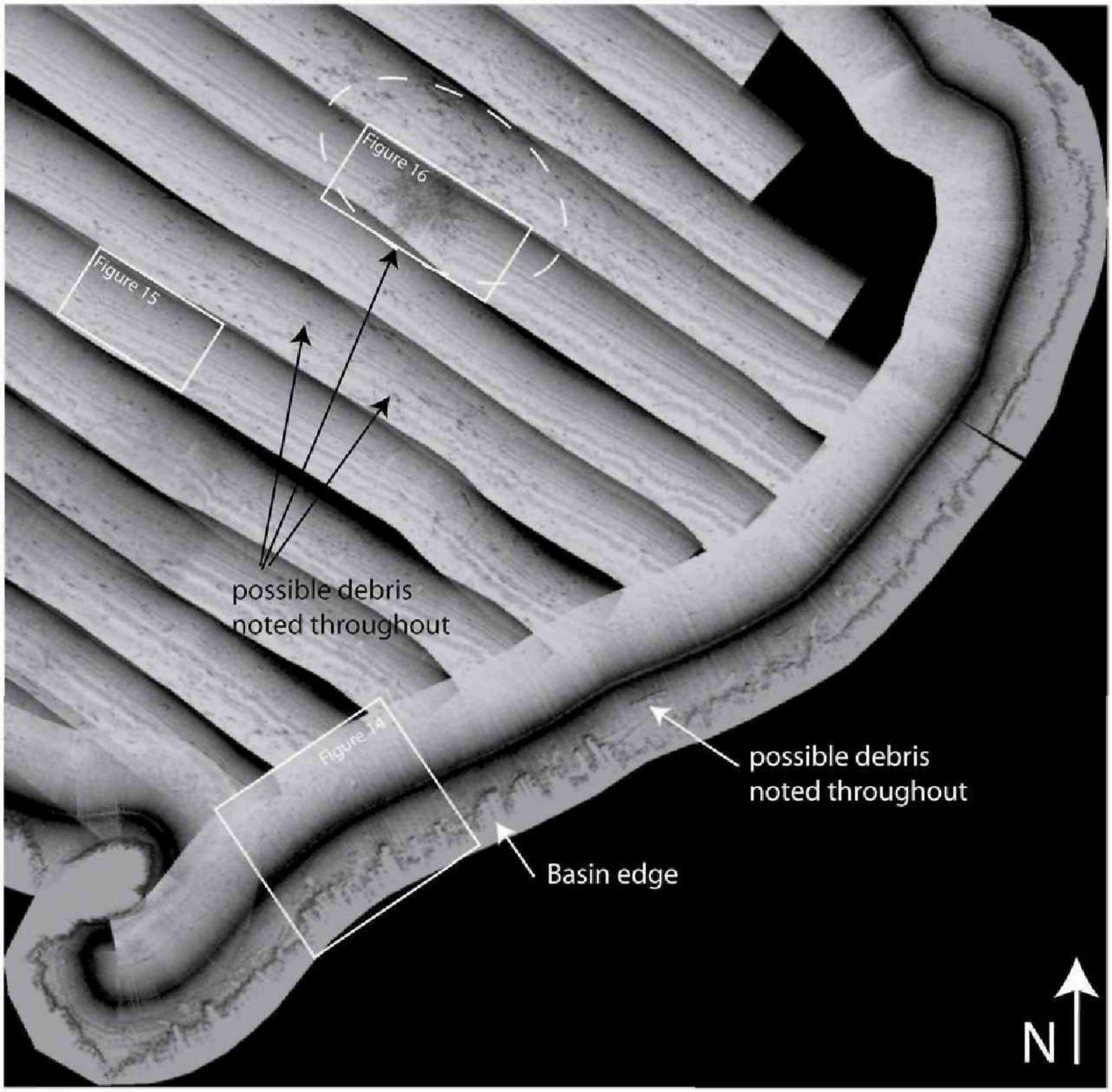


Figure 13: Southeast sidescan quadrant. Region of possible SAV is outlined by the dashed white circle. Outline boxes indicate the location of the detailed sidescan profiles shown in figures 14, 15 and 16.

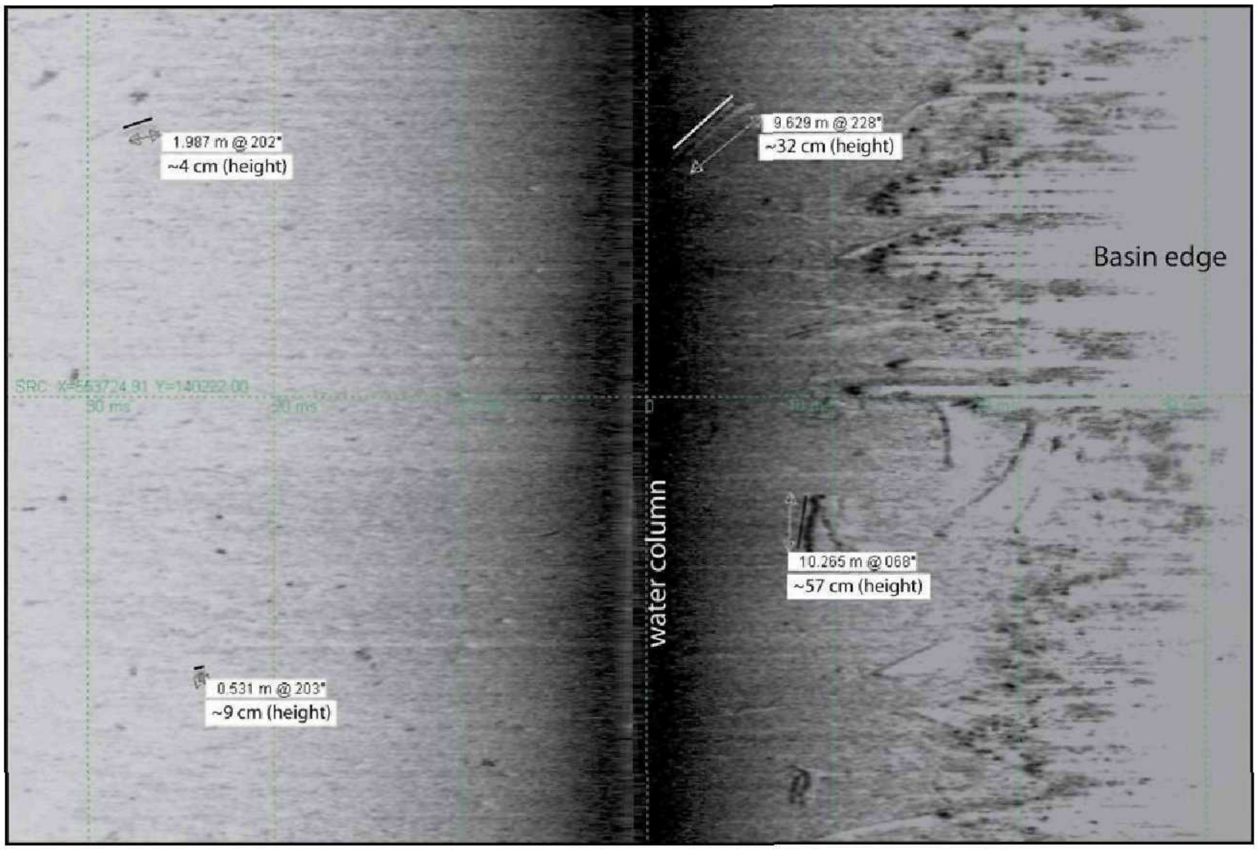


Figure 14: Example sidescan profile from along the Basin edge of the southeast quadrant. Sizes of various features have been noted on the profile. All sizes in the figure refer to estimated lengths of individual features. Only a few example features are labeled because numerous features are present.

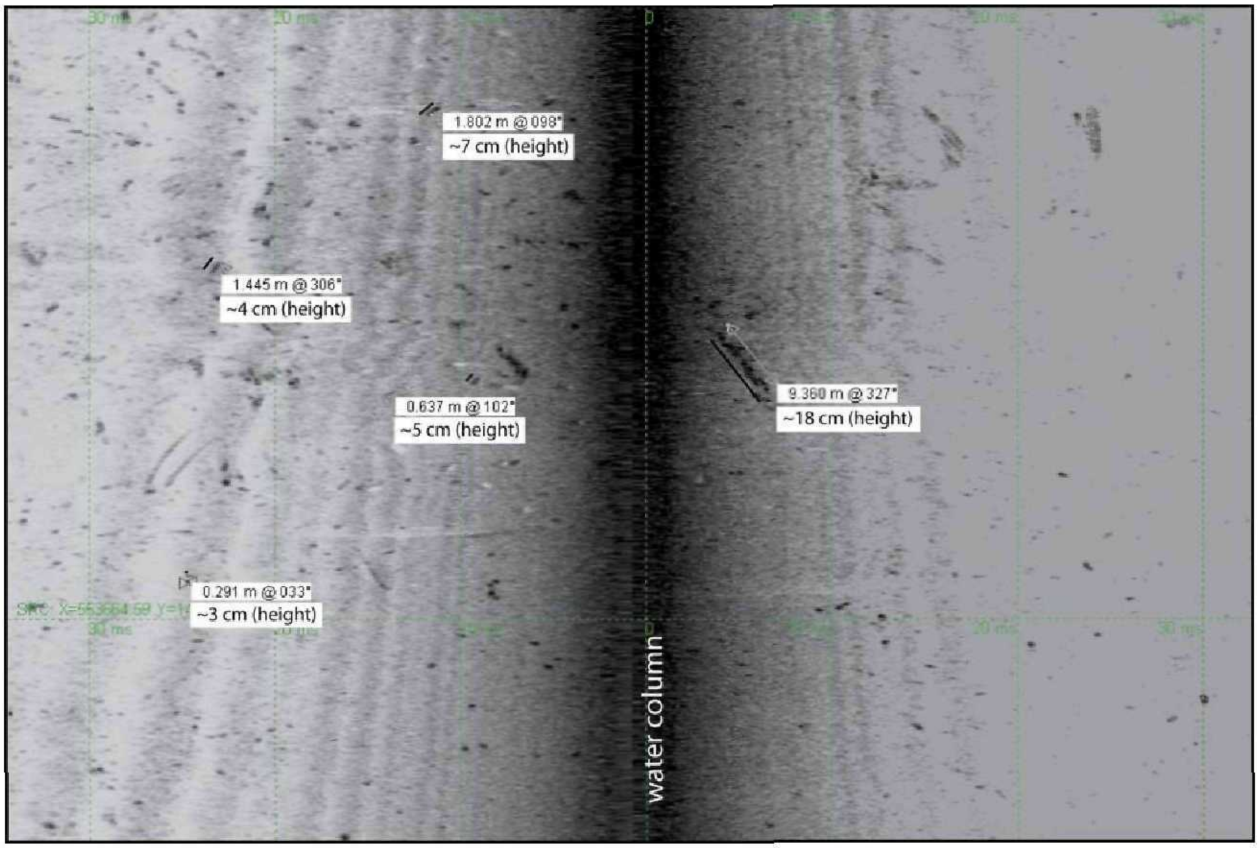


Figure 15: Example sidescan profile from the shallow region of the southeast quadrant. Sizes of various features have been noted on the profile. All sizes in the figure refer to estimated lengths of individual features. Only a few example features are labeled because numerous features are present.

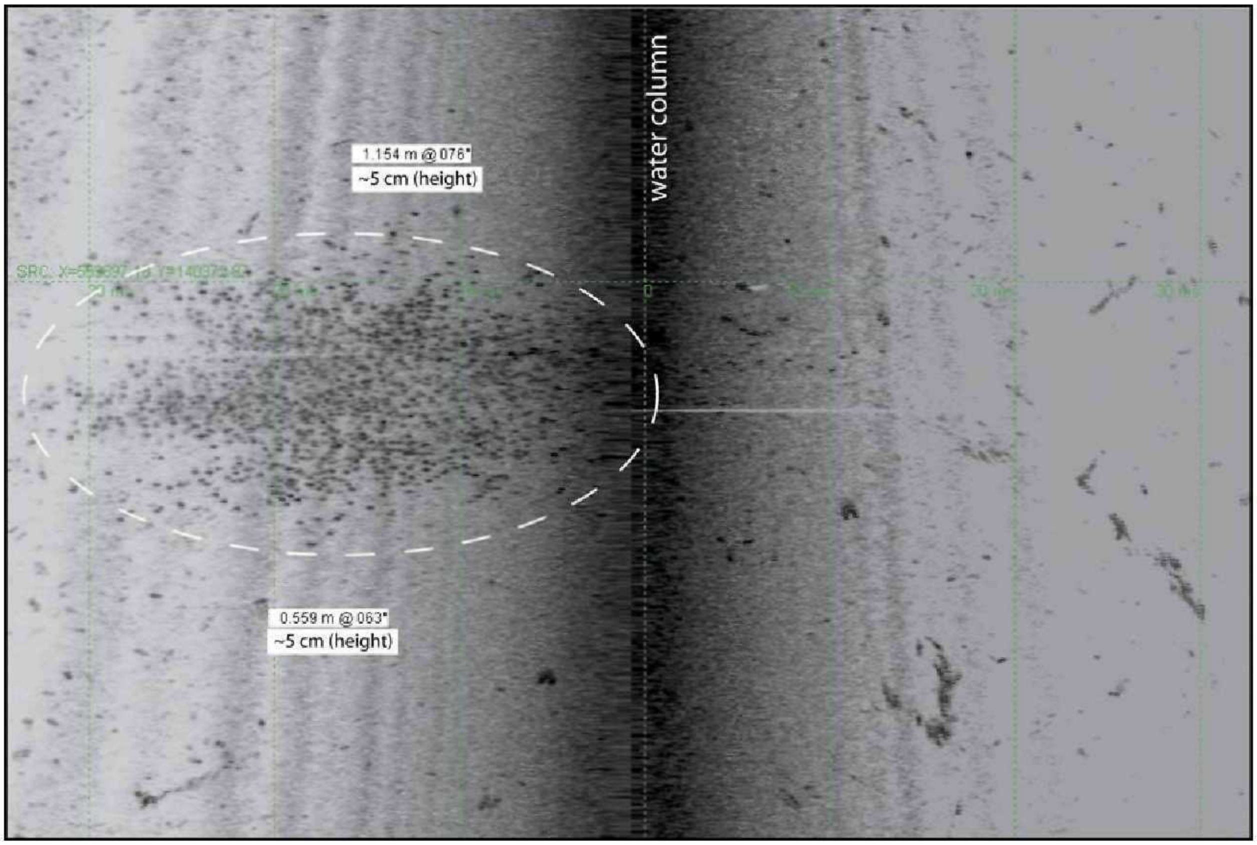


Figure 16: Example sidescan profile showing the region of probably SAV delineated in Figure 13. The region of probable SAV is indicated by the dashed oval. Sizes of various features have been noted on the profile, and average < 30 cm length/width in the dense region. All sizes in the figure refer to estimated lengths of individual features. Only a few example features are labeled because numerous features are present.

5.0 Conclusions

Overall, the sidescan data reveal that the Basin bed is covered in substantial amounts of debris. Close to the Basin edges, debris is significantly larger, up to 10's of meters in length, several meters in width, and protruding from 10's of centimeters to up to a meter from the Basin bed. This debris is likely comprised of larger logs and stumps. Approximately 50% of the Basin edges are characterized by debris of this type. The shallower portion of the Basin (less than ~ -8m water depth, NAVD88) has numerous smaller features, ranging from <1m to several meters in length, and up to a meter or more in width. The average length and/or width of these features is ~ 60 cm, with an average height above the Basin bed of less than 20 cm, and they are interpreted to be tree branches and/or other forest litter. This smaller debris is more prevalent in the southern portion of the Basin (covering ~40-50% of the Basin bottom) than in the northern portion of the Basin (~30% of the Basin bottom). The deeper portion of the Basin in the northwestern quadrant is composed of significantly softer sediment, which absorbs the seismic energy and results in fewer apparent features (~15% of the Basin bottom). The features that are observed are approximately the same size as the larger features of the shallower environs described above; likely, tree branches and/or other forest litter. Smaller features might be buried in the softer sediments of the deeper Basin region and may not reflect sufficient energy to be detectable in the sidescan record.

This report should not be considered to present an exhaustive description of Basin debris, as additional debris has likely accumulated since the 2006 survey. In addition, due to settling and/or sedimentation, the visible measurements (length, width and height estimates) may have changed for any given individual feature. New debris may have accumulated that is larger, wider, and/or protruding at a greater height than the features mapped in the 2006 survey. Despite these limitations, this report presents a fair assessment of the nature and type of debris characterizing the Basin bottom.

APPENDIX B

CALIBRATION LOGS

Date: 06/03/09
Time: 7:57

MNA Field Operations Manual
Olin OU-2
McIntosh, AL
MACTEC Project No. 6107-09-0035

Pine Sonde ID: 5118
Pine Handset ID: ~~07F100582~~ 11449
Battery Voltage %:

ATTACHMENT 4.1a

YSI CALIBRATION PRIOR TO SAMPLING

DISSOLVED OXYGEN (DO)		VALUE	
Was DO membrane changed?	Yes ___ No X Date: ___ Time: ___		
Current Air Temperature °C (meter reading):		24.44	
Current Barometric Pressure (from Weather Channel or NOAA.gov, which is corrected to sea level):	30.02 x 25.4 = 762.508	762.5	
Elevation Corrected Barometric Pressure to enter into YSI DO calibration:	Ex.: 30.02 in. Hg x 25.4 = mm Hg; **subtract** 2.54 mm Hg for every 100 ft. above sea level: 565/100 x 2.54 = 14.4 mm Hg	762.5	
Theoretical DO (mg/L) from DO table based on current temperature and elevation corrected pressure:			
DO concentration before Calibration (mg/L):	Depending on meter version, this may not be available.	8.11	97.5%
DO concentration after Calibration (mg/L):		8.33	100.2%
% Recovery (actual/theory x 100)	Range is 90 to 110% Recovery		
DO Charge (DO ch):	Acceptable Range is 25 to 75	36.9	
DO Gain (should be between -0.7 and 1.5):	Exit Calibration menu and go to Advanced/Cal Constants		

Note: Reference elevation for the Fairfield, AL site is 565 ft.

CONDUCTIVITY [Note: Calibrate before pH to avoid carry-over from pH standards (i.e. pH buffers are conductive)]		
Calibration standard used (mS/cm)		1.413
Temperature (°C)		24.80
Reading before Calibration (mS/cm)		1.395
Reading AFTER Calibration (mS/cm)	1.413 mS/cm^c	1.408
Conductivity Cell Constant (unitless):		

Note: Be sure conductivity cell is submerged and free of bubbles (gently tap sonde on table)

pH		
pH **7.0** value before calibration:		~~7.03~~ 7.04
pH **7.0** value after calibration:		7.00
pH **7.0** mV **(range is -50 to +50 mV):**		-13.4
pH 10 value before calibration:		9.92
pH 10 value after calibration:		10.00
pH 10 mV **(range is -130 to -230 mV):**		-174.9
pH **4.0** value before calibration:		~~3.84~~ 3.83
pH **4.0** value after calibration:		3.97
pH **4.0** mV **(range is 130 to 230 mV):**		157.8

Note: Span between ph 4 and 7, and 7 and 10 should be between 165 to 180 mV

OXIDATION/REDUCTION POTENTIAL (ORP)		
Calibration Temperature (°C):		24.74
Theoretical Calibration standard (mV)	0.231+0.0013(25-T) x 1000 = mV (T is Temperature °C)	
Reading before calibration (mV):		243.6
Reading after calibration (mV):		240.0

Note: mV theory will change with temperature, so calculate based on your current YSI temp.

TURBIDITY Note: Lens wiper should be parked 180 degrees from the optics.		
~~0 NTU~~ Turbidity Standard 123.0 Standard	Before Cal: 123.1	After Cal: 123.0
100 NTU Turbidity Standard	Before Cal:	After Cal:

YSI CALIBRATION SUCCESSFUL?	YES

Date: 6/3/09
Time: 1745

MNA Field Operations Manual
Olin OU-2
McIntosh, AL
MACTEC Project No. ~~6300-03-0035~~ 6107090035

Pine Sonde ID: ~~11449~~ RR
Pine Handset ID: 11449
Battery Voltage %:

ATTACHMENT 4.1a

YSI CALIBRATION AFTER SAMPLING

Only the shaded boxes need to be filled in if no recalibration is required.

DISSOLVED OXYGEN (DO) Note: Leave meter in "run" mode to check calibration		VALUE
Was DO membrane changed?	Yes____ No X Date:____ Time:____	
Current Air Temperature °C (meter reading):		
Current Barometric Pressure (from Weather Channel or NOAA.gov, which is corrected to sea level):		
Elevation Corrected Barometric Pressure to enter into YSI DO calibration:	Ex.: 30.02 in. Hg x 25.4 = mm Hg; **subtract** 2.54 mm Hg for every 100 ft. above sea level: 565/100 x 2.54 = 14.4 mm Hg	
Theoretical DO (mg/L) from DO table based on current temperature and elevation corrected pressure:		
DO concentration before Calibration (mg/L):	Depending on meter version, this may not be available.	9.72 @ 25.71
DO concentration after Calibration (mg/L):		
% Recovery (actual/theory x 100)	Range is 90 to 110% Recovery	
DO Charge (DO ch):	Acceptable Range is 25 to 75	
DO Gain (should be between -0.7 and 1.5):	Exit Calibration menu and go to Advanced/Cal Constants	

Note: Reference elevation for the Fairfield, AL site is 565 ft.

CONDUCTIVITY [Note: Calibrate before pH to avoid carry-over from pH standards (i.e. pH buffers are conductive)]	lot 6735 Exp 12/9/09	
Calibration standard used (mS/cm)		
Temperature (°C)		27.28
Reading before Calibration (mS/cm)	1.383 mS/cm^c	1.444
Reading AFTER Calibration (mS/cm)		
Conductivity Cell Constant (unitless):		

Note: Be sure conductivity cell is submerged and free of bubbles (gently tap sonde on table)

pH		
pH 7.0 value before calibration: lot	281586 Exp 12/2010	7.07
pH 7.0 value after calibration:		
pH 7.0 mV **(range is -50 to +50 mV):**		
pH 10 value before calibration: lot	2808147 Exp 1/2010	9.95
pH 10 value after calibration:		
pH 10 mV **(range is -130 to -230 mV):**		
pH 4.0 value before calibration: lot	6757 Exp 12/15/09	4.05
pH 4.0 value after calibration:		
pH 4.0 mV **(range is 130 to 230 mV):**		

Note: Span between ph 4 and 7, and 7 and 10 should be between 165 to 180 mV

OXIDATION/REDUCTION POTENTIAL (ORP) 231		
Calibration Temperature (°C):		
Theoretical Calibration standard (mV)	0.231+0.0013(25-T) x 1000 = mV (T is Temperature °C)	
Reading before calibration (mV):		235.4
Reading after calibration (mV):		

Note: mV theory will change with temperature, so calculate based on your current YSI temp.

TURBIDITY Note: Lens wiper should be parked 180 degrees from the optics.			
0 NTU Turbidity Standard	Before Cal: -0.1	After Cal:	
100 NTU Turbidity Standard	Before Cal: 123.4	After Cal:	
YSI CALIBRATION VERIFICATION SUCCESSFUL?			

ATTACHMENT 4.1a

YSI CALIBRATION PRIOR TO SAMPLING

DISSOLVED OXYGEN (DO)		VALUE
Was DO membrane changed?	Yes___ No X Date:___ Time:___	
Current Air Temperature °C (meter reading):		22.50
Current Barometric Pressure (from Weather Channel or NOAA.gov, which is corrected to sea level):	29.89	?
Elevation Corrected Barometric Pressure to enter into YSI DO calibration:	Ex.: 30.02 in. Hg x 25.4 = mm Hg; **subtract** 2.54 mm Hg for every 100 ft. above sea level: 565/100 x 2.54 = 14.4 mm Hg	759.2
Theoretical DO (mg/L) from DO table based on current temperature and elevation corrected pressure:		
DO concentration before Calibration (mg/L):	Depending on meter version, this may not be available.	9.25
DO concentration after Calibration (mg/L):		8.86
% Recovery (actual/theory x 100)	Range is 90 to 110% Recovery	
DO Charge (DO ch):	Acceptable Range is 25 to 75	
DO Gain (should be between -0.7 and 1.5):	Exit Calibration menu and go to Advanced/Cal Constants	

Note: Reference elevation for the Fairfield, AL site is 565 ft.

CONDUCTIVITY [Note: Calibrate before pH to avoid carry-over from pH standards (i.e. pH buffers are conductive)]		
Calibration standard used (mS/cm)		1.413
Temperature (°C)		23.69
Reading before Calibration (mS/cm)	1.338 mS/cm^c	1.304
Reading AFTER Calibration (mS/cm)	1.378 mS/cm^c	1.413
Conductivity Cell Constant (unitless):		

Note: Be sure conductivity cell is submerged and free of bubbles (gently tap sonde on table)

pH		
pH **7.0** value before calibration:		7.13
pH **7.0** value after calibration:		7.00
pH **7.0** mV **(range is -50 to +50 mV):**		-17.3
pH 10 value before calibration:		9.90
pH 10 value after calibration:		10.00
pH 10 mV **(range is -130 to -230 mV):**		-177.5
pH **4.0** value before calibration:		3.76
pH **4.0** value after calibration:		3.96
pH **4.0** mV **(range is 130 to 230 mV):**		155.5

Note: Span between ph 4 and 7, and 7 and 10 should be between 165 to 180 mV

OXIDATION/REDUCTION POTENTIAL (ORP)		
Calibration Temperature (°C):		23.73
Theoretical Calibration standard (mV)	0.231+0.0013(25-T) x 1000 = mV (T is Temperature °C)	
Reading before calibration (mV):		235.5
Reading after calibration (mV):		240.3

Note: mV theory will change with temperature, so calculate based on your current YSI temp.

TURBIDITY Note: Lens wiper should be parked 180 degrees from the optics.		
0 NTU Turbidity Standard	Before Cal: 2.3	After Cal: 0.0
~~100~~ 123 NTU Turbidity Standard	Before Cal: 119.5	After Cal: 123.0

YSI CALIBRATION SUCCESSFUL?	YES

Date: 6/4/09
Time: 1500

MNA Field Operations Manual
Olin OU-2
McIntosh, AL
MACTEC Project No. 6107-09-0035

Pine Sonde ID: 5118
Pine Handset ID: 11449
Battery Voltage %:

YSI CALIBRATION AFTER SAMPLING

Only the shaded boxes need to be filled in if no recalibration is required.

DISSOLVED OXYGEN (DO) Note: Leave meter in "run" mode to check calibration		VALUE
Was DO membrane changed?	Yes___ No___ Date:___ Time:___	
Current Air Temperature °C (meter reading):		
Current Barometric Pressure (from Weather Channel or NOAA.gov, which is corrected to sea level):		
Elevation Corrected Barometric Pressure to enter into YSI DO calibration:	Ex.: 30.02 in. Hg x 25.4 = mm Hg; **subtract** 2.54 mm Hg for every 100 ft. above sea level: 565/100 x 2.54 = 14.4 mm Hg	
Theoretical DO (mg/L) from DO table based on current temperature and elevation corrected pressure:		
DO concentration before Calibration (mg/L):	Depending on meter version, this may not be available.	
DO concentration after Calibration (mg/L):		9.05 @ 23.61
% Recovery (actual/theory x 100)	Range is 90 to 110% Recovery	
DO Charge (DO ch):	Acceptable Range is 25 to 75	
DO Gain (should be between -0.7 and 1.5):	Exit Calibration menu and go to Advanced/Cal Constants	

Note: Reference elevation for the Fairfield, AL site is 565 ft.

CONDUCTIVITY [Note: Calibrate before pH to avoid carry-over from pH standards (i.e. pH buffers are conductive)]		
Calibration standard used (mS/cm)	1.413mS/cm Lot 6735 12/9/09	
Temperature (°C)		
Reading before Calibration (mS/cm)	RR	~~25.5~~ 1.380 mS/cm
Reading AFTER Calibration (mS/cm)		
Conductivity Cell Constant (unitless):		~~1.380~~ mS/cm RR

Note: Be sure conductivity cell is submerged and free of bubbles (gently tap sonde on table)

pH		
pH 7.0 value before calibration:	lot 281586 Exp 12/2010	7.03
pH 7.0 value after calibration:		
pH 7.0 mV **(range is -50 to +50 mV):**		
pH 10 value before calibration:	lot 2808147 Exp 1/2010	9.95
pH 10 value after calibration:		
pH 10 mV **(range is -130 to -230 mV):**		
pH 4.0 value before calibration:	lot 6494 Exp 12/15/09	4.00
pH 4.0 value after calibration:		
pH 4.0 mV **(range is 130 to 230 mV):**		

Note: Span between ph 4 and 7, and 7 and 10 should be between 165 to 180 mV

OXIDATION/REDUCTION POTENTIAL (ORP) ~~[illegible]~~ lot G2486 Exp 10/2012		
Calibration Temperature (°C):		
Theoretical Calibration standard (mV)	0.231+0.0013(25-T) x 1000 = mV (T is Temperature °C)	
Reading before calibration (mV):		240.3
Reading after calibration (mV):		

Note: mV theory will change with temperature, so calculate based on your current YSI temp.

TURBIDITY Note: Lens wiper should be parked 180 degrees from the optics.			
0 NTU Turbidity Standard	Before Cal: 0.1	After Cal:	
123 ~~[illegible]~~ NTU Turbidity Standard Lot 08M894070 Exp 12/09	Before Cal: 121.1	After Cal:	
YSI CALIBRATION VERIFICATION SUCCESSFUL?			

Date: 06/05/09
Time: 0810

MNA Field Operations Manual
Olin OU-2
McIntosh, AL
MACTEC Project No. 6107-09-0035

Pine Sonde ID: 5718
Pine Handset ID: 11449
Battery Voltage %:

ATTACHMENT 4.1a

YSI CALIBRATION PRIOR TO SAMPLING

DISSOLVED OXYGEN (DO)		**VALUE**
Was DO membrane changed?	Yes ___ No X Date: ___ Time: ___	
Current Air Temperature °C (meter reading):		22.23
Current Barometric Pressure (from Weather Channel or NOAA.gov, which is corrected to sea level):	29.87	29.87
Elevation Corrected Barometric Pressure to enter into YSI DO calibration:	Ex.: 30.02 in. Hg x 25.4 = mm Hg; **subtract** 2.54 mm Hg for every 100 ft. above sea level: 565/100 x 2.54 = 14.4 mm Hg	758.698
Theoretical DO (mg/L) from DO table based on current temperature and elevation corrected pressure:		
DO concentration before Calibration (mg/L):	Depending on meter version, this may not be available.	~~11.53~~ AES 11.32
DO concentration after Calibration (mg/L):		8.68
% Recovery (actual/theory x 100)	Range is 90 to 110% Recovery	
DO Charge (DO ch):	Acceptable Range is 25 to 75	48.2
DO Gain (should be between -0.7 and 1.5):	Exit Calibration menu and go to Advanced/Cal Constants	

Note: Reference elevation for the Fairfield, AL site is 565 ft.

CONDUCTIVITY [Note: Calibrate before pH to avoid carry-over from pH standards (i.e. pH buffers are conductive)]		
Calibration standard used (mS/cm)	Lot # 6735 EXP 12/09/09	1.413
Temperature (°C)		22.42
Reading before Calibration (mS/cm)	1.374 mS/cm^c	1.306
Reading AFTER Calibration (mS/cm)	1.413 mS/cm^c	1.343
Conductivity Cell Constant (unitless):		

Note: Be sure conductivity cell is submerged and free of bubbles (gently tap sonde on table)

pH		
pH **7.0** value before calibration:	Lot # 281586 12/2010 EXP	7.02
pH **7.0** value after calibration:		7.00
pH **7.0** mV **(range is -50 to +50 mV):**		~~-13.8~~ -13.0
pH 10 value before calibration:	Lot # 2808147 01/2010 EXP	9.91
pH 10 value after calibration:		10.00
pH 10 mV **(range is -130 to -230 mV):**		-174.7
pH **4.0** value before calibration:	Lot # 6757 12/15/2009 EXP	3.88
pH **4.0** value after calibration:		3.98
pH **4.0** mV **(range is 130 to 230 mV):**		+153.4

Note: Span between ph 4 and 7, and 7 and 10 should be between 165 to 180 mV

OXIDATION/REDUCTION POTENTIAL (ORP)		
Calibration Temperature (°C):	Lot # 62486 EXP 10/2012	22.42
Theoretical Calibration standard (mV)	0.231+0.0013(25-T) x 1000 = mV (T is Temperature °C)	
Reading before calibration (mV):		243.8
Reading after calibration (mV):		240.3

Note: mV theory will change with temperature, so calculate based on your current YSI temp.

TURBIDITY **Note: Lens wiper should be parked 180 degrees from the optics.**

0 NTU Turbidity Standard	Lot # 08M894070 12/2009	Lot # 6757 12/15/09	Before Cal: -2.0	After Cal:	0.0
100 NTU Turbidity Standard	✓		Before Cal: 120.4	After Cal:	~~123.0~~ AES 122.9

YSI CALIBRATION SUCCESSFUL?	YES

Date: 06/05/09
Time: 1630

MNA Field Operations Manual
Olin OU-2
McIntosh, AL
MACTEC Project No. 6107-09-0035

Pine Sonde ID: ~~#449~~ 5118 #449
Pine Handset ID: 11449
Battery Voltage %: ______

YSI CALIBRATION AFTER SAMPLING

Only the shaded boxes need to be filled in if no recalibration is required.

DISSOLVED OXYGEN (DO) Note: Leave meter in "run" mode to check calibration		VALUE
Was DO membrane changed?	Yes ____ No X Date: ____ Time: ____	
Current Air Temperature °C (meter reading):		22.96
Current Barometric Pressure (from Weather Channel or NOAA.gov, which is corrected to sea level):		
Elevation Corrected Barometric Pressure to enter into YSI DO calibration:	Ex.: 30.02 in. Hg x 25.4 = mm Hg; **subtract** 2.54 mm Hg for every 100 ft. above sea level: 565/100 x 2.54 = 14.4 mm Hg	
Theoretical DO (mg/L) from DO table based on current temperature and elevation corrected pressure:		
DO concentration before Calibration (mg/L):	Depending on meter version, this may not be available.	9.08
DO concentration after Calibration (mg/L):		
% Recovery (actual/theory x 100)	Range is 90 to 110% Recovery	
DO Charge (DO ch):	Acceptable Range is 25 to 75	
DO Gain (should be between -0.7 and 1.5):	Exit Calibration menu and go to Advanced/Cal Constants	

Note: Reference elevation for the Fairfield, AL site is 565 ft.

CONDUCTIVITY [Note: Calibrate before pH to avoid carry-over from pH standards (i.e. pH buffers are conductive)]		
Calibration standard used (mS/cm)		
Temperature (°C)		
Reading before Calibration (mS/cm)	used same lot # as calibration	1.389
Reading AFTER Calibration (mS/cm)		
Conductivity Cell Constant (unitless):		

Note: Be sure conductivity cell is submerged and free of bubbles (gently tap sonde on table)

pH		
pH 7.0 value before calibration:	Same lot as am calibration	6.99
pH 7.0 value after calibration:		
pH 7.0 mV **(range is -50 to +50 mV)**:		
pH 10 value before calibration:	Same lot as am Calibration	9.98
pH 10 value after calibration:		
pH 10 mV **(range is -130 to -230 mV)**:		
pH 4.0 value before calibration:	Same lot as am calibration	3.97
pH 4.0 value after calibration:		
pH 4.0 mV **(range is 130 to 230 mV)**:		

Note: Span between ph 4 and 7, and 7 and 10 should be between 165 to 180 mV

OXIDATION/REDUCTION POTENTIAL (ORP)		
Calibration Temperature (°C):		
Theoretical Calibration standard (mV)	0.231+0.0013(25-T) x 1000 = mV (T is Temperature °C)	
Reading before calibration (mV):	Same lot as am calibration	237.6
Reading after calibration (mV):		

Note: mV theory will change with temperature, so calculate based on your current YSI temp.

TURBIDITY Note: Lens wiper should be parked 180 degrees from the optics.			
0 NTU Turbidity Standard same lot # as am	Before Cal: 0.0	After Cal:	
~~100~~ NTU Turbidity Standard 123 Stand - Same lot # as am	Before Cal: 122.9	After Cal:	
YSI CALIBRATION VERIFICATION SUCCESSFUL?			

Date: 06/06/09
Time: 0900

MNA Field Operations Manual
Olin OU-2
McIntosh, AL
MACTEC Project No. 6107-09-0035

Pine Sonde ID: 5718
Pine Handset ID: 1449
Battery Voltage %: ________

ATTACHMENT 4.1a

YSI CALIBRATION PRIOR TO SAMPLING

DISSOLVED OXYGEN (DO)		VALUE
Was DO membrane changed?	Yes ____ No X Date: ____ Time: ____	
Current Air Temperature °C (meter reading):		20.45
Current Barometric Pressure (from Weather Channel or NOAA.gov, which is corrected to sea level):		29.97
Elevation Corrected Barometric Pressure to enter into YSI DO calibration:	Ex.: 30.02 in. Hg x 25.4 = mm Hg; **subtract** 2.54 mm Hg for every 100 ft. above sea level: 565/100 x 2.54 = 14.4 mm Hg	761.238
Theoretical DO (mg/L) from DO table based on current temperature and elevation corrected pressure:		
DO concentration before Calibration (mg/L):	Depending on meter version, this may not be available.	~~100.1~~ AES 87.1
DO concentration after Calibration (mg/L):		8.78
% Recovery (actual/theory x 100)	Range is 90 to 110% Recovery	
DO Charge (DO ch):	Acceptable Range is 25 to 75	46.1
DO Gain (should be between -0.7 and 1.5):	Exit Calibration menu and go to Advanced/Cal Constants	

Note: Reference elevation for the Fairfield, AL site is 565 ft.

CONDUCTIVITY [Note: Calibrate before pH to avoid carry-over from pH standards (i.e. pH buffers are conductive)]		
Calibration standard used (mS/cm)	Lot # 6735 EXP 12/09/09	1.413
Temperature (°C)		20.47
Reading before Calibration (mS/cm)	1.396 mS/cm^c	~~1.396~~ 1.313
Reading AFTER Calibration (mS/cm)	1.413 mS/cm^c	1.291
Conductivity Cell Constant (unitless):		

Note: Be sure conductivity cell is submerged and free of bubbles (gently tap sonde on table)

pH		
pH **7.0** value before calibration:	Lot # 2815586 EXP 12/10	7.07
pH **7.0** value after calibration:		6.99
pH **7.0** mV **(range is -50 to +50 mV):**		-14.6
pH 10 value before calibration:	Lot # 2808147 EXP 01/10	9.94
pH 10 value after calibration:		10.00
pH 10 mV **(range is -130 to -230 mV):**		-175.0
pH **4.0** value before calibration:	Lot # 6757 EXP 12/15/09	~~4.10~~ AES 4.01
pH **4.0** value after calibration:		4.00
pH **4.0** mV **(range is 130 to 230 mV):**		144.7

Note: Span between ph 4 and 7, and 7 and 10 should be between 165 to 180 mV

OXIDATION/REDUCTION POTENTIAL (ORP)		
Calibration Temperature (°C):	Lot # G2486 EXP 10/2012	20.94
Theoretical Calibration standard (mV)	0.231+0.0013(25-T) x 1000 = mV (T is Temperature °C)	
Reading before calibration (mV):		242.1
Reading after calibration (mV):		240.0

Note: mV theory will change with temperature, so calculate based on your current YSI temp.

TURBIDITY Note: Lens wiper should be parked 180 degrees from the optics.			
0 NTU Turbidity Standard	Lot # 6757 EXP 12/15/09	Before Cal: -0.1	After Cal: 0.0
123 ~~100~~ NTU Turbidity Standard	Lot # 08M894070 EXP 12/09	Before Cal: 126.5	After Cal: 123.0

YSI CALIBRATION SUCCESSFUL?	YES

Date: ~~10/06/09~~ 10/7/09 (AES)
Time: ~~1500~~ ~~1445~~ (AES) 0835

MNA Field Operations Manual
Olin OU-2
McIntosh, AL
MACTEC Project No. 6107-09-0035

Pine Sonde ID: 5118
Pine Handset ID: 11449
Battery Voltage %:

YSI CALIBRATION AFTER SAMPLING

Only the shaded boxes need to be filled in if no recalibration is required.

DISSOLVED OXYGEN (DO) Note: Leave meter in "run" mode to check calibration		VALUE
Was DO membrane changed?	Yes ___ No X Date: ___ Time: ___	
Current Air Temperature °C (meter reading):		
Current Barometric Pressure (from Weather Channel or NOAA.gov, which is corrected to sea level):		
Elevation Corrected Barometric Pressure to enter into YSI DO calibration:	Ex.: 30.02 in. Hg x 25.4 = mm Hg; **subtract** 2.54 mm Hg for every 100 ft. above sea level: 565/100 x 2.54 = 14.4 mm Hg	
Theoretical DO (mg/L) from DO table based on current temperature and elevation corrected pressure:		
DO concentration before Calibration (mg/L):	Depending on meter version, this may not be available.	8.85 (104.0%)
DO concentration after Calibration (mg/L):		
% Recovery (actual/theory x 100)	Range is 90 to 110% Recovery	
DO Charge (DO ch):	Acceptable Range is 25 to 75	
DO Gain (should be between -0.7 and 1.5):	Exit Calibration menu and go to Advanced/Cal Constants	

Note: Reference elevation for the Fairfield, AL site is 565 ft.

CONDUCTIVITY [Note: Calibrate before pH to avoid carry-over from pH standards (i.e. pH buffers are conductive)]		
Calibration standard used (mS/cm)		
Temperature (°C)		
Reading before Calibration (mS/cm)		1.320
Reading AFTER Calibration (mS/cm)		
Conductivity Cell Constant (unitless):		

Note: Be sure conductivity cell is submerged and free of bubbles (gently tap sonde on table)

pH		
pH **7.0** value before calibration:		6.78
pH **7.0** value after calibration:		
pH **7.0** mV **(range is -50 to +50 mV):**		
pH 10 value before calibration:		10.04
pH 10 value after calibration:		
pH 10 mV **(range is -130 to -230 mV):**		
pH **4.0** value before calibration:		4.06
pH **4.0** value after calibration:		
pH **4.0** mV ***(range is 130 to 230 mV):***		

Note: Span between ph 4 and 7, and 7 and 10 should be between 165 to 180 mV

OXIDATION/REDUCTION POTENTIAL (ORP)		
Calibration Temperature (°C):		
Theoretical Calibration standard (mV)	0.231+0.0013(25-T) x 1000 = mV (T is Temperature °C)	
Reading before calibration (mV):		240.3
Reading after calibration (mV):		

Note: mV theory will change with temperature, so calculate based on your current YSI temp.

TURBIDITY Note: Lens wiper should be parked 180 degrees from the optics.			
0 NTU Turbidity Standard 6757 EXP 12/15/09	Before Cal: 0.1	After Cal:	
100 NTU Turbidity Standard	Before Cal: 121.0	After Cal:	
YSI CALIBRATION VERIFICATION SUCCESSFUL?			

Date: 06/17/09
Time: 0835

MNA Field Operations Manual
Olin OU-2
McIntosh, AL
MACTEC Project No. 6107-09-0035

Pine Sonde ID: 5718
Pine Handset ID: 11449
Battery Voltage %:

ATTACHMENT 4.1a

YSI CALIBRATION PRIOR TO SAMPLING

DISSOLVED OXYGEN (DO)		VALUE
Was DO membrane changed?	Yes ___ No X Date: ___ Time: ___	
Current Air Temperature °C (meter reading):		21.44
Current Barometric Pressure (from Weather Channel or NOAA.gov, which is corrected to sea level):		30.00
Elevation Corrected Barometric Pressure to enter into YSI DO calibration:	Ex.: 30.02 in. Hg x 25.4 = mm Hg; **subtract** 2.54 mm Hg for every 100 ft. above sea level: 565/100 x 2.54 = 14.4 mm Hg	~~762~~ 762.00 KES
Theoretical DO (mg/L) from DO table based on current temperature and elevation corrected pressure:		
DO concentration before Calibration (mg/L):	Depending on meter version, this may not be available. 104.0%	~~104.0~~ 8.85
DO concentration after Calibration (mg/L):	100.3%	8.54
% Recovery (actual/theory x 100)	Range is 90 to 110% Recovery	~~44.1~~ KES
DO Charge (DO ch):	Acceptable Range is 25 to 75	44.1
DO Gain (should be between -0.7 and 1.5):	Exit Calibration menu and go to Advanced/Cal Constants	

Note: Reference elevation for the Fairfield, AL site is 565 ft.

CONDUCTIVITY [Note: Calibrate before pH to avoid carry-over from pH standards (i.e. pH buffers are conductive)]		
Calibration standard used (mS/cm)	Lot # 6735 Exp 12/9/09	1.413
Temperature (°C)		
Reading before Calibration (mS/cm)	1.415 (mS/cm^c)	1.320
Reading AFTER Calibration (mS/cm)	1.413 (mS/cm^c)	1.318
Conductivity Cell Constant (unitless):		

Note: Be sure conductivity cell is submerged and free of bubbles (gently tap sonde on table)

pH		
pH 7.0 value before calibration:	Lot# 281586 Exp 12/2010	6.78
pH 7.0 value after calibration:		7.00
pH 7.0 mV **(range is -50 to +50 mV):**		-2.9
pH 10 value before calibration:	Lot# 2808147 01/2010	10.04
pH 10 value after calibration:		10.00
pH 10 mV **(range is -130 to -230 mV):**		-163.9
pH **4.0** value before calibration:		4.06
pH **4.0** value after calibration:		4.01
pH **4.0** mV **(range is 130 to 230 mV):**		155.0

Note: Span between ph 4 and 7, and 7 and 10 should be between 165 to 180 mV

OXIDATION/REDUCTION POTENTIAL (ORP)		
Calibration Temperature (°C):		21.18
Theoretical Calibration standard (mV)	0.231+0.0013(25-T) x 1000 = mV (T is Temperature °C)	
Reading before calibration (mV):		240.3
Reading after calibration (mV):		240.0

Note: mV theory will change with temperature, so calculate based on your current YSI temp.

TURBIDITY Note: Lens wiper should be parked 180 degrees from the optics.				
0 NTU Turbidity Standard	6757 Exp. 12/15/09	Before Cal: -0.1	After Cal:	0.0
100 NTU Turbidity Standard	~~100 136~~ KES 08M894070 Exp 12/09	Before Cal: 124.0	After Cal:	123.0

YSI CALIBRATION SUCCESSFUL?	YES

Date: ~~1530~~ 6/7/09
Time: 1530

MNA Field Operations Manual
Olin OU-2
McIntosh, AL
MACTEC Project No. 6107-09-0035

Pine Sonde ID: 5118
Pine Handset ID: 1449
Battery Voltage %:

YSI CALIBRATION AFTER SAMPLING

Only the shaded boxes need to be filled in if no recalibration is required.

DISSOLVED OXYGEN (DO) Note: Leave meter in "run" mode to check calibration		VALUE
Was DO membrane changed?	Yes ____ No X Date: ____ Time: ____	
Current Air Temperature °C (meter reading):		
Current Barometric Pressure (from Weather Channel or NOAA.gov, which is corrected to sea level):		
Elevation Corrected Barometric Pressure to enter into YSI DO calibration:	Ex.: 30.02 in. Hg x 25.4 = mm Hg; **subtract** 2.54 mm Hg for every 100 ft. above sea level: 565/100 x 2.54 = 14.4 mm Hg	
Theoretical DO (mg/L) from DO table based on current temperature and elevation corrected pressure:		
DO concentration before Calibration (mg/L):	Depending on meter version, this may not be available.	7.25 (93%)
DO concentration after Calibration (mg/L):		
% Recovery (actual/theory x 100)	Range is 90 to 110% Recovery	
DO Charge (DO ch):	Acceptable Range is 25 to 75	
DO Gain (should be between -0.7 and 1.5):	Exit Calibration menu and go to Advanced/Cal Constants	

Note: Reference elevation for the Fairfield, AL site is 565 ft.

CONDUCTIVITY [Note: Calibrate before pH to avoid carry-over from pH standards (i.e. pH buffers are conductive)]		
Calibration standard used (mS/cm)		
Temperature (°C)		
Reading before Calibration (mS/cm)	Lot # ~~08M894070~~ 6735 12/2009	1.540 (1.398 mS/cm)
Reading AFTER Calibration (mS/cm)		
Conductivity Cell Constant (unitless):		

Note: Be sure conductivity cell is submerged and free of bubbles (gently tap sonde on table)

pH		
pH **7.0** value before calibration:		7.03
pH **7.0** value after calibration:		
pH **7.0** mV **(range is -50 to +50 mV)**:		
pH 10 value before calibration:		~~4.03~~ (AES) 9.95
pH 10 value after calibration:		
pH 10 mV **(range is -130 to -230 mV)**:		
pH **4.0** value before calibration:		4.03
pH **4.0** value after calibration:		
pH **4.0** mV **(range is 130 to 230 mV)**:		

Note: Span between ph 4 and 7, and 7 and 10 should be between 165 to 180 mV

OXIDATION/REDUCTION POTENTIAL (ORP)		
Calibration Temperature (°C):		
Theoretical Calibration standard (mV)	0.231+0.0013(25-T) x 1000 = mV (T is Temperature °C)	
Reading before calibration (mV):		234.6
Reading after calibration (mV):		

Note: mV theory will change with temperature, so calculate based on your current YSI temp.

TURBIDITY Note: Lens wiper should be parked 180 degrees from the optics.			
0 NTU Turbidity Standard	Before Cal:	After Cal:	
100 NTU Turbidity Standard Lot # 08M894070 12/2009	Before Cal:	After Cal:	
YSI CALIBRATION VERIFICATION SUCCESSFUL?			

Date: 06/08/09
Time: 0751

MNA Field Operations Manual
Olin OU-2
McIntosh, AL
MACTEC Project No. 6107-09-0035

Pine Sonde ID: 5118
Pine Handset ID: 11449
Battery Voltage %:

ATTACHMENT 4.1a

YSI CALIBRATION PRIOR TO SAMPLING

DISSOLVED OXYGEN (DO)		VALUE
Was DO membrane changed?	Yes ___ No X Date: ___ Time: ___	
Current Air Temperature °C (meter reading):		19.0
Current Barometric Pressure (from Weather Channel or NOAA.gov, which is corrected to sea level):		29.98
Elevation Corrected Barometric Pressure to enter into YSI DO calibration:	Ex.: 30.02 in. Hg x 25.4 = mm Hg; **subtract** 2.54 mm Hg for every 100 ft. above sea level: 565/100 x 2.54 = 14.4 mm Hg	761.492
Theoretical DO (mg/L) from DO table based on current temperature and elevation corrected pressure:		~~761.492~~
DO concentration before Calibration (mg/L):	Depending on meter version, this may not be available.	8.05
DO concentration after Calibration (mg/L):	100.3%	8.82
% Recovery (actual/theory x 100)	Range is 90 to 110% Recovery	
DO Charge (DO ch):	Acceptable Range is 25 to 75	45.1
DO Gain (should be between -0.7 and 1.5):	Exit Calibration menu and go to Advanced/Cal Constants	

Note: Reference elevation for the Fairfield, AL site is 565 ft.

CONDUCTIVITY [Note: Calibrate before pH to avoid carry-over from pH standards (i.e. pH buffers are conductive)]		
Calibration standard used (mS/cm)	Lot # 6735 EXP 12/9/09	1.413
Temperature (°C)		21.88
Reading before Calibration (mS/cm)	1.328 (mS/cmC)	1.250
Reading AFTER Calibration (mS/cm)	1.413 (mS/cmC)	1.329
Conductivity Cell Constant (unitless):		

Note: Be sure conductivity cell is submerged and free of bubbles (gently tap sonde on table)

pH		
pH **7.0** value before calibration:	Lot # 281586 Exp ~~281586~~ 12/10	7.19
pH **7.0** value after calibration:		7.00
pH **7.0** mV **(range is -50 to +50 mV)**:		-14.0
pH 10 value before calibration:	Lot # 2808147 EXP 01/10	3.95
pH 10 value after calibration:		4.00
pH 10 mV **(range is -130 to -230 mV)**:		148.3
pH **4.0** value before calibration:	Lot # 6752 12/15/09 Exp	10.05
pH **4.0** value after calibration:		10.00
pH **4.0** mV **(range is 130 to 230 mV)**:		-178.16

Note: Span between ph 4 and 7, and 7 and 10 should be between 165 to 180 mV

OXIDATION/REDUCTION POTENTIAL (ORP)		
Calibration Temperature (°C):	Lot # 624860 EXP 10/12	22.17
Theoretical Calibration standard (mV)	0.231+0.0013(25-T) x 1000 = mV (T is Temperature °C)	
Reading before calibration (mV):		231.2
Reading after calibration (mV):		240.2

Note: mV theory will change with temperature, so calculate based on your current YSI temp.

TURBIDITY Note: Lens wiper should be parked 180 degrees from the optics.		
0 NTU Turbidity Standard	Before Cal: ~~44~~ 0.1	After Cal: 0.0
123 ~~100~~ NTU Turbidity Standard Lot # 08M894070	Before Cal: 117.4	After Cal: ~~117.4~~ 123.0

YSI CALIBRATION SUCCESSFUL?	YES

Date: 6/8/09
Time: 1200

MNA Field Operations Manual
Olin OU-2
McIntosh, AL
MACTEC Project No. 6107-09-0035

Pine Sonde ID: 5718
Pine Handset ID: 11449
Battery Voltage %:

YSI CALIBRATION AFTER SAMPLING

Only the shaded boxes need to be filled in if no recalibration is required.

DISSOLVED OXYGEN (DO) Note: Leave meter in "run" mode to check calibration		**VALUE**
Was DO membrane changed?	Yes ____ No X Date: ____ Time: ____	
Current Air Temperature °C (meter reading):		
Current Barometric Pressure (from Weather Channel or NOAA.gov, which is corrected to sea level):		
Elevation Corrected Barometric Pressure to enter into YSI DO calibration:	Ex.: 30.02 in. Hg x 25.4 = mm Hg; **subtract** 2.54 mm Hg for every 100 ft. above sea level: 565/100 x 2.54 = 14.4 mm Hg	
Theoretical DO (mg/L) from DO table based on current temperature and elevation corrected pressure:		
DO concentration before Calibration (mg/L):	Depending on meter version, this may not be available.	7.79
DO concentration after Calibration (mg/L):		
% Recovery (actual/theory x 100)	Range is 90 to 110% Recovery	
DO Charge (DO ch):	Acceptable Range is 25 to 75	
DO Gain (should be between -0.7 and 1.5):	Exit Calibration menu and go to Advanced/Cal Constants	

101%

Note: Reference elevation for the Fairfield, AL site is 565 ft.

CONDUCTIVITY [**Note:** Calibrate before pH to avoid carry-over from pH standards (i.e. pH buffers are conductive)]		
Calibration standard used (mS/cm)		
Temperature (°C)		
Reading before Calibration (mS/cm)		1.442
Reading AFTER Calibration (mS/cm)		
Conductivity Cell Constant (unitless):		

Note: Be sure conductivity cell is submerged and free of bubbles (gently tap sonde on table)

pH		
pH **7.0** value before calibration:		6.94
pH **7.0** value after calibration:		
pH **7.0** mV **(range is -50 to +50 mV)**:		
pH 10 value before calibration:		9.59
pH 10 value after calibration:		
pH 10 mV **(range is -130 to -230 mV)**:		
pH **4.0** value before calibration:		3.96
pH **4.0** value after calibration:		
pH **4.0** mV **(range is 130 to 230 mV)**:		

Note: Span between ph 4 and 7, and 7 and 10 should be between 165 to 180 mV

OXIDATION/REDUCTION POTENTIAL (ORP)		
Calibration Temperature (°C):		
Theoretical Calibration standard (mV)	0.231+0.0013(25-T) x 1000 = mV (T is Temperature °C)	
Reading before calibration (mV):		238.5
Reading after calibration (mV):		

Note: mV theory will change with temperature, so calculate based on your current YSI temp.

TURBIDITY Note: Lens wiper should be parked 180 degrees from the optics.			
0 NTU Turbidity Standard	Before Cal:	After Cal:	
100 NTU Turbidity Standard	Before Cal:	After Cal:	
YSI CALIBRATION VERIFICATION SUCCESSFUL?			

Date: 6/9/09
Time: 0757

MNA Field Operations Manual
Olin OU-2
McIntosh, AL
MACTEC Project No. 6107-09-0035

Pine Sonde ID: 5718
Pine Handset ID: 11449
Battery Voltage %:

ATTACHMENT 4.1a

YSI CALIBRATION PRIOR TO SAMPLING

DISSOLVED OXYGEN (DO)		VALUE	
Was DO membrane changed?	Yes ___ No X Date: ___ Time: ___		
Current Air Temperature °C (meter reading):		23.08	
Current Barometric Pressure (from Weather Channel or NOAA.gov, which is corrected to sea level):		~~29.98~~ 30.03 (RES)	
Elevation Corrected Barometric Pressure to enter into YSI DO calibration:	Ex.: 30.02 in. Hg x 25.4 = mm Hg; **subtract** 2.54 mm Hg for every 100 ft. above sea level: 565/100 x 2.54 = 14.4 mm Hg	762.762	
Theoretical DO (mg/L) from DO table based on current temperature and elevation corrected pressure:			
DO concentration before Calibration (mg/L):	Depending on meter version, this may not be available.	11.51	134 ie %
DO concentration after Calibration (mg/L):		8.57	
% Recovery (actual/theory x 100)	Range is 90 to 110% Recovery		
DO Charge (DO ch):	Acceptable Range is 25 to 75	40.0	
DO Gain (should be between -0.7 and 1.5):	Exit Calibration menu and go to Advanced/Cal Constants		

Note: Reference elevation for the Fairfield, AL site is 565 ft.

CONDUCTIVITY [Note: Calibrate before pH to avoid carry-over from pH standards (i.e. pH buffers are conductive)]		
Calibration standard used (mS/cm)	Lot # 6735 EXP 12/09/09	1.413
Temperature (°C)		23.10
Reading before Calibration (mS/cm)	1.405 (mS/cmc)	1.354
Reading AFTER Calibration (mS/cm)	1.427 (mS/cmc)	1.378
Conductivity Cell Constant (unitless):		

Note: Be sure conductivity cell is submerged and free of bubbles (gently tap sonde on table)

pH			
pH **7.0** value before calibration:	Lot # 2815816 EXP 12/2010	~~7.01~~ (RES) 6.99	
pH **7.0** value after calibration:		7.00	
pH **7.0** mV **(range is -50 to +50 mV):**		-14.1	
pH 10 value before calibration:	Lot # 2808147 Exp 01/2010	9.93	
pH 10 value after calibration:		10.00	
pH 10 mV **(range is -130 to -230 mV):**		-174.8	
pH **4.0** value before calibration:	Lot # 6757 Exp 12/15/2009	4.01	
pH **4.0** value after calibration:		4.00	
pH **4.0** mV **(range is 130 to 230 mV):**		146.4	

Note: Span between ph 4 and 7, and 7 and 10 should be between 165 to 180 mV

OXIDATION/REDUCTION POTENTIAL (ORP)		
Calibration Temperature (°C):	LOT # 62486 EXP 10/2012	23.36
Theoretical Calibration standard (mV)	0.231+0.0013(25-T) x 1000 = mV (T is Temperature °C)	
Reading before calibration (mV):		241.3
Reading after calibration (mV):		240.3

Note: mV theory will change with temperature, so calculate based on your current YSI temp.

TURBIDITY Note: Lens wiper should be parked 180 degrees from the optics.

0 NTU Turbidity Standard	Lot # 6757 Exp 12/15/09	Before Cal: 0.7	After Cal: 0.0
100 NTU Turbidity Standard	Lot # 08m 894070 Exp 12/09	Before Cal: ~~110.1~~ 119.1	After Cal: 124.2

YSI CALIBRATION SUCCESSFUL?	YES

Date: 6-9-09
Time: 1220

MNA Field Operations Manual
Olin OU-2
McIntosh, AL
MACTEC Project No. 6300-03-0035

Pine Sonde ID:
Pine Handset ID:
Battery Voltage %:

ATTACHMENT 4.1a
YSI CALIBRATION AFTER SAMPLING
Only the shaded boxes need to be filled in if no recalibration is required.

DISSOLVED OXYGEN (DO) Note: Leave meter in "run" mode to check calibration		**VALUE**
Was DO membrane changed?	Yes ✓ No ___ Date: 6-9-09 Time: 1200	
Current Air Temperature °C (meter reading):		
Current Barometric Pressure (from Weather Channel or NOAA.gov, which is corrected to sea level):		
Elevation Corrected Barometric Pressure to enter into YSI DO calibration:	Ex.: 30.02 in. Hg x 25.4 = mm Hg; **subtract** 2.54 mm Hg for every 100 ft. above sea level: 565/100 x 2.54 = 14.4 mm Hg	
Theoretical DO (mg/L) from DO table based on current temperature and elevation corrected pressure:		
DO concentration before Calibration (mg/L):	Depending on meter version, this may not be available.	
DO concentration after Calibration (mg/L):		4.32
% Recovery (actual/theory x 100)	Range is 90 to 110% Recovery	
DO Charge (DO ch):	Acceptable Range is 25 to 75	
DO Gain (should be between -0.7 and 1.5):	Exit Calibration menu and go to Advanced/Cal Constants	

Note: Reference elevation for the Fairfield, AL site is 565 ft.

CONDUCTIVITY [**Note:** Calibrate before pH to avoid carry-over from pH standards (i.e. pH buffers are conductive)]		
Calibration standard used (mS/cm)		
Temperature (°C)		
Reading before Calibration (mS/cm)		
Reading AFTER Calibration (mS/cm)		2.510
Conductivity Cell Constant (unitless):		

Note: Be sure conductivity cell is submerged and free of bubbles (gently tap sonde on table)

pH		
pH **7.0** value before calibration:		
pH **7.0** value after calibration:		6.85
pH **7.0** mV **(range is -50 to +50 mV)**:		
pH 10 value before calibration:		
pH 10 value after calibration:		9.68
pH 10 mV **(range is -130 to -230 mV)**:		
pH **4.0** value before calibration:		
pH **4.0** value after calibration:		3.93
pH **4.0** mV **(range is 130 to 230 mV)**:		

Note: Span between ph 4 and 7, and 7 and 10 should be between 165 to 180 mV

OXIDATION/REDUCTION POTENTIAL (ORP)		
Calibration Temperature (°C):		
Theoretical Calibration standard (mV)	0.231+0.0013(25-T) x 1000 = mV (T is Temperature °C)	
Reading before calibration (mV):		
Reading after calibration (mV):		228.3

Note: mV theory will change with temperature, so calculate based on your current YSI temp.

TURBIDITY **Note: Lens wiper should be parked 180 degrees from the optics.**			
0 NTU Turbidity Standard	Before Cal:	After Cal:	
100 NTU Turbidity Standard	Before Cal:	After Cal:	160.3
YSI CALIBRATION VERIFICATION SUCCESSFUL?			

FIELD SAMPLING REPORT

PROJECT NO: 6100080036

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW1A DEPTH TO PRODUCT: NA DATE: 9/30/08

SAMPLE METHOD: peristaltic pump TIME: 0906

DUP./REP. OF: ______ DEPTH TO WATER: 27.88 GRAB (✓) COMPOSITE ( )

TOTAL DEPTH: 30.88 3.00

PURGE VOLUME: 0.12 x 3 = 0.36 gal.

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]
1" = 0.04 gal/ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial: 0922		4.96	21.19	0.122	220.0	—	1.93	25. (pw)	30.48
0932	0.25	4.98	21.48	0.127	207.7	out of range	1.79		
0944	0.3	5.02	21.93	0.132	194.2	—	1.97	empty chamber	
1008	0.35	5.08	22.70	0.141	174.5	228	3.10	20	30.48
1014	Turned pump off to let well recharge								
1045	- decision from Mgmt (C. Draper + K Roberts) not to sample because well yield was too low to meet quality purging + sampling standards.								

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: very slow recharge ~~rate~~ pump is 0.4ft from bottom of well
* Due to poor recharge + 3ft initial water column
YSI: 12644 Lamotte 2020: 04168

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
2-500mL	glass	None	1631	LL Hg (total + dissolved)

GENERAL INFORMATION

WEATHER: Sunny, clear ~70°

SHIPPED VIA: FedEx

SHIPPED TO: Battelle

SAMPLER: D Howard, M Rottenberg OBSERVER: ~~M Rottenberg~~ EBlomberg

FIELD SAMPLING REPORT

PROJECT NO: 6100080086

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW1B DEPTH TO PRODUCT: NA DATE: 9/29/08

SAMPLE METHOD: peristaltic pump TIME: 1539

DUP./REP. OF: ______ DEPTH TO WATER: 28.76 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 47.34 18.58

PURGE VOLUME: 0.74 x 3 = 2.2 gal

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]
1" = 0.04 gal/ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)c	ORP (mV)	TURB. (NTU)	DO (mg/L)	ml/min Pump Rate ml/min. (& pump setting)	ft New Water Level
Initial: 1545		4.56	22.17	0.271	155.7	40	2.01	250 (ml)	28.90
1555	0.75	4.28	21.03	0.287	178.0	4.9	1.70	250	28.89
1605	1.5	4.30	20.97	0.295	178.6	2.6	1.58	210	28.88
1615	2.08	4.32	20.88	0.300	180.0	1.1	1.61	210	28.88
1625	2.5	4.34	20.85	0.302	178.5	1.1	1.58	220	28.89

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: Sample time 1632

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
2-500mL		—	1631	LL Hg

GENERAL INFORMATION

WEATHER: partly cloudy upper 80's

SHIPPED VIA: FedEx

SHIPPED TO: Battelle

SAMPLER: MRottenberg OBSERVER: D. Howard, EBlomberg, AKennedy

FIELD SAMPLING REPORT

PROJECT NO: 6100080036

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW1C DEPTH TO PRODUCT: NA DATE: 9/30/08

SAMPLE METHOD: peristaltic pump TIME: 0919

DUP./REP. OF: ______ DEPTH TO WATER: 28.11 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 67.36 39.25

PURGE VOLUME: 1.57 x 3 = 4.71 gal

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]
1" = 0.04 gal / ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial: 0927		4.48	20.52	3.603	242.6	18	1.25	220 ml	[illegible]
0937	0.5	4.56	20.28	3.805	223.7	2.9	0.95	220	28.25
0950	1.5	4.51	20.30	3.886	211.0	0.56	1.02	220	28.25
1000	2.25	4.54	20.43	3.909	199.8	1.5	0.88	210	28.25
1010	3.00	4.68	20.48	3.920	190.0	1.3	0.88	200	28.25
1020	3.5	4.70	20.61	3.928	166.8	1.4	1.05	200	28.25
1030	4.0	4.65	20.54	3.931	169.2	1.6	0.92	200	28.26
1040	4.5	4.93	20.76	3.934	143.9	1.1	0.88	200	28.25
1050	5.0	4.61	20.80	3.937	151.9	1.0	0.85	200	28.26
1055	5.25	4.61	20.82	3.937	153.2	1.1	0.85	200	28.27
1100	5.50	4.64	20.92	3.937	151.1	1.3	0.86	200	28.26

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: Sample time 1115

YSI ID: 12642 Lamotte ID: 03166

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
2 - 500ml	glass	—	1631	LL Hg (total + dissolved)

GENERAL INFORMATION

WEATHER: sunny, clear mid - 60's

SHIPPED VIA: FedEx

SHIPPED TO: Battelle

SAMPLER: D Howard OBSERVER: E Blomberg

M Rotterberg

FIELD SAMPLING REPORT

PROJECT NO: ______________

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW2B DEPTH TO PRODUCT: NA DATE: 9/22/08

SAMPLE METHOD: Peristaltic TIME: 1020

DUP./REP. OF: ______ DEPTH TO WATER: ~~14.6~~ 11.3 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 25.92 = 14.62

PURGE VOLUME: 0.6 x 3 = 1.8

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]

1 inch ~~1ft~~ pipe 0.04 gallons for 1" well

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial: 1028		6.37	24.40	4.261	-117.5	24.1	1.14	200 ( )	
1038	0.75	6.35	23.28	5.142	-120.0	8.56	~~10~~ 0.87	150	12.62
1047	1.5	6.33	23.38	5.313	-117.1	5.27	0.82	180	12.75
1055	2.0	6.34	23.56	5.109	-117.4	5.52	0.88	150	12.60
1103	2.25	6.34	23.23	5.244	-120.4	6.28	0.98	150	12.63
1109	2.50	6.34	23.44	5.221	-114.1	8.28	0.96	150	12.54
1117	2.75	6.35	24.08	5.177	-113.0	4.53	0.76	150	12.64
1126	3.00	6.33	24.21	5.202	-107.0	5.64	~~1.24~~ 0.84	150	12.50
1135	3.25	6.33	24.00	5.242	-109.2	7.83	~~8.90~~ 0.84	150	12.64
1144	3.50	6.33	23.21	5.188	-110.0	5.15	0.90	150	12.60

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: YSI ID: 12644 Water level meter 145781
LaMotte 2020 ID: 01468
Sample time 1210

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
500ml glass	2	None	1631	LL Hg (total + dissolved)
1L Amber	2	none	8081, 8270	DDTr, HCB

GENERAL INFORMATION	
WEATHER:	Clear + Sunny
SHIPPED VIA:	Fed Ex
SHIPPED TO:	
SAMPLER: D Howard	OBSERVER: M Rottenberg, A Kennedy (Olin), L. George (EPA)

FIELD SAMPLING REPORT

PROJECT NO: ____________

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW2C DEPTH TO PRODUCT: NA DATE: 9/23/08

SAMPLE METHOD: Peristaltic Pump TIME: 1445

DUP./REP. OF: ____ DEPTH TO WATER: 10.45 = GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 46.64 = 36.19

PURGE VOLUME: 1.45 gal x 3 = ~~3.35~~ 0.4 4.35 gal

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]

1 inch pipe 0.04 gal per 1 Ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial: 1453		4.74	23.92	2.996	178.4	13.2	0.75	240 ( )	
1503	0.5	4.47	23.98	3.174	206.1	3.11	0.76	200	10.80
1513	1.0	4.48	23.62	3.197	206.8	1.46	0.79	200	10.85
1523	1.5	4.51	23.48	3.190	209.5	0.77	0.99	200	10.84
1533	2.0	4.49	23.76	3.181	202.6	0.81	0.87	200	10.85
1543	2.5	4.49	23.18	3.158	201.6	0.73	0.79	200	10.85
1553	3.0	4.48	23.88	3.131	207.0	0.50	0.76	200	10.80
1603	3.5	4.52	23.70	3.111	216.7	0.65	1.03	200	10.80
1613	4.0	4.51	22.82	3.088	214.6	0.69	0.89	200	10.88
1623	4.5	4.50	23.24	3.050	220.5	0.39	0.83	200	10.80
1628	4.75	4.49	22.94	3.046	223.3	0.67	0.81	200	10.80

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: YSI ID: 12644 Water level meter ID: 49882
LaMotte 2020 ID: 01468
Sample time 1700. Duplicate sample collected

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
1L Amber		none	8081	DDTr
1L Amber		none	8270	HCB
2-500ml glass		none	1631	LL Hg total & dissolved

GENERAL INFORMATION	
WEATHER:	clear + sunny
SHIPPED VIA:	Fed Ex
SHIPPED TO:	
SAMPLER: D Howard	OBSERVER:

FIELD SAMPLING REPORT

PROJECT NO: 6100080036/2008.6W

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW3B DEPTH TO PRODUCT: ________ DATE: 9/24/08 + 9/25/08

SAMPLE METHOD: Peristaltic Pump TIME: 0930

DUP./REP. OF: ________ DEPTH TO WATER: 11.21 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 25.94 = 14.73

PURGE VOLUME: 0.6 gal x 3 = 1.8 gal

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]
1 inch pipe = 0.04 gal per 1 ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND.c (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial: 0936		6.58	23.53	2.093	-120.0	28.2	0.98	200 ( )	
0947	0.5	6.60	23.54	2.171	-121.4	2.97	0.98	200	16.39
0957	1.0	6.69	23.43	2.145	-111.8	1.68	1.12	200	16.48
1007	1.5	6.70	23.83	2.047	-114.2	1.75	0.98	200	16.56
1017	2.0	6.69	23.64	2.074	-118.1	—	0.88	—	20.98
1028	2.25	6.69	24.70	2.121	-115.0	33.5	1.06	—	22.8
1228	2.50	6.56	24.35	1.927	-107.1	23.9	1.13	140	22.0
Crew to allow well to recharge over night + commence 9/25/08									
0915 9/25/08	Initial water level →								13.17
0933	0.25	6.53	22.27	1.850	-128.4	15.9	1.02	150.00	15.70
0943	~~0.5~~ 0.5	6.55	22.67	1.877	-113.3	~~10.52~~	0.74	150.0	16.52
0953	0.75	6.56	22.84	1.845	-97.0	~~10.41~~ 4.58	0.75	150.0	18.55
1004	1.0	6.55	22.90	1.959	-89.9	6.71	0.75	150.0	21.36
1012	ceased purging - crew to allow well to recharge →								22.25
1245	water level check →								17.4

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: YSI ID: 12644 Water meter ID: 49882
Lamotte 2020: 04168
Stopped pump at 1028 due to low water level
1215 restarted purging water level 17.8
1230 stopped pump due to low water level
9/25/08 restart purge (1.5 gal) then sample per Mgmt team.

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
~~1 L glass Amber~~		~~NONE~~	~~8081A~~	~~DDTs (2,4' + 4,4' DDD, DDE, DDT)~~ MR
1 L glass Amber		NONE	~~8081A~~	HCB Method 8270
500 mL glass		NONE	1631	LL Hg total
500 mL glass		NONE	1631	LL Hg dissolved - not field filtered

GENERAL INFORMATION	
WEATHER:	clear + sunny temp ~75°F
SHIPPED VIA:	Fed Ex
SHIPPED TO:	Battelle + Pace
SAMPLER:	D Howard — OBSERVER: M Rottenberg

FIELD SAMPLING REPORT

PROJECT NO: 6200080036 / 2008.GW

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW 3B   DEPTH TO PRODUCT: N/A   DATE: 9/25/08

SAMPLE METHOD: Peristaltic Pump   TIME: 1625

DUP./REP. OF: ______   DEPTH TO WATER: 11.21   GRAB ( ) COMPOSITE ( )

TOTAL DEPTH: 25.94 = 14.73

PURGE VOLUME: 0.6 gal x 3 = 1.8 gal

~~[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]~~
1 inch pipe = 0.04 gal / ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial:								( )	
1330 water level check →									16.8
1615 water level check →									16.4
crew sample & read turbidity									
1627						13.1			
1629						9.98			
1648 end of sampling						19.9			23.47

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: Sample time 1630

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
		See p.1		

GENERAL INFORMATION

WEATHER:
SHIPPED VIA: See p.1
SHIPPED TO:
SAMPLER: OBSERVER:

FIELD SAMPLING REPORT

PROJECT NO: 6100080036/2008.GW

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW3C DEPTH TO PRODUCT: ________ DATE: 9/24/08

SAMPLE METHOD: Peristaltic Pump TIME: 0935

DUP./REP. OF: ________ DEPTH TO WATER: 11.33 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 44.37 = 33.04

PURGE VOLUME: 1.32 gal x 3 = 4 gal

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]

1inch pipe=0.04 gal per 1Ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial: 0940		6.84	21.87	1.927	-142.2	41.6	0.65	250 ( )	
0950	0.5	6.81	21.80	2.174	-131.9	5.70	0.40	280	12.02
1000	1.25	6.77	21.61	2.219	-139.8	3.74	0.36	260	12.01
1010	2.25	6.82	21.78	2.212	-156.6	3.59	0.51	260	12.00
1020	3.0	6.81	21.86	2.218	-140.2	7.57	0.41	280	~~12.00~~ 11.99
1033	4.0	6.79	21.87	2.221	-134.2	5.47	0.37	260	11.99
1040	4.25	6.80	21.81	2.222	-144.2	1.30	0.37	280	11.99
1045	4.5	6.81	21.74	2.224	-142.0	1.15	0.36	260	11.98
1050	4.75	6.80	21.83	2.219	-136.0	1.40	0.42	260	11.98
1055	5.0	6.80	21.86	2.217	-139.0	1.74	0.40	260	11.97
1100	5.25	6.80	21.91	2.218	-145.4	1.35	0.38	260	11.96

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: YSI ID: 12642 Water meter ID: 45781
Lamotte 2020 I: 05678
Sample time 1125

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
500ml glass	2	none	1631	LL Hg (total + dissolved)
1L Amber	1	none	8081	DDTr
1L Amber	1	none	8270	HCB

GENERAL INFORMATION

WEATHER:	clear & sunny ~75°F
SHIPPED VIA:	FedEx
SHIPPED TO:	
SAMPLER: D Howard	OBSERVER: M Rottenberg

FIELD SAMPLING REPORT

PROJECT NO: 6100080036/2008.GW

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW4B DEPTH TO PRODUCT: NA DATE: 9/25/08

SAMPLE METHOD: peristaltic pump TIME: 1053

DUP./REP. OF: DEPTH TO WATER: 11.56 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 28.68 17.12

PURGE VOLUME: 0.68 x 3 = 2.0

~~[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]~~

1 inch well = 0.04 gal / foot

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm^c)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial: 1058		6.61	22.97	1.331	-133.9	20.6	0.76	220 ( )	12.25
1108	0.5	6.64	22.69	1.307	-140.3	18.9	0.31	240	12.24
1118	1.0	6.64	22.61	1.286	-152.7	9.38	0.34	240	12.23
1133	1.5	6.67	22.69	1.255	-127.3	4.14	0.54	220	12.21
1143	2.0	6.66	22.69	1.253	-151.1	8.31	0.48	240	12.20
1148	2.25	6.66	22.65	1.249	-146.1	7.99	0.46	240	12.19
1158	3.0	6.67	22.68	1.232	-130.6	7.80	0.53	240	12.17
1204	3.25	6.65	22.67	1.230	-130.8	5.50	0.51	240	12.16
1209	3.50	6.64	22.56	1.230	-133.2	4.24	0.48	240	12.16

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: Sample time 1215

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
1 L glass Amber		None	8270	HCB
1 L Glass Amber		None	8081	DDTr
500 ml glass		none	1631	LL Hg (total)
500 ml glass		none	1631	LL Hg (dissolved)

GENERAL INFORMATION

WEATHER: Clear sunny ~73°F

SHIPPED VIA: FedEx

SHIPPED TO:

SAMPLER: MBR/DLH OBSERVER:

FIELD SAMPLING REPORT

PROJECT NO: ____________

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW4C DEPTH TO PRODUCT: NA DATE: 9/24/08

SAMPLE METHOD: Peristaltic Pump TIME: 1340

DUP./REP. OF: ____ DEPTH TO WATER: 11.43 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: ~~43.16~~ 42.40 = 30.97

PURGE VOLUME: 1.24 gal x 3 = 3.72 gal

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]

1" pipe = 0.04 gal per 1 ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial: 1346		6.62	23.99	1.258	-136.3	9.85	0.66	230 (ml)	
1356	0.5	6.60	23.65	1.222	-136.6	4.30	0.25	230	11.86
1406	1.0	6.51	23.72	1.217	-130.3	3.24	0.27	250	11.85
1416	1.5	6.60	23.69	1.203	-125.8	2.99	0.39	250	11.86
1426	2.0	6.51	23.66	1.212	-128.1	3.17	0.37	250	11.85
1436	2.5	6.54	23.51	1.208	-119.3	3.27	0.35	230	11.85
1446	3.0	6.55	23.45	1.207	-115.0	3.27	0.50	250	11.85
1456	3.5	6.50	23.68	1.222	-118.4	3.34	0.39	250	11.84
1502	3.75	6.51	23.39	1.224	-115.9	4.05	0.37	250	11.84
1507	4.0	6.55	23.62	1.212	-110.3	3.54	0.38	230	11.83

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: collected MS/MSD
Sample time 1600

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
500 mL glass	4	none	1631	LL Hg (total + dissolved)
1L Amber	2	none	8081	DDTr
1L Amber	2	none	8270	HCB

GENERAL INFORMATION	
WEATHER:	Sunny temp ~ 85°F
SHIPPED VIA:	Fed Ex
SHIPPED TO:	
SAMPLER: D Howard	OBSERVER:

FIELD SAMPLING REPORT

PROJECT NO: ______________________

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW5B   DEPTH TO PRODUCT: NA   DATE: 9/25/08

SAMPLE METHOD: Peristaltic Pump   TIME: 1424

DUP./REP. OF: ______   DEPTH TO WATER: 11.71   GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 27.28 = 15.57

PURGE VOLUME: 0.62 gal x 3 = 1.86

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]

1" well = 0.04 gal/Ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial: 1430	0.25	6.69	23.01	1.235	-144.9	11.4	0.48	240 (ml)	
1440 ~~1435~~	0.5	6.69	22.57	1.221	-138.9	4.0	0.48	240	12.11
1450	1.0	6.68	23.65	1.199	-144.2	3.77	0.52	240	12.11
1500	1.5	6.68	22.49	1.188	-146.5	4.42	0.48	240	12.13
1510	2.0	6.69	22.44	1.167	-144.2	3.27	0.45	240	12.12
1520	2.5	6.70	22.56	1.154	-147.2	3.45	0.46	240	12.12
1525	2.75	6.70	22.82	1.147	-144.1	3.56	0.52	240	12.13
1530	3.00	6.71	23.02	1.140	-150.9	3.37	0.50	240	12.14
1535	3.25	6.71	22.97	1.137	-142.6	3.53	0.50	240	12.15

12.1 [illegible] on

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: Sample time 1540

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
500 mL glass	2	none	1631	LL Hg
1L glass	1	none	8270	HCB

GENERAL INFORMATION	
WEATHER:	clear & sunny
SHIPPED VIA:	FedEx
SHIPPED TO:	
SAMPLER: DHoward	OBSERVER: MLottenberg

FIELD SAMPLING REPORT

PROJECT NO: ______________________

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW5C DEPTH TO PRODUCT: ________ DATE: 9/26/08

SAMPLE METHOD: Peristaltic Pump TIME: 0937

DUP./REP. OF: ________ DEPTH TO WATER: 11.35 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 38.47 = 27.12

PURGE VOLUME: 1.1 x 3 = 3.3

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]

1" well = 0.04 gal/Ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial: 0942		6.87	21.29	0.947	-146.4	111	0.68	200 (ml)	12.3
0952	0.5	6.91	21.00	0.953	-155.0	20.5	0.36	220	12.29
1002	1.0	6.89	20.97	0.957	-165.9	12.8	0.36	220	12.28
1012	1.5	6.89	20.98	0.957	-166.4	6.69	0.26	220	12.26
1022	2.0	6.89	21.08	0.961	-155.0	7.27	0.25	230	12.24
1032	2.5	6.88	21.18	0.962	-148.6	6.30	0.27	230	12.22
1042	3.0	6.89	21.22	0.964	-150.7	5.21	0.24	230	12.21
1052	3.5	6.88	21.26	0.963	-151.4	6.19	0.24	230	12.19

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: Sample time 1105

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
2-500mL glass		—	1631	LL Hg
1 L Amber			8270	HCB

GENERAL INFORMATION

WEATHER: Clear + Sunny temp ≈ 70°F

SHIPPED VIA: Fed Ex

SHIPPED TO:

SAMPLER: D Howard OBSERVER: M Rottenberg

FIELD SAMPLING REPORT

PROJECT NO: ____________________

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW6B DEPTH TO PRODUCT: ________ DATE: 9/26/08

SAMPLE METHOD: Peristaltic Pump TIME: 1244

DUP./REP. OF: ________ DEPTH TO WATER: 11.28 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 26.87 = 15.59

PURGE VOLUME: 0.62 x 3 = 1.9

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]

1" well = 0.04 gal/ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	11.29 New Water Level
Initial: 1250		6.59	22.00	1.088	-79.9	13.5	0.74	180 (ml)	
1300	0.5	6.63	22.27	1.083	-104.9	6.84	0.68	200	11.77
1310	1.0	6.65	22.13	1.081	-109.5	4.92	0.61	200	11.77
1320	1.5	6.66	22.06	1.081	-113.2	4.27	0.49	200	11.76
1330	2.0	6.68	22.17	1.085	-116.7	4.24	0.47	200	11.75
1335	2.25	6.69	22.07	1.089	-118.5	3.83	0.50	200	11.74

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: Sample time 1352

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
2 500 ml		—		LL Hg

GENERAL INFORMATION

WEATHER:	
SHIPPED VIA:	
SHIPPED TO:	
SAMPLER: D Howard	OBSERVER: M Rottenberg

FIELD SAMPLING REPORT

PROJECT NO: 6100080036

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW6C DEPTH TO PRODUCT: NA DATE: ~~6/2~~ mb. 9/26/08

SAMPLE METHOD: peristaltic pump TIME: 1233

DUP./REP. OF: ______ DEPTH TO WATER: 11.45 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 46.40 = 34.95

PURGE VOLUME: 1.4 x 3 = 4.2 gal.

~~[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]~~

1" well 0.04 gal/ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial: 1249		6.85	22.19	1.127	-145.6	20.4	0.37	200 ( )	11.98
1300	1.0	6.84	22.35	1.129	-157.2	16.0	0.29	200	11.94
1310	2.0	6.85	22.64	1.134	-154.3	7.99	0.30	230	11.94
1320	2.75	6.85	22.18	1.135	-155.7	6.14	0.28	230	11.91
1330	3.25	6.86	22.64	1.128	-151.6	5.2	0.25	200	11.91
1340	3.75	6.85	22.72	1.130	-152.1	4.2	0.27	210	11.90
1357	4.75	6.87	22.23	1.133	-154.3	3.2	0.25	220	11.88

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: sample time = 1412

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
2-500mL glass		none	1631	LL Hg - total + dissolved

GENERAL INFORMATION

WEATHER: Sunny, clear upper 80's

SHIPPED VIA: Fedex

SHIPPED TO: Battelle

SAMPLER: M Rottenberg OBSERVER: D Howard

FIELD SAMPLING REPORT

PROJECT NO: ______________________

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: RAMW7B DEPTH TO PRODUCT: ________ DATE: 9/26/08

SAMPLE METHOD: Peristaltic TIME: 1456

DUP./REP. OF: ________ DEPTH TO WATER: 11.61 GRAB ( ) COMPOSITE ( )

TOTAL DEPTH: 27.22 = 15.61

PURGE VOLUME: 0.62 x 3 = 1.9

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]

1" well = 0.04 gal/ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	12.03 New Water Level
Initial: 1500		6.46	22.88	0.712	-107.6	51.2	0.94	200 (ml)	
1510	0.5	6.40	23.18	0.714	-116.1	19.8	0.76	180	12.02
1520	1.0	6.41	22.42	0.710	-111.4	8.56	0.59	200	12.03
1530	1.5	6.41	22.22	0.710	-112.1	6.25	0.54	210	12.02
1540	2.0	6.41	22.26	0.710	-111.7	4.50	0.53	210	12.00
1545	2.25	6.41	22.40	0.708	-112.2	4.34	0.52	210	12.01

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: sample time 1555

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
2-500 ml				LL Hg

GENERAL INFORMATION	
WEATHER:	Sunny + clear temp ≈ 88°F
SHIPPED VIA:	Fed Ex
SHIPPED TO:	
SAMPLER: D Howard	OBSERVER: M Rottenberg

FIELD SAMPLING REPORT

PROJECT NO: ~~BAMW7C~~ 6100080036

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW7C DEPTH TO PRODUCT: NA DATE: 9/29/08

SAMPLE METHOD: Peristaltic pump TIME: 0921

DUP./REP. OF: ______ DEPTH TO WATER: 11.73 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 46.65=34.92

PURGE VOLUME: 1.4 X 3 = 4.2

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]

1" well = 0.04 gal/Ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)^C	ORP (mV)	TURB. (NTU)	DO (mg/L)	ml/min Pump Rate ml/min. (& pump setting)	ft New Water Level
Initial: 0929		6.55	21.60	0.538	-98.6	358	0.91	200 (mL)	[illegible]
0939	0.5	6.61	20.70	0.542	-120.5	9.02	0.45	240	12.40
0949	1.25	6.62	20.87	0.840	-125.3	6.09	0.40	220	12.41
0959	1.75	6.62	20.78	0.535	-131.8	4.82	0.40	220	12.42
1014	2.50	6.61	20.96	0.530	-132.2	4.10	0.33	220	12.43
1024	3.0	6.61	21.00	0.528	-130.5	4.05	0.31	220	12.45
1034	3.5	6.60	20.90	0.528	-131.8	3.67	0.31	220	12.47
1044	4.0	6.60	21.17	0.525	-131.8	3.55	0.32	220	12.48
1049	4.25	6.61	21.29	0.525	-132.4	3.35	0.31	220	12.49

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: Duplicate collected - BAMWDUP02092908 sample time 1200
Sample time 1055

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
2-500mL			1631	LLHg sample
2-500mL			1631	LLHg duplicate

GENERAL INFORMATION

WEATHER:	clear sunny ~68°F
SHIPPED VIA:	FedEx
SHIPPED TO:	Battelle
SAMPLER:	MRottenberg
OBSERVER:	D. Howard

FIELD SAMPLING REPORT

PROJECT NO: 6100080036

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW8B DEPTH TO PRODUCT: NA DATE: 9/29/08

SAMPLE METHOD: peristaltic pump TIME: 1250

DUP./REP. OF: DEPTH TO WATER: 12.07 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 25.45 13.38

PURGE VOLUME: 0.53 x 3 = 1.6 gal

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]

1" well = 0.04 gal/ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial: 1255		6.49	23.77	0.470	-93.8	110	0.66	150 ml	12.96
1305	0.25	6.53	23.54	0.471	-113.3	40	0.38	170	12.96
1315	0.5	6.56	23.76	0.468	-112.5	17	0.31	160	12.97
1325	1.0	6.58	24.01	0.470	-120.0	7.9	0.36	160	12.99
1335	1.5	6.60	23.11	0.469	-125.1	6.7	0.28	180	12.99
1340	1.75	6.61	23.49	0.467	-128.8	4.9	0.27	180	12.99
1345	2.0	6.61	23.17	0.469	-127.1	4.3	0.26	180	12.99

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: Sample time 1354

YSI 12644 ~~Turb~~ Turbidity meter 03166

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
500 ml	2	–	1631	LL Hg

GENERAL INFORMATION			
WEATHER:	Clear, sunny		
SHIPPED VIA:	Fed Ex		
SHIPPED TO:	Battelle		
SAMPLER:	D Howard	OBSERVER:	M Rottenberg

FIELD SAMPLING REPORT

PROJECT NO: 6100080036

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW BC DEPTH TO PRODUCT: NA DATE: 9/29/08

SAMPLE METHOD: Peristaltic pump TIME: 1250

DUP./REP. OF: DEPTH TO WATER: 12.19 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 46.11 = 33.92

PURGE VOLUME: 1.36 x 3 = 4.1

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]

1" well = 0.04 gal/Ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)^C	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting) ml/min	New Water Level Ft
Initial: 1254		6.61	22.75	0.825	23.6	434	0.69	210 (ml)	13.05
1304	0.5	6.67	22.59	0.874	-107.3	27.9	0.39	220	13.07
1315	1.0	6.68	23.27	0.873	-123.0	16.1	0.35	200	13.07
1325	1.50	6.70	23.07	0.866	-128.1	8.14	0.44	200	13.07
1335	2.0	6.69	22.90	0.865	-127.1	6.70	0.41	210	13.10
1345	2.5	6.68	23.12	0.863	-129.9	5.14	0.42	200	13.08
1402	3.5	6.68	21.92	0.860	-126.5	3.47	0.38	210	13.10
1410	4.0	6.69	21.40	0.856	-125.4	3.11	0.38	240	13.09
1415	4.25	6.69	21.49	0.850	-123.9	3.21	0.43	260	13.11
1420	4.50	6.68	22.02	0.851	-123.9	2.74	0.43	260	13.10
1425	4.75	6.68	21.89	0.854	-122.8	2.53	0.43	260	13.10

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: Sample time 1432

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
500 mL	2		1631	LL Hg

GENERAL INFORMATION			
WEATHER:	Clear, sunny ~~~68°F~~		
SHIPPED VIA:	FedEx		
SHIPPED TO:	Battelle		
SAMPLER:	M Rottenberg	OBSERVER:	D. Howard

FIELD SAMPLING REPORT

PROJECT NO: 6100080036/2008.GW

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW1B DEPTH TO PRODUCT: NA DATE: 11/11/08

9:41 Start

SAMPLE METHOD: peristaltic pump TIME:

DUP./REP. OF: ~ DEPTH TO WATER: 29.13 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 47.34
difference = 18.21
PURGE VOLUME: 0.73 x 3 = 2.2 gal. Actually started pumping at 9:49
[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]
1" = 0.04 gal / ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial: JAm								( )	
9:51	Just filled YSI	4.53	18.97	0.245	217	0.63	2.67	130 ml/min	29.15
10:11	0.5 Gal	4.31	19.63	0.247	260.4	0.28	1.46	100 ml/min	29.15
10:21	0.7 Gal	4.30	19.83	0.257	274.8	0.25	1.31	100 ml/min	29.15
10:31	1 Gal	4.30	19.95	0.260	274.6	0.27	1.19	100 ml/min	29.15
10:41	1.4 Gal	4.31	20.49	0.265	276.9	0.25	1.19	100 ml/min	29.15
10:51	1.7 Gal	4.31	20.91	0.270	280	0.24	1.13	100 ml/min	29.15
11:01	2 Gal	4.33	20.96	0.272	281	0.23	1.14	100 ml/min	29.16
11:11	2.3 Gal	4.33	20.98	0.275	280	0.23	1.14	100 ml/min	29.15
11:14 - Parameters stable - Sample									

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS:
YSI ID: 08H100816
LaMotte ID: 05600
Sample time: 11:14
water level meter ID: 07620

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
500 mL	2	none	1631	LL Hg (total + dissolved)

GENERAL INFORMATION	
WEATHER:	
SHIPPED VIA:	FedEx
SHIPPED TO:	Battelle
SAMPLER: MR/JM	OBSERVER:

FIELD SAMPLING REPORT

PROJECT NO: 6100080036/2008.GW

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW1C DEPTH TO PRODUCT: NA DATE: 11/11/08

SAMPLE METHOD: peristaltic pump TIME: 1012 start

DUP./REP. OF: - DEPTH TO WATER: 28.50 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 67.36
difference: 38.86
PURGE VOLUME: 1.55 x 3 = 4.7 gal
[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]
1" = 0.04 gal/ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial: JKW								( )	
10:22	0.75	4.69	19.52	3.22	192	2.41	2.49	500 ml/min	28.55
10:27	1.50	4.51	19.69	3.46	257	0	0.56	500 ml/min	28.55
10:37	3	4.49	19.70	3.49	272	0	0.40	500 ml/min	28.56
10:47	4.5	4.49	19.73	3.51	278	0	0.34	500 ml/min	28.56
10:50 - Parameters Stable - Sample									

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS:
YSI ID: 07E100591
LaMotte ID: 4430
Sample time: 10:50
Water level meter 10:03431

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
500 ml	2	none	1631	LL Hg (total + dissolved)

GENERAL INFORMATION

WEATHER:	
SHIPPED VIA:	FedEx
SHIPPED TO:	Battelle
SAMPLER: MR / JW	OBSERVER:

FIELD SAMPLING REPORT

PROJECT NO: 6100080036/2008.GW

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BA MW2C DEPTH TO PRODUCT: NA DATE: 11-11-08

SAMPLE METHOD: peristaltic pump TIME: 12:25 Start

DUP./REP. OF: — DEPTH TO WATER: 11.24 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 46.64

difference =

PURGE VOLUME: 1.46x3= 4.3

Could Not Get water levels due to joints in sample tubing & small diameter well

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]

1" pipe 0.04 gal/ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial: JAM		4.66	20.72	3.172	195	29.6	2.27	500ml/A x 41'	
12:30	1 Gal	4.54	20.39	2.923	211.7	14.2	0.84	600ml/min	NA
12:40	2.5 Gal	4.53	20.27	2.852	219.5	8.33	0.43	500ml/min	NA
12:50	4 Gal	4.53	20.26	2.808	220	3.41	0.37	500ml/min	NA
1:00	5.5	4.53	20.27	2.74	224	1.08	0.30	" "	NA
Sampled at 1:05 - Parameters Stable									

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS: YSI ID: 07E100591 Water level meter ID: NA
LaMotte ID: 4430
Sample time: 1305
Water level meter would not fit in well with tubing due to multiple (4) connections/joints.

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
500 mL	2	none	1631	LL Hg - (total + dissolved)

GENERAL INFORMATION			
WEATHER:			
SHIPPED VIA:	FedEx		
SHIPPED TO:	Battelle		
SAMPLER:	MR/JM	OBSERVER:	

[redacted]

FIELD SAMPLING REPORT

PROJECT NO: 6100080036 / 2008, GW

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW3B DEPTH TO PRODUCT: — DATE: 11/12/08

SAMPLE METHOD: peristaltic pump TIME: 1040 start

DUP./REP. OF: — DEPTH TO WATER: 12.65 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 25.94 13.29

PURGE VOLUME: 0.53 x 3 = 1.6 gal

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]

0.04 gal / ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial: MR								ml/min	
1045	start	6.60	21.83	2.153	-135.3	5.50	0.58	210	16.5
1050	1.0	6.66	22.21	2.200	-135.9	8.28	0.36	300	16.52
1055	1.5	6.71	22.26	2.192	-143.8	2.19	0.22	300	16.53
1100	2.0	6.73	22.29	2.171	-140.1	2.07	0.22	280	16.83
1105		stopped purge	– allow to	recharge					19.7
1108								→	17.05
1111								→	16.84
1112	restart pump	to collect	sample						
1113	sample time								

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS:
YSI ID - 08H100816
Lamotte ID - 05600
Water level meter ID - 03431
Sample time -

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
amber glass	1L	—	HCB	~~8270~~ Method 8081A

GENERAL INFORMATION			
WEATHER:	100% cloud cover - rain expected		
SHIPPED VIA:	FedEx		
SHIPPED TO:	PACE		
SAMPLER: MR/JM		OBSERVER:	

FIELD SAMPLING REPORT

PROJECT NO: 6100080836 /2008,GW

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW 4C DEPTH TO PRODUCT: NA DATE: 11/12/08

SAMPLE METHOD: peristaltic pump TIME: 11:08

(DUP)/REP. OF: ________ DEPTH TO WATER: 12.40 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 42.40

PURGE VOLUME: 1.2 x3 = 3.6

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]
0.04 gal/ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial: 11:09		6.49	20.85	1.067	-117.4	3.48	6.05	600 ml/min (37)	12.46
11:13	1	6.60	20.79	1.123	-137	1.19	0.39	600 ml/min	12.46
11:18	2	6.61	20.81	1.128	-140	0.21	0.25	" "	12.46
11:23	3	6.61	20.80	1.129	-141	0.19	0.21	" "	12.46
11:28	4	6.61	20.80	1.130	-142	0.15	0.20	" "	12.46
Parameters Stable - Sample 11:30 & Take (Duplicate)									

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS:
YSI ID: 07E100591
LaMotte ID: 4430 DUP sample here - 1200 sample time
Water level ID: 7620
sample time = ~~[illegible]~~ MR 1130

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
glass-amber	1L	NA	8081A	HCB

GENERAL INFORMATION

WEATHER:	100% cloud cover rain expected
SHIPPED VIA:	FedEx
SHIPPED TO:	PACE
SAMPLER: JM/MR	OBSERVER:

FIELD SAMPLING REPORT

PROJECT NO: 6100080036130008, G-W

MACTEC ENGINEERING AND CONSULTING, INC.
3200 TOWN POINT DRIVE, SUITE 100 KENNESAW GA 30144
PHONE: (770) 421-3400 / FAX: (770) 421-3486

WELL ID: BAMW5C DEPTH TO PRODUCT: — DATE: 11/12/08

SAMPLE METHOD: peristaltic pump TIME: 11:54 start

DUP./REP. OF: — DEPTH TO WATER: 12.47 GRAB (X) COMPOSITE ( )

TOTAL DEPTH: 38.47

PURGE VOLUME: 1.04 x3 = 3.12

[0.163 x water column height (ft) x 3 (well volumes) for 2" wells]

0.04 gal / ft

TIME	VOL. PURGED (gal)	pH	TEMP (°C)	SPEC. COND. (ms/cm)	ORP (mV)	TURB. (NTU)	DO (mg/L)	Pump Rate ml/min. (& pump setting)	New Water Level
Initial:		6.75	21.41	0.874	-66	18.4	5.0	600ml/min (33)	12.51
11:59	1	6.94	20.75	0.867	-160.4	12.7	0.36	600ml/min	12.51
12:04	2	6.96	20.72	0.867	-167	7.54	0.22	" "	12.51
12:09	3	6.95	20.69	0.868	-171	2.82	0.15	" "	12.51
12:12 -	Parameters	Stable	- Sample						

Low Flow Stability Critera: pH = ± 0.1 ORP = ± 10mV Sp. Cond = ± 3% DO = ± 10% Turb. < 10 NTU

COMMENTS:
YSI ID - 07E100591
LaMotte ID: 4430
water level meter ID = 7620
Sample time = 12:12

CONTAINER SIZE/TYPE	NO.	PRESERVATIVE	ANALYTICAL METHOD	ANALYSIS
1L glass	1	NA	8081A	HCB

GENERAL INFORMATION	
WEATHER:	100% cloud cover - rain expected
SHIPPED VIA:	Fed Ex
SHIPPED TO:	PACE
SAMPLER: JM / MR	OBSERVER:

APPENDIX C

IN SITU WATER QUALITY RESULTS

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date	4/29/2009					
Location ID	ST17					
Depth (ft)	Temperature - EPA 170.1, °C	Conductivity - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	Dissolved Oxygen - EPA 360.1, %	pH - EPA 150.1, Standard Units	Turbidity - EPA 180.1, NTU
0	24.0	0.076	9.20	110	6.80	4.8
-1	24.1	0.076	9.10	108	6.78	5.0
-2	24.1	0.075	9.15	109	6.79	6.9
-3	22.3	0.074	7.39	89.2	6.59	11.3
-4	20.0	0.071	3.22	38.2	6.42	11.5
-5	19.9	0.071	2.06	23.3	6.34	12.3
-6	18.8	0.071	1.57	16.9	6.31	14.1
-7	18.6	0.072	1.15	12.6	6.30	19.0
-8	18.4	0.074	0.91	9.9	6.30	18.2
-9	18.4	0.076	0.79	8.4	6.30	19..1
-10	18.4	0.076	0.75	7.9	6.32	17.4
-11	18.4	0.076	0.79	8.5	6.31	21.4

Notes:
˚C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: MBR 8/17/09
CHECKED BY/DATE: RMR 8/24/09

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date	4/29/2009					
Location ID	ST14					
Depth (ft)	Temperature - EPA 170.1, °C	Conductivity - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	Dissolved Oxygen - EPA 360.1, %	pH - EPA 150.1, Standard Units	Turbidity - EPA 180.1, NTU
0	24.1	0.076	8.68	103	6.84	5.9
-1	24.2	0.076	8.90	107	6.84	5.9
-2	23.0	0.074	7.82	93.7	6.73	6.2
-3	23.2	0.074	7.85	92.8	6.73	6.8
-4	20.8	0.073	4.62	55.8	6.52	10.5
-5	20.1	0.070	2.91	33.0	6.41	9.9
-6	19.3	0.069	1.88	22.0	6.36	10.0
-7	18.8	0.070	1.56	17.0	6.33	10.0
-8	18.5	0.073	1.31	14.3	6.33	12.5
-9	18.4	0.075	1.16	12.5	6.33	14.0
-10	18.4	0.076	1.12	12.0	6.33	14.6
-11	18.3	0.076	1.05	11.2	6.33	14.9
-12	18.3	0.077	0.88	9.6	6.34	15.7
-13	18.3	0.078	0.66	7.0	6.34	17.5
-14	18.3	0.079	0.57	6.0	6.35	18.1
-15	18.3	0.079	0.51	5.4	6.35	17.7
-16	18.3	0.080	0.55	5.8	6.37	17.2
-17	18.3	0.080	0.58	6.2	6.37	17.6
-18	18.3	0.082	0.56	6.1	6.37	19.1
-19	18.2	0.084	0.45	4.8	6.39	17.9

Notes:
°C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: MBR 8/17/09
CHECKED BY/DATE: RMR 8/24/09

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date	**4/29/2009**					
Location ID	**ST19**					
Depth (ft)	**Temperature - EPA 170.1, °C**	**Conductivity - EPA 120.1, mS/cm**	**Dissolved Oxygen - EPA 360.1, mg/L**	**Dissolved Oxygen - EPA 360.1, %**	**pH - EPA 150.1, Standard Units**	**Turbidity - EPA 180.1, NTU**
0	23.8	0.076	9.69	115	6.87	6.4
-1	24.1	0.075	9.35	112	6.86	6.4
-2	23.6	0.076	8.80	104	6.80	6.8
-3	22.0	0.072	6.84	80.7	6.60	8.9
-4	20.7	0.072	3.68	42.8	6.42	9.8
-5	19.9	0.070	2.74	30.0	6.38	9.8
-6	19.2	0.070	1.95	21.4	6.34	10.0
-7	18.8	0.071	1.76	19.2	6.31	11.1
-8	18.5	0.072	1.53	16.5	6.33	13.0
-9	18.4	0.075	1.53	16.2	6.34	14.8
-10	18.4	0.077	1.50	16.3	6.35	49.0

Notes:
°C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: MBR 8/17/09
CHECKED BY/DATE: RMR 8/24/09

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date	4/29/2009					
Location ID	**ST32**					
Depth (ft)	**Temperature - EPA 170.1, °C**	**Conductivity - EPA 120.1, mS/cm**	**Dissolved Oxygen - EPA 360.1, mg/L**	**Dissolved Oxygen - EPA 360.1, %**	**pH - EPA 150.1, Standard Units**	**Turbidity - EPA 180.1, NTU**
0	25.0	0.078	9.96	121	6.94	5.6
-2	24.3	0.077	9.25	112	6.84	6.0
-4	20.5	0.071	3.91	43.4	6.43	9.8
-6	19.7	0.070	1.95	21.4	6.30	9.6
-8	19.5	0.070	1.82	20.0	6.27	9.5
-10	18.6	0.071	1.53	16.6	6.24	10.6
-12	18.4	0.076	1.29	14.0	6.23	13.8
-14	18.3	0.078	1.22	13.0	6.28	13.7
-16	18.3	0.079	1.24	13.2	6.29	14.3
-18	18.3	0.080	1.14	12.2	6.30	14.7
-20	18.3	0.081	1.01	11.3	6.31	14.8
-22	18.2	0.083	0.73	8.0	6.32	14.8
-24	18.2	0.086	0.63	6.5	6.34	15.1
-26	18.2	0.087	0.62	6.9	6.35	14.4
-28	18.1	0.089	0.51	5.4	6.37	14.8
-30	18.1	0.092	0.47	5.0	6.38	13.9
-32	18.1	0.092	0.44	4.7	6.41	14.2
-34	18.1	0.094	0.45	4.8	6.41	14.4
-36	18.1	0.093	0.45	4.8	6.42	14.0
-38	18.0	0.098	0.42	4.4	6.43	13.8
-40	18.0	0.099	0.41	4.3	6.45	14.3

Notes:
°C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: MBR 8/17/09
CHECKED BY/DATE: RMR 8/24/09

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date				5/27/2009			
Location ID				**ST17**			
Depth (ft)	**Temperature - EPA 170.1, °C**	**Conductivity - EPA 120.1, mS/cm**	**Dissolved Oxygen - EPA 360.1, mg/L**	**Dissolved Oxygen - EPA 360.1, %**	**pH - EPA 150.1, Standard Units**	**Oxidation-Reduction Potential - A2580A, mV**	**Turbidity - EPA 180.1, NTU**
0	23.8	0.131	4.48	52.4	6.78	231	10.1
-1	23.2	0.130	4.80	58.5	6.74	231	10.5
-2	22.8	0.128	4.02	46.9	6.68	237	10.7
-3	22.6	0.127	3.70	43.1	6.64	242	10.5
-4	22.4	0.127	3.21	37.1	6.60	248	11.2
-5	22.3	0.127	3.08	35.5	6.58	250	11.6
-6	22.2	0.127	3.06	35.2	6.57	253	11.8
-7	22.2	0.127	3.07	35.2	6.57	255	12.2
-8	22.1	0.128	3.07	35.2	6.56	257	12.5
-9	22.1	0.128	3.06	35.1	6.56	258	12.7
-10	22.0	0.128	3.02	34.6	6.56	259	13.3
-11	21.9	0.129	3.04	34.7	6.56	261	13.7
-12	21.8	0.130	3.02	34.4	6.57	264	14.7
-13	21.8	0.131	2.90	33.2	6.57	265	14.2
-14	21.6	0.133	2.39	28.0	6.55	267	19.1
-15	21.5	0.135	1.83	21.1	6.54	269	18.0

Notes:
°C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: RMR 7/7/2009
CHECKED BY/DATE: JAB 7/14/2009

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date	5/27/2009						
Location ID	ST14						
Depth (ft)	Temperature - EPA 170.1, °C	Conductivity - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	Dissolved Oxygen - EPA 360.1, %	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU
0	23.4	0.130	4.40	51.5	6.68	244	10.4
-1	23.1	0.129	4.12	48.4	6.64	251	10.9
-2	22.7	0.126	4.23	48.6	6.60	256	12.9
-3	22.7	0.126	4.30	48.7	6.60	258	15.6
-4	22.6	0.126	4.86	56.0	6.61	261	17.1
-5	22.5	0.126	4.87	56.5	6.61	263	17.7
-6	22.4	0.125	4.31	49.8	6.59	266	15.2
-7	22.3	0.125	3.75	43.1	6.56	268	14.1
-8	22.2	0.127	3.15	37.9	6.54	270	12.2
-9	22.1	0.130	2.73	31.6	6.52	272	12.3
-10	21.9	0.131	2.57	29.4	6.52	274	12.8
-11	21.7	0.131	2.55	29.0	6.51	276	14.5
-12	21.7	0.132	2.59	29.4	6.52	277	14.4
-13	21.7	0.132	2.59	29.4	6.53	277	14.4
-14	21.6	0.132	2.60	29.6	6.53	278	14.1
-15	21.4	0.135	2.04	23.4	6.52	279	14.6
-16	21.4	0.137	1.86	21.0	6.52	280	13.9
-17	21.4	0.142	1.73	19.6	6.52	281	14.5
-18	21.4	0.143	1.56	17.7	6.52	282	14.6
-19	21.3	0.139	1.49	16.8	6.52	282	14.8
-20	21.3	0.138	1.44	16.4	6.52	282	14.6
-21	21.3	0.137	1.33	15.4	6.52	283	15.3
-22	21.3	0.140	1.01	11.9	6.52	284	17.4
-23	21.3	0.142	0.73	8.4	6.52	284	16.5

Notes:
°C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: RMR 7/7/2009
CHECKED BY/DATE: JAB 7/14/2009

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date	5/27/2009						
Location ID	**ST19**						
Depth (ft)	**Temperature - EPA 170.1, °C**	**Conductivity - EPA 120.1, mS/cm**	**Dissolved Oxygen - EPA 360.1, mg/L**	**Dissolved Oxygen - EPA 360.1, %**	**pH - EPA 150.1, Standard Units**	**Oxidation-Reduction Potential - A2580A, mV**	**Turbidity - EPA 180.1, NTU**
0	23.7	0.133	6.40	76.0	6.65	232	14.8
-1	23.5	0.132	6.17	72.4	6.60	247	15.7
-2	22.8	0.130	5.84	68.0	6.54	257	17.3
-3	22.5	0.130	5.16	60.0	6.51	265	16.2
-4	22.4	0.129	5.06	58.3	6.48	269	18.4
-5	22.3	0.129	4.90	56.8	6.48	272	16.3
-6	22.3	0.129	4.66	53.9	6.47	275	16.3
-7	22.2	0.129	4.41	51.0	6.46	277	15.8
-8	22.2	0.129	4.25	49.0	6.46	279	16.0
-9	22.2	0.128	4.13	47.5	6.45	280	16.9
-10	22.1	0.129	3.52	41.3	6.44	283	15.7
-11	21.9	0.131	3.23	37.0	6.43	285	15.8
-12	21.7	0.133	2.60	31.4	6.41	286	15.2
-13	21.6	0.134	2.24	25.6	6.41	288	15.5
-14	21.6	0.151	2.07	23.5	6.40	288	17.0

Notes:
°C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: RMR 7/7/2009
CHECKED BY/DATE: JAB 7/14/2009

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date	5/27/2009						
Location ID	ST32						
Depth (ft)	Temperature - EPA 170.1, °C	Conductivity - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	Dissolved Oxygen - EPA 360.1, %	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU
0	25.0	0.136	6.86	83.1	6.84	229	14.8
-1	24.8	0.135	6.84	82.5	6.83	235	15.8
-2	24.5	0.134	6.80	81.5	6.81	243	15.6
-3	24.2	0.132	6.59	78.8	6.78	248	17.2
-4	23.6	0.131	6.20	73.5	6.73	254	19.2
-5	23.0	0.130	6.04	70.5	6.70	258	22.0
-6	22.8	0.129	5.87	68.4	6.68	261	24.5
-7	22.7	0.128	5.70	66.0	6.66	263	24.0
-8	22.2	0.129	4.36	50.7	6.59	267	17.3
-9	22.2	0.129	3.96	45.6	6.55	269	16.4
-10	21.8	0.131	2.90	35.4	6.49	272	14.3
-11	21.6	0.132	2.64	30.0	6.48	274	13.7
-12	21.6	0.133	2.43	27.8	6.47	275	13.7
-13	21.5	0.133	2.37	27.1	6.46	277	14.3
-14	21.5	0.133	2.36	26.7	6.47	278	13.1
-15	21.5	0.133	2.27	25.9	6.46	279	12.9
-16	21.5	0.135	2.27	25.6	6.46	280	13.1
-17	21.4	0.138	2.03	23.0	6.47	281	13.4
-18	21.4	0.135	1.99	22.7	6.46	282	13.3
-19	21.3	0.135	1.70	20.3	6.47	283	12.7
-20	21.3	0.136	1.73	19.5	6.47	284	12.3
-21	21.3	0.136	1.50	17.0	6.48	284	12.4
-22	21.3	0.137	1.34	15.3	6.48	285	13.2
-23	21.3	0.143	1.16	13.1	6.48	285	13.7
-24	21.3	0.157	1.19	13.4	6.48	286	14.9
-25	21.3	0.167	1.25	14.1	6.49	286	15.2
-26	21.3	0.162	1.16	13.4	6.50	286	13.8
-27	21.3	0.150	0.93	10.9	6.51	285	13.7
-28	21.2	0.144	0.73	8.2	6.50	286	13.5
-29	21.2	0.147	0.62	7.1	6.50	286	14.0
-30	21.2	0.148	0.53	6.0	6.50	286	14.1
-31	21.2	0.148	0.45	5.0	6.50	285	14.9
-32	21.2	0.149	0.29	3.5	6.51	280	16.5
-33	21.2	0.153	0.14	1.7	6.51	250	16.7
-34	21.1	0.156	0.09	1.0	6.52	189	17.5
-35	21.1	0.189	0.08	0.8	6.53	179	15.1
-36	21.2	0.208	0.07	0.8	6.55	186	15.0
-37	21.2	0.218	0.06	0.6	6.55	177	15.2
-38	21.2	0.215	0.05	0.6	6.56	163	15.3
-39	21.2	0.223	0.06	0.6	6.56	141	15.0
-40	21.0	0.218	0.04	0.5	6.56	111	14.4
-41	21.0	0.213	0.05	0.5	6.57	101	13.4
-42	20.3	0.194	0.04	0.5	6.55	72.0	13.5

Notes:
°C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: RMR 7/7/2009
CHECKED BY/DATE: JAB 7/14/2009

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date				**5/28/2009**			
Location ID				**R101**			
Depth (ft)	**Temperature - EPA 170.1, °C**	**Conductivity - EPA 120.1, mS/cm**	**Dissolved Oxygen - EPA 360.1, mg/L**	**Dissolved Oxygen - EPA 360.1, %**	**pH - EPA 150.1, Standard Units**	**Oxidation-Reduction Potential - A2580A, mV**	**Turbidity - EPA 180.1, NTU**
0	24.7	0.129	6.53	78.6	5.91	306	19.2
-1	23.9	0.127	6.25	74.5	5.96	320	20.6
-2	23.7	0.127	6.23	73.5	6.02	333	23.3
-3	23.6	0.127	6.15	72.4	6.06	338	23.5
-4	23.6	0.127	6.15	72.5	6.09	342	24.8
-5	23.6	0.127	6.17	72.4	6.14	346	26.5
-6	23.5	0.126	6.17	72.6	6.18	349	26.9
-7	23.5	0.125	5.97	70.2	6.22	352	27.5
-8	23.3	0.124	5.63	66.1	6.25	356	23.5
-9	23.3	0.123	5.32	62.6	6.26	359	20.3
-10	23.2	0.122	5.12	60.0	6.29	361	19.4
-11	22.8	0.120	4.40	51.4	6.28	364	21.4
-12	22.7	0.120	4.04	47.0	6.28	295	278.3

Notes:
°C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: RMR 7/7/2009
CHECKED BY/DATE: JAB 7/14/2009

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date	5/28/2009						
Location ID	B302						
Depth (ft)	Temperature - EPA 170.1, °C	Conductivity - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	Dissolved Oxygen - EPA 360.1, %	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU
0	25.5	0.127	6.61	80.6	7.04	250	19.0
-1	23.8	0.127	7.05	83.7	6.90	270	27.7
-2	23.3	0.126	7.00	82.1	6.85	281	29.7
-3	23.2	0.126	6.96	81.4	6.84	288	31.4
-4	23.2	0.126	6.92	81.0	6.83	293	31.2
-5	23.1	0.126	6.88	80.4	6.84	297	30.3
-6	23.1	0.126	6.87	80.2	6.84	302	29.5
-7	23.0	0.126	6.69	78.1	6.82	306	28.9
-8	22.9	0.125	5.92	69.5	6.80	310	25.0
-9	22.9	0.123	5.51	64.7	6.76	313	22.2
-10	22.9	0.123	5.21	60.6	6.74	315	21.6
-11	22.8	0.123	5.05	58.9	6.72	316	38.6

Notes:
°C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: RMR 7/7/2009
CHECKED BY/DATE: JAB 7/14/2009

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date	5/29/2009						
Location ID	ST15						
Depth (ft)	Temperature - EPA 170.1, °C	Conductivity - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	Dissolved Oxygen - EPA 360.1, %	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU
0	23.8	0.133	6.98	83.0	6.18	245	25.4
-1	23.7	0.132	6.73	79.4	6.29	270	26.4
-2	23.3	0.131	6.72	78.8	6.31	277	26.5
-3	23.4	0.131	6.68	78.4	6.32	281	26.6
-4	23.4	0.131	6.66	78.1	6.34	285	29.1
-5	23.3	0.131	6.65	78.0	6.35	289	27.6
-6	23.2	0.132	6.55	78.8	6.35	291	28.3
-7	23.2	0.132	6.70	78.4	6.36	293	29.2
-8	23.2	0.132	6.69	78.4	6.38	295	30.4
-9	23.2	0.132	6.71	78.5	6.39	297	27.9
-10	23.2	0.132	6.71	78.5	6.39	298	27.9
-11	23.1	0.132	6.67	77.9	6.40	300	27.4
-12	22.9	0.133	6.38	75.2	6.40	302	27.4
-13	22.6	0.136	5.58	65.6	6.35	306	23.4
-14	22.2	0.140	4.34	51.0	6.32	309	20.0
-15	21.7	0.143	2.82	33.3	6.26	312	15.9
-16	21.6	0.144	2.34	26.5	6.22	315	15.6
-17	21.5	0.143	1.89	21.1	6.20	317	14.6
-18	21.4	0.142	1.66	18.8	6.18	321	14.6
-19	21.4	0.143	1.38	15.6	6.18	323	14.6
-20	21.3	0.145	1.10	12.6	6.19	326	14.0

Notes:
°C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: RMR 7/7/2009
CHECKED BY/DATE: JAB 7/14/2009

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date	5/29/2009					
Location ID	**B403**					
Depth (ft)	**Temperature -**	**Conductivity -**	**Dissolved**	**pH - EPA 150.1,**	**Oxidation-**	**Turbidity - EPA**
0	23.6	0.132	7.58	6.72	220	31.6
-1	23.2	0.130	7.55	6.74	239	33.7
-2	23.2	0.130	7.46	6.75	248	33.6
-3	23.0	0.130	7.46	6.75	253	33.0
-4	23.0	0.130	7.39	6.76	259	32.1
-5	22.9	0.130	7.34	6.76	264	33.1
-6	22.9	0.130	7.37	6.76	269	32.0
-7	22.9	0.130	7.32	6.76	272	31.8
-8	22.9	0.130	7.27	6.77	275	31.6
-9	22.9	0.130	7.23	6.77	281	33.2
-10	22.9	0.130	7.25	6.78	282	33.7
-11	22.8	0.130	6.77	6.77	286	32.6
-12	22.7	0.131	6.54	6.75	289	29.7
-13	22.4	0.134	5.41	6.69	292	24.6
-14	22.0	0.138	3.80	6.60	296	22.4

Notes:

°C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: RMR 7/7/2009
CHECKED BY/DATE: JAB 7/14/2009

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date	5/29/2009					
Location ID	B304					
Depth (ft)	Temperature -	Conductivity -	Dissolved	pH - EPA 150.1,	Oxidation-	Turbidity - EPA
0	24.2	0.133	7.57	6.90	205	28.6
-1	23.7	0.132	7.52	6.87	218	29.8
-2	23.4	0.131	7.44	6.85	230	30.3
-3	23.1	0.130	7.39	6.83	237	32.8
-4	23.0	0.129	7.26	6.82	246	34.8
-5	23.0	0.130	7.24	6.81	250	33.0
-6	23.0	0.129	7.23	6.81	254	34.4
-7	22.9	0.129	7.20	6.80	257	31.3
-8	22.9	0.129	7.03	6.80	260	30.6
-9	22.8	0.130	6.87	6.79	263	29.6
-10	22.9	0.130	6.64	6.77	266	28.6
-11	22.8	0.130	6.45	6.76	268	27.0

Notes:
°C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: RMR 7/7/2009
CHECKED BY/DATE: JAB 7/14/2009

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IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date	11/12/2009					
Location ID	**ST17**					
Depth (ft)	**Temperature -**	**Conductivity -**	**Dissolved**	**pH - EPA 150.1,**	**Oxidation-**	**Turbidity - EPA**
0	17.34	0.192	8.02	6.81	-54.7	11.9
-1	17.33	0.191	7.75	6.77	-60.9	11.4
-2	17.18	0.189	7.64	6.77	-64.4	11.5
-3	17.07	0.183	7.54	6.77	-66.4	11.6
-4	16.94	0.184	7.28	6.76	-67.8	11.4
-5	16.89	0.187	7.20	6.74	-67.7	11.9
-6	16.86	0.192	7.19	6.74	-68.4	13.2
-7	16.80	0.191	7.23	6.74	-68.5	13.4
-8	16.79	0.194	7.10	6.72	-68.4	16.1
-9	16.82	0.207	6.78	6.70	-70.0	19.2
-10	16.82	0.210	6.59	6.68	-69.0	20.6

Notes:

°C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: RMR 11/30/2009
CHECKED BY/DATE: AES 12/11/2009

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IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date	11/12/2009					
Location ID	ST14					
Depth (ft)	Temperature -	Conductivity -	Dissolved	pH - EPA 150.1,	Oxidation-	Turbidity - EPA
0	17.69	0.114	7.58	6.70	-57.9	9.2
-1	17.45	0.187	7.50	6.64	-65.5	11.1
-2	17.42	0.194	7.55	6.62	-67.8	11.9
-3	17.06	0.201	7.50	6.59	-67.7	13.4
-4	16.88	0.203	7.34	6.56	-68.0	13.6
-5	16.82	0.203	7.36	6.57	-63.0	14.4
-6	16.79	0.203	7.66	6.59	-66.9	14.2
-7	16.72	0.205	7.70	6.57	-67.4	15.1
-8	16.71	0.205	7.61	6.57	-66.2	15.4
-9	16.68	0.214	7.52	6.56	-65.1	17.9
-10	16.68	0.216	7.50	6.56	-64.6	18.5
-11	16.68	0.216	7.35	6.55	-65.8	16.2
-12	16.76	0.259	0.95	6.44	-132.8	-0.1
-13	16.68	0.218	7.56	6.66	-68.1	0.3
-14	16.70	0.218	0.70	6.63	-69.4	0.2
-15	16.68	0.219	6.52	6.67	-69.2	2.4
-16	16.74	0.239	1.74	6.67	-70.7	5.0
-17	16.74	0.287	0.68	6.53	-122.7	-0.5
-18	16.78	0.287	0.39	6.57	-146.8	-0.6
-19	16.78	0.287	0.33	6.59	-151.5	-0.6
-20	16.78	0.287	0.30	6.60	-157.5	-0.6

Notes:

°C - degree Celsius
EPA - Environme
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: RMR 11/30/2009
CHECKED BY/DATE: AES 12/11/2009

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date	11/12/2009					
Location ID	ST19					
Depth (ft)	Temperature -	Conductivity -	Dissolved	pH - EPA 150.1,	Oxidation-	Turbidity - EPA
0	17.63	0.191	9.68	7.00	-85.6	11.2
-1	17.54	0.195	8.91	6.99	-87.9	11.5
-2	17.10	0.202	8.75	6.96	-89.7	12.9
-3	16.92	0.201	8.55	6.94	-88.4	13.0
-4	16.91	0.199	8.46	6.91	-86.9	12.6
-5	16.84	0.201	8.35	6.90	-86.7	13.6
-6	16.82	0.201	8.28	6.89	-86.5	13.3
-7	16.82	0.200	8.23	6.86	-85.3	13.0
-8	16.80	0.201	8.34	6.87	-84.4	13.0
-9	16.74	0.200	8.33	6.87	-81.3	13.0
-10	16.74	0.208	8.30	6.86	-79.9	13.1

Notes:

°C - degree Celsius

EPA - Environmental Protection Agency

ft - feet

mg/L - milligram per liter

mS/cm - milliSiemans per centimeter

mV - millivolt

NTU - nephelometric turbidity unit

pH - negative log of the hydrogen ion concentration

% - percent

Data collected using a YSI 6920.

PREPARED BY/DATE: RMR 12/9/2009
CHECKED BY/DATE: AES 12/14/2009

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date			**11/12/2009**			
Location ID			**ST32**			
Depth (ft)	**Temperature -**	**Conductivity -**	**Dissolved**	**pH - EPA 150.1,**	**Oxidation-**	**Turbidity - EPA**
0	17.62	0.177	8.14	6.87	-82.5	9.8
-5	16.91	0.199	8.19	6.86	-85.0	12.8
-10	16.78	0.202	8.18	6.84	-77.8	12.9
-15	16.70	0.211	8.05	6.80	-75.8	18.0
-20	16.68	0.230	7.71	6.74	-77.8	19.8
-25	16.68	0.235	7.50	6.76	-75.1	20.6
-30	16.68	0.235	7.58	6.73	-74.0	19.2
-35	16.70	0.228	7.22	6.85	-76.3	NA

Notes:

°C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NA - data not recorded
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: RMR 12/9/2009
CHECKED BY/DATE: AES 12/14/2009

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date				11/11/2009			
Location ID				**R101**			
Depth (ft)	**Temperature -**	**Conductivity -**	**Dissolved**	**Dissolved**	**pH - EPA 150.1,**	**Oxidation-**	**Turbidity - EPA**
0	17.26	0.132	5.25	54.6	6.42	-31.4	7.1
-1	16.91	0.133	5.01	52.1	6.39	-33.2	7.3
-2	16.80	0.132	4.76	49.5	6.39	-36.4	7.6
-3	16.72	0.132	4.63	47.7	6.38	-36.6	7.6
-4	16.70	0.132	4.61	47.5	6.38	-37.8	7.8
-5	16.65	0.131	4.61	47.3	6.38	-40.1	8.2
-6	16.61	0.131	4.21	43.0	6.37	-42.1	8.3
-7	16.49	0.130	2.44	23.5	6.31	-51.4	8.6
-8	16.45	0.130	1.86	19.3	6.26	-62.6	9.8
-9	16.46	0.130	1.33	13.7	6.31	-62.2	0.8

Notes:

˚C - degree Celsius

EPA - Environmental Protection Agency

ft - feet

mg/L - milligram per liter

mS/cm - milliSiemans per centimeter

mV - millivolt

NTU - nephelometric turbidity unit

pH - negative log of the hydrogen ion concentration

% - percent

Data collected using a YSI 6920.

PREPARED BY/DATE: RMR 11/30/2009
CHECKED BY/DATE: AES 12/14/2009

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date	**11/12/2009**					
Location ID	**B302**					
Depth (ft)	**Temperature -**	**Conductivity -**	**Dissolved**	**pH - EPA 150.1,**	**Oxidation-**	**Turbidity - EPA**
0	17.60	0.202	9.08	6.74	-28.7	12.0
-1	17.52	0.202	8.12	6.75	-59.5	12.3
-2	17.50	0.203	8.05	6.76	-63.0	12.1
-3	17.41	0.202	8.04	6.78	-64.3	12.5
-4	17.37	0.203	8.04	6.79	-64.2	12.4
-5	17.27	0.204	8.08	6.80	-64.5	12.5
-6	17.23	0.204	8.11	6.80	-64.7	13.2
-7	17.23	0.204	8.12	6.80	-65.4	13.4

Notes:

°C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: RMR11/30/2009
CHECKED BY/DATE: AES 12/14/2009

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date			11/12/2009			
Location ID			**ST15**			
Depth (ft)	**Temperature -**	**Conductivity -**	**Dissolved**	**pH - EPA 150.1,**	**Oxidation-**	**Turbidity - EPA**
0	17.12	0.132	8.83	7.07	-94.1	9.4
-1	16.95	0.136	7.33	6.97	-98.0	8.8
-2	16.95	0.135	6.76	6.90	-98.3	8.6
-3	16.95	0.134	6.54	6.85	-98.2	8.9
-4	16.74	0.134	5.86	6.81	-98.6	8.8
-5	16.72	0.142	5.72	6.78	-98.3	9.0
-6	16.72	0.151	5.71	6.72	-95.4	9.4
-7	16.72	0.161	6.27	6.78	-92.3	10.1
-8	16.72	0.146	6.06	6.78	-92.5	9.4
-9	16.71	0.166	6.22	6.76	-90.0	10.5
-10	16.72	0.173	6.70	6.76	-89.3	10.8
-11	16.72	0.170	6.75	6.76	-88.0	11.2
-12	16.72	0.189	7.32	6.76	-83.8	23.7

Notes:

°C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: RMR 12/9/2009
CHECKED BY/DATE: AES 12/14/2009

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date	11/12/2009					
Location ID	B403					
Depth (ft)	Temperature -	Conductivity -	Dissolved	pH - EPA 150.1,	Oxidation-	Turbidity - EPA
0	17.58	0.154	9.00	7.01	-91.9	8.0
-1	17.20	0.162	7.21	6.94	-95.5	9.6
-2	16.96	0.157	6.98	6.90	-95.4	10.2
-3	16.86	0.150	6.51	6.86	-97.0	10.0
-4	16.81	0.169	6.16	6.81	-93.8	12.0
-5	16.76	0.202	7.28	6.81	-89.6	14.9
-6	16.75	0.217	7.85	6.83	-84.8	17.3

Notes:

˚C - degree Celsius

EPA - Environmental Protection Agency
ft - feet

mg/L - milligram per liter

mS/cm - milliSiemans per centimeter

mV - millivolt

NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration

% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: RMR 12/9/2009
CHECKED BY/DATE: AES 12/14/2009

TABLE C-1

IN SITU SURFACE WATER QUALITY RESULTS: APRIL THROUGH AUGUST 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh, OU-2

Date	11/12/2009					
Location ID	B304					
Depth (ft)	Temperature -	Conductivity -	Dissolved	pH - EPA 150.1,	Oxidation-	Turbidity - EPA
0	17.20	0.178	7.51	6.73	-17.2	9.8
-1	17.20	0.178	7.44	6.69	-26.9	10.0
-2	17.21	0.178	7.44	6.68	-31.5	10.0
-3	17.16	0.178	7.45	6.68	-34.8	9.9
-4	17.15	0.178	7.47	6.69	-39.8	10.0
-5	17.09	0.178	7.41	6.69	-44.6	10.1
-6	17.05	0.176	7.41	6.69	-46.7	10.1
-7	17.05	0.176	7.44	6.70	-49.3	12.6
-8	16.92	0.175	7.49	6.69	-51.3	15.1
-9	16.98	0.175	7.56	6.73	-54.0	16.3

Notes:

°C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - negative log of the hydrogen ion concentration
% - percent
Data collected using a YSI 6920.

PREPARED BY/DATE: RMR 11/30/2009
CHECKED BY/DATE: AES 12/14/2009

TABLE C-2
IN SITU WATER QUALITY RESULTS: JUNE 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2

Sample Date		6/5/2009						6/4/2009						6/5/2009					
Associated Sample IDs		OU2B-SED-004C-09						OU2B-SW-101DS-09, OU2B-SW-101DD-09						OU2B-SED-101C-09					
Analysis - Method		Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU
Depth (ft)	0	24.4	0.125	6.57	6.86	234	11.2	27.4	0.129	10.3	7.06	285	5.2	24.9	0.129	5.50	6.80	240	10.1
	-1	24.4	0.125	6.47	6.85	234	12.1	27.4	0.129	10.7	7.07	285	5.3	24.9	0.128	5.59	6.78	240	10.1
	-2	24.4	0.125	6.31	6.84	236	10.5	27.3	0.129	10.8	7.06	286	5.5	24.8	0.128	5.37	6.76	240	10.5
	-3	24.3	0.125	6.20	6.84	237	10.7	26.9	0.128	10.6	7.05	286	5.5	24.3	0.128	4.89	6.69	244	10.9
	-4	24.2	0.125	5.93	6.81	240	11.2	24.4	0.123	5.3	6.72	292	6.8	23.8	0.127	3.38	6.64	246	11.3
	-5	23.8	0.129	5.06	6.73	243	13.2	24.6	0.123	4.62	6.64	293	6.9	23.7	0.127	2.45	6.59	248	11.7
	-6	23.3	0.128	3.31	6.65	245	13.0	23.9	0.122	4.01	6.57	295	7.1	23.5	0.127	2.12	6.56	250	11.3
	-7	23.1	0.129	2.46	6.61	247	12.9	23.6	0.121	3.32	6.51	296	7.4	23.1	0.129	1.72	6.53	252	12.4
	-8	23.1	0.129	2.05	6.59	249	13.6	23.3	0.122	2.80	6.45	298	8.5	23.1	0.129	1.46	6.50	255	11.5
	-9	23.0	0.131	1.58	6.55	251	14.5	23.1	0.124	2.36	6.41	300	11.7	23.0	0.130	1.32	6.49	256	11.2
	-10	22.9	0.133	1.41	6.53	253	15.2	23.1	0.125	2.06	6.38	301	11.3	22.8	0.132	1.16	6.49	258	12.4
	-11	22.7	0.136	1.23	6.52	254	23.8	23.0	0.126	2.08	6.37	302	9.8	22.8	0.133	0.91	6.48	259	13.8
	-12							22.9	0.128	2.11	6.36	303	11.2	22.7	0.134	0.67	6.48	260	14.3
	-13							22.9	0.129	1.86	6.35	304	11.8	22.7	0.135	0.59	6.47	262	14.1
	-14							22.8	0.130	1.65	6.35	305	12.8						
	-15							22.8	0.131	1.56	6.34	306	13.3						
	-16							22.7	0.133	1.52	6.34	307	14.1						
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Notes:
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EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - Negative log of the hydrogen ion concentration
Data collected

TABLE C-2
IN SITU WATER QUALITY RESULTS: JUNE 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2

Sample Date	6/5/2009						6/4/2009						6/6/2009					
Associated Sample IDs	OU2B-SED-102C-09						OU2B-SW-103DS-09, OU2B-SW-103DD-09						OU2B-SED-103DC-09, OU2B-SED-103DNE-09, OU2B-SED-103DNW-09, OU2B-SED-103DSE-09, OU2B-SED-103DSW-09					
Analysis - Method	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU
Depth (ft) 0	22.9	0.127	6.37	6.95	225	14.8	26.6	0.129	9.74	6.91	260	5.2	24.6	0.130	7.56	7.07	150	12.1
-1	24.9	0.127	6.05	6.89	228	14.7	26.5	0.128	9.96	6.91	262	5.4	24.3	0.130	7.25	7.01	165	12.1
-2	24.8	0.128	5.93	6.83	232	15.9	26.1	0.127	9.96	6.89	264	5.7	24.4	0.130	7.09	6.94	177	12.0
-3	24.2	0.127	4.53	6.76	236	16.1	25.8	0.126	9.85	6.81	266	5.7	24.2	0.129	6.98	6.87	188	12.2
-4	24.4	0.127	4.52	6.72	239	17.2	25.2	0.125	9.15	6.76	269	6.3	23.8	0.128	6.45	6.81	196	11.8
-5	23.8	0.126	3.35	6.65	243	13.2	24.4	0.124	6.70	6.63	272	6.8	23.5	0.128	5.59	6.74	203	11.2
-6	23.2	0.127	2.50	6.60	245	11.1	23.7	0.123	4.81	6.54	275	7.3	23.4	0.128	5.01	6.68	210	11.2
-7	23.1	0.127	2.03	6.56	248	11.1	23.5	0.122	3.66	6.47	276	7.5	23.4	0.128	4.55	6.63	216	11.2
-8	23.0	0.128	1.74	6.53	250	12.5	23.4	0.121	3.11	6.42	278	7.5	23.2	0.131	3.76	6.56	221	11.3
-9	23.0	0.130	1.67	6.51	254	11.3	23.1	0.122	2.75	6.38	280	8.0	23.1	0.132	2.81	6.50	226	10.9
-10	22.9	0.133	1.63	6.51	256	11.5	23.1	0.124	2.54	6.35	282	8.1	23.1	0.134	1.82	6.44	232	10.9
-11	22.8	0.133	1.59	6.50	258	12.4	23.0	0.125	2.45	6.33	283	8.5	22.9	0.136	1.53	6.41	235	10.7
-12	22.8	0.135	1.32	6.49	261	13.2	23.0	0.127	2.43	6.32	284	8.8	22.7	0.138	1.26	6.38	239	11.2
-13	22.7	0.137	1.22	6.48	262	12.1	22.9	0.129	2.43	6.32	285	9.2	22.6	0.140	1.08	6.36	242	11.1
-14	22.5	0.139	0.75	6.47	265	15.9	22.8	0.132	2.44	6.30	288	9.8	22.5	0.142	0.95	6.33	249	11.4
-15	22.5	0.141	0.61	6.46	267	13.8	22.8	0.132	2.28	6.30	289	11.4	22.4	0.145	0.54	6.30	253	10.5
-16	22.2	0.150	0.51	6.45	269	11.1	22.7	0.134	2.11	6.29	289	11.2	22.2	0.149	0.42	6.29	254	10.2
-17	21.7	0.155	0.43	6.44	270	10.7	22.7	0.135	1.97	6.28	291	14.3						
-18	21.6	0.157	0.36	6.44	270	9.8	22.6	0.137	1.56	6.27	292	14.7						
-19	21.5	0.159	0.32	6.43	270	9.8	22.3	0.141	1.29	6.27	294	10.8						
-20	21.4	0.162	0.30	6.42	270	10.3												
-21	21.3	0.166	0.28	6.42	267	10.5												
-22	21.2	0.169	0.28	6.43	251	12.4												
-23	21.1	0.173	0.25	6.43	221	14.3												
-24	21.1	0.174	0.25	6.45	187	15.6												
-25	21.0	0.175	0.25	6.45	155	18.2												
-26	21.0	0.176	0.23	6.46	122	21.3												
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Notes:

˚C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - Negative log of the hydrogen ion concentration
Data collected using a YSI 6920.

TABLE C-2
IN SITU WATER QUALITY RESULTS: JUNE 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2

Sample Date		6/6/2009						6/8/2009						6/8/2009					
Associated Sample IDs		OU2B-SED-104DC-09, OU2B-SED-104DNE-09, OU2B-SED-104DNW-09, OU2B-SED-104DSE-09, OU2B-SED-104DSW-09						OU2B-SED-105C-09, OU2B-SW-105DS-09, OU2B-SW-105DD-09						OU2B-SED-106C-09					
Analysis - Method		Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU
Depth (ft)	0	25.1	0.132	7.40	7.14	238	12.1	25.7	0.143	8.63	6.85	257	10.5	27.7	0.147	11.4	7.29	285	4.6
	-1	25.4	0.132	7.17	7.08	240	12.2	25.9	0.144	9.31	6.92	257	9.8	27.7	0.147	11.6	7.36	285	5.4
	-2	25.2	0.131	7.07	7.02	243	11.8	25.8	0.144	9.44	6.91	258	10.7	26.7	0.144	11.5	7.29	288	10.1
	-3	23.8	0.127	6.44	6.88	248	11.4	25.5	0.143	9.19	6.88	259	13.6	25.7	0.143	10.7	7.18	290	12.4
	-4	23.8	0.128	5.74	6.82	250	11.2	25.2	0.143	8.32	6.81	262	19.1	25.3	0.142	9.98	7.05	291	13.2
	-5	23.6	0.127	5.40	6.76	252	11.2	24.6	0.143	7.20	6.72	264	26.7	24.8	0.140	9.20	6.92	293	10.2
	-6	23.5	0.127	5.01	6.70	255	11.3	24.2	0.143	5.75	6.63	264	39.8	24.3	0.139	7.81	6.79	294	9.9
	-7	23.2	0.129	4.51	6.63	258	11.8							23.7	0.139	6.42	6.67	296	12.4
	-8	23.1	0.130	3.24	6.57	260	11.8							23.4	0.140	5.11	6.55	297	16.8
	-9	23.1	0.130	2.83	6.54	262	11.8							23.3	0.141	4.01	6.46	297	29.8
	-10	23.1	0.131	2.69	6.48	263	26.2							23.3	0.141	3.23	6.38	280	95.8
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mV - millivolt
NTU - nephelometric turbidity unit
pH - Negative log of the hydrogen ion concentration
Data collected using a YSI 6920.

TABLE C-2
IN SITU WATER QUALITY RESULTS: JUNE 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2

Sample Date	6/3/2009						6/6/2009						6/4/2009					
Associated Sample IDs	OU2B-SW-201DS-09, OU2B-SW-201DD-09, OU2B-SED-201C-09						OU2B-SED-202DC-09, OU2B-SED-202DNE-09, OU2B-SED-202DNW-09, OU2B-SED-202DSE-09, OU2B-SED-202DSW-09						OU2B-SW-203DS-09, OU2B-SW-203DD-09					
Analysis - Method	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU
Depth (ft) 0	26.4	0.121	9.53	6.97	262	8.5	27.4	0.137	8.81	7.22	250	10.6	26.2	0.127	10.8	7.15	151	5.6
-1	26.3	0.121	9.80	6.97	263	7.1	27.4	0.137	8.85	7.18	253	10.7	26.3	0.126	10.5	7.11	172	5.6
-2	26.4	0.121	9.36	6.96	263	8.4	27.3	0.137	8.92	7.16	255	10.8	25.9	0.126	10.2	7.07	186	5.5
-3	26.4	0.121	9.18	6.94	264	8.6	25.3	0.131	7.05	6.91	263	14.2	25.6	0.125	9.98	7.02	197	5.4
-4	26.1	0.120	8.82	6.91	266	9.1	24.1	0.129	7.10	6.86	267	15.3	25.4	0.124	9.41	6.98	206	5.6
-5	25.2	0.120	7.78	6.82	269	9.5	23.4	0.127	6.15	6.75	270	13.1	24.6	0.123	7.71	6.85	215	6.5
-6	23.9	0.119	5.25	6.69	272	9.9	23.4	0.128	4.87	6.67	272	14.0	24.1	0.123	4.98	6.72	223	7.1
-7	23.3	0.118	4.03	6.61	275	10.6	23.2	0.130	3.93	6.59	295	13.4	23.4	0.121	3.60	6.62	230	7.5
-8	23.2	0.117	3.36	6.56	275	10.8	23.1	0.132	3.13	6.53	277	12.9	23.2	0.121	2.98	6.56	235	7.7
-9	23.1	0.117	3.17	6.53	277	10.8	23.0	0.133	2.44	6.47	279	13.5	23.1	0.122	2.64	6.51	240	7.8
-10	23.1	0.117	3.09	6.51	277	13.2	22.9	0.134	1.83	6.43	280	15.8	23.0	0.123	2.55	6.48	244	8.4
-11	23.1	0.119	2.64	6.47	279	12.0							23.0	0.125	2.42	6.46	248	9.9
-12													22.9	0.127	2.25	6.44	251	13.5
-13													22.9	0.128	2.02	6.43	254	14.9
-14													22.9	0.129	1.88	6.42	258	15.8
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mV - millivolt
NTU - nephelometric turbidity unit
pH - Negative log of the hydrogen ion concentration
Data collected using a YSI 6920.

TABLE C-2
IN SITU WATER QUALITY RESULTS: JUNE 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2

Sample Date	6/7/2009						6/7/2009						6/8/2009					
Associated Sample IDs	OU2B-SED-203DC-09, OU2B-SED-203DNE-09, OU2B-SED-203DNW-09, OU2B-SED-203DSE-09, OU2B-SED-203DSW-09						OU2B-SED-204C-09						OU2B-SED-205C-09, OU2B-SW-205DS-09, OU2B-SW-205DD-09					
Analysis - Method	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU
Depth (ft) 0	28.5	0.142	10.9	7.38	315	8.8	26.8	0.136	11.4	8.22	311	9.8	27.1	0.145	10.1	7.22	282	6.4
-1	28.0	0.141	11.0	7.42	315	8.6	27.2	0.137	11.3	8.25	309	9.8	27.1	0.145	10.3	7.24	282	7.5
-2	28.4	0.140	11.0	7.42	316	10.3	26.9	0.136	11.2	8.24	310	10.6	26.4	0.144	10.4	7.21	283	11.9
-3	25.7	0.135	10.9	7.30	319	11.8	25.7	0.133	11.4	8.06	312	11.3	25.7	0.142	9.79	7.14	285	15.8
-4	24.8	0.133	10.9	7.01	322	12.4	24.8	0.131	11.3	7.72	315	11.9	25.2	0.141	9.16	7.04	287	26.8
-5	24.1	0.131	10.5	6.67	326	13.2	24.1	0.130	10.3	7.43	317	12.2	24.4	0.140	8.04	6.91	289	24.8
-6	23.6	0.132	9.25	6.42	327	14.6	23.8	0.139	9.01	7.22	318	13.2						
-7	23.4	0.133	7.95	6.26	329	21.1	23.8	0.129	7.68	7.02	321	13.9						
-8	23.2	0.134	6.48	6.17	330	19.8												
-9	21.1	0.134	5.78	6.09	331	18.6												
-10	23.1	0.135	5.08	6.01	333	22.4												
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mV - millivolt
NTU - nephelometric turbidity unit
pH - Negative log of the hydrogen ion concentration
Data collected using a YSI 6920.

TABLE C-2
IN SITU WATER QUALITY RESULTS: JUNE 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2

Sample Date		6/3/2009						6/8/2009						6/3/2009					
Associated Sample IDs		OU2B-SW-301DS-09, OU2B-SW-301DD-09, OU2B-SED-301C-09						OU2B-SED-302C-09						OU2B-SW-303DS-09, OU2B-SW-303DD-09					
Analysis - Method		Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU
Depth (ft)	0	26.1	0.121	8.76	6.57	225	8.6	26.9	0.145	9.57	6.98	283	5.6	26.3	0.121	7.82	6.94	258	8.7
	-1	26.2	0.122	8.90	6.65	234	8.6	26.8	0.145	9.90	6.99	284	5.9	26.5	0.121	7.95	6.91	259	8.8
	-2	26.2	0.122	8.93	6.68	236	8.6	26.4	0.144	9.91	6.97	285	6.1	25.9	0.120	7.71	6.86	262	9.0
	-3	25.9	0.120	8.71	6.69	240	8.7	25.9	0.142	9.86	6.93	287	6.7	25.8	0.119	7.49	6.81	263	9.5
	-4	24.9	0.119	6.39	6.62	245	8.9	25.4	0.142	9.41	6.87	288	9.1	25.2	0.118	7.32	6.76	266	9.4
	-5	23.8	0.117	5.04	6.54	250	9.3	25.1	0.142	8.98	6.74	290	18.4	24.6	0.118	6.52	6.69	269	9.3
	-6	23.4	0.115	3.79	6.49	254	10.0							23.6	0.115	4.50	6.58	272	9.5
	-7	23.2	0.115	3.30	6.46	257	10.3							23.4	0.115	3.62	6.52	275	10.2
	-8	23.2	0.116	3.11	6.45	259	10.5							23.2	0.117	3.29	6.47	277	11.5
	-9	23.1	0.118	3.07	6.44	261	10.8							23.1	0.118	3.02	6.45	278	16.1
	-10	23.0	0.119	2.76	6.43	263	16.2							23.1	0.119	2.46	6.43	279	18.1
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TABLE C-2
IN SITU WATER QUALITY RESULTS: JUNE 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2

Sample Date	6/7/2009						6/3/2009						6/9/2009					
Associated Sample IDs	OU2B-SED-303DC-09, OU2B-SED-303DNE-09, OU2B-SED-303DNW-09, OU2B-SED-303DSE-09, OU2B-SED-303DSW-09						OU2B-SW-304DS-09, OU2B-SW-304DD-09						OU2B-SED-304C-09					
Analysis - Method	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU
Depth (ft) 0	25.6	0.134	9.09	7.08	268	10.8	27.1	0.123	9.98	7.30	176	9.7	25.2	0.146	12.6	6.17	196	5.2
-1	25.9	0.135	9.20	7.02	272	11.1	27.2	0.123	10.2	7.22	189	9.8	26.7	0.148	12.5	6.45	215	7.6
-2	25.5	0.134	8.73	6.94	276	11.5	26.9	0.122	10.4	7.14	200	9.3	26.4	0.143	12.2	6.52	224	5.7
-3	24.8	0.132	8.13	6.82	279	12.8	25.1	0.119	7.81	6.94	213	9.6	26.2	0.147	11.6	6.56	232	9.4
-4	24.5	0.131	7.52	6.72	282	15.1	24.7	0.118	6.74	6.85	220	9.5	25.3	0.145	11.4	6.48	239	11.6
-5	24.0	0.131	6.37	6.61	285	19.7	24.5	0.117	5.96	6.75	226	9.8	24.1	0.145	10.3	6.39	245	14.9
-6	23.7	0.132	5.45	6.52	287	22.1	23.7	0.116	4.54	6.65	231	10.6	24.0	0.146	9.36	6.33	249	20.8
-7							23.5	0.116	3.47	6.58	235	11.7						
-8							23.4	0.116	2.93	6.53	239	11.5						
-9							23.3	0.115	2.67	6.49	242	11.8						
-10							23.1	0.117	2.55	6.46	246	15.5						
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pH - Negative log of the hydrogen ion concentration
Data collected using a YSI 6920.

TABLE C-2
IN SITU WATER QUALITY RESULTS: JUNE 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2

Sample Date	6/9/2009						6/9/2009						6/9/2009					
Associated Sample IDs	OU2B-SED-401C-09						OU2B-SED-402C-09						OU2B-SED-403C-09					
Analysis - Method	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU
Depth (ft) 0	27.6	0.150	11.7	6.87	239	5.6	27.4	0.148	10.4	7.21	286	6.9	28.1	0.151	10.5	7.42	265	7.1
-1	27.1	0.148	12.3	6.84	246	5.8	27.3	0.148	10.8	7.17	287	7.7	28.2	0.150	10.3	7.40	267	7.5
-2	26.7	0.147	12.5	6.80	251	7.3	27.0	0.146	11.3	7.09	289	10.8	28.0	0.150	10.6	7.37	269	7.4
-3	26.3	0.147	12.6	6.71	256	7.7	26.2	0.145	11.4	6.98	291	12.4	27.1	0.147	10.9	7.28	271	8.2
-4	25.5	0.146	12.1	6.55	262	9.8	25.7	0.144	11.4	6.84	294	11.7	26.5	0.145	10.7	7.21	272	8.8
-5	24.8	0.145	11.7	6.37	267	10.4	24.6	0.143	10.9	6.68	297	12.2	26.2	0.144	10.8	7.10	275	10.5
-6	24.1	0.144	10.7	6.23	271	10.3	24.0	0.142	10.1	6.54	298	14.1	24.8	0.142	10.3	6.91	278	13.4
-7	23.8	0.144	10.0	6.14	274	11.1	23.7	0.143	9.44	6.42	299	15.4	24.1	0.141	9.18	6.74	280	15.1
-8	23.5	0.144	8.45	5.99	280	13.4	23.6	0.143	8.59	6.36	301	15.1	23.7	0.142	8.15	6.62	281	17.2
-9	23.3	0.145	7.97	5.94	282	16.1	23.4	0.142	8.08	6.28	302	13.9	23.5	0.142	7.24	6.53	282	20.1
-10	23.2	0.145	7.54	5.90	284	16.2	23.2	0.143	7.95	6.21	305	12.4						
-11	23.1	0.146	7.33	5.85	283	16.2	23.2	0.142	7.59	6.14	307	12.4						
-12	22.8	0.149	7.07	5.82	287	25.5	23.1	0.144	7.23	6.09	307	14.5						
-13							22.7	0.148	6.79	6.06	287	25.3						
-14							22.4	0.151	6.41	6.05	211	27.2						
-15							22.3	0.157	6.17	6.07	167	18.4						
-16							22.0	0.163	6.00	6.08	131	18.2						
-17							21.8	0.166	5.81	6.07	105	20.8						
-18							21.6	0.172	5.61	6.07	109	18.2						
-19							21.4	0.176	5.44	6.07	107	19.8						
-20							21.3	0.180	5.70	6.07	105	16.3						
-21							21.2	0.182	5.78	6.07	111	16.2						
-22							21.1	0.185	5.82	6.07	122	21.5						
-23							21.1	0.189	5.94	6.07	106	29.4						
-24							21.0	0.195	5.74	6.08	79.5	30.6						
-25							20.9	0.197	5.83	6.09	67.2	30.8						
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pH - Negative log of the hydrogen ion concentration
Data collected using a YSI 6920.

TABLE C-2
IN SITU WATER QUALITY RESULTS: JUNE 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2

Sample Date	6/9/2009						6/7/2009						6/7/2009					
Associated Sample IDs	OU2B-SED-404C-09						OU2B-SED-501DC-09, OU2B-SED-501DNW-09, OU2B-SED-501DNE-09, OUB-SED-501DSW-09, OU2B-SED-501DSE-09						OU2B-SED-502DC-09, OU2B-SED-502DNE-09, OU2B-SED-502DNW-09, OU2B-SED-502DSE-09, OU2B-SED-502DSW-09					
Analysis - Method	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU
Depth (ft) 0	27.2	0.148	10.5	7.28	283	11.4	24.6	0.134	10.1	7.15	230	12.6	25.8	0.135	8.52	7.30	239	15.1
-1	27.4	0.148	10.5	7.27	283	9.4	24.6	0.134	9.74	7.08	232	12.6	26.0	0.136	8.74	7.28	242	12.6
-2	27.4	0.148	10.7	7.25	284	10.7	24.7	0.134	9.31	7.06	235	12.4	25.9	0.136	9.01	7.26	245	13.2
-3	26.8	0.147	10.9	7.15	286	15.2	24.6	0.134	8.15	7.04	237	12.9	25.0	0.134	8.89	7.14	250	15.4
-4	25.9	0.147	10.7	7.00	289	50.1	24.5	0.133	8.17	7.02	240	13.1	24.5	0.133	8.23	7.02	255	22.7
-5	25.3	0.145	10.1	6.81	292	33.5	24.3	0.133	7.96	6.98	242	13.4	24.1	0.133	6.81	6.88	258	27.2
-6							24.2	0.133	7.46	6.91	245	14.5	23.8	0.133	5.43	6.77	261	35.9
-7							23.9	0.133	6.69	6.82	248	17.5						
-8							23.4	0.134	5.11	6.73	251	18.4						
-9							23.2	0.135	3.95	6.65	252	17.1						
-10							23.1	0.136	3.01	6.61	254	16.2						
-11							23.0	0.137	2.37	6.56	255	16.1						
-12							22.9	0.138	1.91	6.52	257	15.1						
-13							22.7	0.141	1.49	6.48	259	14.6						
-14							22.7	0.143	1.23	6.47	260	13.8						
-15							22.6	0.145	0.97	6.45	262	13.4						
-16							22.3	0.149	0.81	6.42	241	17.1						
-17							22.1	0.155	0.67	6.42	120	19.8						
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pH - Negative log of the hydrogen ion concentration
Data collected using a YSI 6920.

Sample Date	6/4/2009						6/5/2009						6/3/2009					
Associated Sample IDs	OU2B-SW-DHDS-09, OU2B-SW-DHDD-09						OU2B-SED-DHC-09						OU2R-SW-101DS-09, OU2R-SW-101DD-09					
Analysis - Method	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU
Depth (ft) 0	25.6	0.129	7.91	6.65	205	5.4	23.1	0.126	3.21	6.65	251	14.1	26.5	0.120	9.67	7.03	263	9.2
-1	25.7	0.129	7.98	6.67	210	5.5	24.2	0.126	3.56	6.63	253	14.8	26.5	0.121	9.71	7.02	266	9.3
-2	25.5	0.128	7.92	6.68	216	5.6	24.2	0.126	3.58	6.62	254	14.5	26.4	0.120	9.50	7.01	268	9.2
-3	25.4	0.128	7.66	6.68	220	5.6	24.1	0.125	3.44	6.61	256	14.1	26.1	0.120	8.57	6.94	270	8.5
-4	25.1	0.128	7.28	6.66	225	5.9	23.9	0.125	3.12	6.57	258	12.8	25.3	0.119	6.91	6.83	272	8.3
-5	24.8	0.127	6.50	6.61	229	6.5	23.7	0.124	2.79	6.54	259	11.1	24.3	0.118	5.18	6.72	275	8.8
-6	23.8	0.125	3.68	6.49	238	7.5	23.6	0.124	2.45	6.52	261	11.3	23.5	0.118	4.06	6.63	277	9.6
-7	23.6	0.124	3.08	6.45	242	7.5	23.3	0.124	2.13	6.50	263	10.3	23.3	0.119	3.29	6.58	279	9.9
-8	23.4	0.124	2.71	6.43	245	8.5	24.1	0.125	1.92	6.48	265	10.5	23.2	0.119	2.68	6.53	280	11.5
-9	23.2	0.126	2.45	6.41	248	9.0	23.0	0.128	1.77	6.47	267	10.8	23.1	0.119	2.16	6.50	286	15.8
-10	23.1	0.126	2.27	6.39	250	8.8	22.9	0.131	1.73	6.46	268	10.4	23.0	0.121	1.68	6.47	281	18.5
-11	23.1	0.127	2.25	6.39	253	8.7	22.8	0.133	1.74	6.46	270	10.6						
-12	23.0	0.128	2.25	6.38	255	8.7	22.8	0.134	1.69	6.46	272	11.3						
-13	22.9	0.132	2.35	6.38	257	9.1	22.7	0.137	1.54	6.45	273	11.6						
-14	22.9	0.133	2.36	6.38	259	9.4	22.6	0.138	1.33	6.44	275	11.8						
-15	22.8	0.134	2.42	6.38	260	9.4	22.5	0.140	1.09	6.44	276	12.6						
-16	22.7	0.136	2.39	6.38	263	9.4	22.3	0.143	0.91	6.43	277	11.3						
-17	22.5	0.140	2.40	6.38	265	9.6	22.2	0.145	0.76	6.44	278	12.4						
-18	22.5	0.141	2.21	6.38	266	9.4	22.2	0.146	0.53	6.43	280	10.7						
-19	22.2	0.144	1.99	6.37	268	9.0	21.9	0.152	0.46	6.42	282	10.4						
-20	22.1	0.147	1.48	6.35	271	8.8	21.5	0.157	0.37	6.41	282	10.1						
-21	21.9	0.151	1.10	6.34	272	9.0	21.4	0.161	0.33	6.41	280	10.2						
-22	21.7	0.154	0.83	6.34	274	8.5	21.3	0.163	0.29	6.41	277	10.1						
-23	21.5	0.157	0.61	6.32	275	7.9	21.2	0.165	0.26	6.41	273	10.1						
-24	21.3	0.162	0.39	6.32	276	8.2	21.2	0.167	0.25	6.41	270	10.7						
-25	21.2	0.166	0.43	6.32	276	9.0	21.1	0.170	0.25	6.41	256	12.1						
-26	21.1	0.168	0.29	6.32	275	9.8	21.1	0.172	0.23	6.41	224	12.6						
-27	21.1	0.169	0.24	6.33	272	10.1	21.1	0.171	0.22	6.43	192	15.6						
-28	21.1	0.173	0.25	6.34	263	10.8	21.1	0.173	0.22	6.44	138	20.1						
-29	21.1	0.174	0.21	6.34	250	13.2	21.0	0.179	0.22	6.44	118	29.1						
-30	21.1	0.174	0.19	6.34	194	17.3	20.9	0.183	0.22	6.45	97.5	30.1						
-31	21.0	0.178	0.19	6.38	167	24.1												
-32	21.0	0.179	0.19	6.39	166	25.1												
-33	20.9	0.179	0.19	6.39	158	25.6												
-34	20.9	0.180	0.18	6.39	137	28.6												
-35	20.9	0.184	0.17	6.39	104	28.6												
-36	20.9	0.188	0.16	6.40	72.8	26.6												
-37	20.9	0.191	0.19	6.40	55.1	26.4												
-38	20.8	0.194	0.20	6.41	41.5	22.6												
-39	20.8	0.200	0.18	6.41	30.3	19.1												
-40	20.7	0.208	0.14	6.44	6.2	16.8												
-41	20.7	0.208	0.16	6.45	1.7	17.5												
-42	20.7	0.212	0.15	6.46	-2.3	13.4												
-43	20.5	0.226	0.13	6.46	-18.7	9.2												
-44	20.5	0.236	0.15	6.46	-36.7	6.4												
-45	20.2	0.265	0.14	6.46	-65.8	5.3												
-46	20.0	0.288	0.14	6.49	-87.3	32.7												

Notes:
˚C - degree Celsius
EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - Negative log of the hydrogen ion concentration
Data collected using a YSI 6920.

TABLE C-2
IN SITU WATER QUALITY RESULTS: JUNE 2009
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2

Sample Date	6/5/2009						6/5/20096					
Associated Sample IDs	OU2R-SED-101DC-09, OU2R-SED-101DNW-09, OU2R-SED-101DNE-09, OU2R-SED-101DSE-09, OU2B-SED-101DSW-09						OU2R-SED-102C-09					
Analysis - Method	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU	Temperature - EPA 170.1, ˚C	Specific Conductance - EPA 120.1, mS/cm	Dissolved Oxygen - EPA 360.1, mg/L	pH - EPA 150.1, Standard Units	Oxidation-Reduction Potential - A2580A, mV	Turbidity - EPA 180.1, NTU
Depth (ft) 0	24.4	0.125	6.18	6.85	240	8.9	24.9	0.126	6.60	6.95	170	7.5
-1	24.4	0.126	5.58	6.80	237	10.0	24.7	0.125	5.26	6.84	186	8.2
-2	24.4	0.126	4.98	6.77	235	10.1	24.7	0.125	5.15	6.81	192	8.2
-3	24.3	0.126	4.77	6.74	236	9.4	24.4	0.124	4.77	6.78	197	8.2
-4	23.9	0.129	3.85	6.67	239	10.0	24.2	0.125	4.18	6.71	203	8.9
-5	23.6	0.129	2.61	6.62	241	11.2	24.0	0.126	3.09	6.65	207	9.5
-6	23.4	0.130	1.60	6.55	215	14.5	23.8	0.130	2.11	6.56	104	23.6
-7	23.1	0.134	1.15	6.50	80.3	34.8						
-8												
-9												
-10												
-11												
-12												
-13												
-14												
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Notes:

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EPA - Environmental Protection Agency
ft - feet
mg/L - milligram per liter
mS/cm - milliSiemans per centimeter
mV - millivolt
NTU - nephelometric turbidity unit
pH - Negative log of the hydrogen ion concentration
Data collected using a YSI 6920.

PREPARED BY/DATE: AES 6/29/2009
CHECKED BY/DATE: RMR 7/6/2009

FIGURE C-1
TEMPERATURE TRENDS IN OU-2
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2

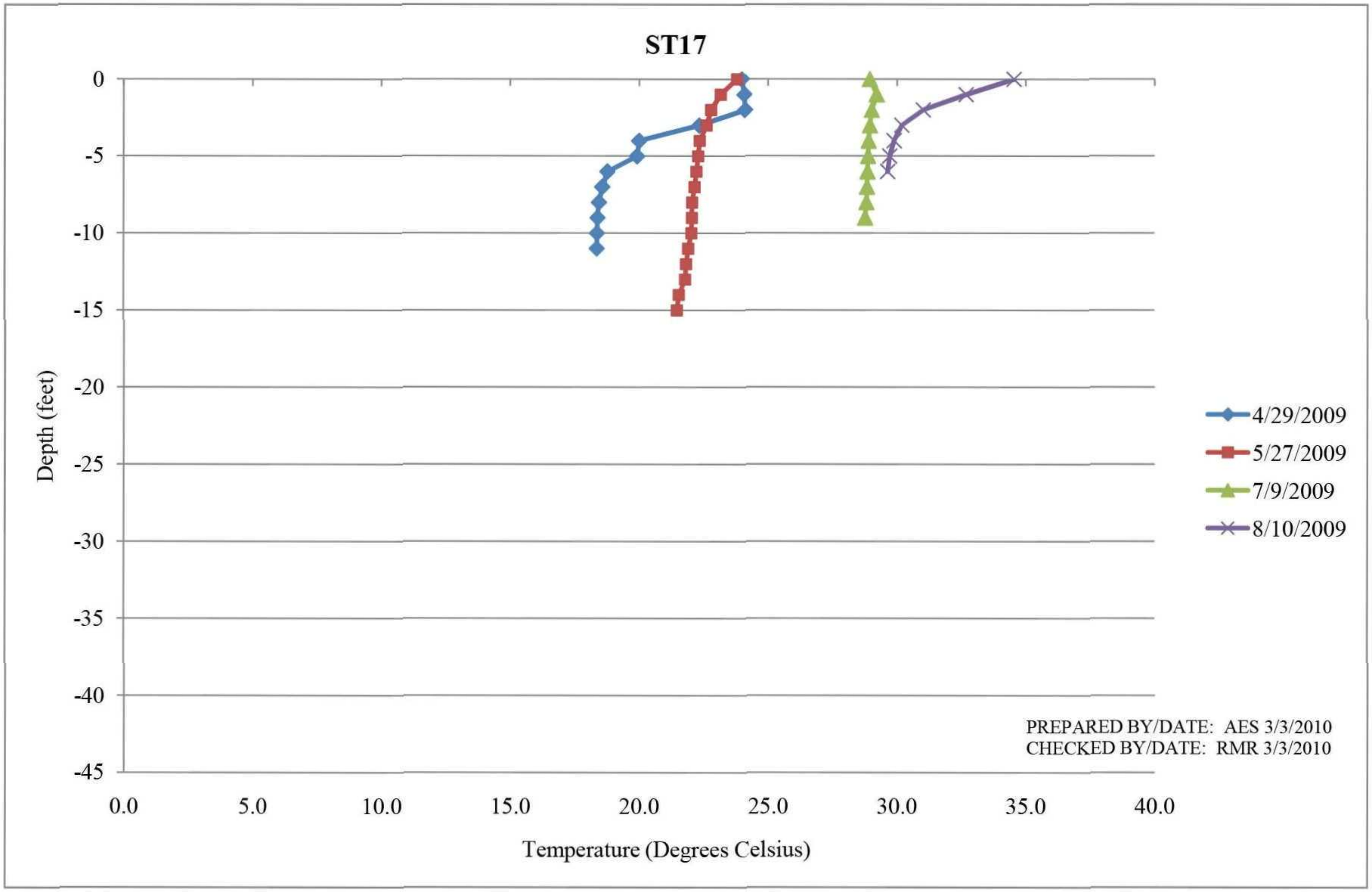

FIGURE C-1
TEMPERATURE TRENDS IN OU-2
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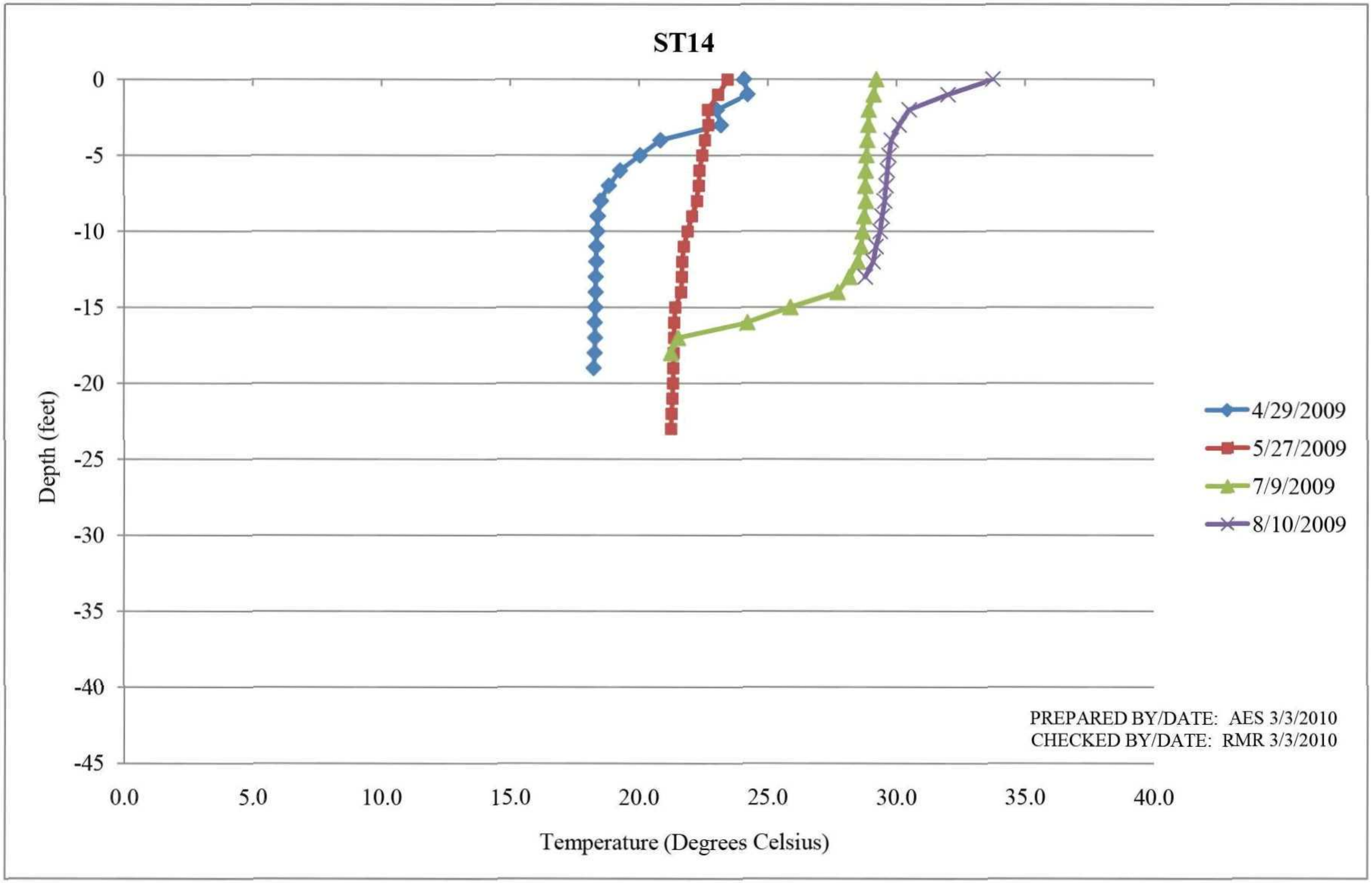
Olin McIntosh OU-2



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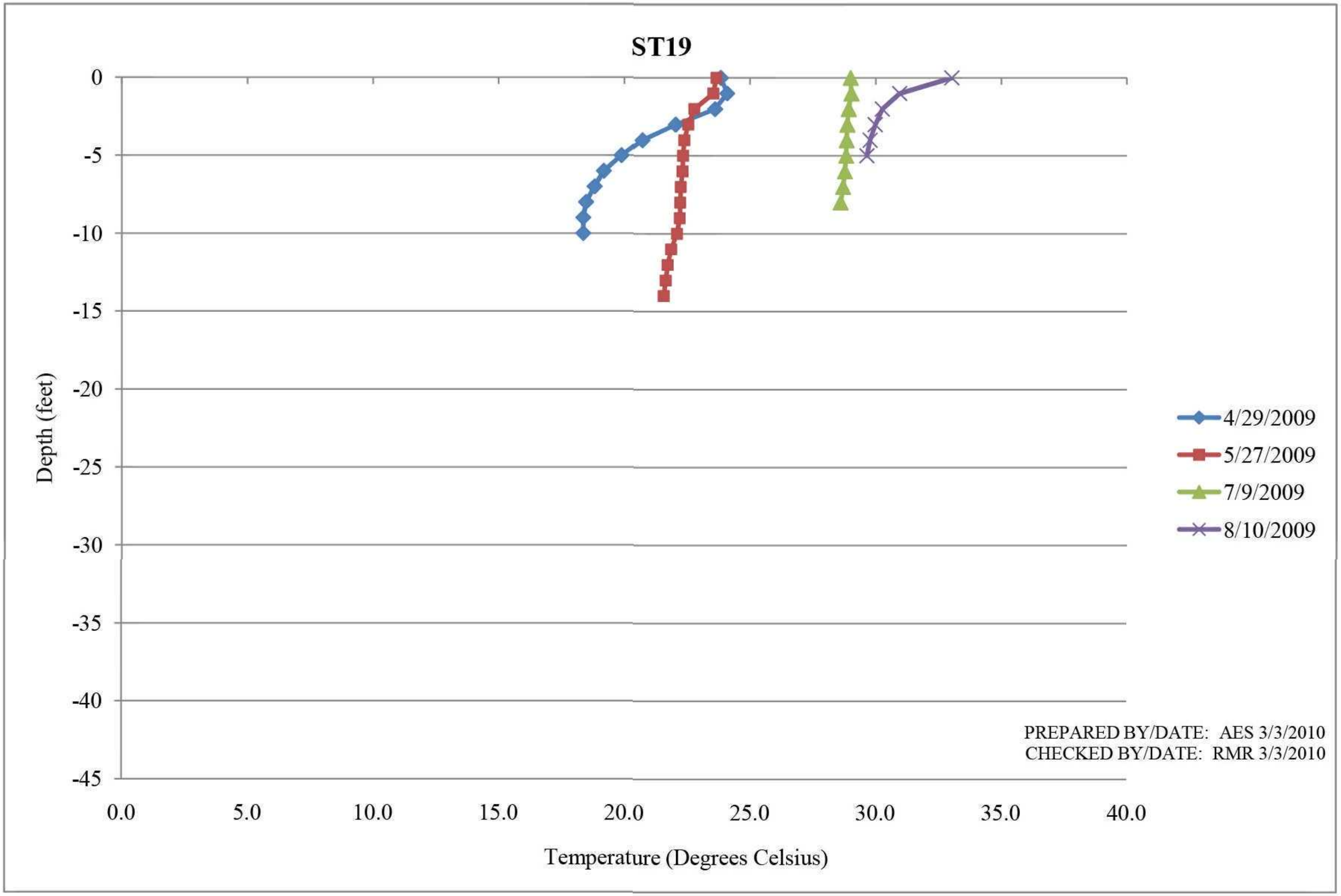
Olin McIntosh OU-2



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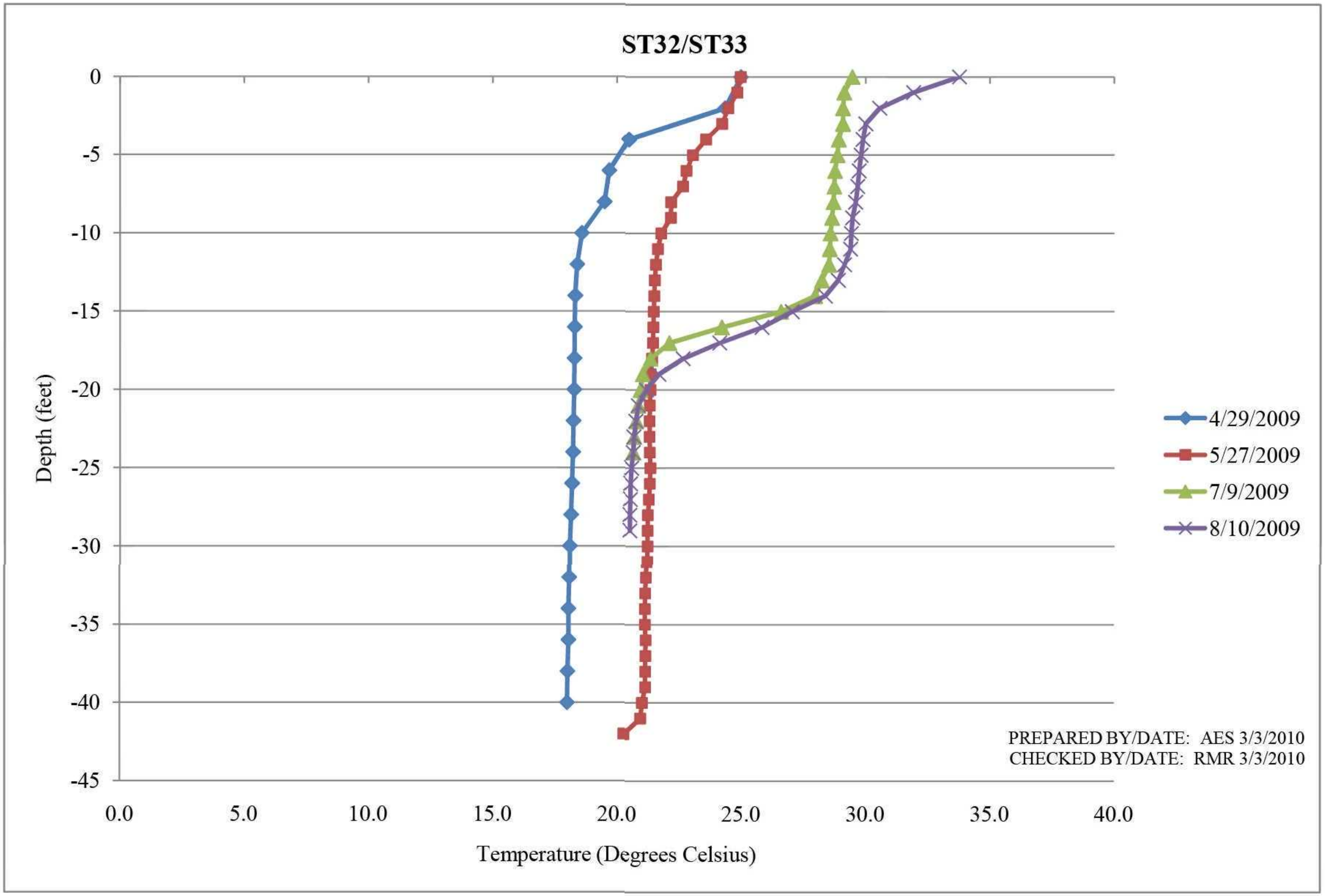
TEMPERATURE TRENDS IN OU-2
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2



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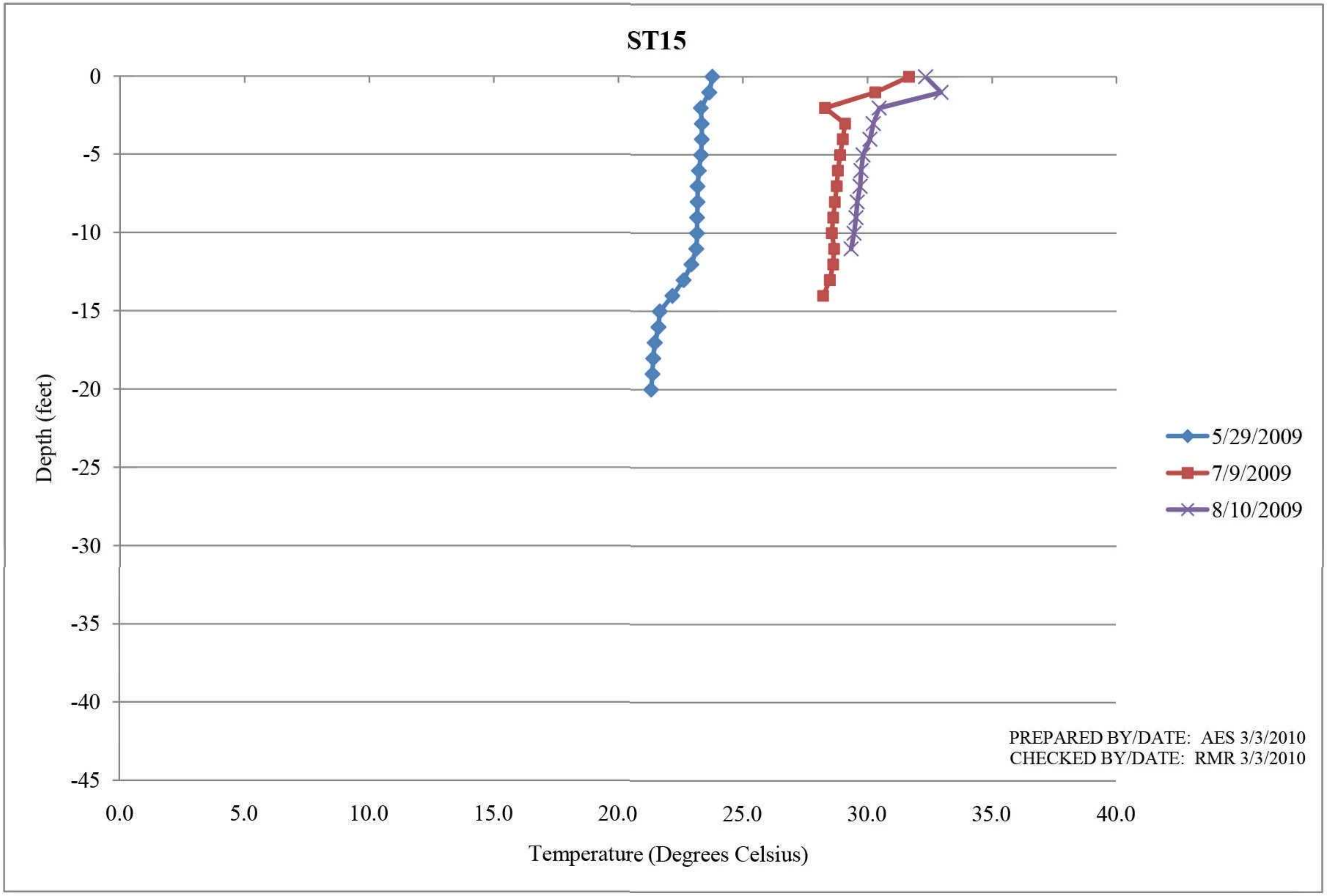
TEMPERATURE TRENDS IN OU-2
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2



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Olin McIntosh OU-2

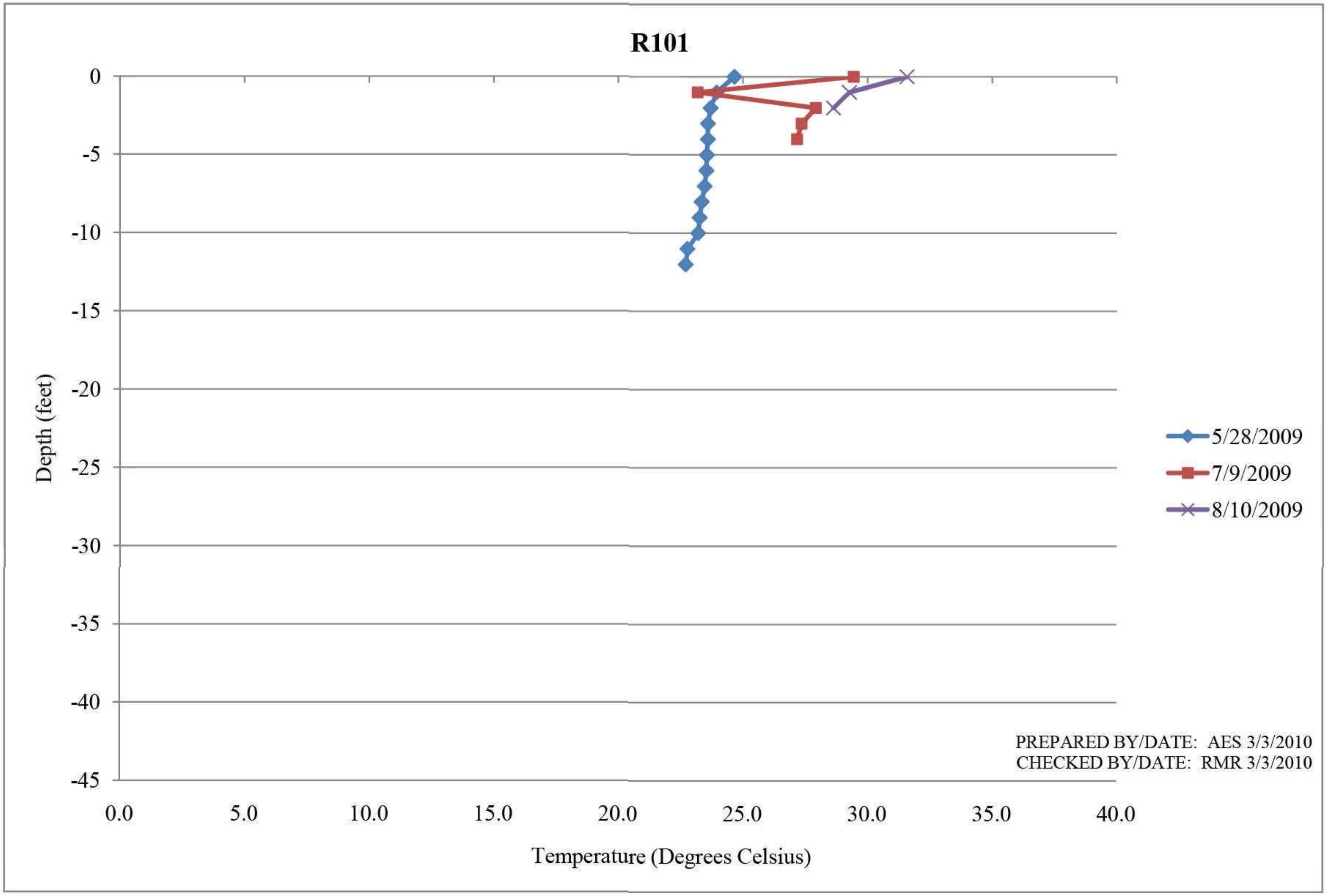


FIGURE C-1
TEMPERATURE TRENDS IN OU-2
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2

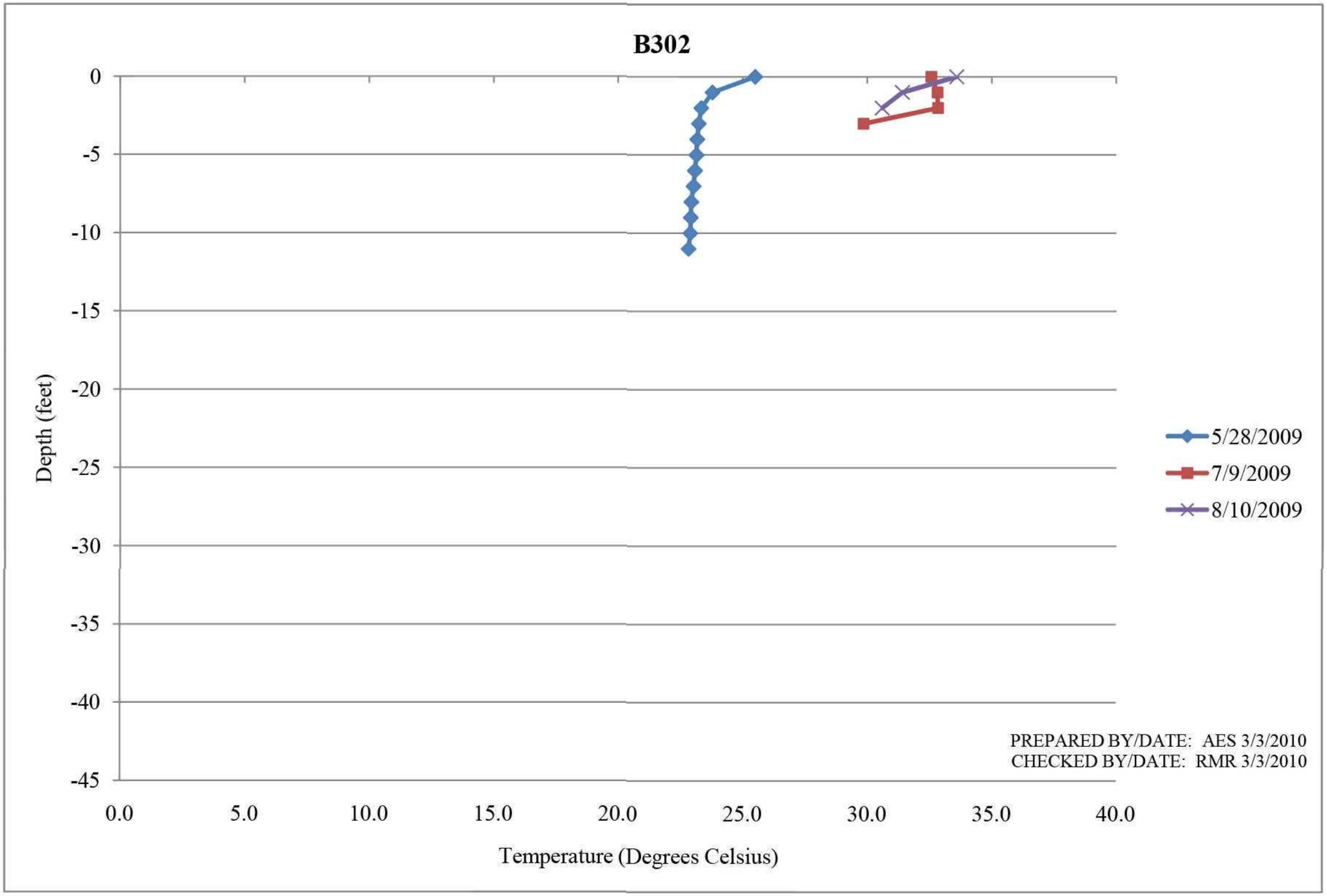
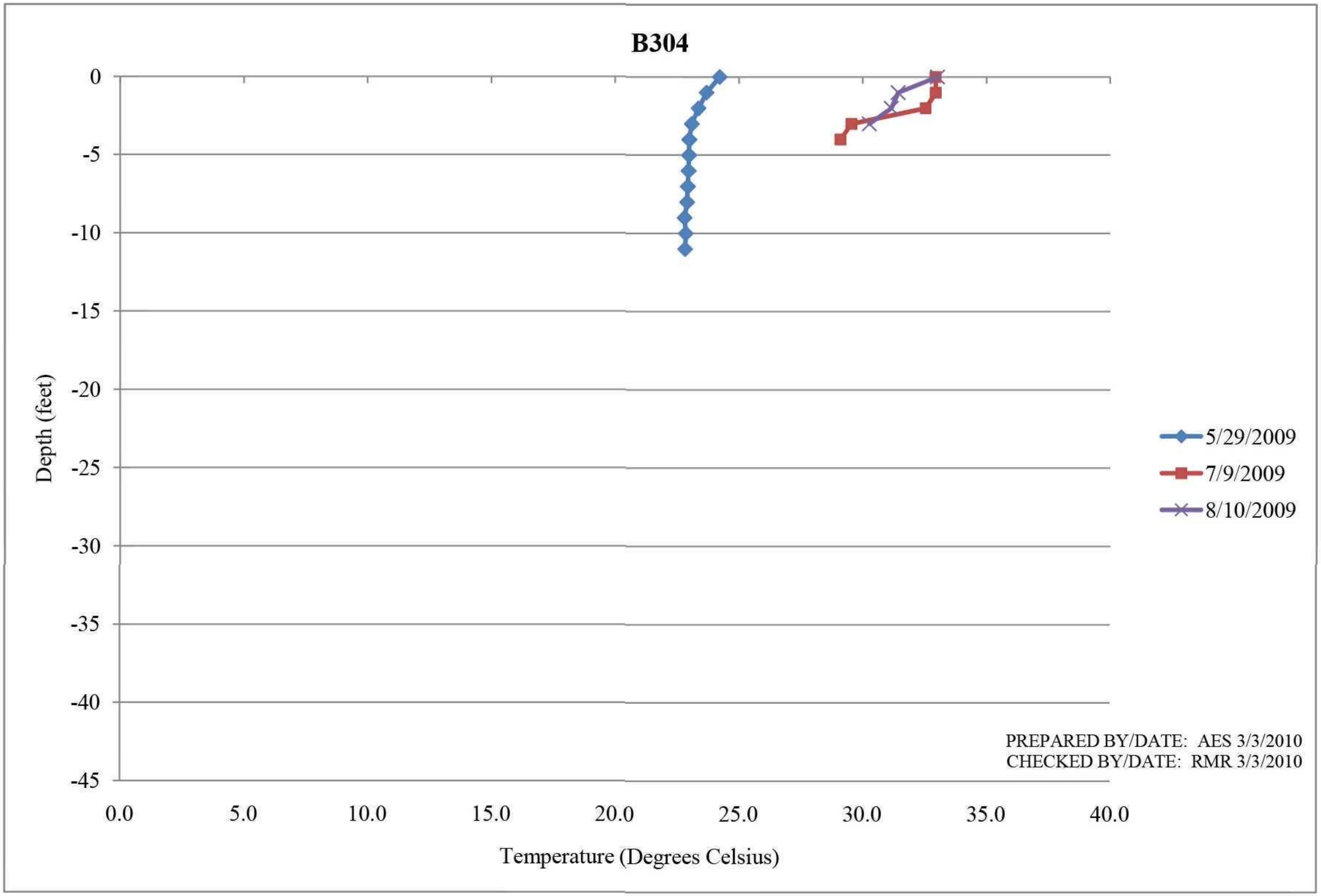


FIGURE C-1
TEMPERATURE TRENDS IN OU-2
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2



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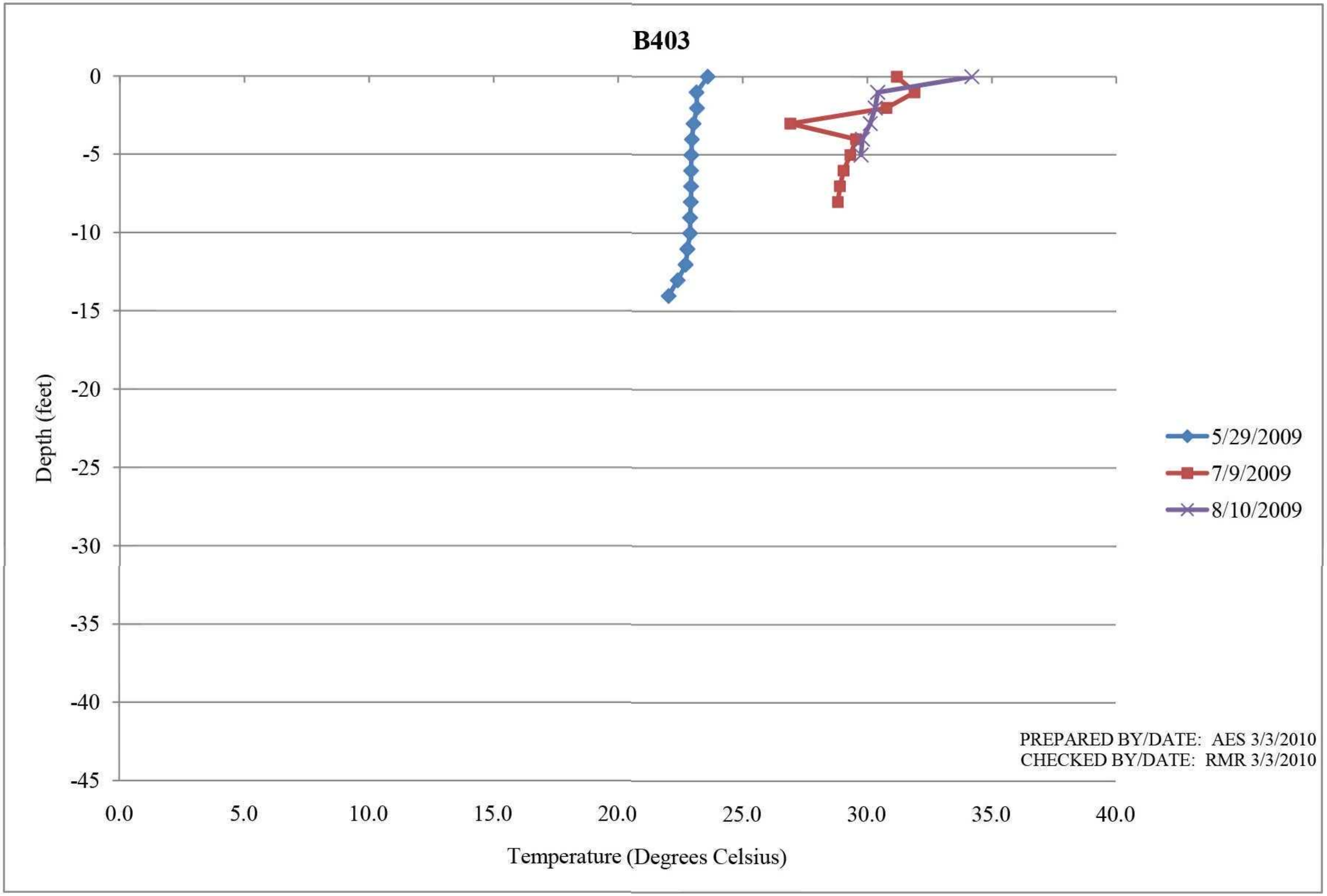
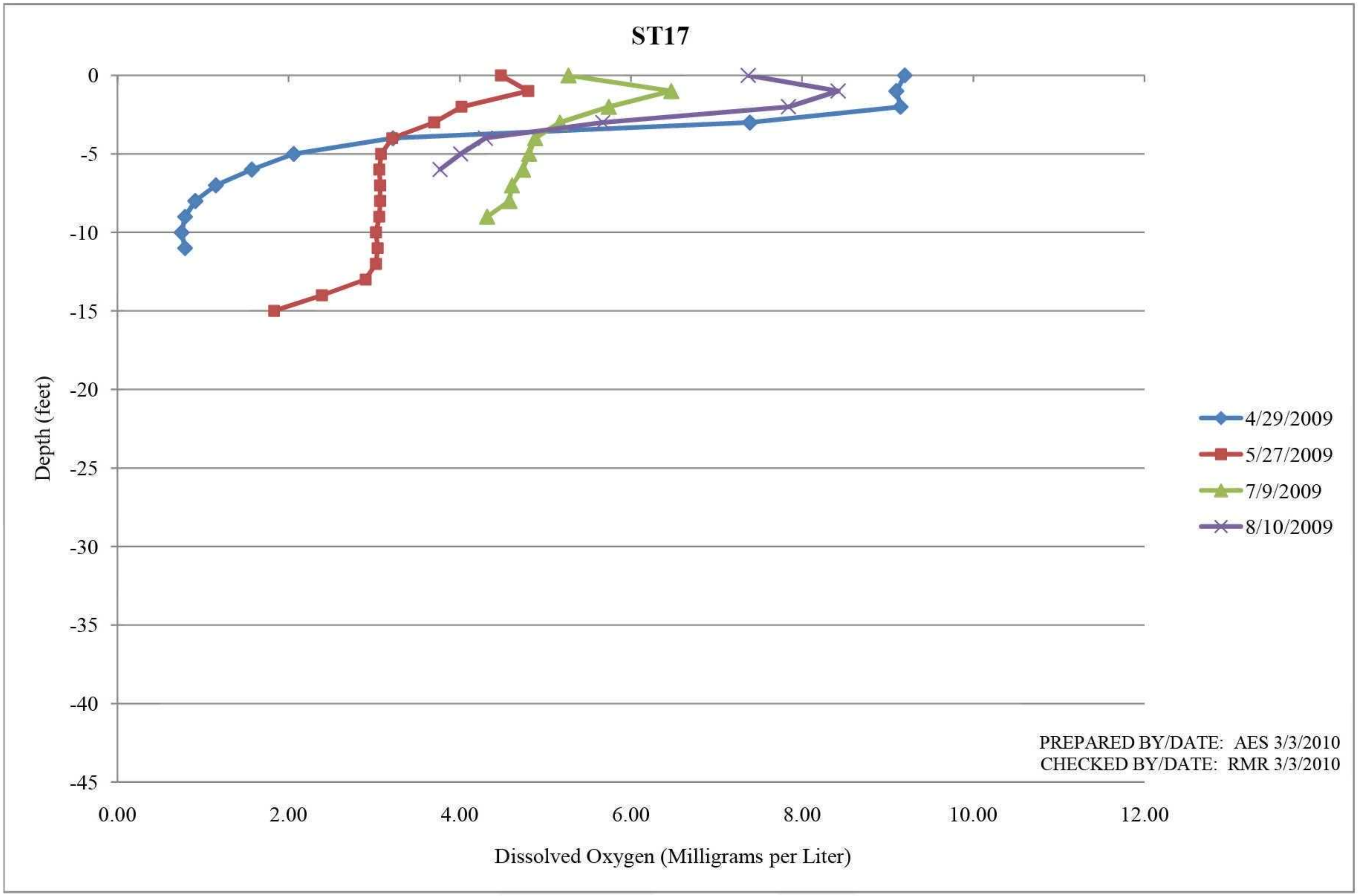
TEMPERATURE TRENDS IN OU-2
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2



PREPARED BY/DATE: AES 3/3/2010
CHECKED BY/DATE: RMR 3/3/2010

FIGURE C-2
DISSOLVED OXYGEN TRENDS IN OU-2
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2



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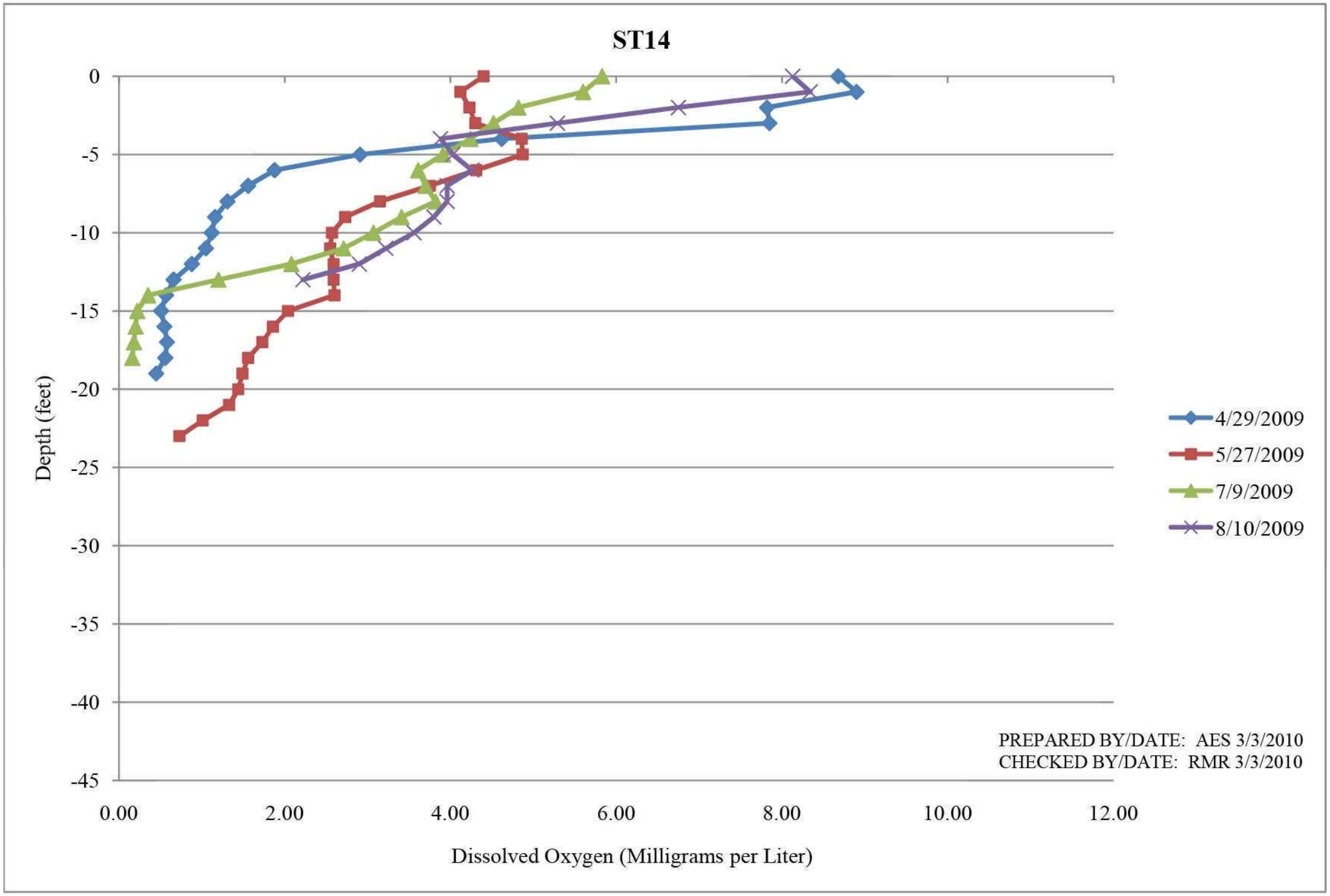
DISSOLVED OXYGEN TRENDS IN OU-2
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2



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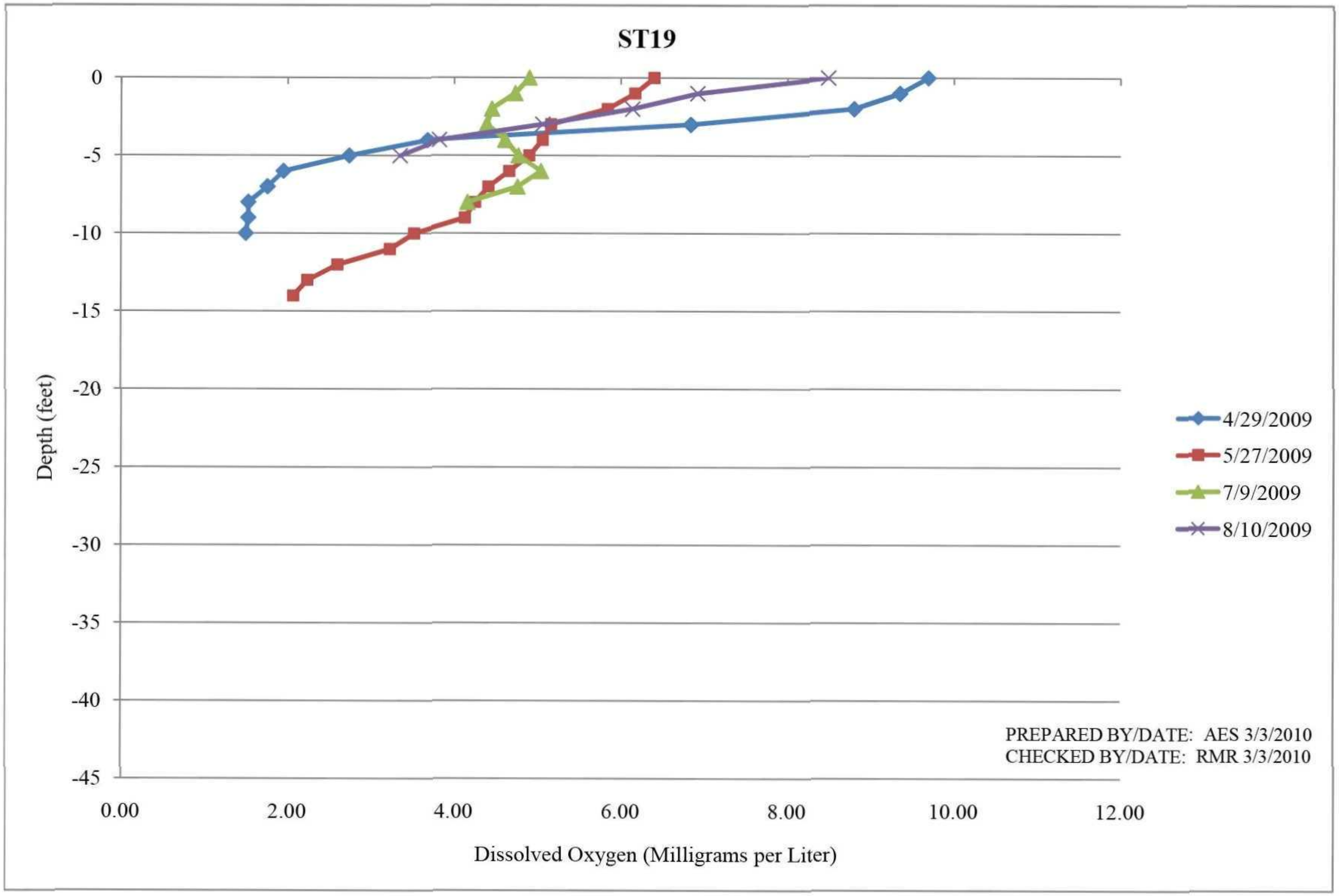
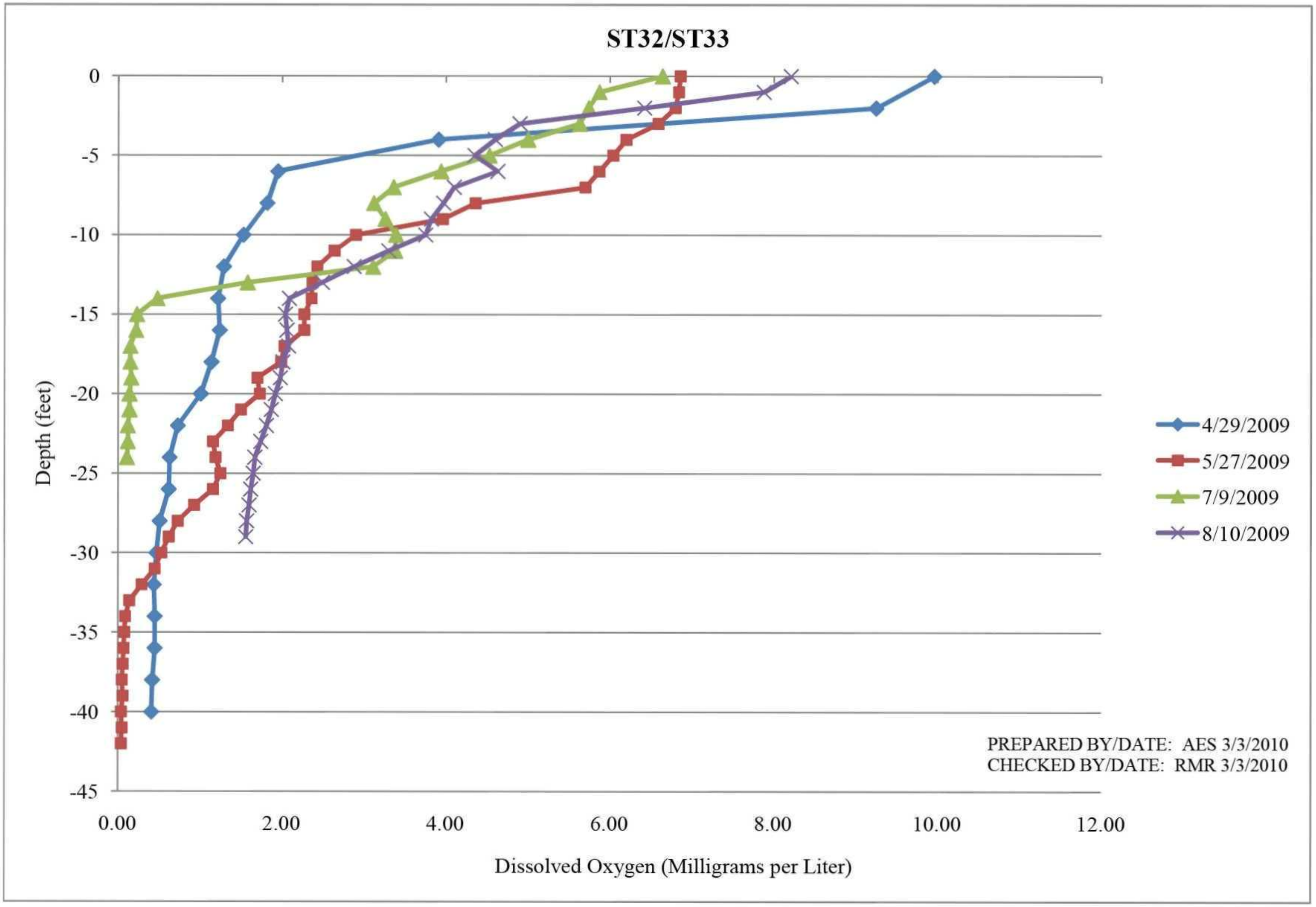
DISSOLVED OXYGEN TRENDS IN OU-2
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2



PREPARED BY/DATE: AES 3/3/2010
CHECKED BY/DATE: RMR 3/3/2010

FIGURE C-2
DISSOLVED OXYGEN TRENDS IN OU-2
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2



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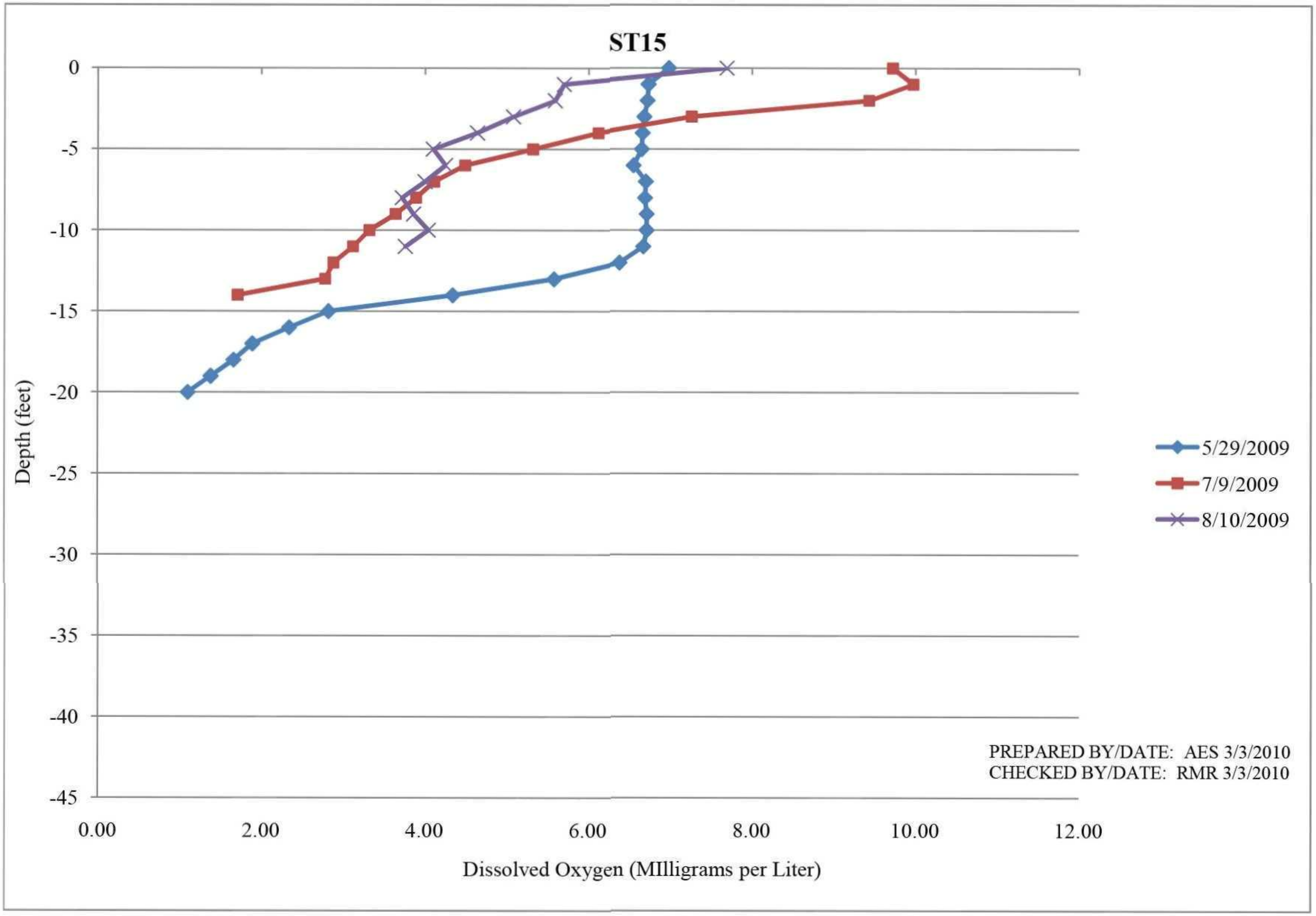
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2



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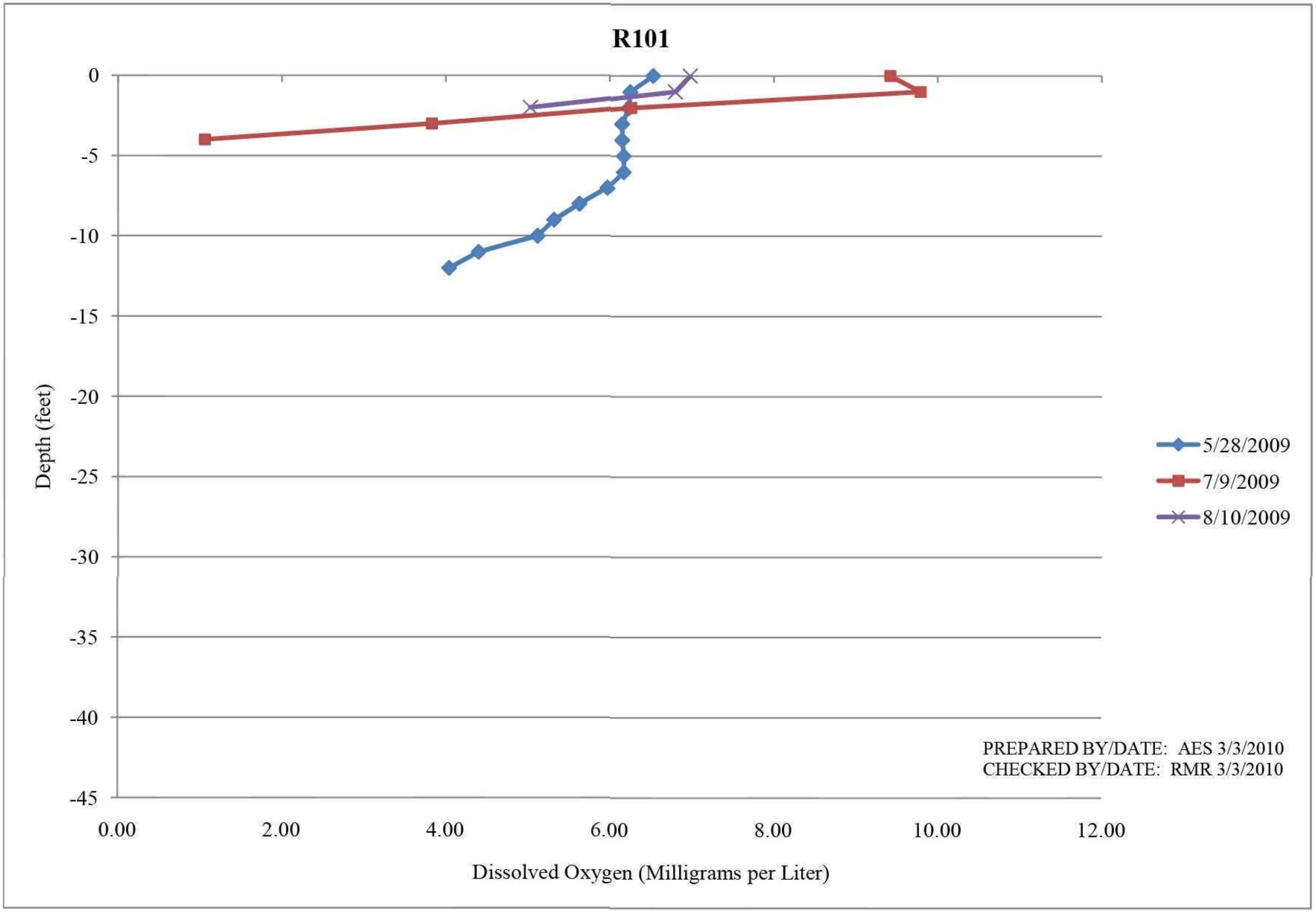
Combined RI Addendum/ESPP Annual Report
Olin McIntosh OU-2



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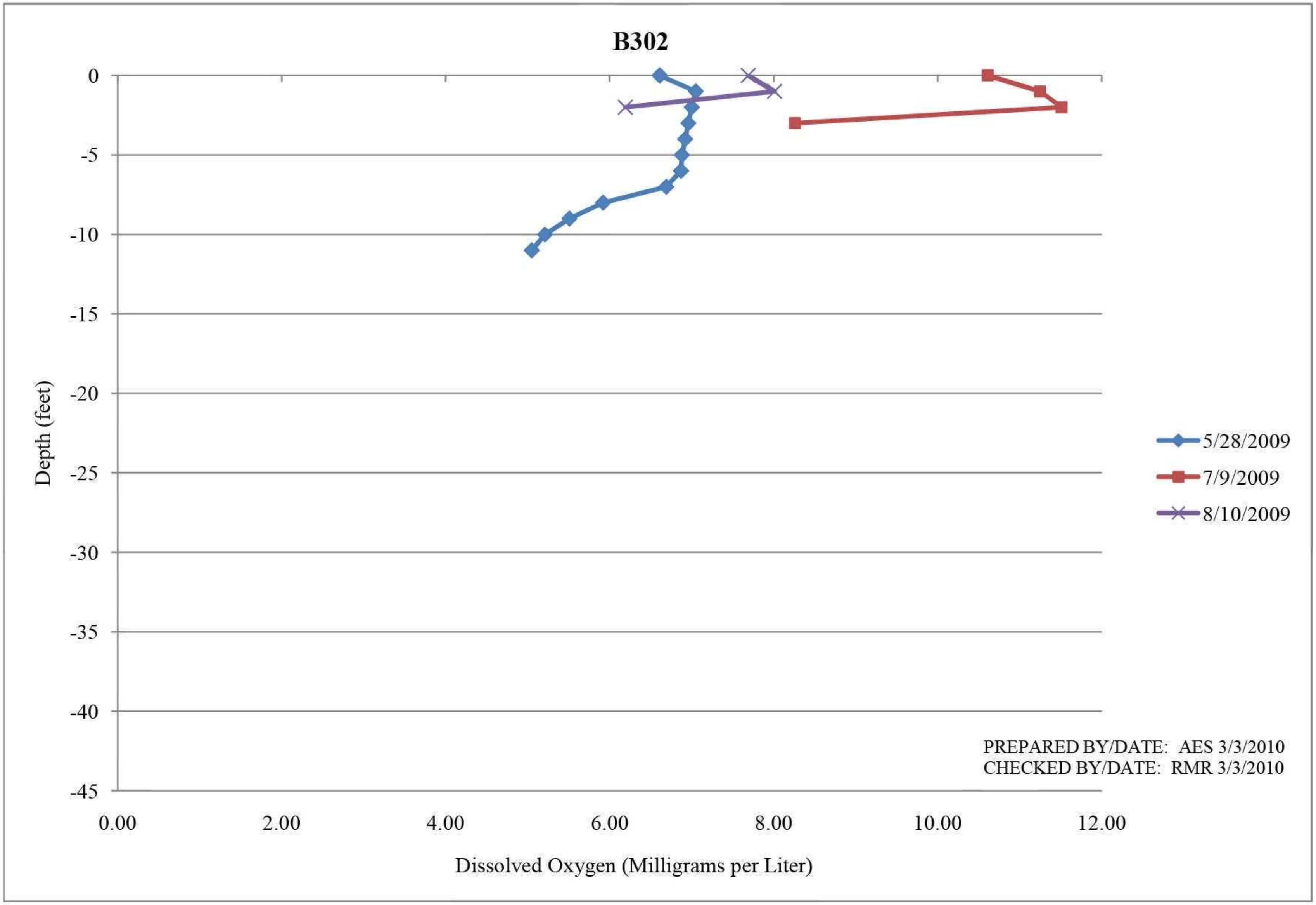
Olin McIntosh OU-2



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DISSOLVED OXYGEN TRENDS IN OU-2
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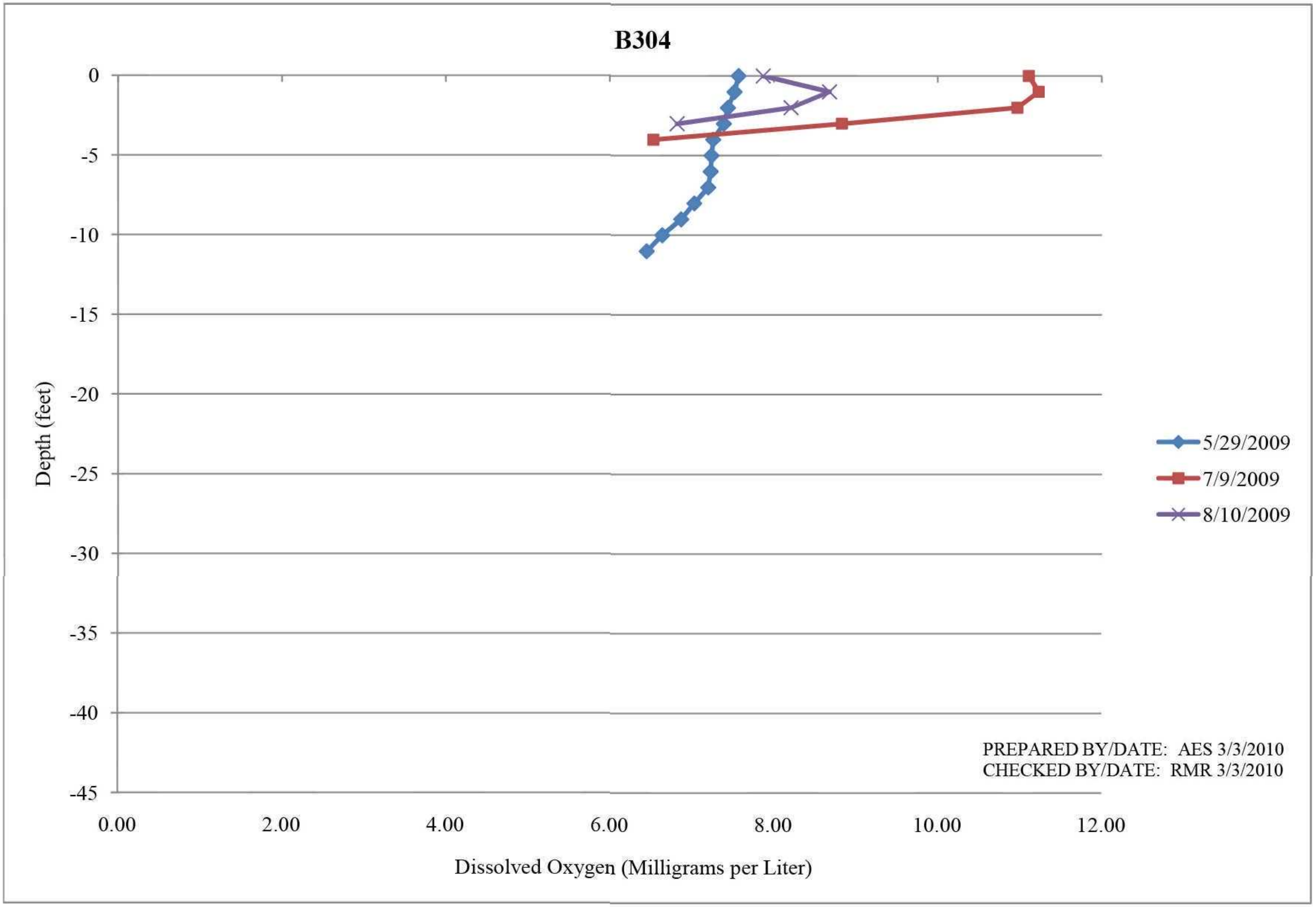

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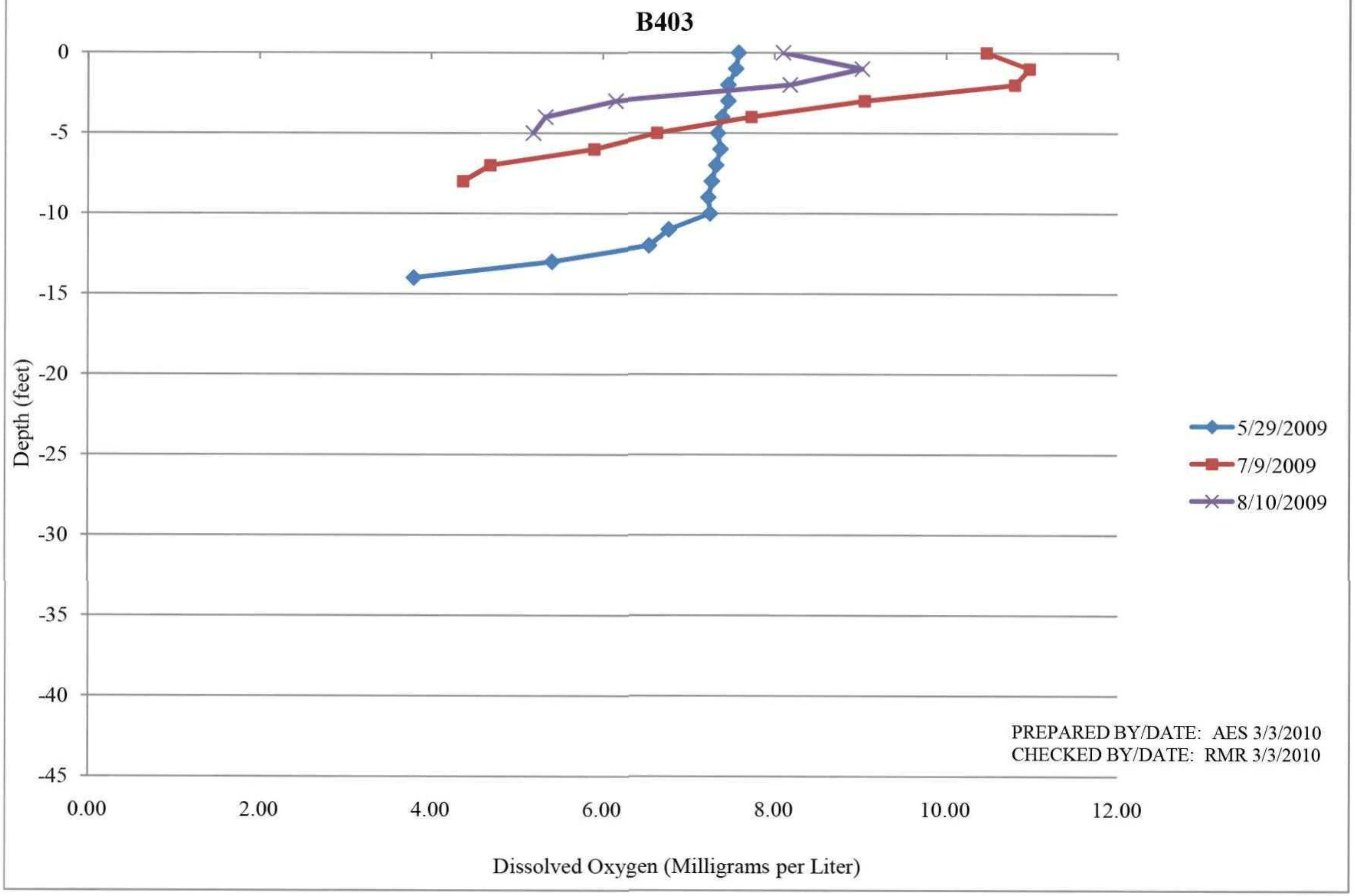


PREPARED BY/DATE: AES 3/3/2010
CHECKED BY/DATE: RMR 3/3/2010

APPENDIX D

BHC-MODEL FOR WIND-DRIVEN RESUSPENSION – INPUTS/OUTPUTS

APPENDIX D

BHC MODEL FOR WIND-DRIVEN RESUSPENSION – INPUTS/OUTPUTS

The purpose of this modeling is to determine the depth of water above which the effect of wind action on resuspension is negligible. The Bachmann-Hoyer-Canfield (BHC) model was chosen for this modeling effort and is presented below:

$$L = \frac{gT^2}{2\pi}$$

Where:

L = wavelength (m)
g = 9.8 m/sec^2
T = wave period (sec)

The wave period (T) is calculated by:

$$\frac{gT}{2\pi U} = 1.20\tanh[0.77(gF/U^2)^{0.25}]$$

Where:

U = wind velocity (m/sec)
F = effective fetch (m)

The waveform evaluated in this equation is assumed to be a perfect sine wave, resulting in wavelength equaling wave height. The wave height is divided by 2 because only the bottom half of the wave can act on the sediments; therefore, dividing the wavelength by 2 gives the depth of effect of the wave.

Determination of Site-Specific Wind Fetch

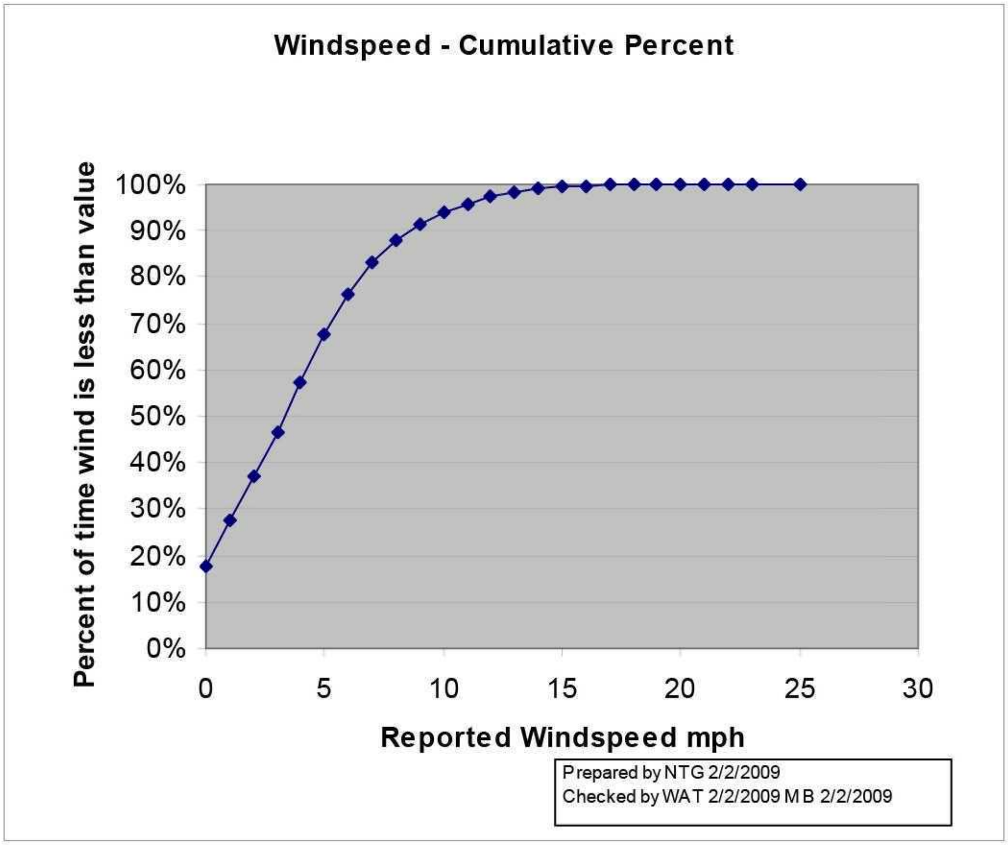
Wind fetch is the distance over which wind can interact with a water body to produce waves. Longer fetches allow for larger waves to form. For a lake or pond, fetch cannot be larger than the physical length of the water body and is generally shorted due to effects of shore obstructions such as trees or hills on wind path. Measurements of the Basin's approximate length in various directions are:

N-S	550 meters
E-W	560 meters
SE-NW	660 meters
SW-NE	550 meters

The maximum fetch at the Basin is 660 meters. This value was used in the BHC model.

Determination of Site-Specific Wind Speeds

Actual wind speed measurements taken at the plant from November 2007 through January 2009 were summarized, and the following chart was developed showing the percentage of time that observed wind speeds were less than a given speed.



This chart shows that calm conditions (wind speed =0) occurred almost 18% of the time, wind speeds less than 5 mph occur about 68% of the time, and speeds in excess of 10 mph occur only about 6% of the time.

Determining Site-specific Depths of Potential Resuspension of Sediments

The BHC formulas were used to estimate the depth of effect from wind-produced waves at a given wind speed.

Wind Speed (mph)	Wind Speed Cumulative Percent	Wind Speed Relative Percent	BHC Depth of Effect = wavelength/2 (feet)
0	18	18	0.0
1	27	10	0.2
2	37	9	0.5
3	47	10	0.8
4	57	11	1.1
5	68	10	1.4
6	76	9	1.7
7	83	7	2.0
8	88	5	2.4
9	91	3	2.7
10	94	3	3.0
11	96	2	3.3
12	97	1	3.7
13	98	1	4.0
14	99	1	4.3
15	99	0	4.6
16	100	0	4.9
17	100	0	5.3
18	100	0	5.6
19	100	0	5.9
20	100	0	6.2
21	100	0	6.6
22	100	0	6.9
23	100	0	7.2
25	100	0	7.8

Prepared by/Date: NTG 2/2/09
Checked by/Date: WAT 2/2/09

The depth of effect of wind-generated waves is approximately 0.8 feet or less 50% of the time. Approximately 75% of the time this depth is 1.73 feet or less. Finally, far less than 0.1% of the time is the depth of effect predicted to be greater than 6 feet. The wavelength is approximately 3 feet or less 94% of the time.

APPENDIX E

CORE BORING LOGS

Site Name:	OLIN-McIntosh, Alabama						
Location ID	SDCR-1	Date:	9/26/2009	Start Time:	11:40	AM	PM
				Finish Time:	16:55	AM	PM
Field Personnel:	F.Mayila, R. Hicks, A. Carringer, Pro-Diving Crew						
Core Tube Diameter:	3-in	Core Tube Length:	10 ft.	Recovered Core:	6 ft.		
NOTES: Encountered Refusal at Approximately 7 ft.							

Sample Depth Interval (in)	Sample Type	Sample Collection Time	Sample Description (grain size, color, and other remarks)	USCS Symbol	Comments
0-12"	S	16:30	soft, dark gray, CLAY	CL	
12-24"	S	16:35	soft, dark gray CLAY mixed with some sand at 2 ft.	CL	
24-36"	S	16:40	soft, dark gray, CLAY with fine sand	CL	
36-48"	S	16:45	soft, dark gray, CLAY	CL	
48-60"	S	16:50	soft, dark gray to black, CLAY	CL	
60-72"	S	16:55	soft, dark gray, CLAY mixed with fine sand	CL	

Sample Type: W = Water; S = Soil or Sediment

Site Name: OLIN-McIntosh, Alabama							
Location ID	SDCR-2	Date:	9/24/2009	Start Time:	10:15	☑ AM	☐ PM
				Finish Time:	11:00	☑ AM	☐ PM
Field Personnel:	F. Maylia/E. Guillen	Drillers:	Kevin Sondag/Jeff Clemens-Aqua Survey (ASI)				
Core Tube Diameter:	4-in	Core Tube Length:	11.5 ft	Recovered Core:	9.5 ft		

Sample Depth Interval (in)	Blow Counts	Sample Collection Time	Sample Description (grain size, color, and other remarks)	USCS Symbol	Comments
0-10"			very soft, dark grey clayey silt	CL	
10-20"			very soft, light brown silty CLAY, relic shells of corbicula	CL	
20-30"			soft and firm, dark grey-greenish, CLAY, corbicula shelll	CL	
30-40"			"same"	CL	
40-50"			"same" with some wood chips/debris	OH	
50-60"			firm, Dark grey, CLAY, color grades into greenish	CL	
60-70"			firm, dark grey-greenish CLAY	CL	
70-80"			firm, dark grey CLAY	CL	
80-90"			firm, dark grey CLAY	CL	
90-100"			firm, dark grey CLAY, interlayered w/ wood chips	OH	
100-110"			Firm, dark grey CLAY	CL	
110-114"			Firm, dary grey CLAY	CL	

Sample Type: W = Water; S = Soil

Site Name: OLIN-McIntosh, Alabama						
Location ID	SDCR-3	Date:	9/27/2009	Start Time:		☑ AM ☐ PM
				Finish Time:	10:25	☑ AM ☐ PM
Field Personnel:	F. Maylia/E. Guillen	Drillers:	Kevin Sondag/Jeff Clemens-Aqua Survey (ASI)			
Core Tube Diameter:	4-in	Core Tube Length:	11 ft	Recovered Core:	9 ft	

Sample Depth Interval (in)	Blow Counts	Sample Collection Time	Sample Description (grain size, color, and other remarks)	USCS Symbol	Comments
0-11"					
11-22"			very soft, dark grey-black, CLAY, plant matter	CL	
22-33"			soft, dark grey-black, CLAY, organic/plant matter	CL	
33-44"			soft, dark grey-dark greenish, CLAY	CL	
44-55"			soft, dark grey-black, CLAY, plant matter	CL	
55-66"			soft, dark grey, CLAY	CL	
66-77"			soft, dark grey, CLAY	CL	
77-88"			soft, dark grey, CLAY	CL	
88-99"			Firm/soft, dark grey, CLAY	CL	
99-108"			Firm, dark grey, CLAYEY SILT	CL	

Sample Type: W = Water; S = Soil

Site Name: OLIN-McIntosh, Alabama						
Location ID	SDCR-4	Date:	9/26/2009	Start Time:		☑ AM ☐ PM
				Finish Time:	11:30	☑ AM ☐ PM
Field Personnel:	F. Maylia/E. Guillen	Drillers:	Kevin Sondag/Jeff Clemens-Aqua Survey (ASI)			
Core Tube Diameter:	4-in	Core Tube Length:	9.5 ft	Recovered Core:	8.25 ft	

Sample Depth Interval (in)	Blow Counts	Sample Collection Time	Sample Description (grain size, color, and other remarks)	USCS Symbol	Comments
0-11"			very soft, dark grey, black, CLAY	CL	
11-22"			very soft, dark grey-black, CLAY	CL	
22-33"			soft, dark to light grey, CLAY	CL	
33-44"			soft, dark to light grey, CLAY, wood chip	CL	
44-55"			soft, dark grey to black, CLAY	CL	
55-66"			soft, dark grey to black, CLAY	CL	
66-77"			soft/firm, dark grey, CLAY	CL	
77-88"			soft/firm, dark grey, CLAY, plant matter	CL	
88-99"			soft/firm, dark grey, CLAY	CL	

Sample Type: W = Water; S = Soil

Site Name: OLIN-McIntosh, Alabama							
Location ID	SDCR-5	Date:	9/26/2009	Start Time: / Finish Time:	13:20	☐ AM ☐ AM	☐ PM ☐ PM
Field Personnel:	F. Maylia/E. Guillen	Drillers:	Kevin Sondag/Jeff Clemens-Aqua Survey (ASI)				
Core Tube Diameter:	4-in	Core Tube Length:	9.5 ft	Recovered Core:	8.0 ft		

Sample Depth Interval (in)	Blow Counts	Sample Collection Time	Sample Description (grain size, color, and other remarks)	USCS Symbol	Comments
0-11"			very soft, black, CLAY, over 50% organic matter. layered	CL	
11-22"			very soft, black, CLAY, over 50% organic matter. interlayered	CL	
22-33"			soft, black, CLAY, over 50% organic matter. interlayered	CL	
33-44"			soft, black, CLAY	CL	
44-55"			soft, grey, CLAY	CL	
55-66"			soft, grey, CLAY, some organic matter, leaves-decomposed	CL	
66-77"			soft, grey, CLAY	CL	
77-88"			firm, grey, CLAY	CL	
88-99"			firm, grey, CLAY	CL	

Sample Type: W = Water; S = Soil

Site Name: OLIN-McIntosh, Alabama							
Location ID	SDCR-6	Date:	9/26/2009	Start Time:		☐ AM	☐ PM
				Finish Time:	14:10	☐ AM	☐ PM
Field Personnel:	F. Maylia/E. Guillen	Drillers:	Kevin Sondag/Jeff Clemens-Aqua Survey (ASI)				
Core Tube Diameter:	4-in	Core Tube Length:	9.5 ft	Recovered Core:	8.2 ft		

Sample Depth Interval (in)	Blow Counts	Sample Collection Time	Sample Description (grain size, color, and other remarks)	USCS Symbol	Comments
0-11"			very soft, black, CLAY, some plant matter-ocassional	CL	
11-22"			very soft, black, CLAY, with some plant matter-ocassional	CL	
22-33"			soft, dark grey, CLAY	CL	
33-44"			soft, dark grey, CLAY	CL	
44-55"			soft, dark grey, CLAY, some plant matter	CL	
55-66"			firm, dark grey-greenish, CLAY	CL	
66-77"			firm, dark grey-greenish, CLAY	CL	
77-88"			firm, dark grey-greenish, CLAY	CL	
88-98"			firm, dark grey-greenish, CLAY	CL	

Sample Type: W = Water; S = Soil

Site Name: OLIN-McIntosh, Alabama						
Location ID	SDCR-7	Date:	9/26/2009	Start Time: / Finish Time:	14:55	☐ AM ☐ PM / ☐ AM ☐ PM
Field Personnel:	F. Maylia/E. Guillen	Drillers:	Kevin Sondag/Jeff Clemens-Aqua Survey (ASI)			
Core Tube Diameter:	4-in	Core Tube Length:	9.5 ft	Recovered Core:	8.25 ft	

Sample Depth Interval (in)	Blow Counts	Sample Collection Time	Sample Description (grain size, color, and other remarks)	USCS Symbol	Comments
0-11"			very soft, dark + black, CLAY	CL	
11-22"			soft, dark grey , CLAY, w/ some plant matter	CL	
22-33"			soft, dark grey-greenish, CLAY	CL	
33-44"			soft, dark grey, CLAY	CL	
44-55"			soft, dark grey, CLAY	CL	
55-66"			soft, dark grey, CLAY, brownish spots	CL	
66-77"			soft, dark grey, CLAY	CL	
77-88"			soft, dark grey-greenish, CLAY	CL	
88-99"			soft, dark grey-greenish, CLAY	CL	

Sample Type: W = Water; S = Soil

Site Name: OLIN-McIntosh, Alabama						
Location ID	SDCR-8	Date:	9/27/2009	Start Time: / Finish Time:	14:35	☐ AM ☐ PM / ☐ AM ☐ PM
Field Personnel:	F. Maylia/E. Guillen	Drillers:	Kevin Sondag/Jeff Clemens-Aqua Survey (ASI)			
Core Tube Diameter:	4-in	Core Tube Length:	11 ft	Recovered Core:	10.2 ft	

Sample Depth Interval (in)	Blow Counts	Sample Collection Time	Sample Description (grain size, color, and other remarks)	USCS Symbol	Comments
0-10"			very soft,black, CLAY	CL	
10-20"			very soft,black, CLAY, organic matter	CL	
20-30"			very soft,black, CLAY, organic matter	CL	
30-40"			very soft,black, CLAY, interlayered with organic matter	CL	
40-50"			very soft,black, CLAY, interlayered with organic matter	CL	
50-60"			very soft,grey, CLAY, some organic matter	CL	
60-70"			very soft,grey, CLAY	CL	
70-80"			very soft,grey, CLAY	CL	
80-90"			very soft,grey, CLAY	CL	
90-100"			very soft,grey, CLAY	CL	
100-110"			very soft,grey, CLAY	CL	
110-120"			very soft,grey, CLAY	CL	

NOTE: Organic matter (black matter) is from the surface to approx. 5.5 ft.
Sample Type: W = Water; S = Soil

Site Name: OLIN-McIntosh, Alabama							
Location ID	SDCR-9	Date:	9/25/2009	Start Time: / Finish Time:	15:30	☐ AM ☐ AM	☐ PM ☐ PM
Field Personnel:	F. Maylia/E. Guillen	Drillers:	Kevin Sondag/Jeff Clemens-Aqua Survey (ASI)				
Core Tube Diameter:	4-in	Core Tube Length:	6.5 ft	Recovered Core:	5.8 ft		

Sample Depth Interval (in)	Blow Counts	Sample Collection Time	Sample Description (grain size, color, and other remarks)	USCS Symbol	Comments
0-11"			very soft, dark grey-black, CLAY, plant matter	CL	
11-22"			very soft, dark grey-black, CLAY, plant matter	CL	
22-33"			very soft, black, CLAY	CL	
33-44"			soft, black, CLAY	CL	
44-55"			soft, dark grey, CLAY	CL	
55-66"			soft, grey, CLAY	CL	
66-72"			soft, grey, CLAY	CL	

Sample Type: W = Water; S = Soil

Site Name: OLIN-McIntosh, Alabama								
Location ID	SDCR-10	Date:	9/26/2009	Start Time:	8:00	☐ AM	☐ PM
				Finish Time:	9:30	☐ AM	☐ PM
Field Personnel:	F. Maylia/E. Guillen	Drillers:	Kevin Sondag/Jeff Clemens-Aqua Survey (ASI)				
Core Tube Diameter:	4-in	Core Tube Length:	6.5 ft	Recovered Core:	5.7 ft		

Sample Depth Interval (in)	Blow Counts	Sample Collection Time	Sample Description (grain size, color, and other remarks)	USCS Symbol	Comments
0-11"			4" of mostly water (60%) and 40% silty clay	CL	
11-22"			soft, dark grey to black, CLAY, high organic matter	CL	
22-33"			soft, dark grey to black, CLAY, organic matter	CL	
33-44"			soft, dark grey + black, light brown spots, CLAY	CL	
44-55"			soft, dark grey, CLAY	CL	
55-66"			soft, grey, CLAY	CL	
66-72"			soft, grey, CLAY	CL	
			NOTE: smells like H_2S - Hydrogen Sulfide	CL	

Sample Type: W = Water; S = Soil

Site Name: OLIN-McIntosh, Alabama							
Location ID	SDCR-11	Date:	9/26/2009	Start Time:	9:40	☐ AM	☐ PM
				Finish Time:	10:10	☐ AM	☐ PM
Field Personnel:	F. Maylia/E. Guillen	Drillers:	Kevin Sondag/Jeff Clemens-Aqua Survey (ASI)				
Core Tube Diameter:	4-in	Core Tube Length:	6.5 ft	Recovered Core:	5.8 ft		

Sample Depth Interval (in)	Blow Counts	Sample Collection Time	Sample Description (grain size, color, and other remarks)	USCS Symbol	Comments
0-11"			soft, dark grey-black, CLAY, organic matter	CL	
11-22"			soft, dark grey-black, CLAY, organic matter	CL	
22-33"			soft, grey, CLAY, organic matter	CL	
33-44"			soft, dark grey, CLAY, organic matter, leaves	CL	
44-55"			soft, dark grey, CLAY, organic matter	CL	
55-66"			soft, dark grey, CLAY, organic matter	CL	
66-72"			soft, dark grey, CLAY, organic matter	CL	

Sample Type: W = Water; S = Soil

Site Name: OLIN-McIntosh, Alabama						
Location ID	SDCR-12	Date: 9/25/2009	Start Time: 13:25 ☐ AM ☐ PM	Finish Time: 14:15 ☐ AM ☐ PM		
Field Personnel:	F. Maylia/E. Guillen	Drillers: Kevin Sondag/Jeff Clemens-Aqua Survey (ASI)				
Core Tube Diameter:	4-in	Core Tube Length: 6.5 ft	Recovered Core: 5.75 ft			

Sample Depth Interval (in)	Blow Counts	Sample Collection Time	Sample Description (grain size, color, and other remarks)	USCS Symbol	Comments
0-11"			very soft, dark grey, CLAY, w/ some wood debris	CL	
11-22"			very soft, dark black, CLAY, plant matter, wood chips	CL	
22-33"			very soft, dark grey-black CLAY	CL	
33-44"			very soft, dark grey to black CLAY, plant matter	CL	
44-55"			soft, dark grey CLAY	CL	
55-66"			very soft, dark grey CLAY	CL	
66-72"			very soft, dark grey CLAY	CL	

Sample Type: W = Water; S = Soil

Site Name: OLIN-McIntosh, Alabama					
Location ID: SDCR-13	Date: 9/25/2009	Start Time: 14:25	☐ AM ☐ PM		
		Finish Time: 14:45	☐ AM ☐ PM		
Field Personnel: F. Maylia/E. Guillen	Drillers: Kevin Sondag/Jeff Clemens-Aqua Survey (ASI)				
Core Tube Diameter: 4-in	Core Tube Length: 6.5 ft	Recovered Core: 6 ft			

Sample Depth Interval (in)	Blow Counts	Sample Collection Time	Sample Description (grain size, color, and other remarks)	USCS Symbol	Comments
0-11"			very soft, dark grey, CLAY, some plant matter	CL	
11-22"			soft, dark grey, CLAY, some plant matter	CL	
22-33"			soft, dark grey, CLAY	CL	
33-44"			soft, dark grey-black, CLAY, some plant matter	CL	
44-55"			soft, dark grey-black, CLAY, some plant matter	CL	
55-66"			soft, dark grey-black, CLAY	CL	
66-72"			soft, dark grey, CLAY	CL	

NOTE: Organic matter (black matter) is from the surface to approx. 5.5 ft.
Sample Type: W = Water; S = Soil

APPENDIX F

EVALUATION OF SEDIMENTATION RATE (ANCHOR QEA)

ANCHOR QEA

305 West Grand Avenue, Suite 300
Montvale, New Jersey 07645
Phone 201.930.9890
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TECHNICAL MEMORANDUM

To:	Cynthia Draper, MACTEC	**Date:**	May 3, 2010
From:	Ricardo Petroni, Anchor QEA, LLC	**Project:**	090320-01
Cc:	Files		
Re:	Estimation of Net Sedimentation Rates in Olin OU2 Basin		

OBJECTIVE

The objective of this study is to estimate the sediment load to and net sedimentation rates in the Olin OU-2 Basin. These estimates are primarily based on data collected by MACTEC and Olin from 2005 through 2009.

DATA COMPILATION

The data provided by MACTEC are presented below:

- The bathymetry and topography of the OU-2 Basin based on surveys conducted by MACTEC in 2005 to 2007 and 1985 U.S. Geological Survey (USGS) maps.
- Water stage height inside the Basin and total suspended solids (TSS) concentration data in the Tombigbee River from 2005 to 2009.
- TSS concentration measurements inside the OU-2 Basin for several storm events during 2008 and 2009.
- Grain size distribution of suspended sediments collected during a storm event in October 2009.
- Water stage height at the Leroy gauging station and flow rate data at the Coffeeville Lock and Dam gauging station. Both data sets were obtained from the USGS website.
- Long-tube testing report (MACTEC 2006).
- Analysis of erosion rate data from sediment cores collected inside the Basin (Sea Engineering 2006).
- Baseline Enhanced Sedimentation Pilot Project (ESPP) Sampling report (MACTEC 2007).

- Evaluation of Monitored Natural Recovery Concept for the Olin OU-2 Site (Scott 2008a).
- Analysis of 2008 Olin Storm Water Sampling Data for Selected Locations in OU-2 (Scott 2008b).

Spatial distributions of TSS concentration data measured inside the OU-2 Basin during 2008 and 2009 are presented in Appendix A.

CONCEPTUAL SITE MODEL

A conceptual site model (CSM) is a useful tool for understanding sediment transport processes in the OU-2 Basin. In general, a CSM is a narrative or graphical representation of processes that influence the transport and fate of physical media (e.g., water, soil, sediment) within a study area of interest. Based on a review of data and information obtained for this study area, the following CSM was developed for the OU-2 Basin.

The Olin OU-2 Basin is connected to the Tombigbee River (river) by a channel and surrounded by a berm. The channel has a gate that allows opening and closing of the connection between the Basin and the river. When the river is at a stage height of 6 feet (NAVD 88) or greater, water is allowed to flow from the river to the Basin and this flow transports sediment into the Basin. As the river continues to rise, more water enters the Basin and the berm is overtopped when stage height reaches a level of approximately 12 feet (NAVD 88). Once the berm is overtopped, the river flow inundates OU-2 Basin, which provides a continuous sediment load Basin during the entire period of overtopping. When the stage height begins to decrease during the falling limb of the flood hydrograph, the gate in the channel is closed to allow the suspended sediment captured inside the Basin to settle.

The CSM indicates that there are two main pathways that transport sediments into the OU-2 Basin. The first pathway is transport of sediment from the river to the Basin through the channel when stage heights are between 6 and 12 feet. During this process, the volume of water and sediment that enters the Basin is consistent with the Basin capacity for the corresponding river stage height. The second pathway occurs when the berm is overtopped and OU-2 is inundated by river flow, which provides a continuous sediment load during the entire period of overtopping.

ANALYSIS OF TSS AND PARTICLE SIZE DATA

TSS concentration data were collected for four storm events during 2008, which occurred in February, August, and December. In addition, TSS concentration and grain size distribution of suspended sediment were measured during the October 2009 storm event. Of these events, only the storm events during August 2008, December 2008, and October 2009 are considered to be sufficiently reliable for this analysis. The January 2008 storm event did not generate flow into the Basin because the Tombigbee River stage height remained below 3 feet. Therefore, the TSS concentration values collected inside the Basin during the January 2008 storm event are assumed to represent background concentrations attained after a prolonged time of settling. During the February 2008 event, the river did exceed the threshold stage height and water entered the Basin. However, the flow through the channel was obstructed by debris and, therefore, the TSS concentration data collected during the February 2008 storm event are considered unreliable. Thus, data obtained during the January and February 2008 storm events were not used in this analysis.

River stage height during the August 2008 event was high enough for water to enter the Basin but it did not overtop the berm. During the other two storm events, the stage height was higher than 12 feet and the berm was overtopped for several days. The TSS concentration values were the highest during the December 2008 event, reaching an average value of 44 mg/L (spatially averaged over the entire Basin). The October 2009 event had the lowest average TSS concentration, with an average value of 12 mg/L.

Minimal correlation exists between measured stage height in the river and TSS concentrations inside the Basin. However, a linear correlation (correlation coefficient, r^2, value of 0.77) exists between the rate of change of river stage height measured at the Olin dock during the rising limb of the flood hydrograph and TSS concentration, as shown in Figure 1. The horizontal axis of this figure represents the time rate of change of stage height (ft/day) during the rising limb of the flood, while the vertical axis shows the spatial average of TSS concentration in the Basin. The spatial average was obtained by averaging all of the

TSS concentration data collected from different locations in the Basin during the same day. The correlation shown in Figure 1 is used to specify a rating curve that is used to estimate TSS concentration based on rate of change of stage height during the rising limb of a flood hydrograph:

$$C_{TSS} = 18\ \delta\eta + 3.9 \qquad (1)$$

where:

C_{TSS} = TSS concentration (mg/L)

$\delta\eta$ = rate of change of stage height (ft/day)

During the October 2009 event, 15 of the suspended sediment samples were analyzed to obtain grain size distribution data. Particle size distributions were separated into three categories: 1) 0.5 to 2 μm; 2) 2 to 25 μm; and 3) greater than 25 μm. To estimate an effective particle diameter for settling calculations, the geometric mean was calculated for each sample assuming that the maximum diameter of the suspended solids was 62 μm, which corresponds to the assumption that the suspended sediment was composed entirely of clay and silt. The results of this analysis are presented in Table 1.

Table 1

Suspended Sediment Particle Distributions Measured in October 2009

Sampling Location	Sample Depth (ft)	0.5 - 2 µm Content (%)	2 - 25 µm Content (%)	25 - 62 µm Content (%)	Geometric Mean (µm)
A-1	2.8	32	25	43	11
A-1	3.6	33	44	24	8
A-1	3.6	23	27	50	14
B-2	3.6	17	6	77	22
B-2	4.8	33	21	46	11
B-2	4.8	41	28	31	7
C-2	3.8	28	8	64	15
C-2	5.6	31	35	34	10
C-2	5.6	12	51	37	16
C-5	4.8	26	6	68	16
C-5	5.6	19	32	49	15
C-5	5.6	25	34	41	12
D-1	2.3	16	4	80	24
D-1	2.6	34	12	54	11
D-1	2.6	27	33	41	11

METHODOLOGY FOR ESTIMATION OF NET SEDIMENTATION RATE

For the estimation of net sedimentation in the Basin over multi-year periods, the two different transport pathways discussed in the CSM were considered separately and the two results added together to estimate the total net sedimentation during each year.

Pathway 1: Channel Transport (Stage Height of 3 to 12 feet)

Historical hydrographs of river flow were analyzed to determine periods when river water and sediment were transported into the Basin via the channel. During periods when stage heights were between 6 and 12 feet, water entering the Basin carries suspended sediments. Because of gate operation that prevents water from flowing out of the Basin during the falling limb of a flood, some of the suspended sediment that enters the Basin will remain long enough in it to be deposited on the sediment bed. It is assumed that a certain portion of the suspended sediment, specified as the background concentration, will never be deposited on the bed, but all of the suspended sediment in excess of the background value will settle on to the bed. Therefore, the calculated amount of net sedimentation depends on: 1) volume of water that enters the Basin; 2) TSS concentration of that water; and 3) background TSS concentration (i.e., amount of suspended sediment assumed not to settle on to the bed). The background suspended sediment was estimated to be 7.2 mg/L based on data collected in January 2008, which corresponds to a non storm event. It has to be noted that the January 2008 measurements where made with a Basin level of 3 ft. The current operation procedure of the Basin does not allow the water level inside the Basin to drop below 6 ft in order to reduce the sediment resuspension due to wind induced waves. Therefore, under the current Basin conditions, the assumed background suspended sediment concentration value may be biased high, potentially resulting in an under-prediction of the sedimentation rate.

The volume of water that enters the Basin was calculated for each measured stage height using topographic and bathymetric data for the Basin. That is, for each measured stage height, the total volume of water inside the Basin was calculated and then the volume of the previous stage height was subtracted. With the volume of water entering the Basin determined, the sediment load into the Basin was calculated by estimating the TSS concentration that the water is carrying. For the rising limb of the flood, the rate of change of the stage height was calculated for each time interval and the corresponding TSS concentration estimated using Equation 1. Therefore, the mass of sediment entering the Basin for each time step is calculated as follows:

$$M_{sed} = 0.027\,(C_{TSS} - C_{BSS})\,V \qquad (2)$$

where:

M_{sed} = mass of sediment entering the Basin during a time increment (g)

C_{TSS} = TSS concentration for each time during a time increment (mg/L)

C_{BSS} = background TSS concentration (mg/L)

V = volume of water entering the Basin during a time increment (ft^3)

The total mass of sediment entering the Basin during storm event is calculated by summing M_{sed} values over the course of the entire event. Once the total mass for an event is determined, the average net sedimentation rate (NSR) for the entire Basin was calculated using:

$$NSR = 360\ M_{sed}/(\rho_{dry}\ A\ T_{event}) \quad (3)$$

where:

NSR	=	net sedimentration rate (in/day)
ρ_{dry}	=	dry density of bed sediment (g/cm^3)
A	=	area of Basin (ft^2)
T_{event}	=	duration of storm event (days)

The area of the Basin is 3.21 million ft^2. The dry density was determined from bulk (wet) density data collected during the Sedflume study (Sea Engineering 2006). The average wet density of the two cores extracted during that study is 1.3 g/cm^3. It can be assumed that the particle density of bed sediment is 2.65 g/cm^3 (Van Rijn, 1993). This particle density is based on the density of quartz mineral and is a standard value used in these types of analyses. The dry density of bed sediment in the Basin was estimated to be 0.48 g/cm^3 based on the same assumptions.

Pathway 2: Basin Inundation by River Flow (Stage Height Greater than 12 feet)

For storm events during which the berm is overtopped, the procedure explained above is used until the berm is overtopped. After the berm is overtopped, the amount of water and suspended sediment that is transported through the Basin depends on the duration of the flood. The river flowing over the inundated Basin provides a continuous source of suspended sediment and a portion of that suspended sediment settles in the Basin. The amount of suspended sediment deposited in the Basin depends on the following parameters:

- Volume of water flowing over the inundated Basin, which depends on the stage height and water velocity
- TSS concentration of that volume of water
- Deposition rate of suspended sediments

Values of these parameters were estimated as described below. In addition, estimates of uncertainty in the three parameters were developed so that uncertainty in predicted net sedimentation rates could be quantified.

Calculation of the volume of water flowing over the inundated Basin required use of measured stage height and estimates of current velocity. The results of a hydrodynamic modeling study conducted by the U.S. Army Corps of Engineers (USACE) were used to estimate current velocities during periods when the Basin was inundated with river flow (Scott 2008a). The Scott (2008a) report presents a predicted current velocity of about 0.2 ft/s in the vicinity of the OU-2 Basin. Thus, the assumption was made that 0.2 ft/s is a representative current velocity for periods when the Basin is inundated with river flow. In the absence of further data, the sensitivity of the model to the current velocity was analyzed by increasing and decreasing the base value by 50%, which yields reasonable bounding values based on professional judgment and experience. Therefore, the lower- and upper-bound values of current velocity were set at 0.1 and 0.3 ft/s, respectively.

The TSS concentration of the volume of water passing over the inundated Basin was calculated using the rating curve presented in Equation 1. For each water level value during a storm event, the rate of change was calculated and if it was positive (i.e., rising limb of the flood) the TSS concentration was calculated using Equation 1. TSS concentration data are not available during the falling limb of the flood hydrograph (i.e., negative rate of change of stage height). Thus, it was assumed that a representative value of TSS concentration of water entering the Basin during the falling limb of the hydrograph was the average of all the existing TSS concentration data (i.e., 23 mg/L).

Uncertainty exists in TSS concentrations estimated using Equation 1. To evaluate the effects of this uncertainty on estimated NSR values, lower- and upper-bound calculations were conducted. For the rising limb of the hydrograph, the slope of the rating curve (i.e., coefficient 18 in Equation 1) was decreased by 50% (i.e., 9) and increased by 100% (i.e., 36) to specify lower- and upper-bound values of the slope. For the falling limb of the hydrograph, the 5^{th} and 95^{th} percentile values of the measured TSS concentration distribution were used for the lower- and upper-bound values (i.e., 6 and 62 mg/L), respectively. These values were obtained from field data and represent the potential variability in suspended sediment concentrations during the falling limb of the hydrograph.

Two approaches were used for estimating the deposition rate of suspended sediment: 1) calculation of settling speed based on particle diameter; and 2) use of long-tube testing data to estimate trapping efficiency in the Basin. For the first approach, the settling speed of discrete particles was calculated using the equation proposed by Chen (1997). The grain size distribution data for suspended sediment obtained during October 2009 were used to determine the average effective particle diameter (14 μm), which was used in the Chen (1997) equation and yielded a settling speed of 32 ft/day. Uncertainty in the settling speed was estimated using the minimum and maximum effective particle diameters in the October 2009 data set (i.e., 7 and 24 μm), which produced lower- and upper-bound settling speeds of 9.5 and 97 ft/day, respectively.

The second approach used the results of long-tube settling tests conducted by MACTEC (2006). The long-tube test utilizes a vertical tube that was 8.5 feet high and was filled with 8 feet of water collected from the Tombigbee River. The suspended sediments contained in the sample settled over time and water was extracted at different heights of the tube to measure TSS concentration. With this measurement, the percentage of sediments that settled out of the water column after a specified time was determined.

For the purposes of this study, the settling time is defined as the period of time needed for a parcel of water to travel across the Basin. This time was calculated for each of the estimated current velocities presented above and assumed the Basin length to be 2,000 feet. The percentage of suspended sediments that settle within the Basin was calculated by averaging the results of the long-tube test for that time. After completing the sedimentation rate calculations, the deposition rates (settling speeds) obtained with this approach were typically equivalent to the values obtained using the settling speeds for particle diameters between 5 and 10 μm (i.e., 4.3 to 17 ft/day).

It is important to note that the probability of deposition is assumed to be one (i.e. it is assumed that the sediments that settle get incorporated in the bed independently of the current velocity). This simplification will tend to over-predict the trapping of sediment.

However, the fact that there are relatively low current velocities flowing over a relatively deep Basin tends to mitigate this potential bias. The estimated bed shear stress for the higher current velocity (0.3 ft/s) is about ten times less than the critical shear stress for deposition (i.e., 0.1 Pa). The critical shear stress for deposition is an empirical value above which deposition of sediments is considered not to happen. Thus, the probability of deposition within the Basin is approximately one. Therefore, the assumption for settling in the Basin is reasonable for the range of analyzed current velocities and is not likely to have a significant impact on the analysis.

In summary, base-case (average), lower-bound, and upper-bound values were estimated for each of the three parameters that are used for calculation of sedimentation during periods when the berm is overtopped. For settling speed, results of the long-tube tests were used as one of the bounding values. The best estimate of the sedimentation rate was obtained using the base-case values for the parameters. In addition, all 24 combinations of the bounding parameters were used to calculate net sedimentation rates over a wide range of conditions and develop a quantitative estimate of uncertainty for this analysis.

For each group of parameters defined previously, the net sedimentation rate was calculated based on the river hydrographs measured at Olin dock. For each water level value, the volume of water flowing over the Basin was calculated using the following equation:

$$V_{flow} = (\eta - 12 \text{ ft})\, B\, \Delta T\, U \tag{4}$$

where:

V_{flow}	=	volume of water flowing over the Basin during a time increment (ft^3)
η	=	stage height as given by the hydrograph (ft). This stage height is calculated as the average of two consecutive stage height values.
B	=	width of the Basin perpendicular to the water flow. This value was estimated from topography data to be 1,600 feet.
ΔT	=	time increment between two consecutive stage height values (s)
U	=	current velocity during the overtopping of the berm (ft/s)

Once the water volume for each ΔT is calculated using Equation 4, the sediment mass that settles inside the Basin is calculated using estimated values of TSS concentration and settling speed. The settling speed limits the amount of sediment that can settle from the water column. The effective height of the water column that contributes its sediments to the Basin is calculated as follows:

$$H_{eff} = W_s \, T_{Basin} \tag{5}$$

where:

H_{eff} = effective water depth within the Basin (ft)

W_s = settling speed (ft/day)

T_{Basin} = travel time over the Basin (days)

and:

$$T_{Basin} = 2{,}000/U \tag{6}$$

The effective water depth is assumed to be constant for each storm event because the settling speed and water velocity are also assumed to be constant.

Finally, the sediment mass that settles within the Basin is calculated using:

$$M_{dep} = 0.037 \, C_{TSS} \, V_{eff} \tag{7}$$

where:

M_{dep} = mass of sediment that is deposited in the Basin (g)

V_{eff} = volume of water effectively contributing sediments to the bed (ft^3)

and:

$$V_{eff} = V_{flow} H_{eff}/(\eta - 12 \text{ ft}) \quad (8)$$

In order to obtain an average sedimentation rate, the mass of sediment that settles resulting from Eq. 7 was assumed to be distributed evenly over the Basin. This simplification was used to obtain an easy-to-compare metric that represents the mass that settles for different conditions and years. It is important to note, however, that the sedimentation rate for a particular area of the basin will probably differ from the average value.

ESTIMATES OF NET SEDIMENTATION RATES

With the methodologies presented above, the mass of sediment deposited in the OU-2 Basin was calculated for storm events during a particular year to obtain an annual net sedimentation rate. The analysis was conducted for the base-case and all bounding parameter combinations for the 5-year period from 2005 through 2009. This period was chosen because stage height measurements were collected at the Olin dock between 2005 and 2009. Tables containing the calculated net sedimentation rates for the base-case and bounding conditions are presented in Appendix B. As a summary, Table 2 presents the average net sedimentation rate for each year. Also included in this table is the value of two times the standard error, which provides an indicator of variability in the NSR value due to uncertainty in the input parameters (i.e., TSS concentration, current velocity, settling speed).

Table 2
Predicted Net Sedimentation Rates for 2005-2009.

	Net Sedimentation Rate (inch/year)	
Year	**Average**	**2 Std. Error**
2005	0.32	0.20
2006	0.23	0.12
2007	0.00	0.00
2008	0.08	0.04
2009	0.51	0.28

Figure 2 compares the average net sedimentation rates in the Basin for each year from 2005 through 2009 (top panel) to the average flow rate in the river for that year (bottom panel).

The error bars in Figure 2 correspond to two standard errors about the average net sedimentation rate. The average net sedimentation rate for this five-year period (2005 to 2009) is 0.23 in/yr. Significant year-to-year variability in the average NSR values occurs due to annual variations in river flow conditions (i.e., number and magnitude of storm events). The bottom panel of this figure shows the annual average flow rate for the Tombigbee River at the Coffeeville Dam gauging station for this five-year period. Note that the annual average flow rates for the 2005 to 2008 period are lower than the long-term average flow rate at Coffeeville Dam (29,000 cfs). This fact suggests that the estimated annual net sedimentation rates for 2005 through 2008 are lower than the long-term average net sedimentation rate.

To compare the hydrologic behavior of the different years, Figures 3a and b presents a more detailed analysis of the Basin hydrographs from January 2005 to December 2009. The graph shows the two threshold levels for stage height (i.e., 6 and 12 feet corresponding to the river stage heights at which water enters the Basin and overtops the berm respectively) as dashed lines. The periods during which the berms were overtopped are shaded on this figure, with the mass of deposited sediment (calculated using base-case parameter values) during these periods also noted. The majority of net sedimentation during a given year occurs when the berm is overtopped, mainly due to a higher volume of river water interacting with the Basin; deposition during conditions when the berm is not overtopped represents a relatively minor contribution to the annual net sedimentation.

LONG-TERM NET SEDIMENTATION RATE ANALYSIS

The five-year period (2005 to 2009) that was analyzed above corresponded to a low-flow period in the river and, thus, the average net sedimentation rate for that period (0.23 in/yr) is likely an under-estimate of the long-term average value. To develop an improved estimate of the long-term average net sedimentation rate in the OU-2 Basin, the analysis procedure used for the 2005-2009 period was applied to the 49-year period of historic flow data collected at Coffeeville Dam (i.e., 1961 through 2009).

The stage height data available at the Olin dock spans the five-year period from 2005 to 2009. Thus, it was necessary to develop an approach for estimating stage height in the Basin for the 49-year period (1961 to 2009). This approach used a log-linear correlation between the stage height at Olin dock and the flow rate at Coffeeville Dam (Figure 4). As can be seen in the stage height rating curve (i.e., stage height as a function of flow rate), the data present an anomalous behavior for stage heights below 1.7 feet. This anomaly is attributed to the stage height gauge not performing properly during low stage height conditions. The impact of this anomaly on predictions was analyzed and, due to the fact that the sedimentation in the Basin occurs for the relatively high stage heights, the correlation was considered valid and representative. This rating curve was used to specify stage height at the Olin Basin for the 49-year period from 1961 through 2009.

Using the same procedure applied to the 2005 to 2009 period, the annual average net sedimentation rate for each year from 1961 through 2009 was calculated (see top panel on Figure 5). The annual net sedimentation rate ranges from a minimum of 0.01 in/yr in 1963 to a maximum of 1.1 in/yr in 1983. Based on these results, the estimated annual average net sedimentation rate in the Basin is 0.29 in/yr for the 49-year period, with two times the standard error having a value of 0.07 in/yr.

It is important to note that the procedure for the long-term analysis produces slightly different net sedimentation values for the 2005 to 2009 period. This relatively minor difference is the result of using the rating curve to predict stage height at the Olin dock and using the actual stage height data. The 2005 and 2006 long-term estimates are less than the corresponding values with the short-term estimates. However, the long-term estimates for 2007, 2008, and 2009 are not significantly different from the short-term values. Overall, the comparison between the long-term and short-term estimates shows that the use of the stage height rating curve to estimate stage height in the Basin is reliable. Therefore, this analysis is considered appropriate to produce an estimate of average net sedimentation rate over the 49-year period: 0.29 in/yr, with the 95% confidence interval ranging from 0.22 to 0.36 in/yr.

The relationship between annual average net sedimentation rate and average flow rate in the river is shown on Figure 6. Generally, net sedimentation rate increases with increasing river flow rate primarily due to increasing frequency of berm overtopping and longer duration of Basin inundation by river flow.

CONCLUSIONS

The present study indicates that the net sedimentation inside the Basin is mainly caused by the settling of sediments during floods of the Tombigbee River that overtop the berm. An uncertainty analysis was conducted for selected parameters using 24 variations of three input parameters (i.e., current velocity, TSS concentration, settling velocity). The duration and height of inundation by river flow during a given year plays an important role in estimating net sedimentation rates. The average net sedimentation rate for the 49-year period evaluated in this analysis is 0.29 in/yr, with annual rates ranging from 0.01 to 1.1 in/yr. With the exception of data collected during 2009, most of the site data were collected during a low-flow period. As a result, annual net sedimentation rates calculated for the 2005-2009 period are likely lower than the actual long-term average value. This is also suggested by the fact that the long-term analysis shows that over a longer period (49 years), the sedimentation rate is almost 50% greater than the sedimentation rate calculated for the short-term period.

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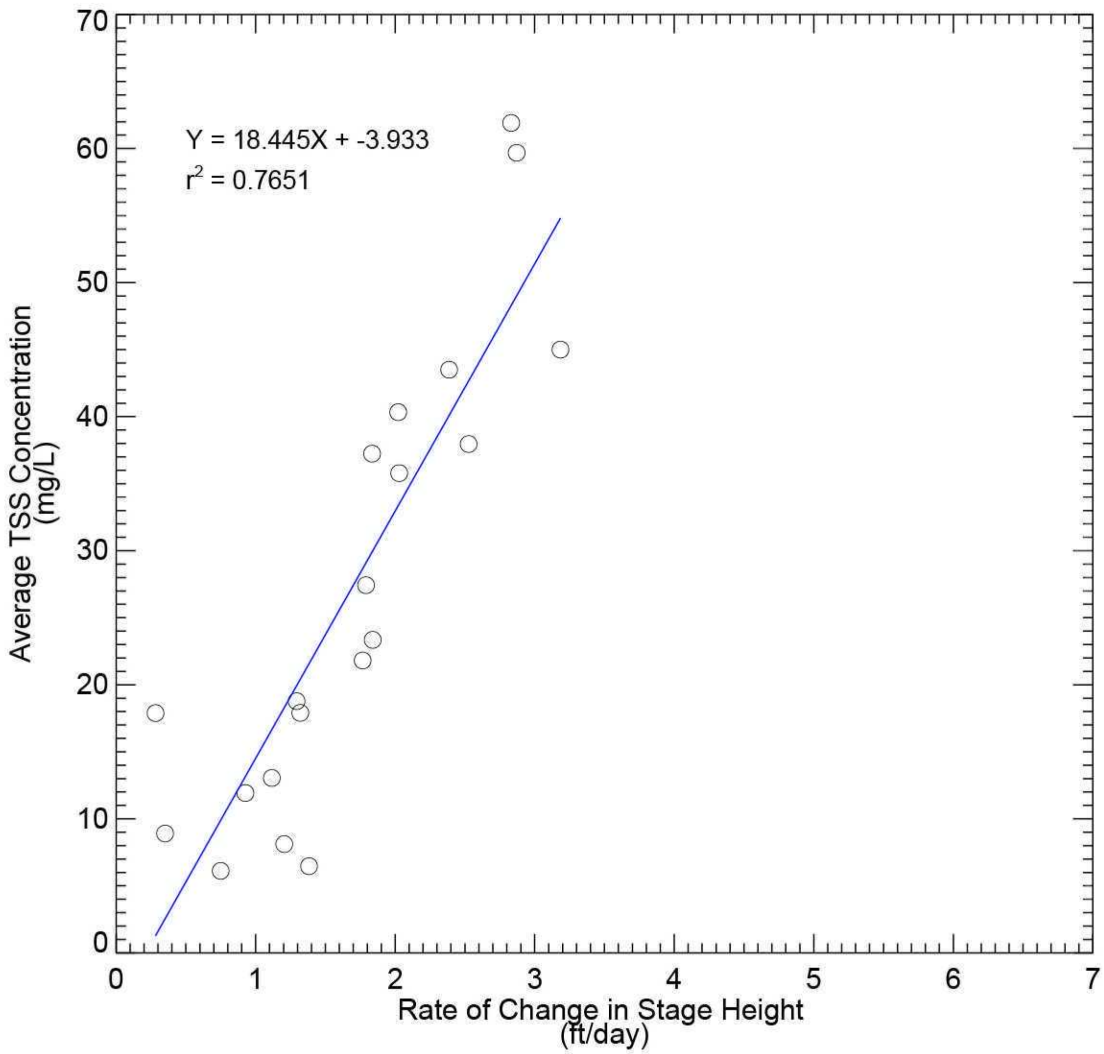
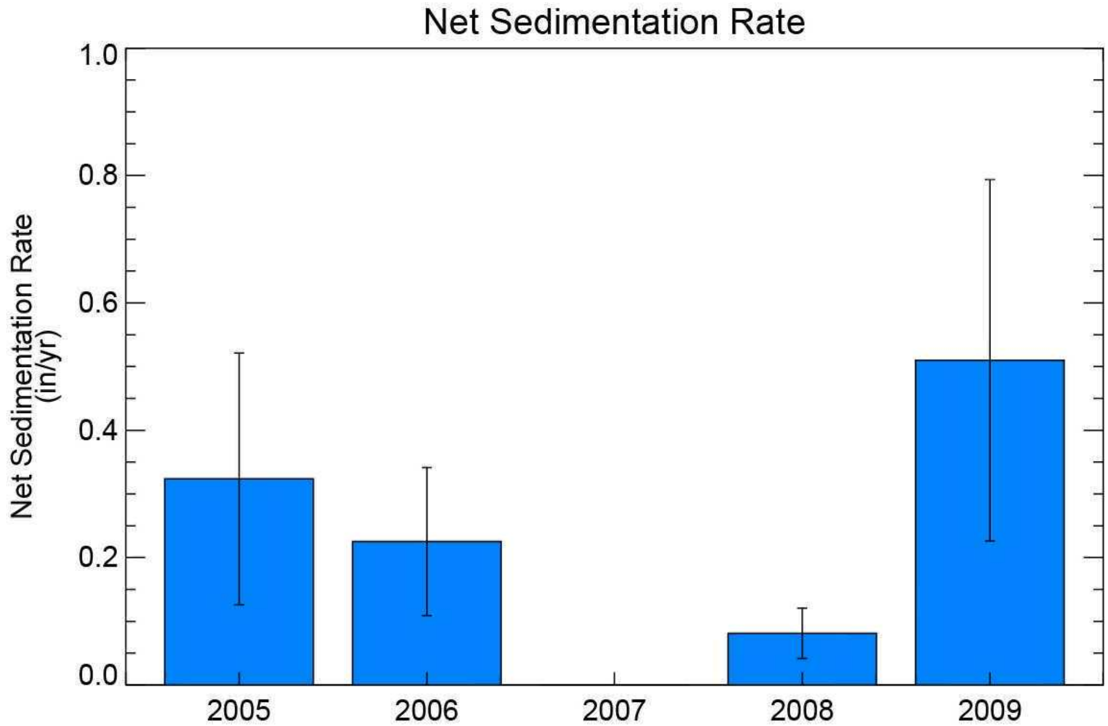


Figure 1

Average TSS Concentration vs. Rate of Change in Stage Height During August 2008, December 2008 and October 2009 Sampling



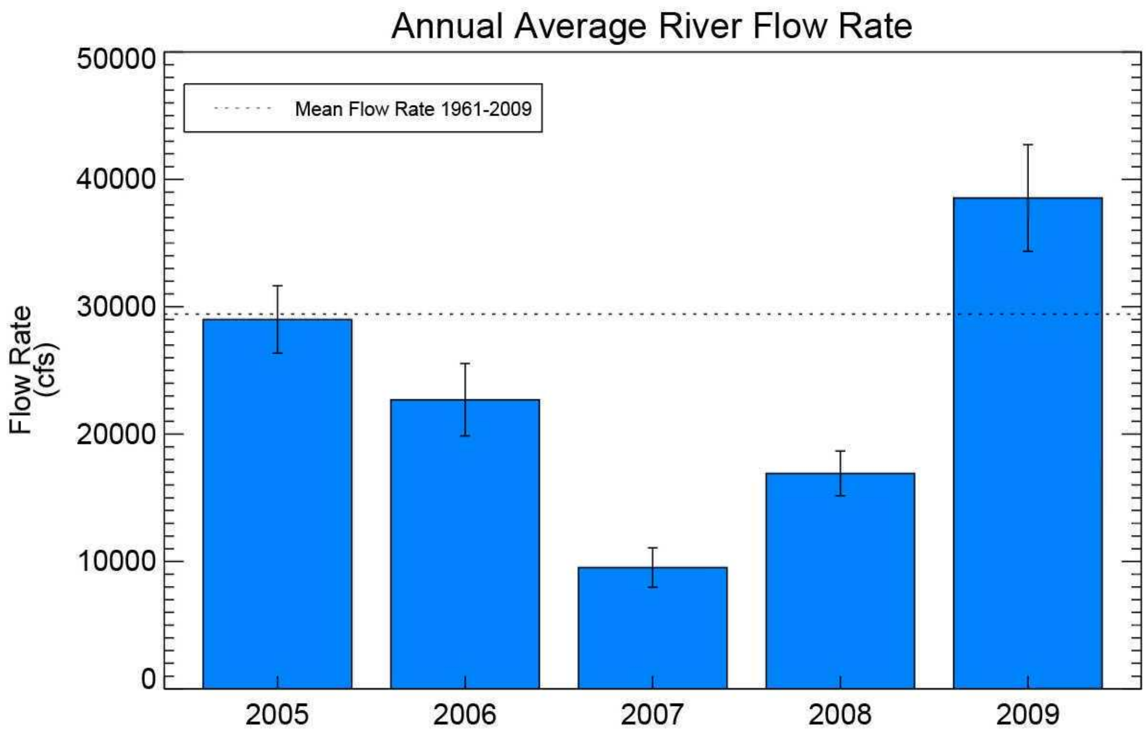


Figure 2

Average Net Sedimentation Rate and River Flow Rate for Sensitivity Analysis, 2005-2009.

Notes: Error bars are mean +/- 2 standard errors.
Flow rate measured at USGS gage #02469761 (Tombigbee River at Coffeeville L&D).
Berm around the basin was constructed in mid-2006, so sedimentation rates calculated for 2005 and part of 2006 are theoretical.

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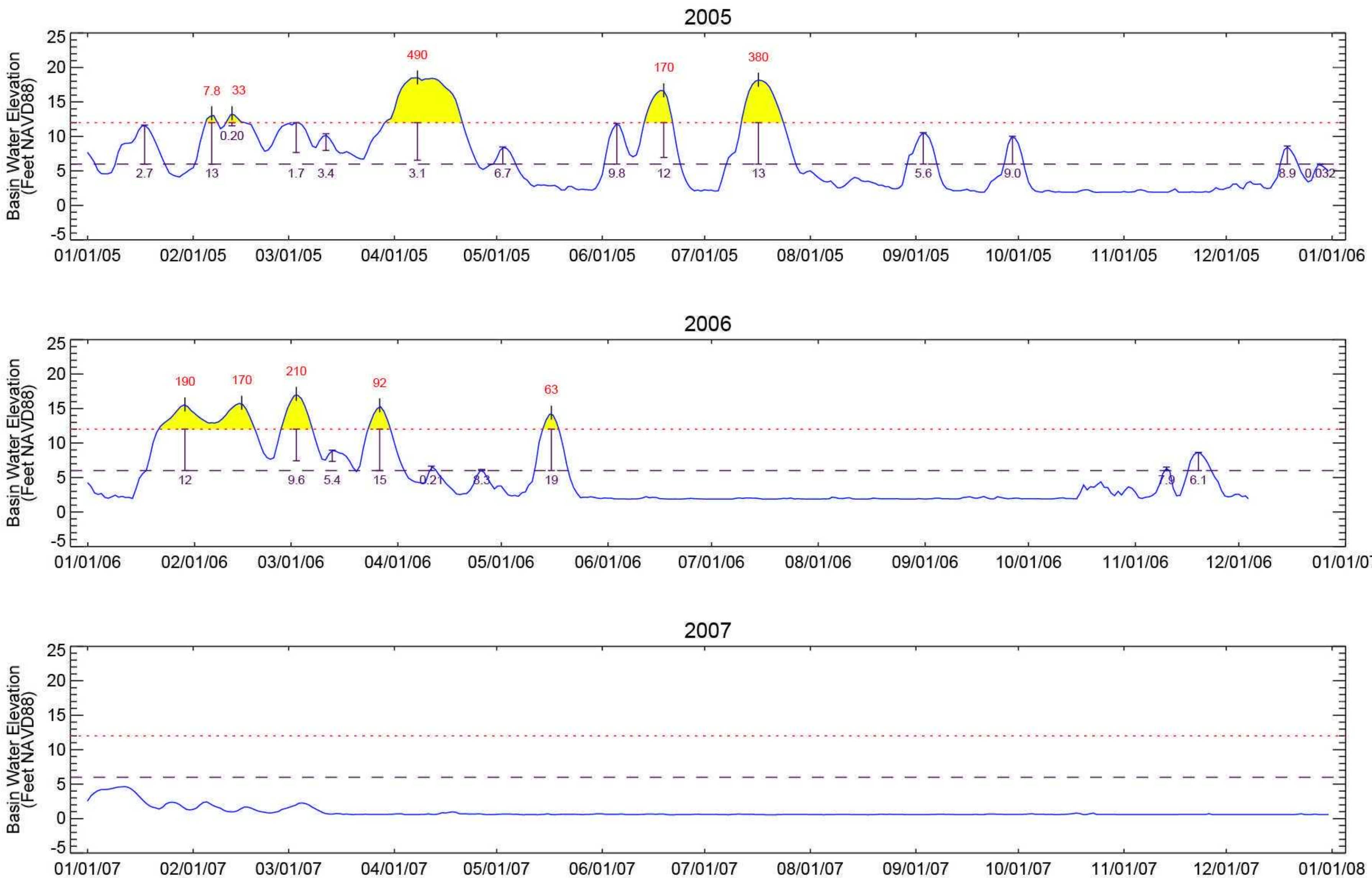

Change in water elevation inside basin during storm

Period of over-berm flow

Elevation of channel

10. Mass of sediment (metric tons) deposited from within-berm flow

10. Mass of sediment (metric tons) deposited from over-berm flow

Elevation of top of berm

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Figure 3a

Over-berm and Within-berm Storm Volumes, 2005-2009

Notes: Sediment masses calculated using particle size of 14. um, River velocity = 0.2 ft/s
Rising limb TSS (mg/L) = 18.445(Δ River Height) + -3.933
Falling limb TSS = 22.6 mg/L.
Berm around the basin was constructed in mid-2006, so sedimentation rates calculated for 2005 and part of 2006 are theoretical.

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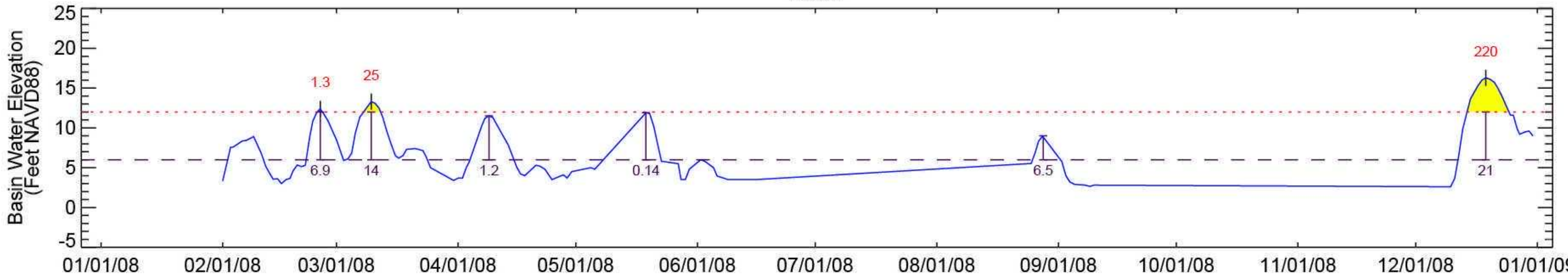

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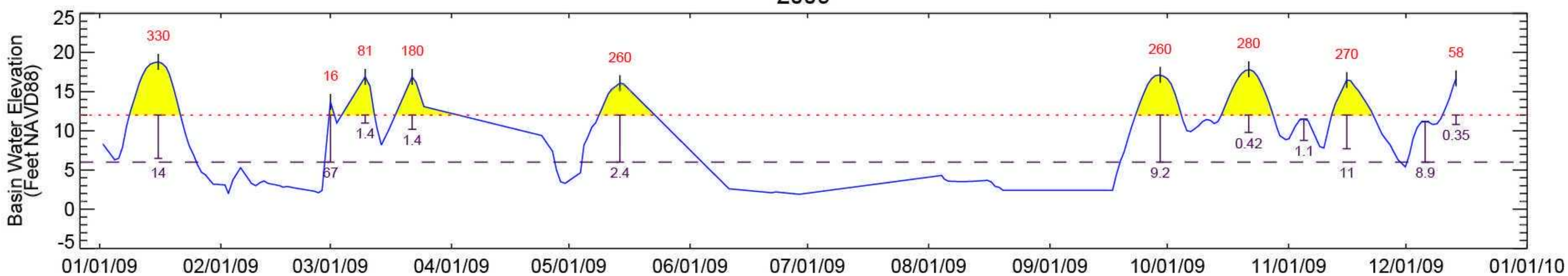

Change in water elevation inside basin during storm

Period of over-berm flow

Elevation of channel

10. Mass of sediment (metric tons) deposited from within-berm flow

10. Mass of sediment (metric tons) deposited from over-berm flow

Elevation of top of berm

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Figure 3b

Over-berm and Within-berm Storm Volumes, 2005-2009

Notes: Sediment masses calculated using particle size of 14. um, River velocity = 0.2 ft/s
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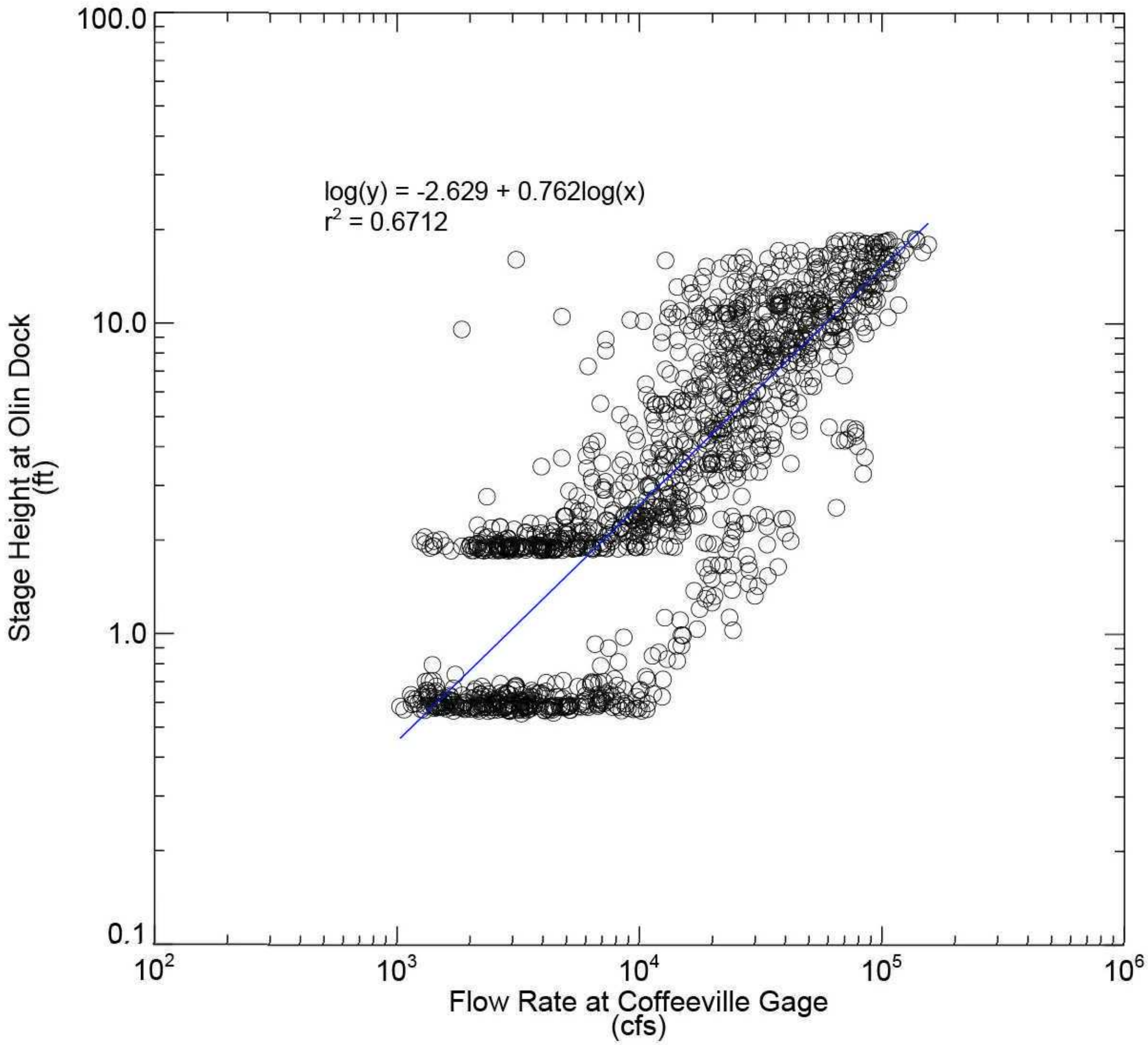

Figure 4

Stage Height at Olin Basin vs. Flow Rate Measured at Coffeeville.

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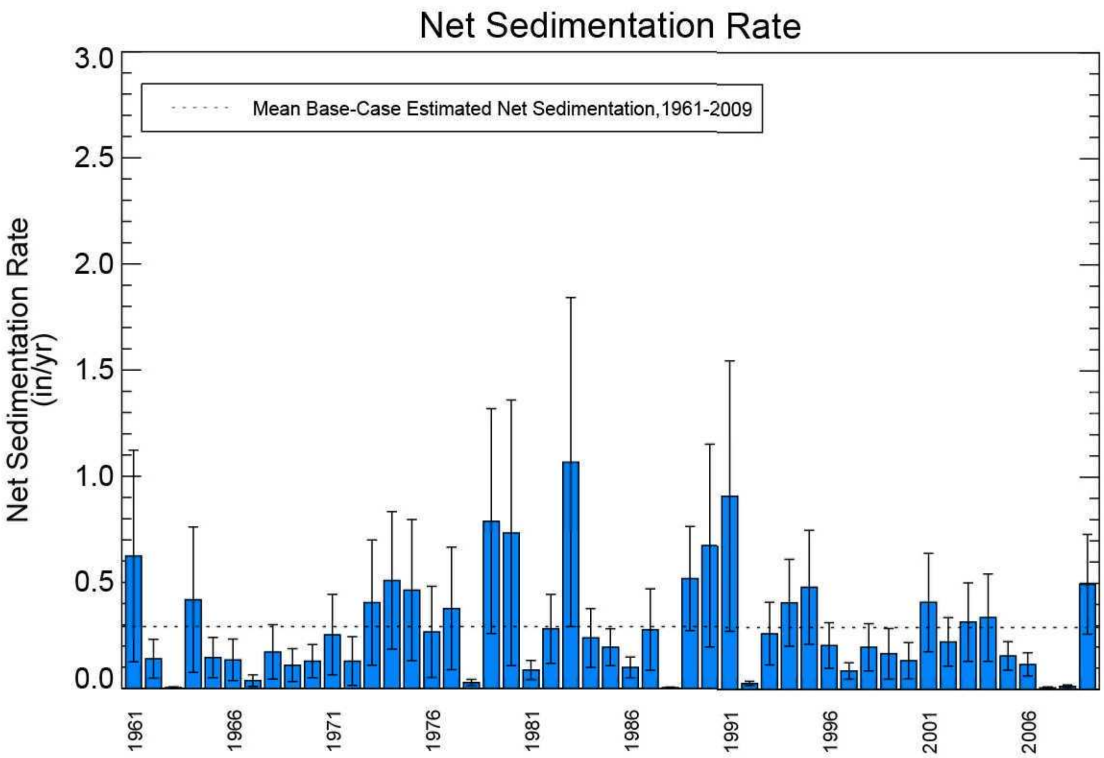

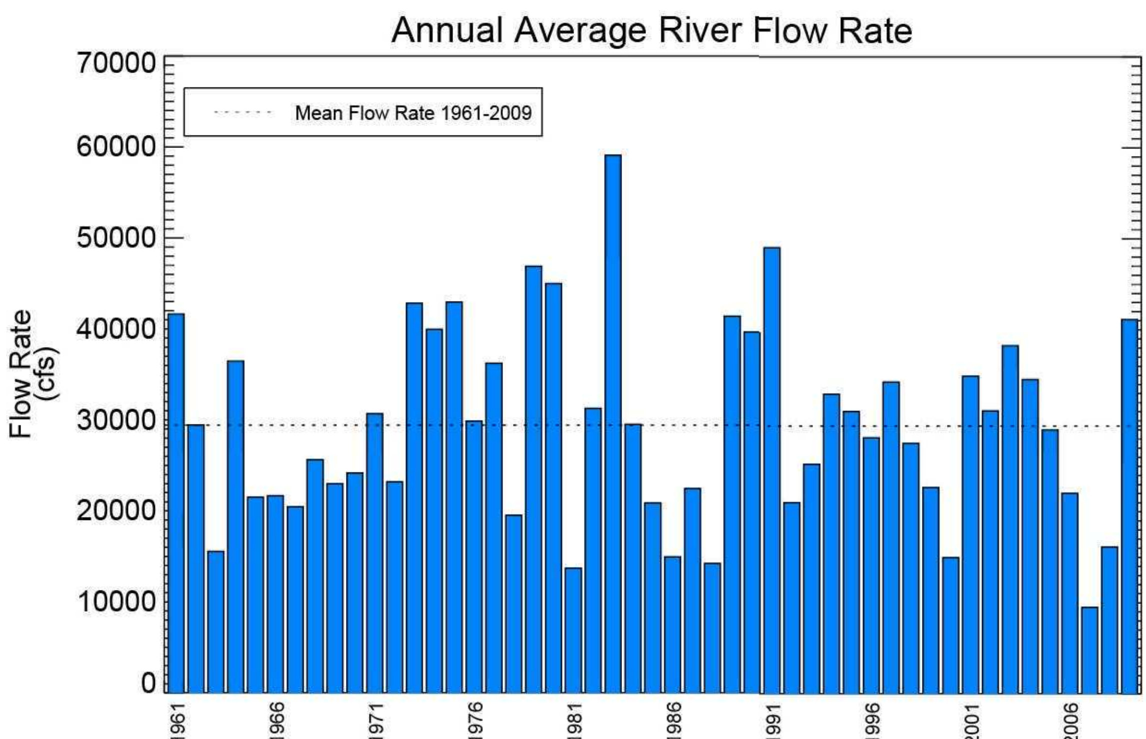

Figure 5

Average Net Sedimentation Rate and River Flow Rate for Sensitivity Analysis, 1961-2009

Notes: Error bars are mean +/- 2 standard errors.
Flow rate measured at USGS gage #02469761 (Tombigbee River at Coffeeville L&D).

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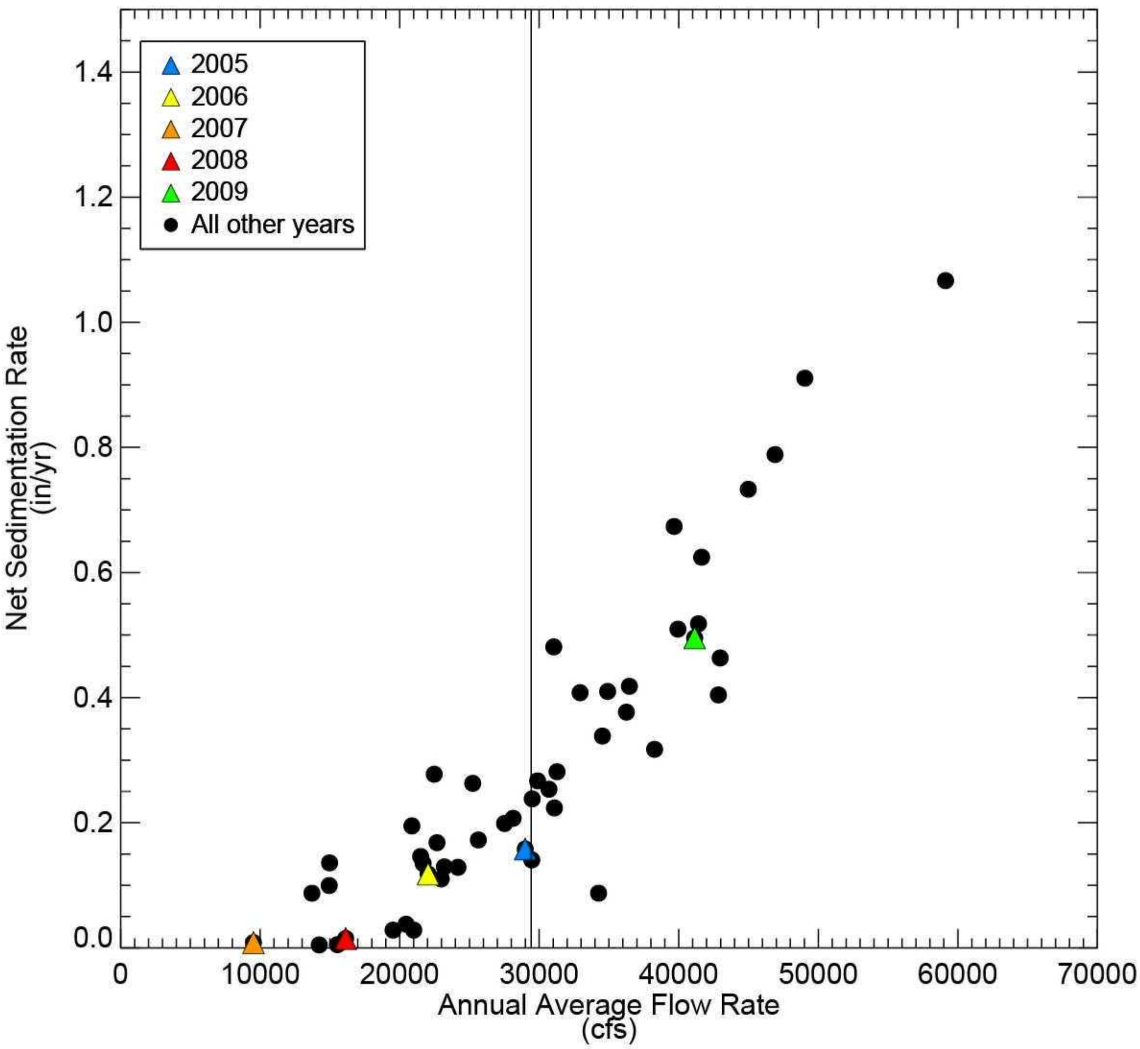
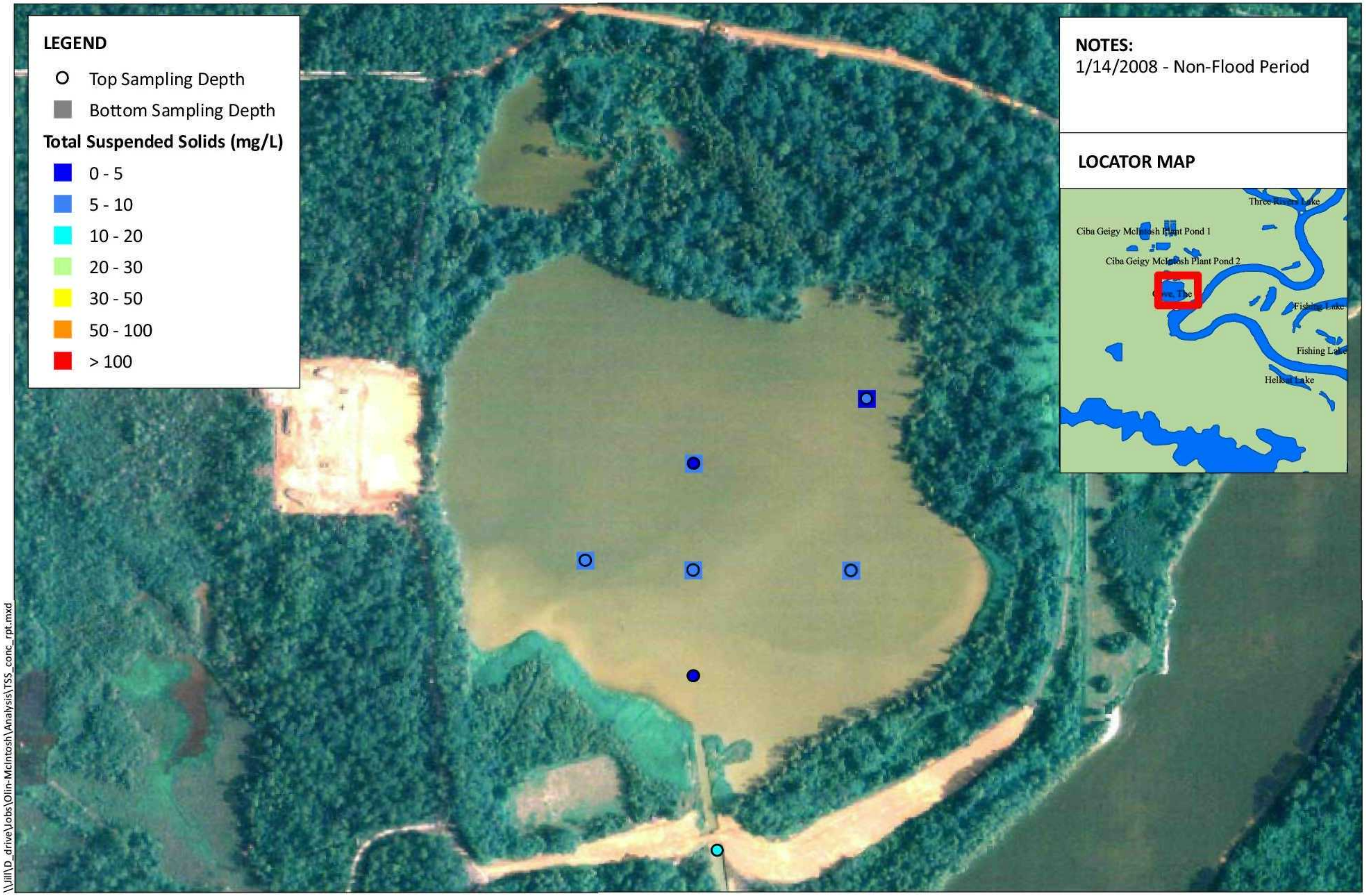


Figure 6

Annual Net Sedimentation vs. Annual Average River Flow Rate

Note: Flow rate measured at USGS gage #02469761 (Tombigbee River at Coffeeville L&D).



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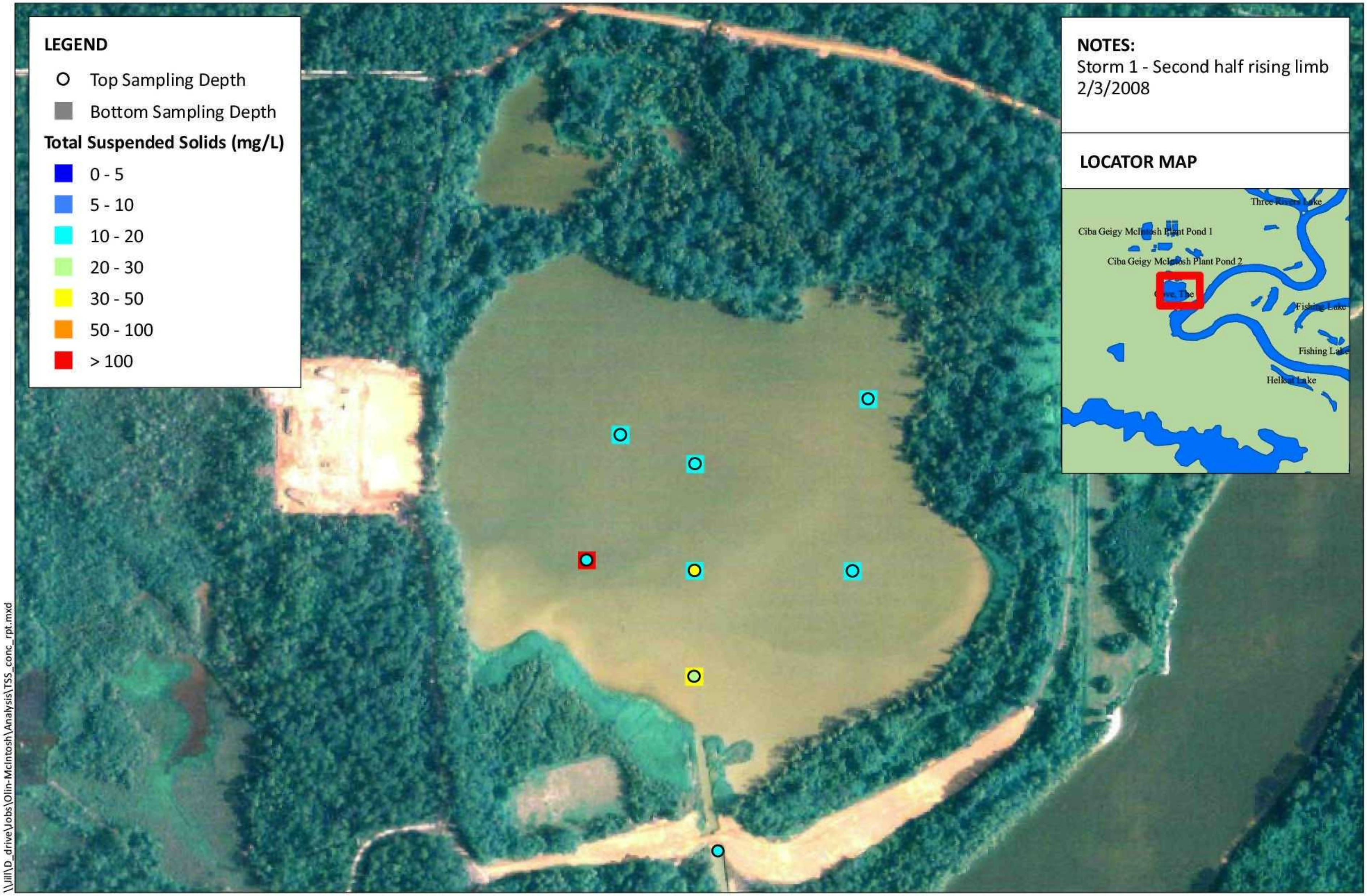
Appendix A
Measured TSS Concentrations
Analysis of Net Sedimentation Rates in the OU-2 Basin
MACTEC / Olin-McIntosh



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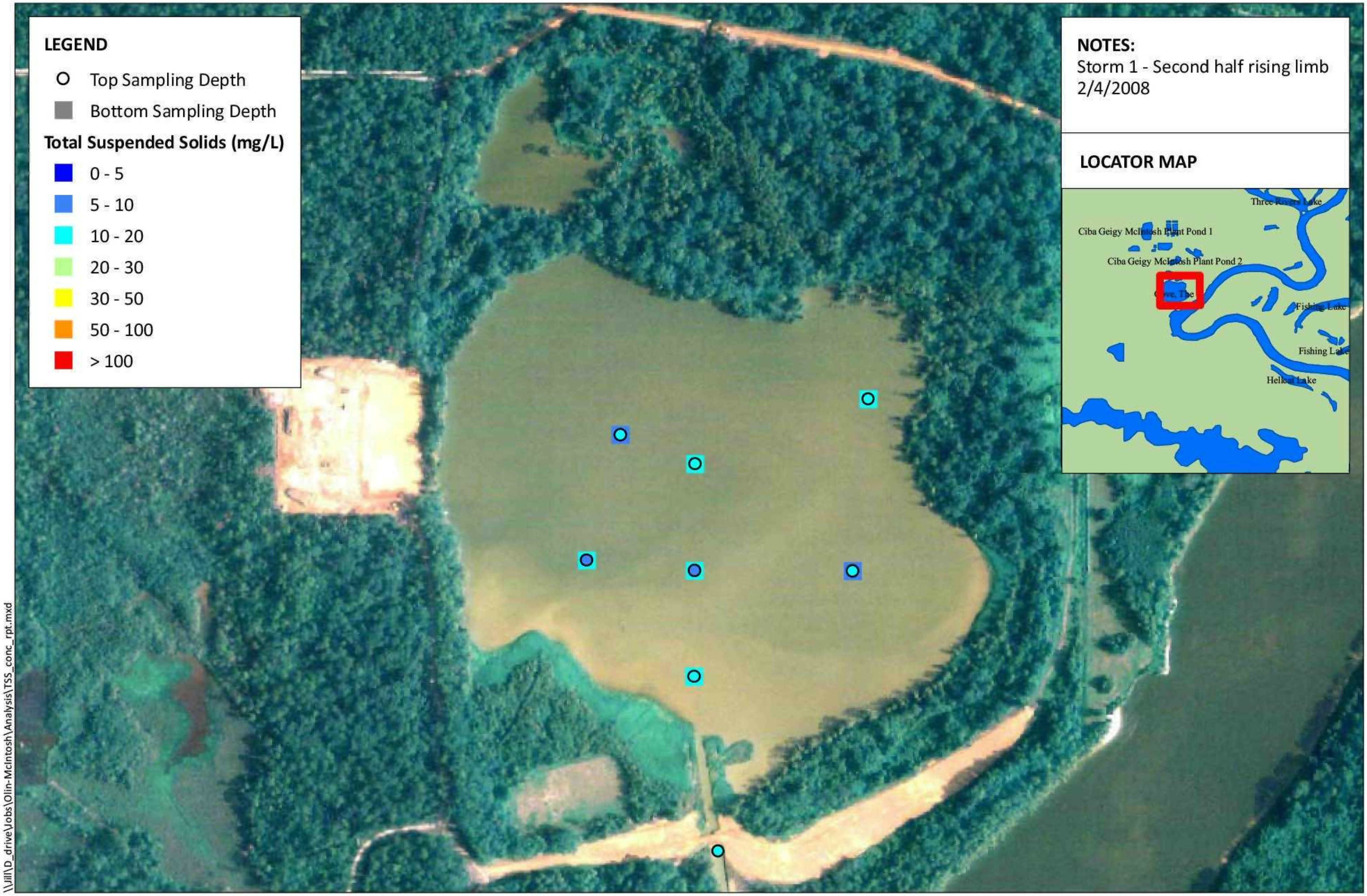

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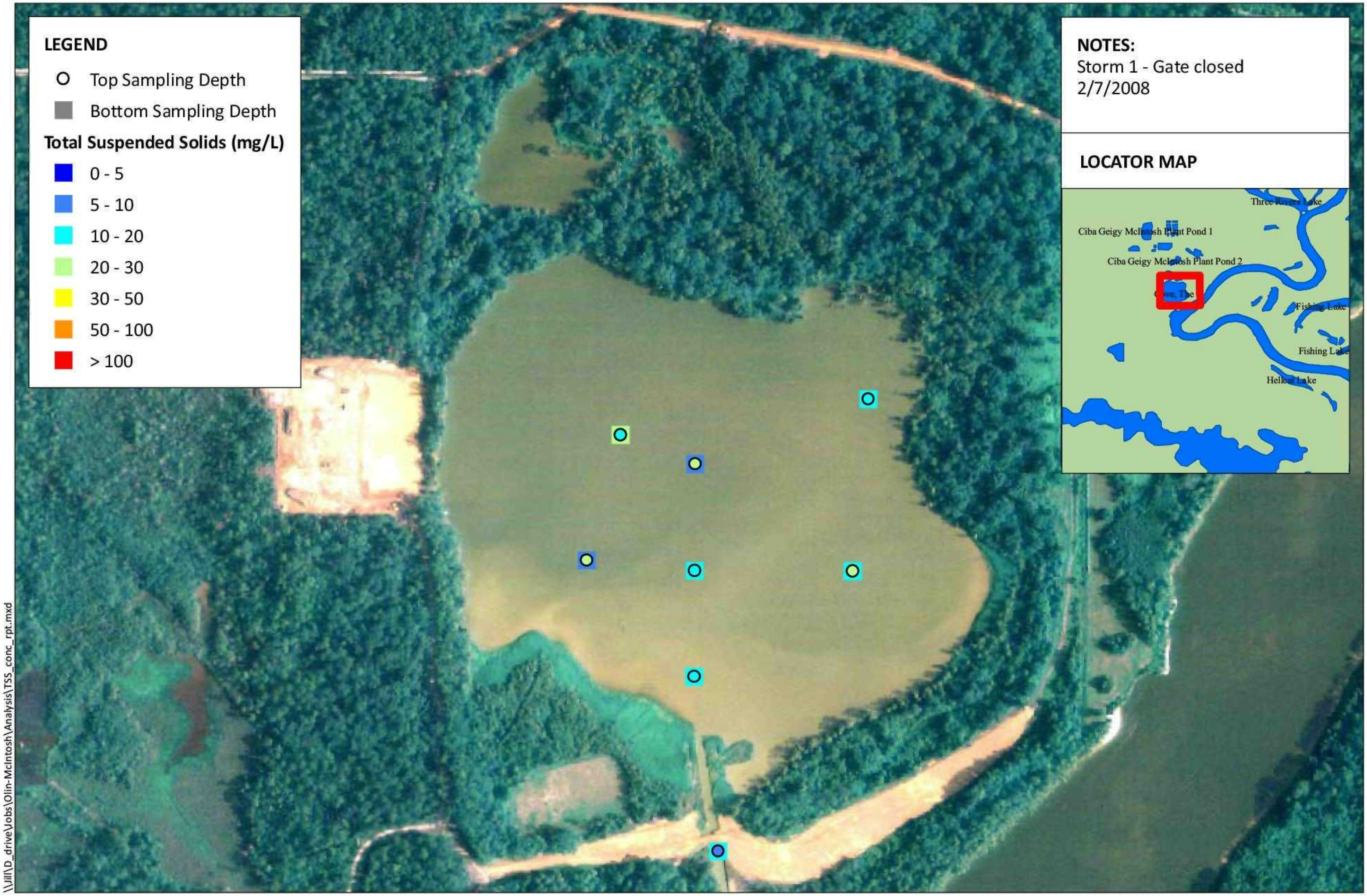

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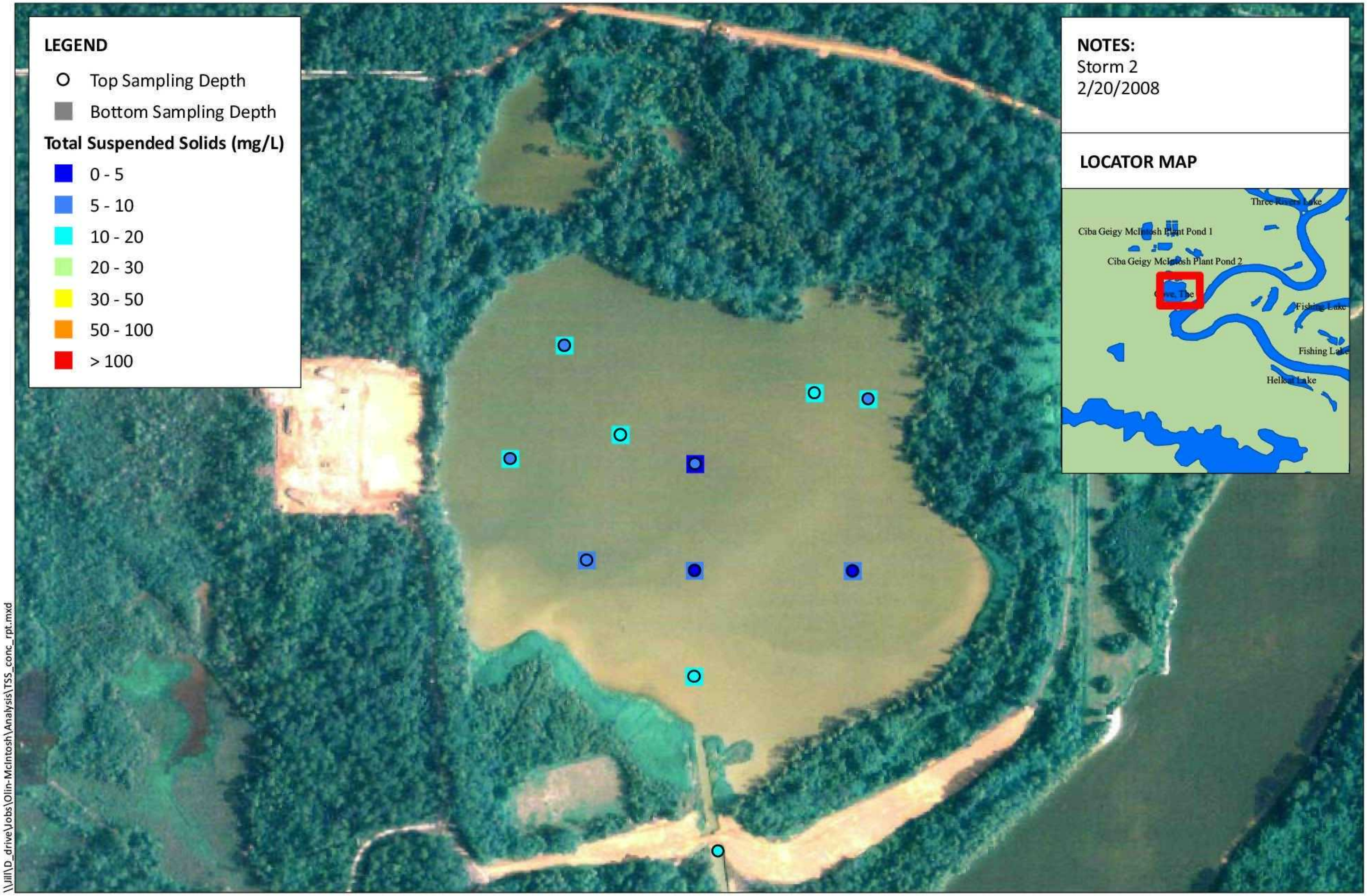

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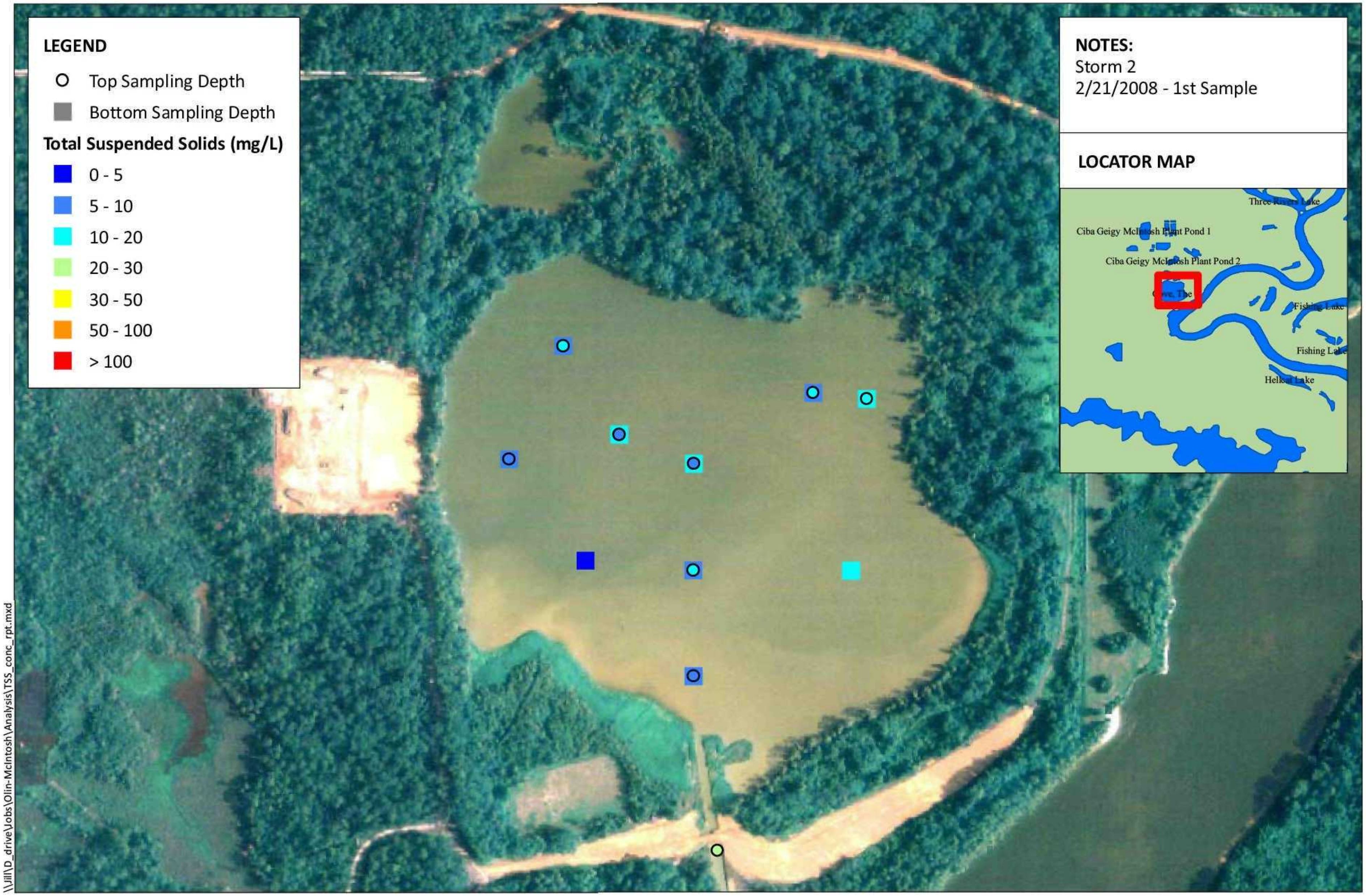

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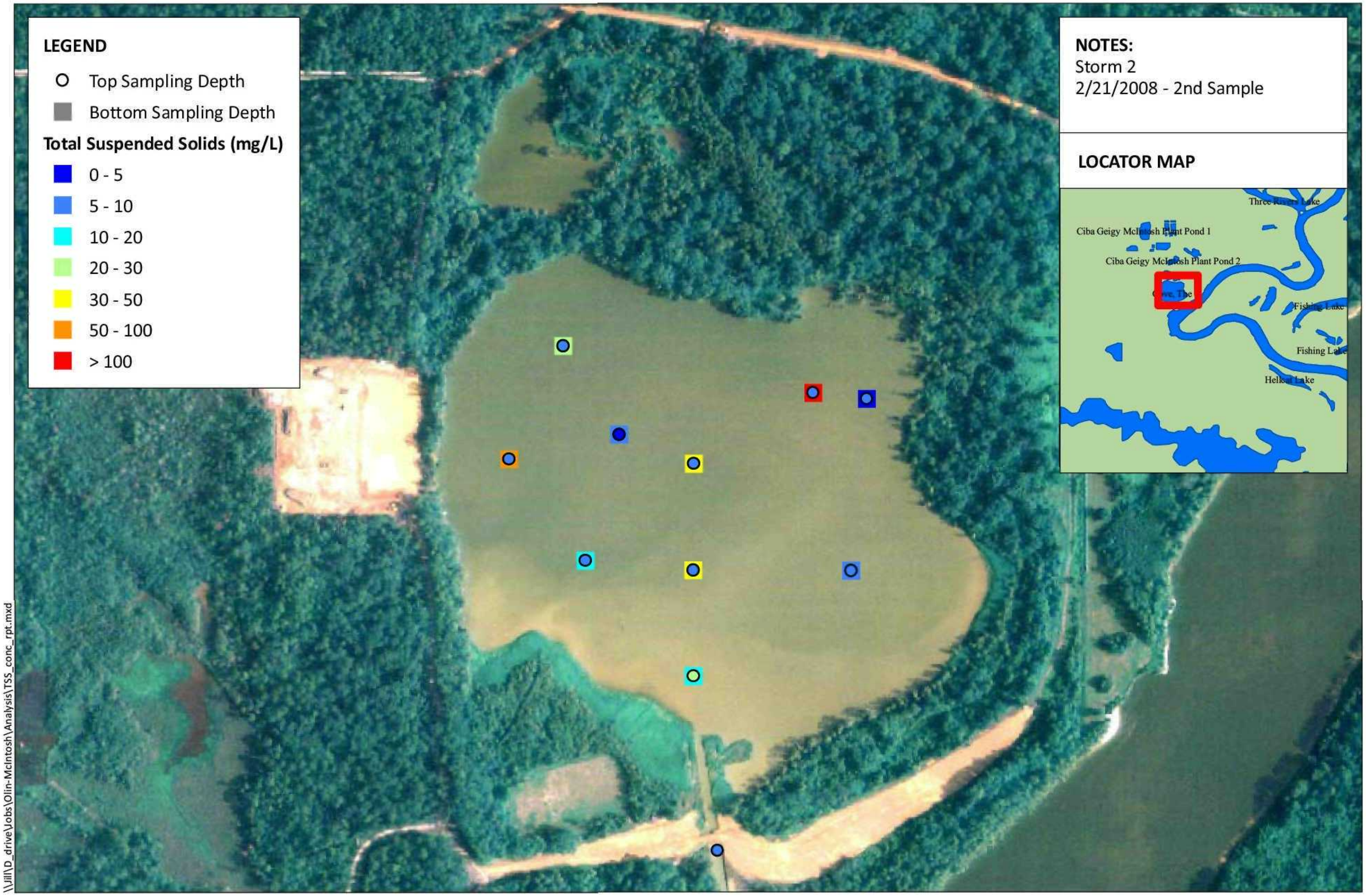

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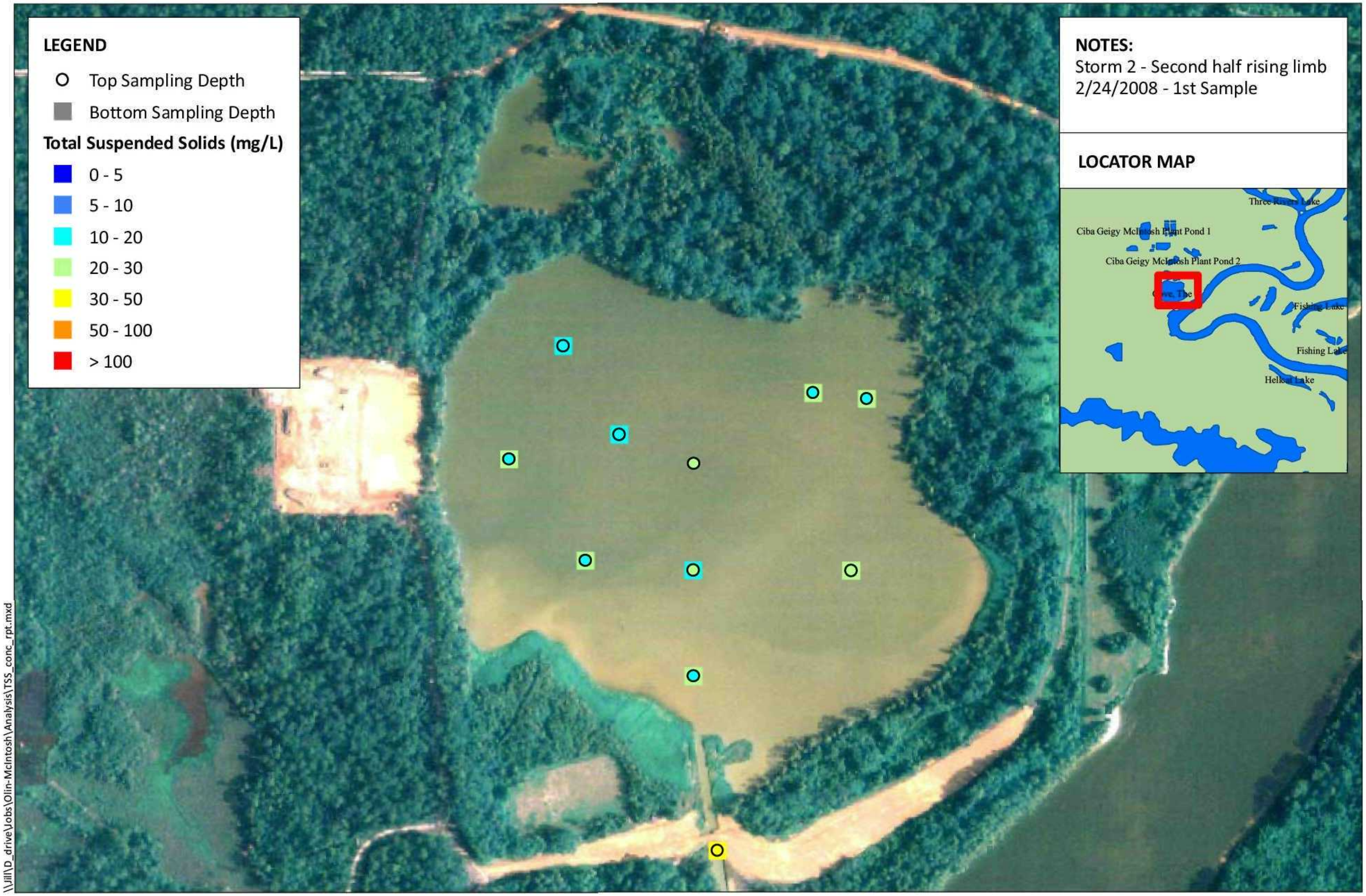

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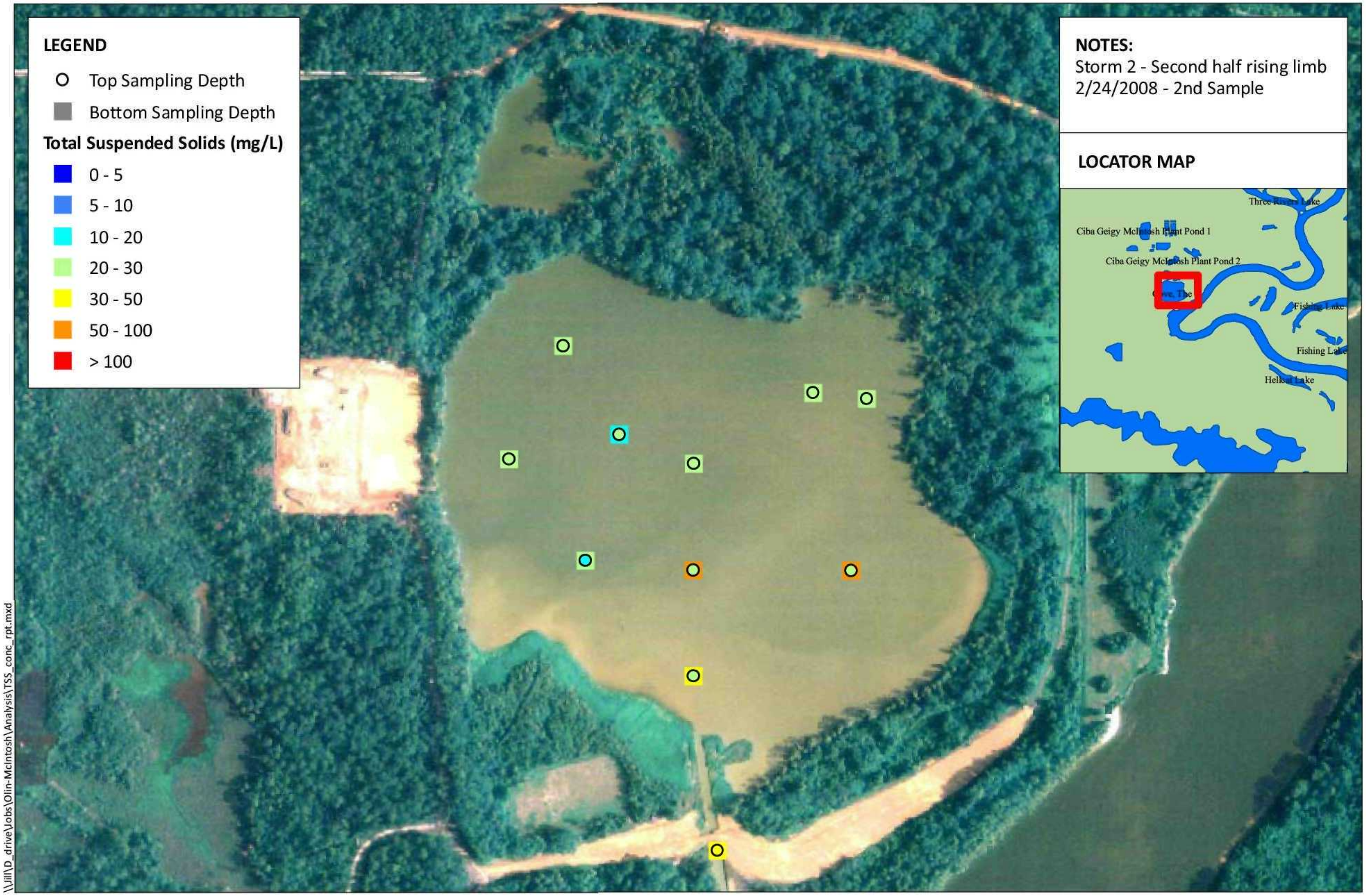

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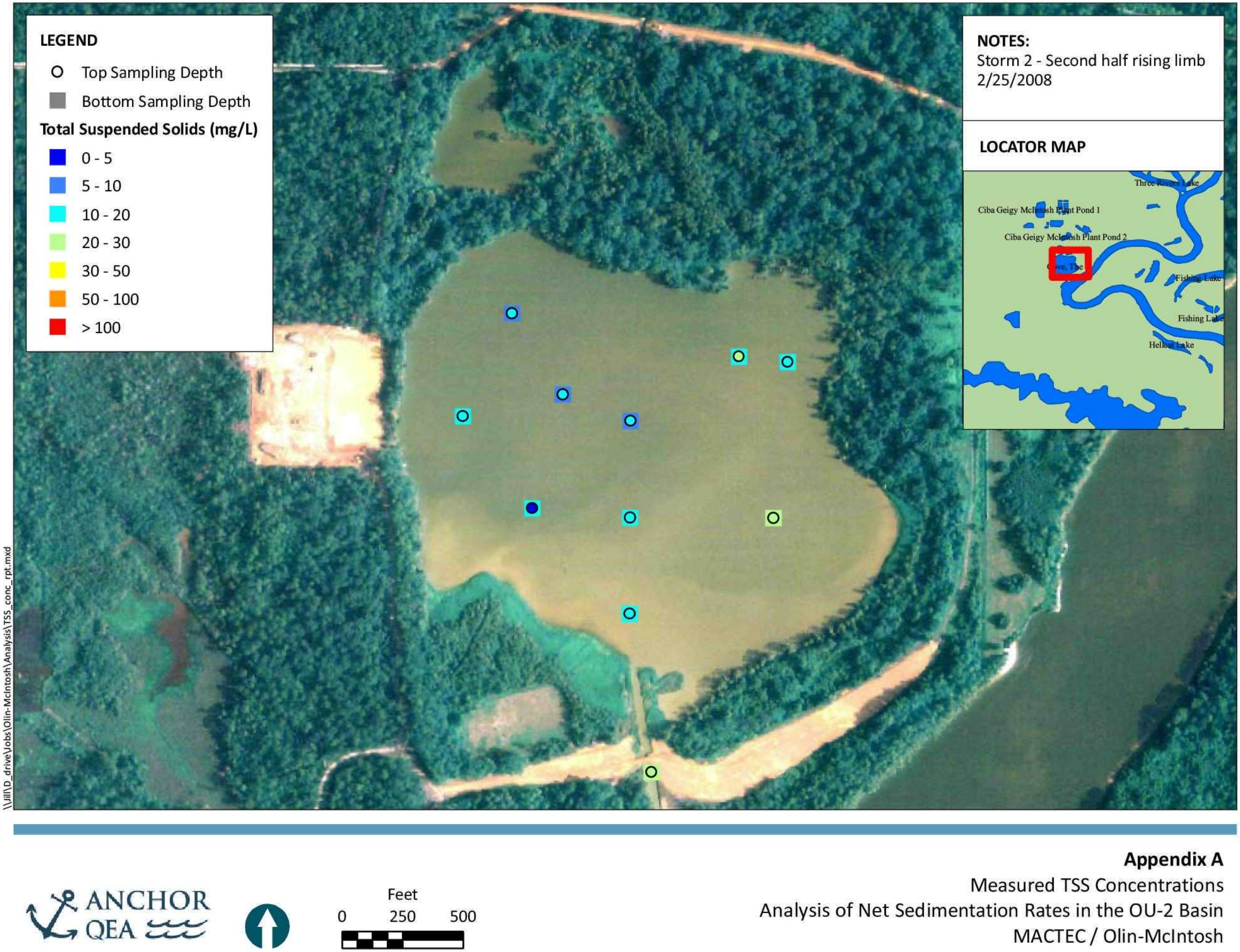

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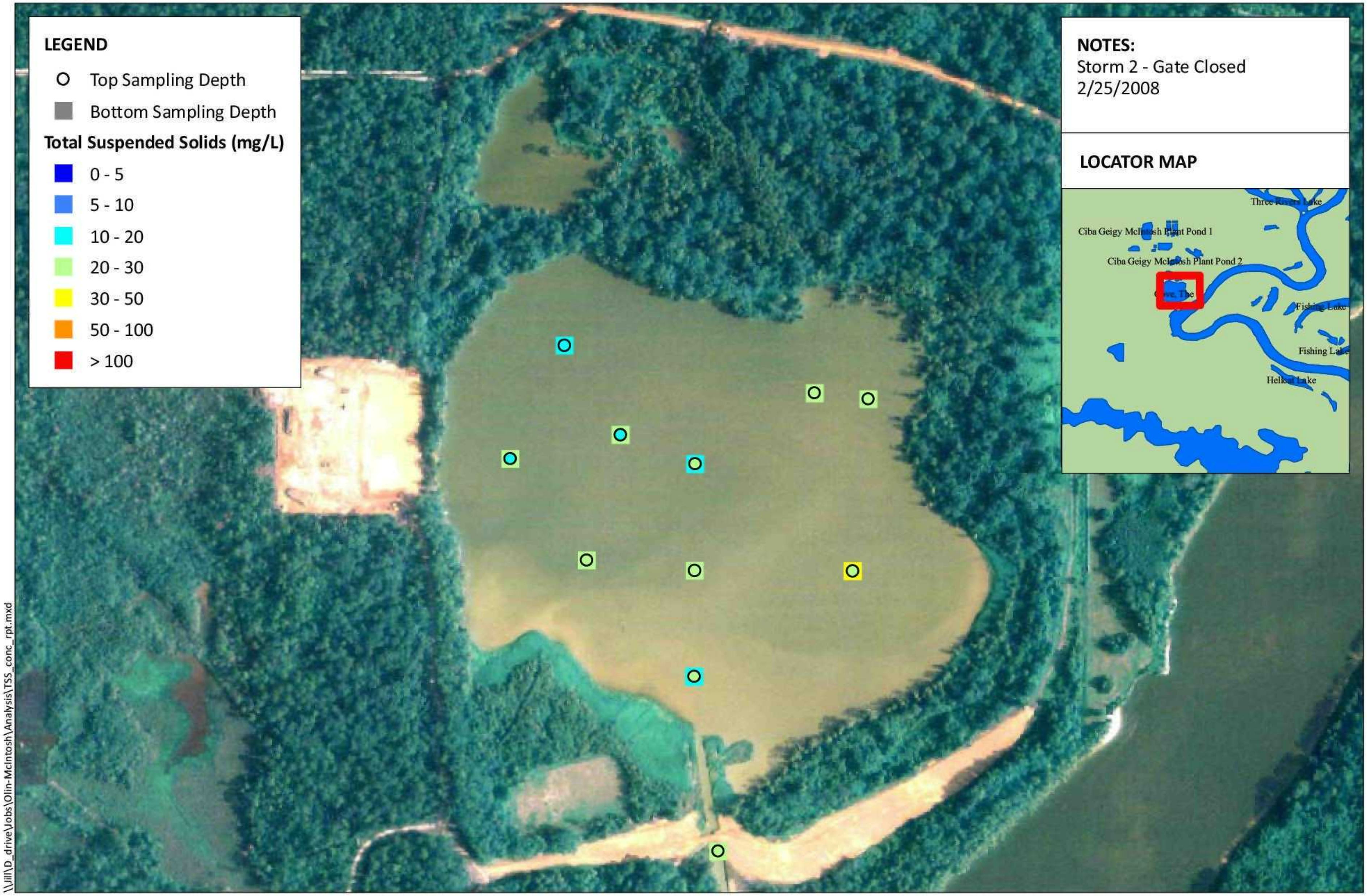

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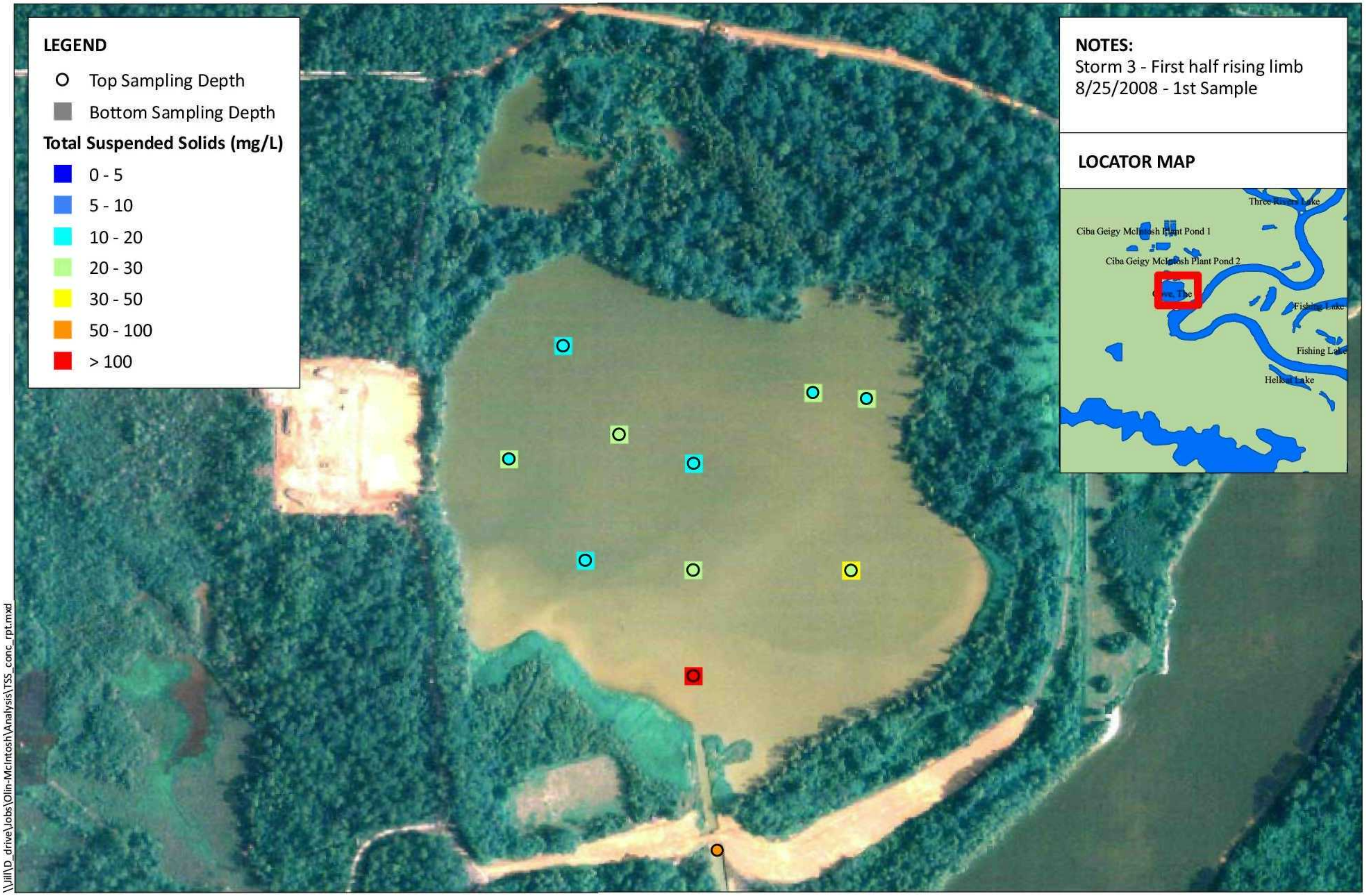

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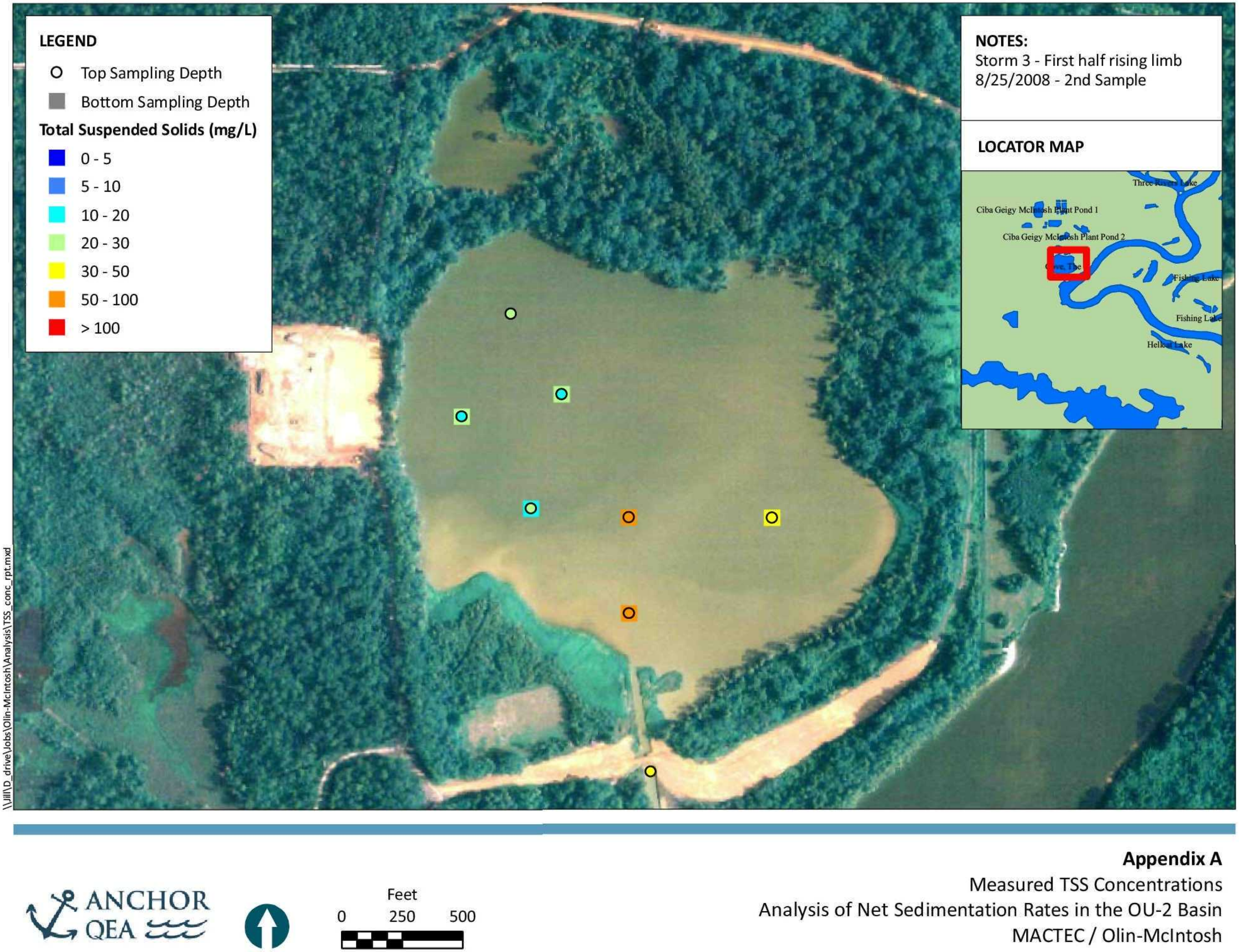

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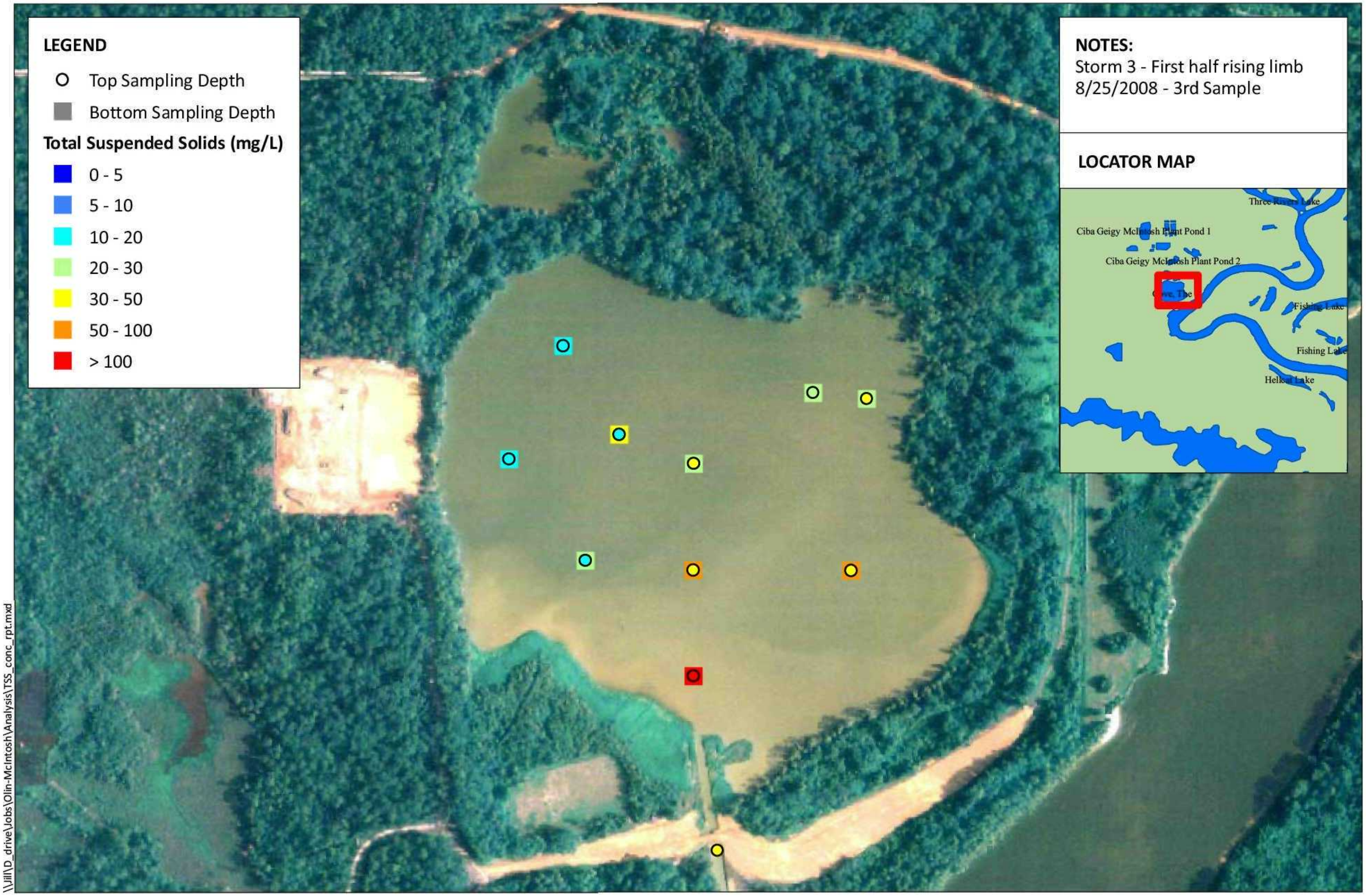

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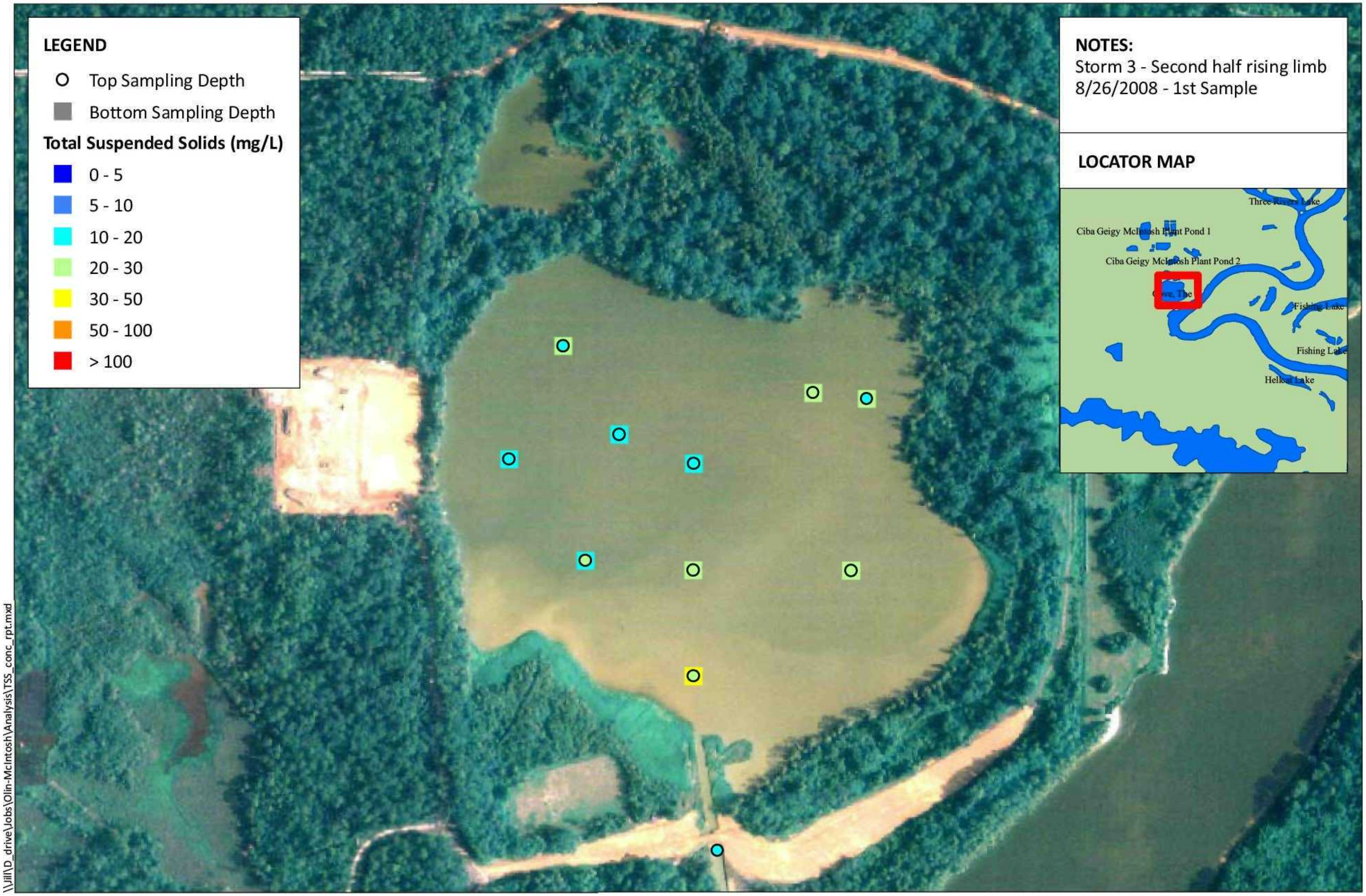

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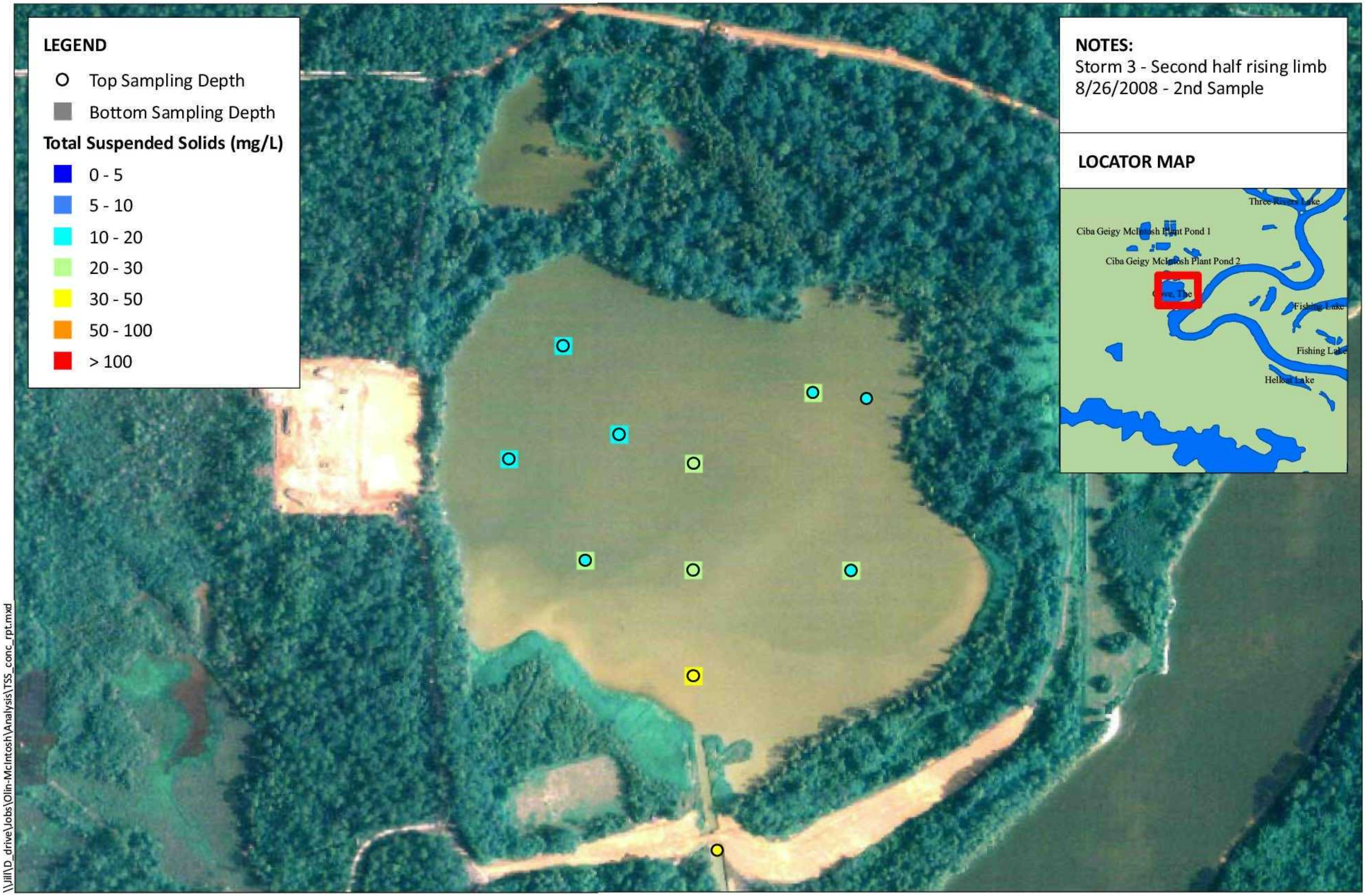

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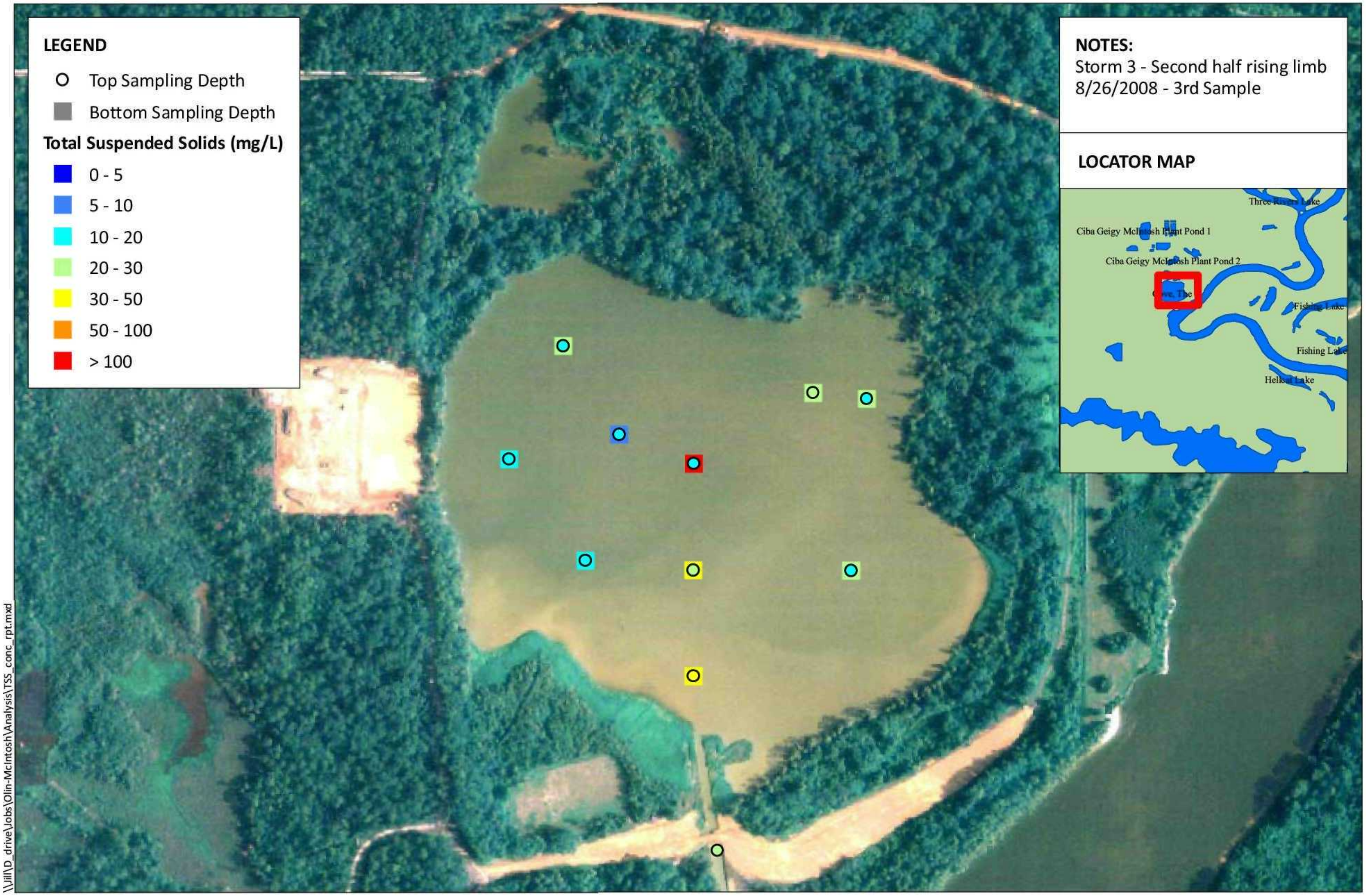

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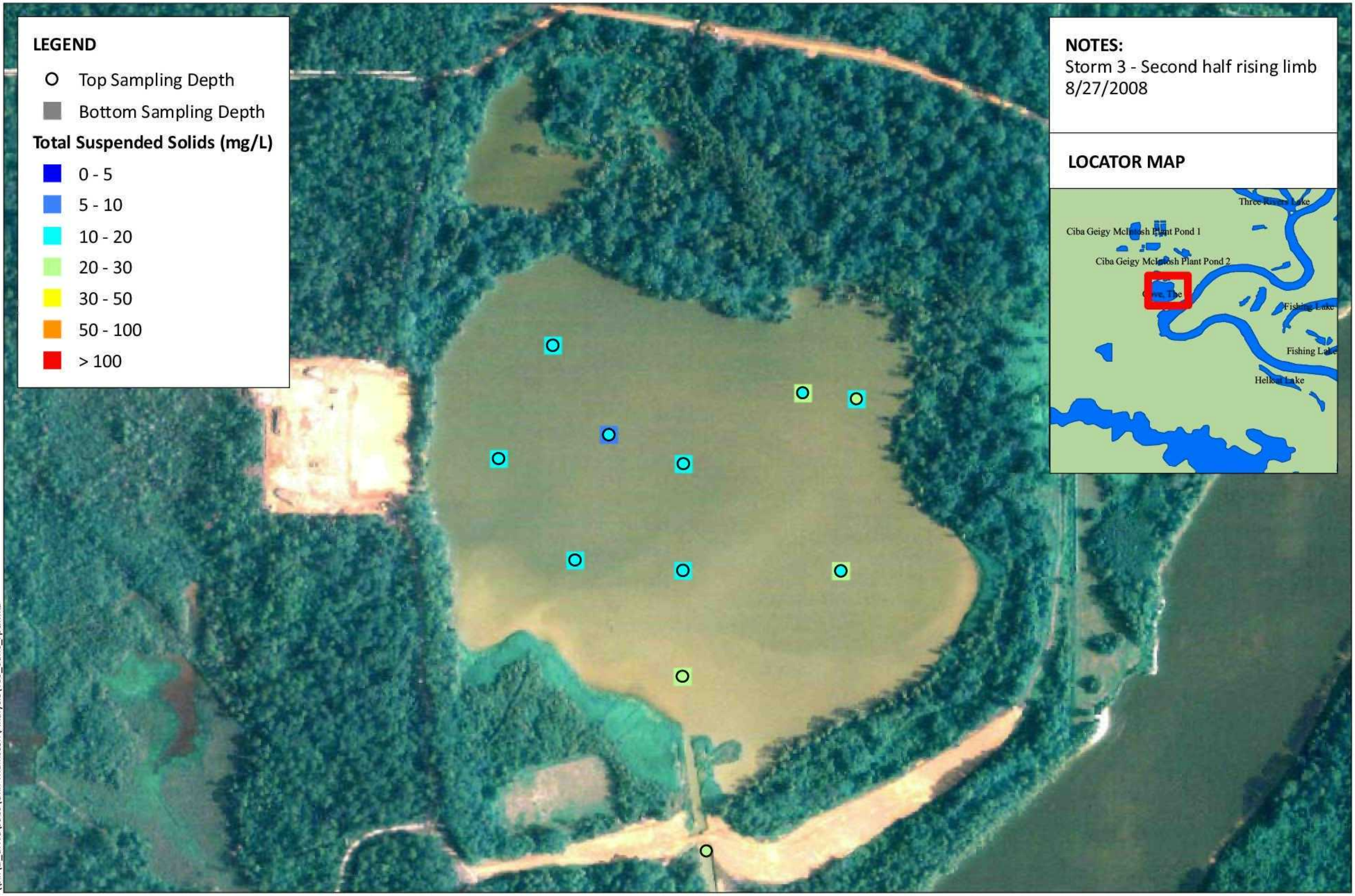

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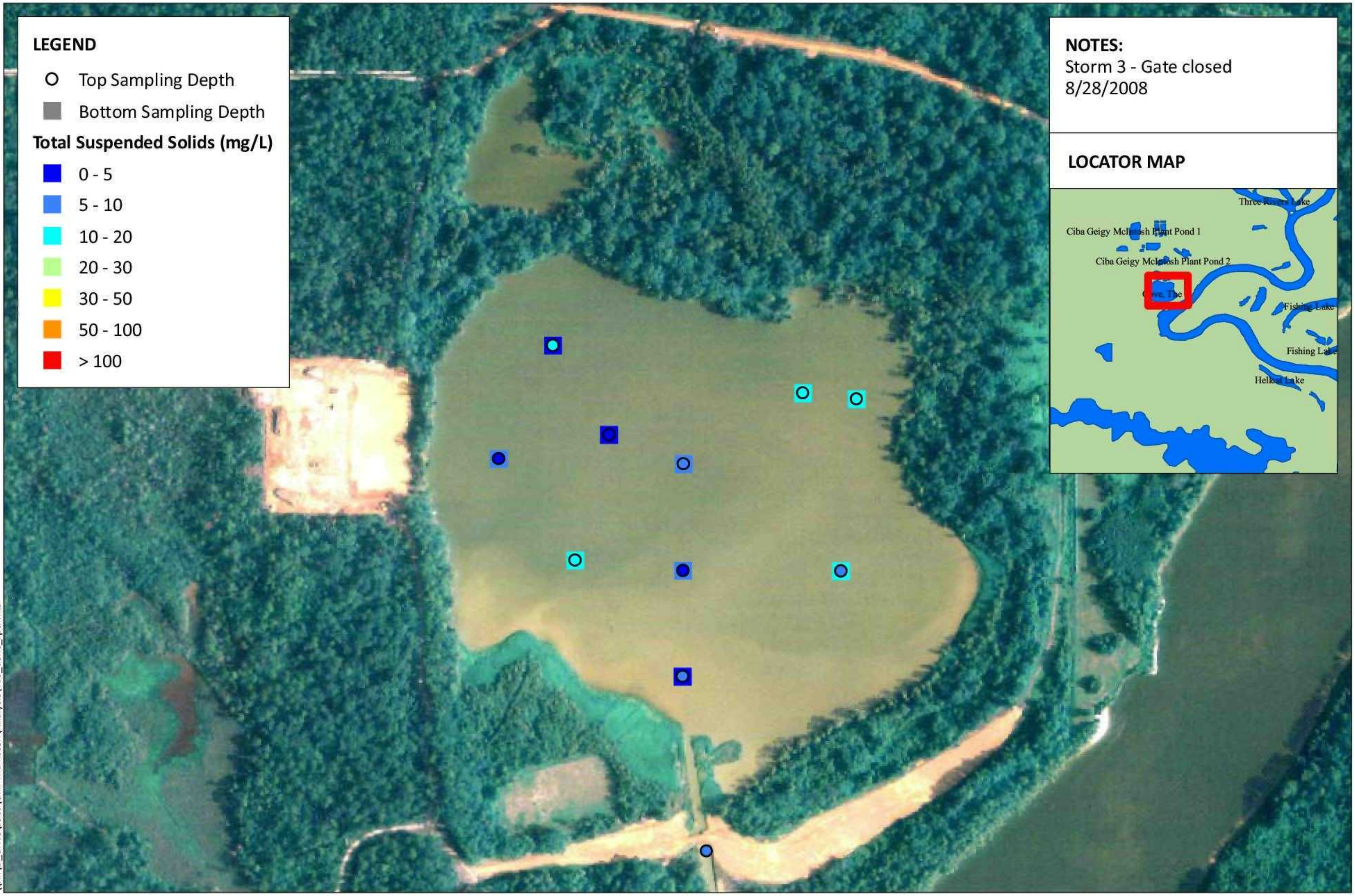

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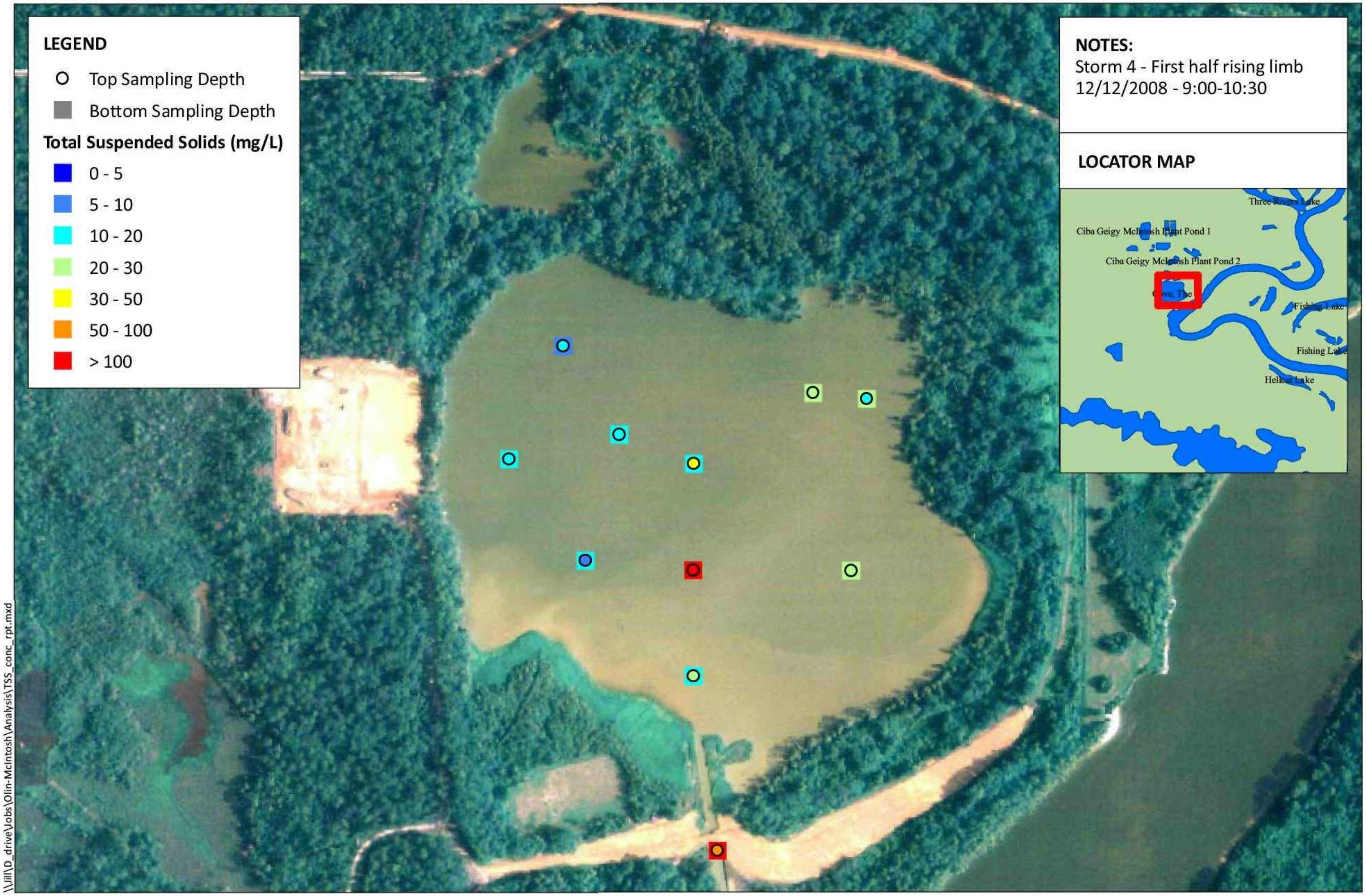
Analysis of Net Sedimentation Rates in the OU-2 Basin
MACTEC / Olin-McIntosh



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ANCHOR QEA

Feet
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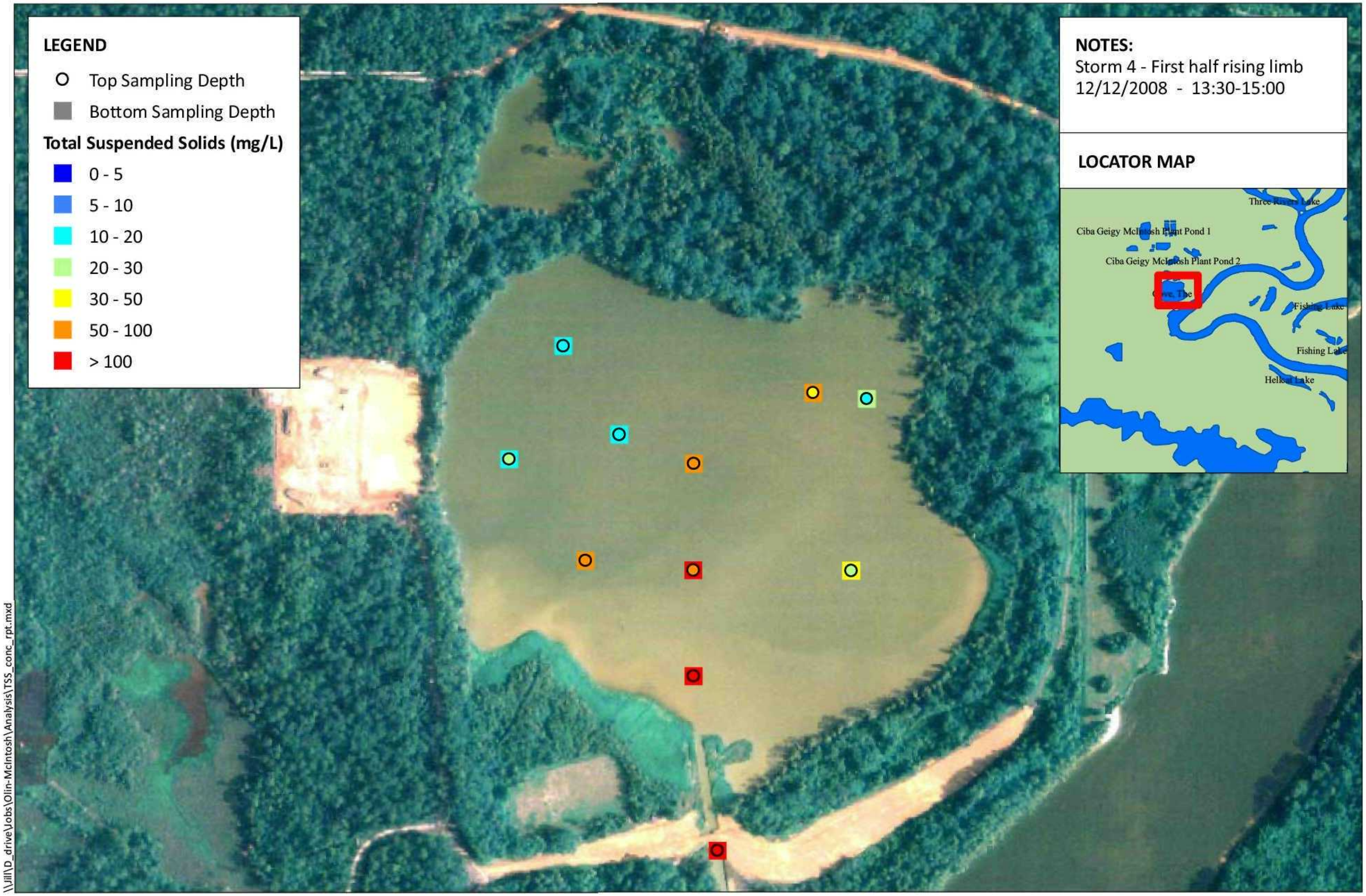
Appendix A
Measured TSS Concentrations
Analysis of Net Sedimentation Rates in the OU-2 Basin
MACTEC / Olin-McIntosh



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ANCHOR QEA

Feet
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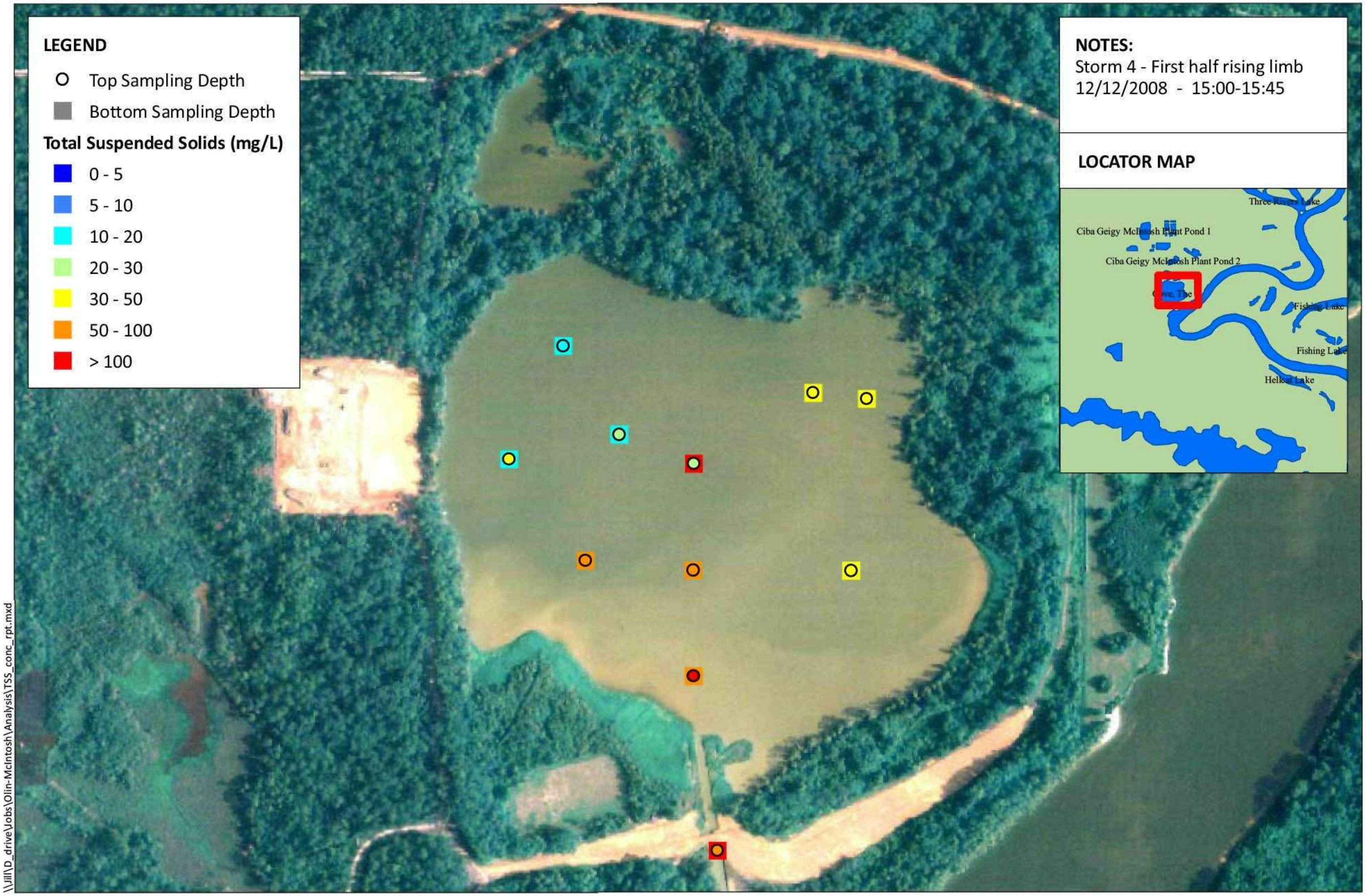
Appendix A
Measured TSS Concentrations
Analysis of Net Sedimentation Rates in the OU-2 Basin
MACTEC / Olin-McIntosh



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ANCHOR QEA

Feet
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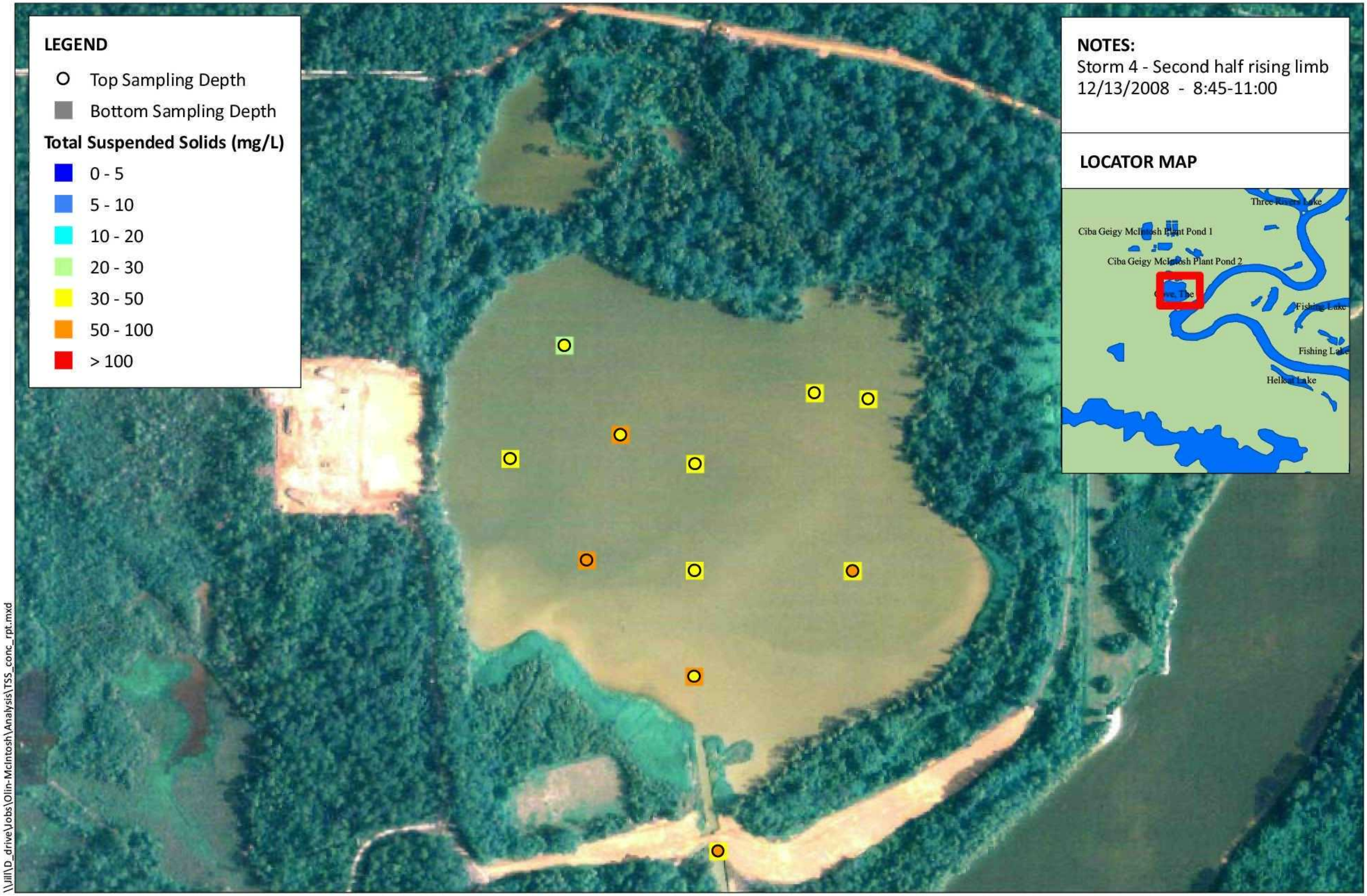
Appendix A
Measured TSS Concentrations
Analysis of Net Sedimentation Rates in the OU-2 Basin
MACTEC / Olin-McIntosh



ANCHOR QEA

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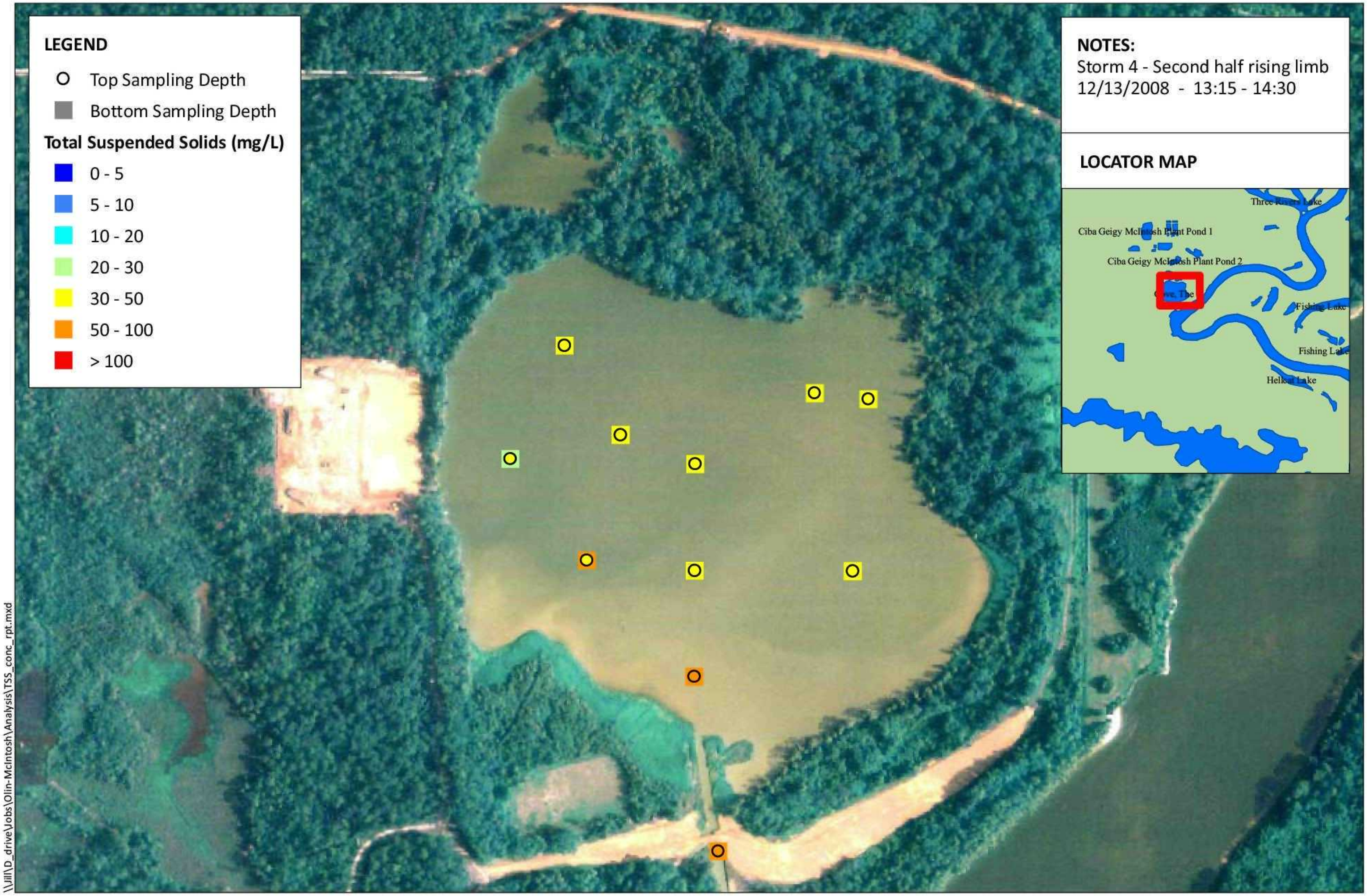
Appendix A
Measured TSS Concentrations
Analysis of Net Sedimentation Rates in the OU-2 Basin
MACTEC / Olin-McIntosh



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ANCHOR QEA

Feet
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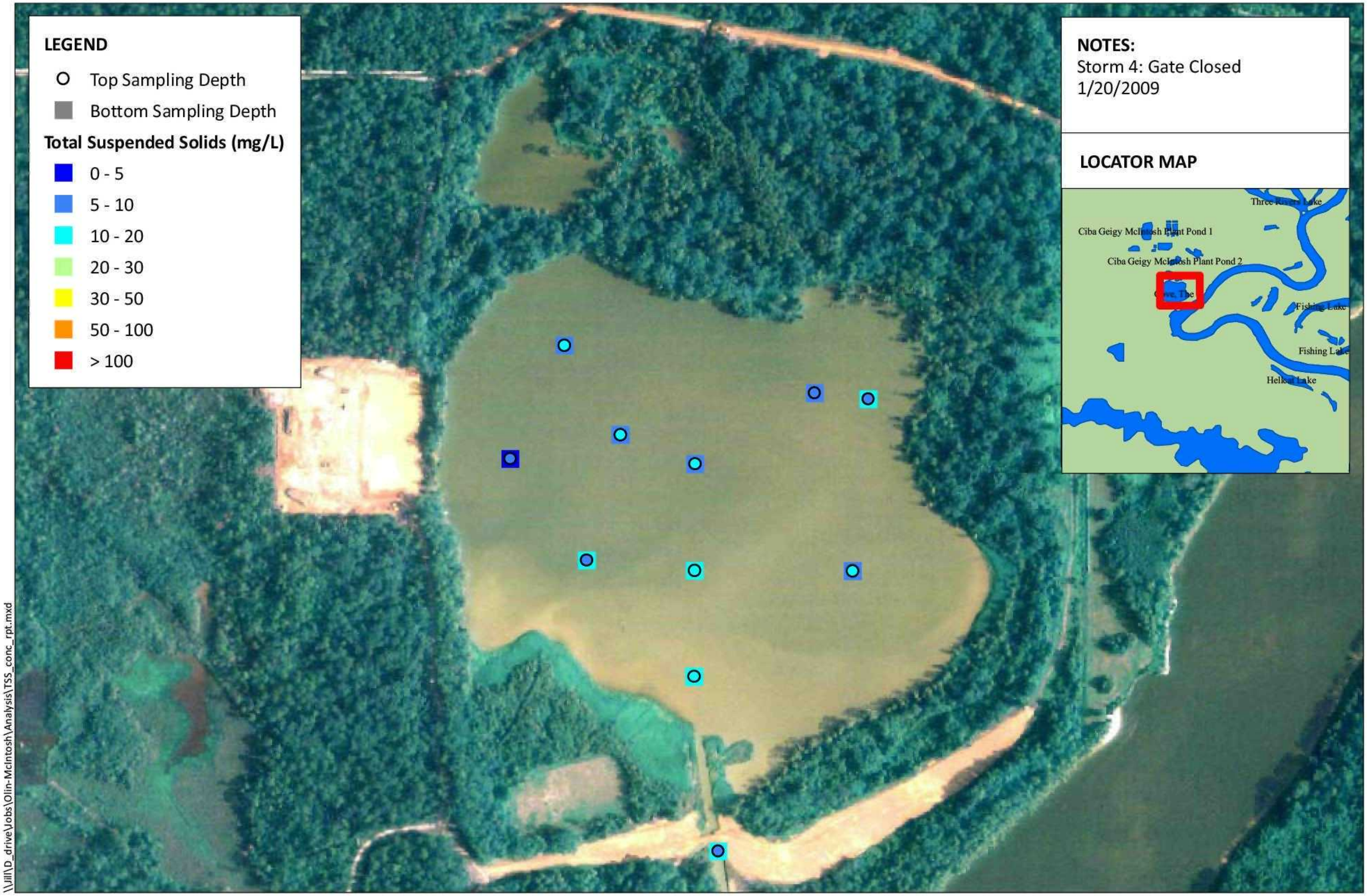
Appendix A
Measured TSS Concentrations
Analysis of Net Sedimentation Rates in the OU-2 Basin
MACTEC / Olin-McIntosh



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Feet
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Appendix A
Measured TSS Concentrations
Analysis of Net Sedimentation Rates in the OU-2 Basin
MACTEC / Olin-McIntosh

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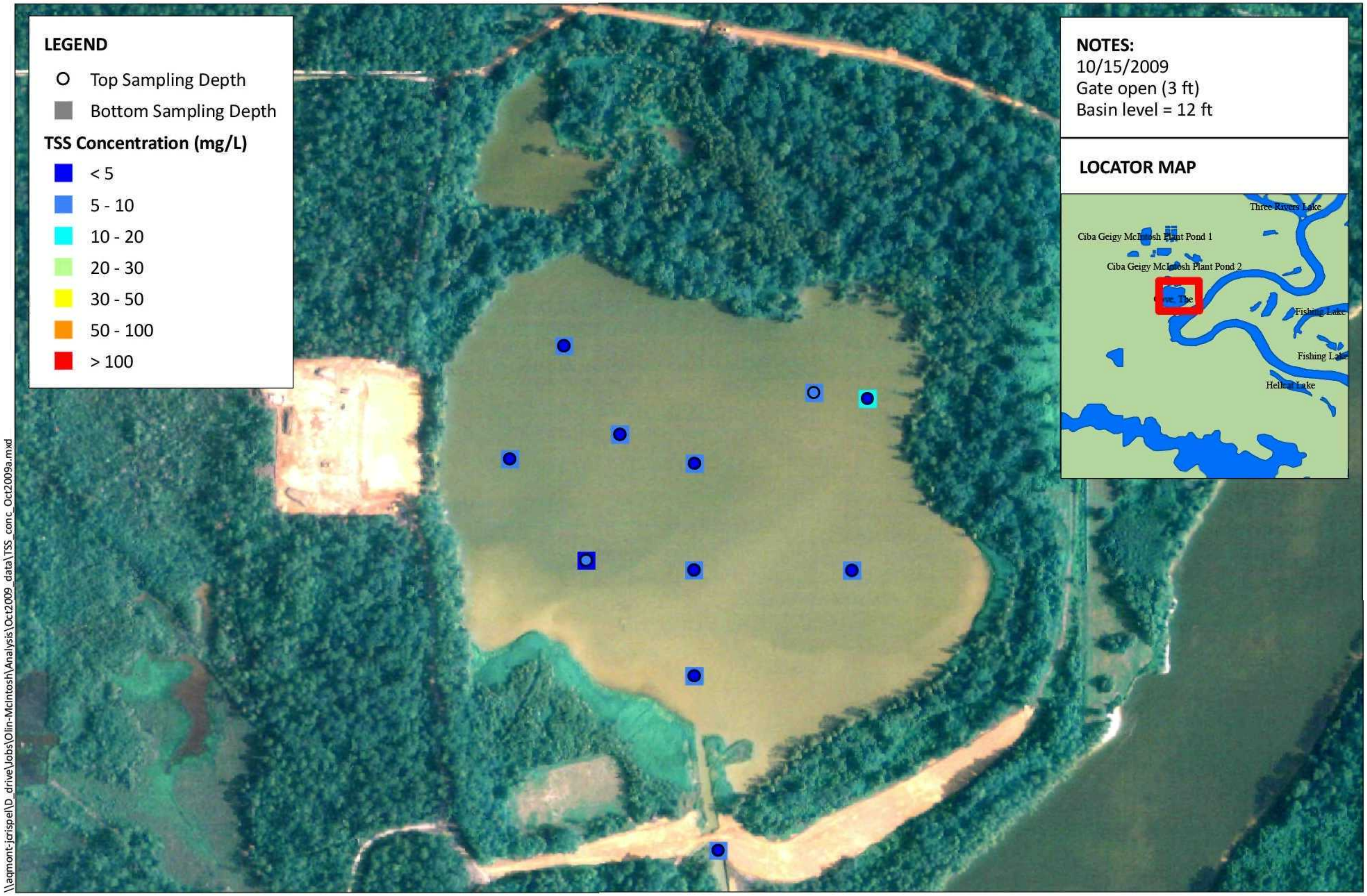

Feet

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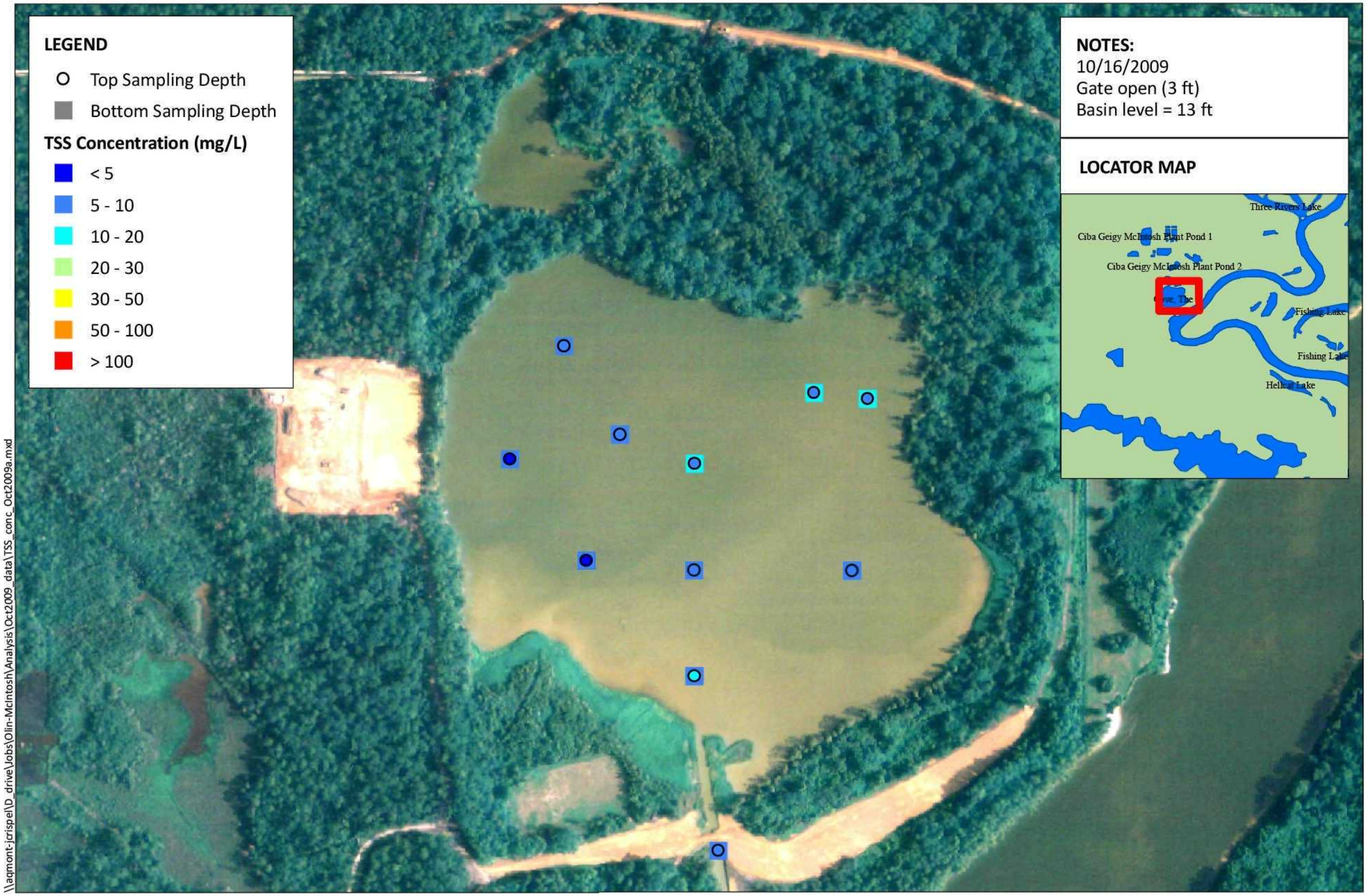
Appendix A

Measured TSS Concentrations - October 2009 Sampling

Analysis of Sedimentation Rates in the OU-2 Basin

MACTEC / Olin-McIntosh



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Feet
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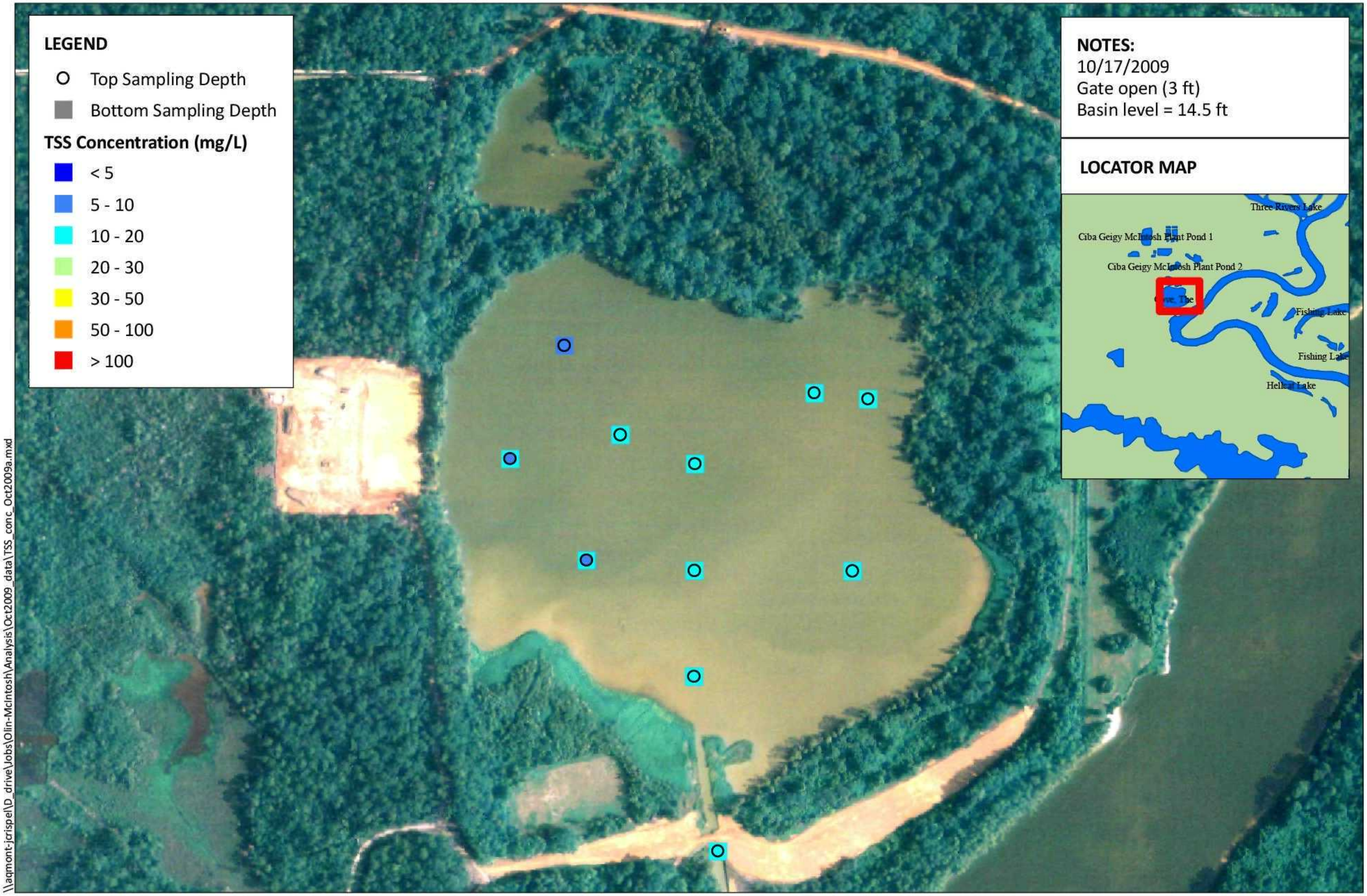
Appendix A
Measured TSS Concentrations - October 2009 Sampling
Analysis of Sedimentation Rates in the OU-2 Basin
MACTEC / Olin-McIntosh



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Feet
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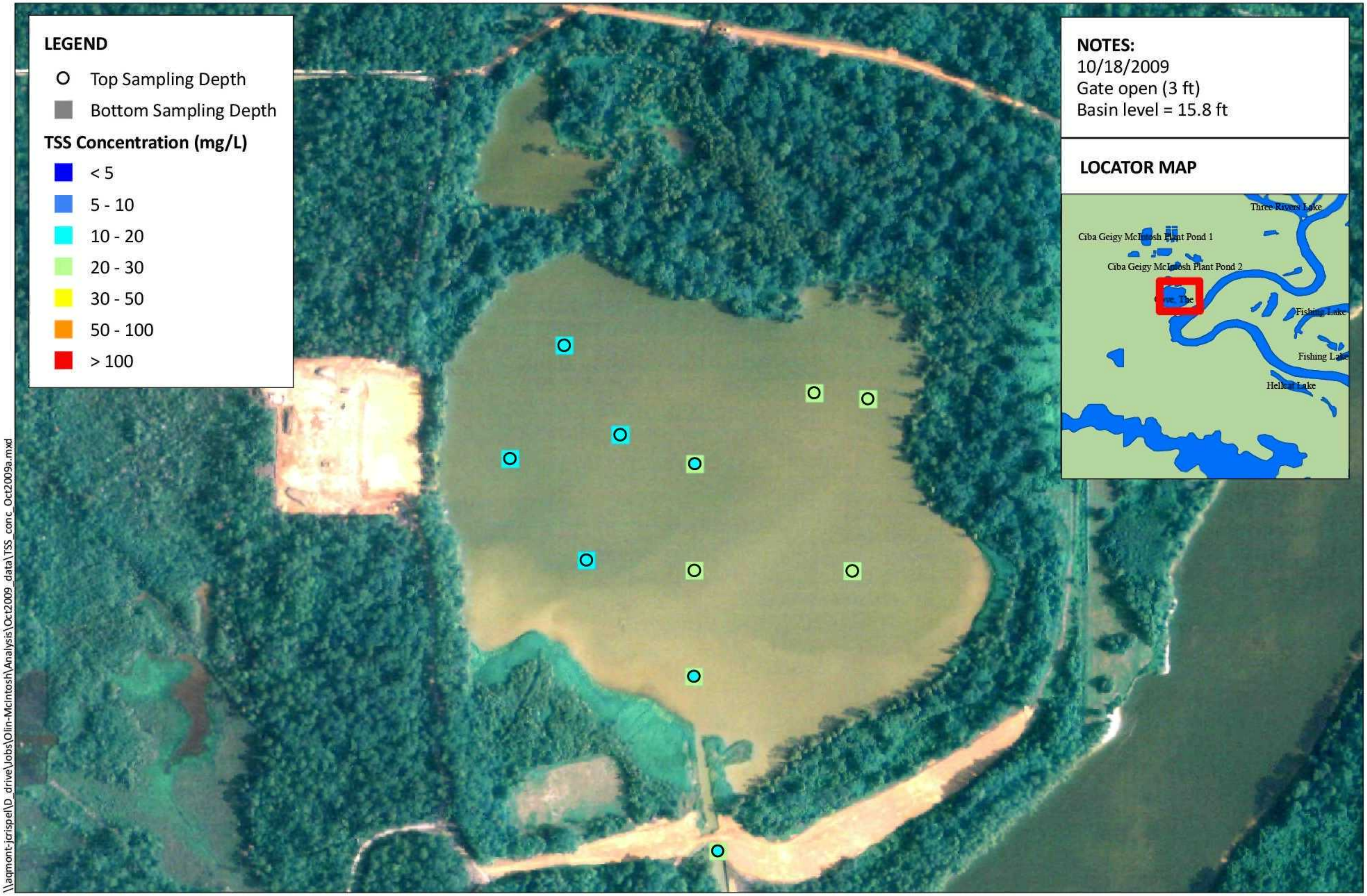
Appendix A

Measured TSS Concentrations - October 2009 Sampling
Analysis of Sedimentation Rates in the OU-2 Basin
MACTEC / Olin-McIntosh



ANCHOR QEA

Feet
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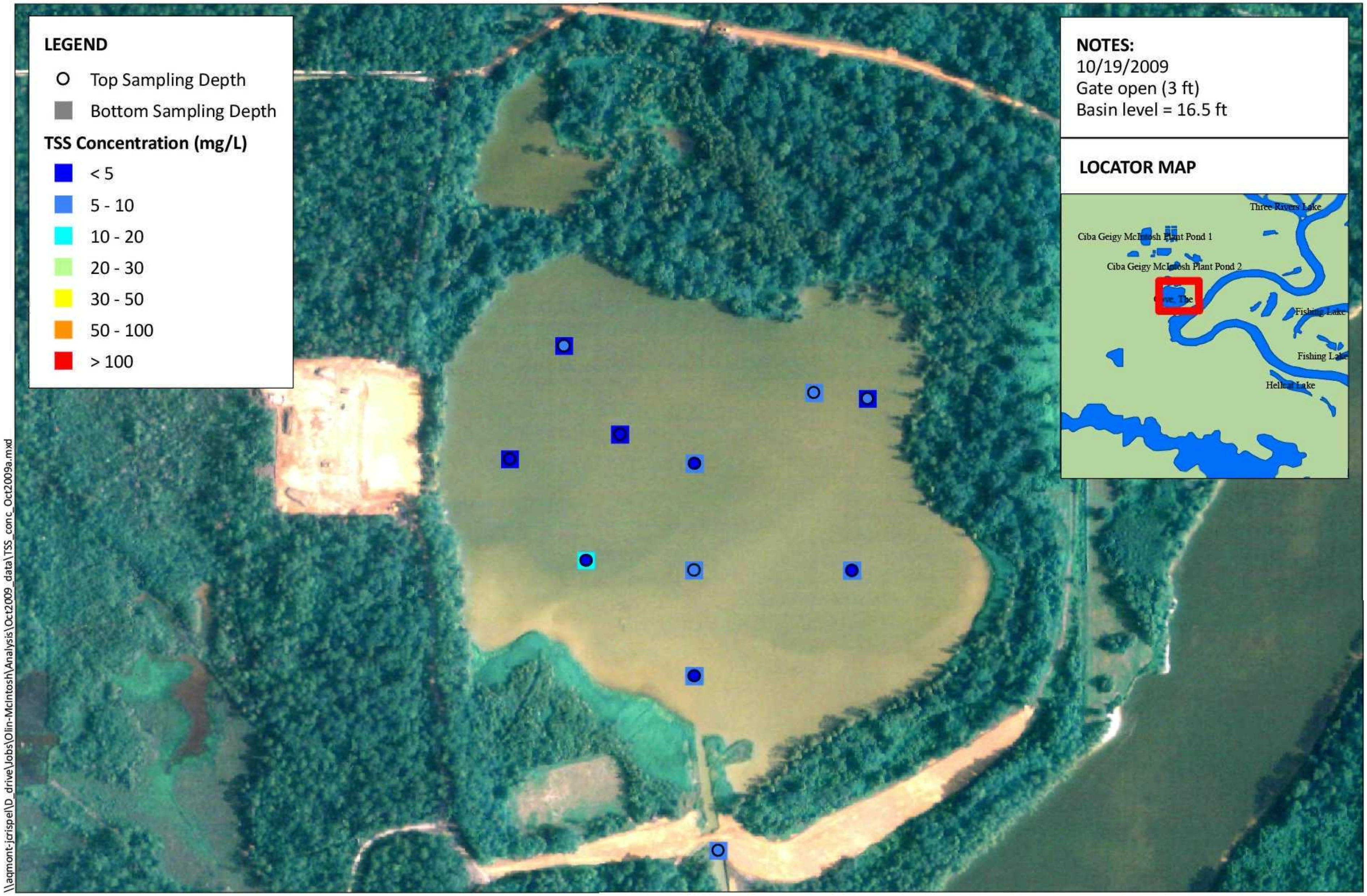
Appendix A

Measured TSS Concentrations - October 2009 Sampling

Analysis of Sedimentation Rates in the OU-2 Basin

MACTEC / Olin-McIntosh



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ANCHOR QEA

Feet
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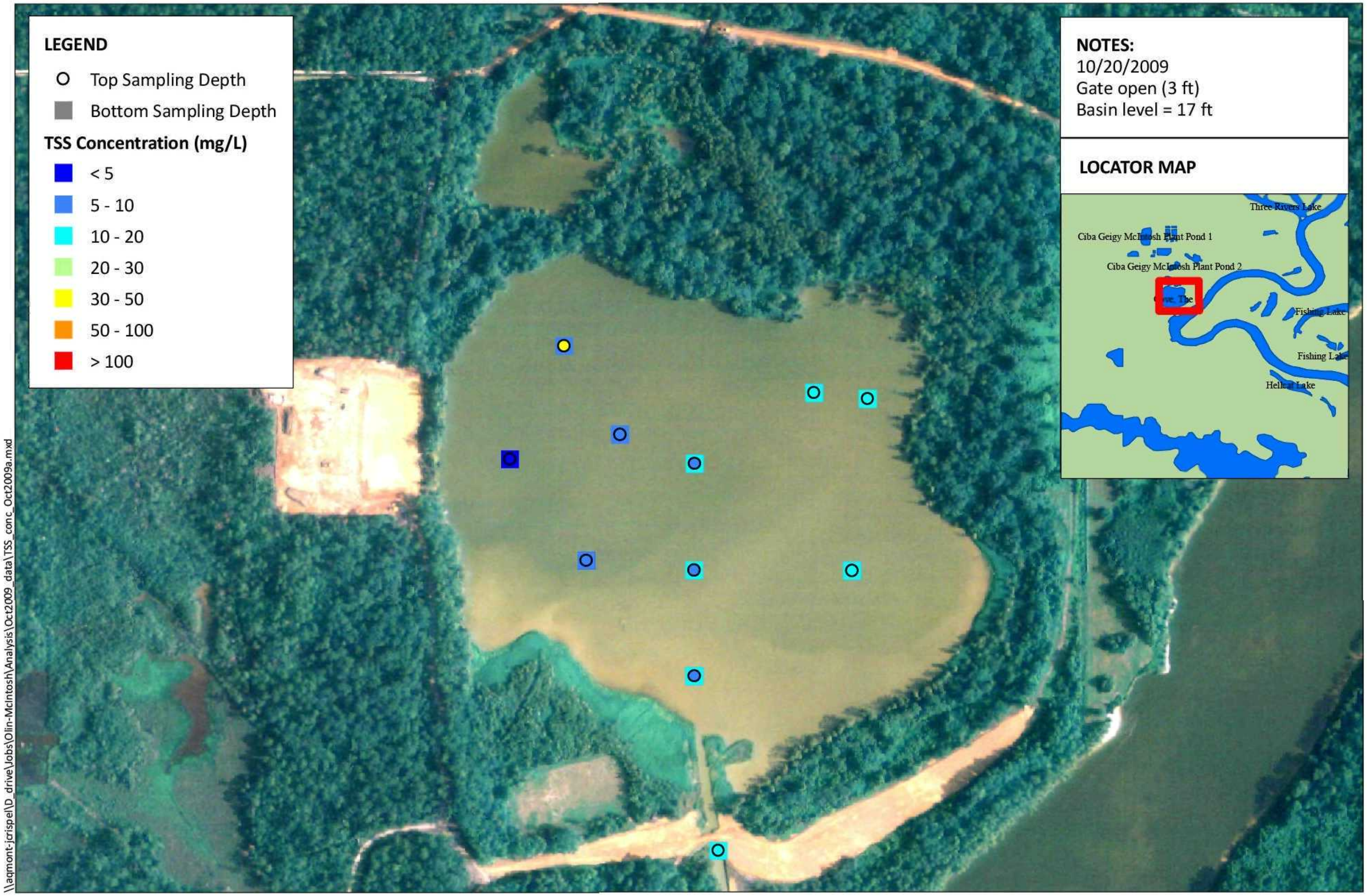
Appendix A

Measured TSS Concentrations - October 2009 Sampling
Analysis of Sedimentation Rates in the OU-2 Basin
MACTEC / Olin-McIntosh



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Feet
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Appendix A
Measured TSS Concentrations - October 2009 Sampling
Analysis of Sedimentation Rates in the OU-2 Basin
MACTEC / Olin-McIntosh

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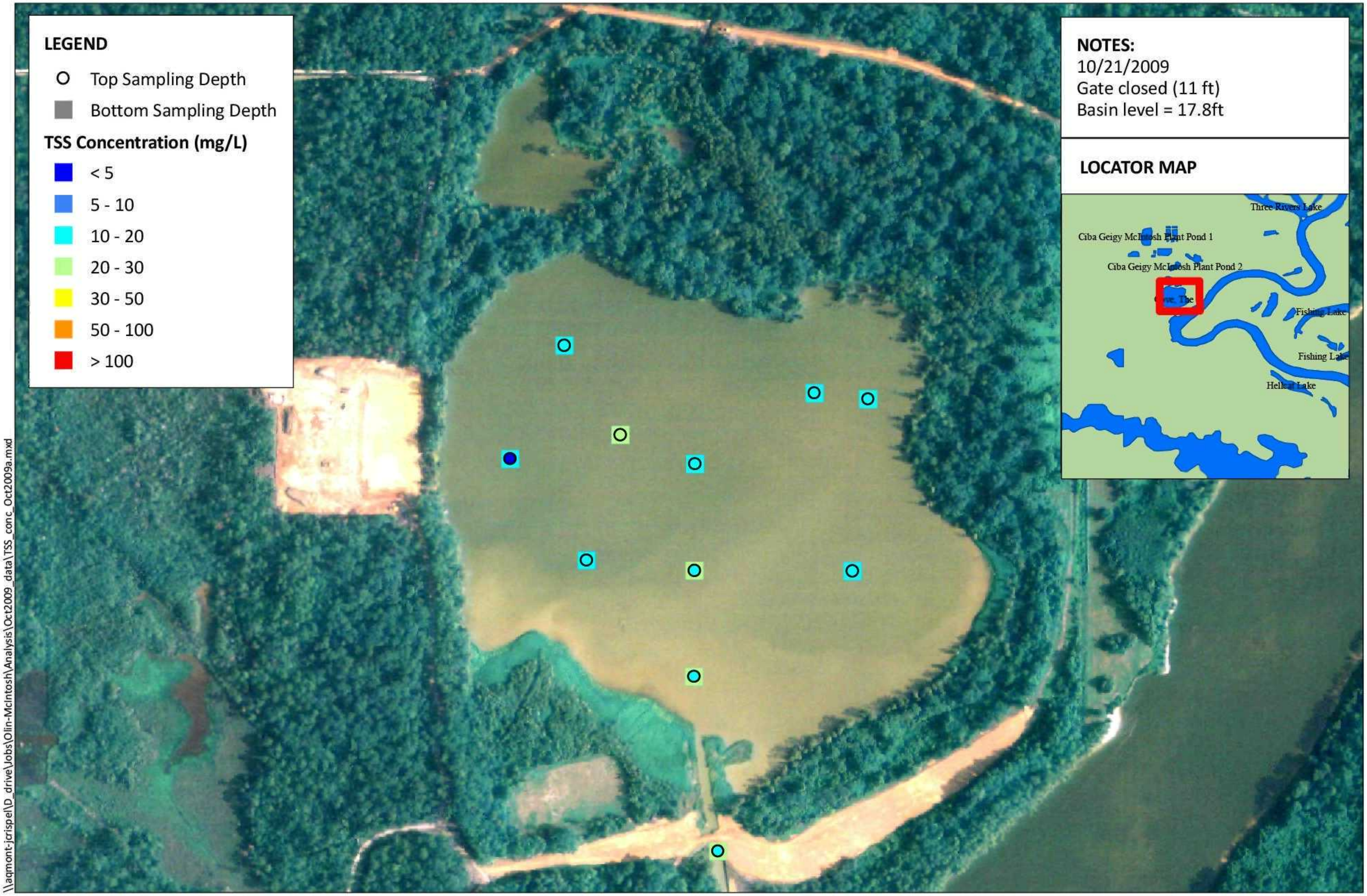

Feet
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Appendix A

Measured TSS Concentrations - October 2009 Sampling
Analysis of Sedimentation Rates in the OU-2 Basin
MACTEC / Olin-McIntosh

Olin - McIntosh

Appendix B-1. Sensitivity analysis of predicted sedimentation rates in OU-2 basin.

Average predicted 2005 sediment depth (in)

BASE CASE:

	River Velocity =	0.1 ft/s			0.3 ft/s			0.2 ft/s
Multiplier for Slope of TSS Rating Curve	Falling limb TSS concentration	Settling speed determined by d50 size =		Long tube trapping efficiency used	Settling speed determined by d50 size =		Long tube trapping efficiency used	Settling speed determined by d50 size =
		7.4 µm	23.7 µm		7.4 µm	23.7 µm		13.5 µm
x 1/2	6.1 mg/L	0.010	0.011	0.053	0.011	0.023	0.097	
	61.8 mg/L	0.289	0.561	0.371	0.337	1.643	0.690	
x 2	6.1 mg/L	0.142	0.187	0.187	0.161	0.455	0.309	
	61.8 mg/L	0.421	0.737	0.504	0.486	2.074	0.902	
x 1	22.6 mg/L							0.324

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Olin - McIntosh

Appendix B-2. Sensitivity analysis of predicted sedimentation rates in OU-2 basin.

Average predicted 2006 sediment depth (in)

	River Velocity =	0.1 ft/s			0.3 ft/s			BASE CASE: 0.2 ft/s
Multiplier for Slope of TSS Rating Curve	**Falling limb TSS concentration**	**Settling speed determined by d50 size =**		**Long tube trapping efficiency used**	**Settling speed determined by d50 size =**		**Long tube trapping efficiency used**	**Settling speed determined by d50 size =**
		7.4 µm	**23.7 µm**		**7.4 µm**	**23.7 µm**		**13.5 µm**
x 1/2	**6.1 mg/L**	0.007	0.007	0.032	0.008	0.010	0.056	
	61.8 mg/L	0.274	0.337	0.228	0.369	0.958	0.411	
x 2	**6.1 mg/L**	0.102	0.114	0.121	0.123	0.258	0.193	
	61.8 mg/L	0.369	0.444	0.317	0.484	1.205	0.548	
x 1	**22.6 mg/L**							0.225

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Olin - McIntosh

Appendix B-3. Sensitivity analysis of predicted sedimentation rates in OU-2 basin.

Average predicted 2007 sediment depth (in)

	River Velocity =	0.1 ft/s			0.3 ft/s			BASE CASE: 0.2 ft/s
Multiplier for Slope of TSS Rating Curve	Falling limb TSS concentration	Settling speed determined by d50 size =		Long tube trapping efficiency used	Settling speed determined by d50 size =		Long tube trapping efficiency used	Settling speed determined by d50 size =
		7.4 µm	23.7 µm		7.4 µm	23.7 µm		13.5 µm
x 1/2	6.1 mg/L	0.000	0.000	0.000	0.000	0.000	0.000	
	61.8 mg/L	0.000	0.000	0.000	0.000	0.000	0.000	
x 2	6.1 mg/L	0.000	0.000	0.000	0.000	0.000	0.000	
	61.8 mg/L	0.000	0.000	0.000	0.000	0.000	0.000	
x 1	22.6 mg/L							0.000

Olin - McIntosh

Appendix B-4. Sensitivity analysis of predicted sedimentation rates in OU-2 basin.

Average predicted 2008 sediment depth (in)

	River Velocity =	0.1 ft/s			0.3 ft/s			BASE CASE: 0.2 ft/s
Multiplier for Slope of TSS Rating Curve	Falling limb TSS concentration	Settling speed determined by d50 size =		Long tube trapping efficiency used	Settling speed determined by d50 size =		Long tube trapping efficiency used	Settling speed determined by d50 size =
		7.4 µm	23.7 µm		7.4 µm	23.7 µm		13.5 µm
x 1/2	6.1 mg/L	0.004	0.004	0.013	0.005	0.005	0.021	
	61.8 mg/L	0.081	0.113	0.074	0.058	0.096	0.080	
x 2	6.1 mg/L	0.050	0.054	0.058	0.107	0.331	0.139	
	61.8 mg/L	0.127	0.163	0.119	0.160	0.422	0.198	
x 1	22.6 mg/L							0.081

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Olin - McIntosh
Appendix B-5. Sensitivity analysis of predicted sedimentation rates in OU-2 basin.
Average predicted 2009 sediment depth (in)

	River Velocity =	0.1 ft/s			0.3 ft/s			BASE CASE: 0.2 ft/s
Multiplier for Slope of TSS Rating Curve	Falling limb TSS concentration	Settling speed determined by d50 size =		Long tube trapping efficiency used	Settling speed determined by d50 size =		Long tube trapping efficiency used	Settling speed determined by d50 size =
		7.4 µm	23.7 µm		7.4 µm	23.7 µm		13.5 µm
x 1/2	6.1 mg/L	0.015	0.015	0.083	0.016	0.023	0.149	
	61.8 mg/L	0.497	0.774	0.513	0.607	2.298	0.970	
x 2	6.1 mg/L	0.246	0.307	0.300	0.282	0.772	0.505	
	61.8 mg/L	0.729	1.067	0.730	0.874	3.046	1.326	
x 1	22.6 mg/L							0.510

APPENDIX G

DATA QUALITY EVALUATION

APPENDIX G

DATA QUALITY EVALUATION

Data quality evaluation (DQE) was performed on the analytical data generated during the 2009 ESSP sampling events and the RI sampling activities at Olin-McIntosh according to the procedures outlined in Section 4.1.2.2 of the project QAPP. The laboratories that generated data as part of the ESSP and the RI during 2009 were Pace Analytical (Pace), Test America (TA), Battelle Marine Sciences Laboratories (Battelle), Analytical Environmental Services (AES), and the MACTEC BioTox Laboratory (MACTEC). Generally, each sample delivery group (SDG) consisted of samples that were collected or shipped together, and DQE was performed on each SDG.

The data are considered acceptable and usable as qualified, and are deemed to be of sufficient quality to be used for the intended purpose with the exceptions specified below.

G.1 ESSP SAMPLING

Surface Water

The annual surface water sampling event was performed between June 3 and June 9, 2009. A total of 22 surface water samples, 2 field duplicates, and 1 equipment blank sample were collected. The analytical testing performed by Pace (SDGs 2095640, 2095784, and 2095803) included total suspended solids (TSS), total dissolved solids (TDS), dissolved organic carbon (DOC), alkalinity, and hardness. The analytical testing performed by Battelle (SDG 3025_1-96M) included filtered and unfiltered mercury and filtered and unfiltered methylmercury. Pace reported alkalinity by method SM 2320B, while the QAPP (Table 1-3) indicated method EPA 310.1 should have been performed. A comparison of the two alkalinity methods indicated that they were equivalent. Only issues affecting the quality of the data are described below.

The relative percent difference (RPD) was outside of QC limits for TSS in field duplicate pair OU2B-SW-303DD-09/OU2B-SW-DUP01-DD-09 (SDG 2095640) and for TSS and TDS in field duplicate pair OU2B-SW-205DS-09/OU2B-SW-DUP01-DS-09 (SDG 2095803). The RPD was also outside of QC limits for unfiltered mercury in OU2B-SW-304DD-09/OU2B-SW-DUP01DD-09 and filtered mercury in OU2B-SW-205DS-09/OU2B-SW-DUP01DS (SDG

2095784). The associated results in both the samples and their duplicates were qualified as estimated and flagged "J" or "UJ".

Several method blanks associated with the surface water samples contained low levels of methylmercury. The filtered and unfiltered methylmercury results in sample OU2B-SW-EB101-09 and the filtered methylmercury result in OU2B-SW-FB103-09 (SDG 3025_1-96M) were less than five times the average method blank value, and were qualified as estimated with possible method blank contamination and flagged "JB".

Sediment

The annual sediment sampling event was performed between June 3 and June 9, 2009. A total of 57 sediment samples, 6 field duplicates, 4 matrix spike/matrix spike duplicates (MS/MSDs), 2 equipment blank samples, and 3 field blank samples were collected. The analytical testing performed by Pace (SDGs 2095670, 2095862, and 2095808) included mercury, total organic carbon (TOC), density, grain size, percent moisture, sulfide, sulfate, hexachlorobenzene (HCB), and DDTr (2,4-DDT/DDD/DDE and 4,4-DDT/DDD/DDE). The analytical testing performed by Battelle (SDG 3025_22-89) included methylmercury, acid volatile sulfide/simultaneously extracted metals (AVS/SEM), and percent moisture. Only issues affecting the quality of the data are described below.

The MS recoveries for sulfide in sample OU2B-SED-101C-09 and TOC in sample OU2B-SED-202DNW-09 (SDG 2095808) were below QC limits, and the associated sulfide and TOC results were qualified as estimated and flagged "J".

The surrogate recovery for decachlorobiphenyl in sample OU2R-SED-101DC (SDG 2095808) was above QC limits, therefore the positive results in that sample were qualified as estimated and flagged "J".

Several method blanks associated with the sediment samples contained low levels of AVS and 5 of the 6 SEM. The associated mercury results in samples OU2B-SED-205C-09 and OU2B-SED101DNW-09 (SDG 3025_22-89) were less than five times the method blank value, and were qualified as estimated with possible method blank contamination and flagged "JB".

G.2 SEDIMENT TRAPS

Sediment trap samples were collected quarterly in February, May, August, and November 2009. Samples from 9 traps were collected in February, with samples from 4 traps collected in May, 8 in August, and 12 in November. No field duplicates or equipment blanks were collected for the sediment trap samples, and no samples were specified for MS/MSD analysis. The analytical testing performed by Pace (SDGs 2092036, 2092711, 2092712, 2096174, 2095492, 2096191, 2095624, 2098384, 2098385, 2098422, 20101843, 20101844, and 20101897) included mercury, TSS, TOC, percent moisture, density, grain size, and organic and inorganic solids. The analytical testing performed by MACTEC included grain size. Only issues affecting the quality of the data are described below.

The analytical holding time was exceeded for the organic and inorganic solids analysis of the May and August sediment trap samples (SDGs 2095624 and 2098422). The associated sample results were qualified as estimated and flagged “J”.

G.3 WIND TRAPS

Wind trap samples were collected from on July 9, 2009. No field duplicates or equipment blank samples were collected, and no samples were specified for MS/MSD analysis. The analytical testing performed by Pace (SDG 2097093) included mercury, TOC, and percent moisture. There were no issues affecting the quality of the data, and the data are usable without qualification.

G.4 STORM

<u>TSS</u>

One storm water TSS sampling event performed in 2009 was associated with the storm event in December 2008. A total of 22 surface water samples were collected on January 20, 2009. No field blanks were collected, and no samples were specified for MS/MSD analysis. The analytical testing performed by Pace (SDG 2090899) included total suspended solids (TSS). There were no issues affecting the quality of the data, and the data are usable without qualification.

One storm water TSS sampling event for 2009 was performed between October 15 and October 21, 2009. A total of 144 surface water samples and 21 field duplicates were collected. No field blanks were collected. The analytical testing performed by Pace (SDGs 20100818, 20100867, and 20101106) included total suspended solids (TSS). The analytical testing performed by MACTEC included grain size. Only issues affecting the quality of the data are described below.

The RPD was outside of QC limits for TSS in the following field duplicate pairs, and the associated results in the samples and the duplicates were qualified as estimated and flagged "J".

SDG 20100818
OU2-TSS-DUP01-101509/OU2-TSS-D1B-101509
OU2-TSS-DUP01-101609/OU2-TSS-A1T-101609
OU2-TSS-DUP01-101709/OU2-TSS-D1T-101709

SDG 20100867
OU2-TSS-DUP02-101709/OU2-TSS-A1B-101709
OU2-TSS-DUP03-101709/OU2-TSS-B2T-101709
OU2-TSS-DUP01-101909/OU2-TSS-D1T-101909

SDG 20101106
OU2-TSS-DUP03-102009/OU2-TSS-B2B-102009
OU2-TSS-DUP02-102109/OU2-TSS-A1T-102109

ISCO

Two sets of storm water samples collected by the automated ISCO sampler located at the end of the Olin dock were submitted for analysis during 2009. A total of 12 samples were collected between March 1 and March 17, 2009, and six samples were collected between October 24 and October 25, 2009. No field duplicates or field blank samples were collected, and no samples were specified for MS/MSD analysis. The analytical testing performed by AES (SDGs 0905181 and 0912792) included total suspended solids (TSS). Only issues affecting the quality of the data are described below.

Due to the nature of collecting periodic samples over time using an automated ISCO sampling device, the analytical holding time for TSS analysis was exceeded. All of the TSS results for samples collected using the ISCO sampler were qualified as estimated and flagged "J".

G.5 BACKGROUND SOIL

One soil background sample was collected in June 2009 and analyzed by Battelle for mercury. The results were included in SDG 3025_22-89s along with ESSP sediment samples sent to Battelle for mercury analysis. There were no issues affecting the quality of the data, and the data are usable without qualification.

G.6 SEDIMENT CORES

The sediment coring investigation initiated as part of the RI activities was performed between September 23 and September 28, 2009, however one sediment core was collected earlier during the field trial on June 3, 2009 in order to develop sampling protocols and sample collection strategies. During the June event, a total of 11 sediment core samples, 2 field duplicates, and one MS/MSD were collected. No field or equipment blanks were collected. The analytical testing performed by Pace (SDG 2095681) included total organic carbon (TOC), grain size, density, percent moisture, and hexachlorobenzene (HCB). The analytical testing performed by Battelle (SDG 3026_1-16) included mercury and methylmercury. Only issues affecting the quality of the data are described below.

The surrogate recovery was above QC limits for one surrogate in samples SDCR-1-CB-060309 and SDCR-1-CD-060309. However only positive results require qualification, therefore the HCB result in sample SDCR-1-CB-060309 (SDG 2095681) was qualified as estimated and flagged "J".

Fine Sectioned Core Sediments

A total of 25 fine sectioned sediment cores, 3 field duplicates, 2 MS/MSDs and 1 equipment blank sample were collected. The analytical testing performed by Test America (SDGs 700-41685-1, 700-41707-1) included mercury and total organic carbon (TOC). The analytical testing performed by Battelle (SDG 3077_9-37 and 3077_1) included methylmercury. Test America reported TOC by method EPA02/Lloyd Kahn, while the QAPP (Table 1-3) indicated method EPA 9060M or SM5310B should have been performed. A comparison of the two TOC methods indicated that they were equivalent. Only issues affecting the quality of the data are described below.

The RPD between the parent sample and the duplicate was outside of QC limits for mercury in SDCR-3-FSE-092309/ SDCR-FSDUP02-092309 (SDG 3077_9-37). The RPD between the parent and the duplicate sample results was also outside of QC limits for mercury in SDCR11-FSE-092509/SDCR-FSDUP03-092509 (SDG 3077_9-37). The associated results in both the parents and duplicate samples were qualified as estimated and flagged "J".

Coarse Sectioned Core Sediments

A total of 98 coarse sectioned sediment cores, 10 field duplicates, 4 MS/MSDs and 2 equipment blank samples were collected. The analytical testing performed by Test America (SDGs 700-

41707-1, 700-41709-1, 700-41727-1, 700-41726-3) mercury, total organic carbon (TOC), density, grain size, percent moisture, hexachlorobenzene (HCB), DDTr (2,4-DDT/DDD/DDE and 4,4-DDT/DDD/DDE), and SPLP mercury. Test America reported TOC by method EPA02/Lloyd Kahn, while the QAPP (Table 1-3) indicated method EPA 9060M or SM5310B should have been performed. A comparison of the two TOC methods indicated that they were equivalent. Only issues affecting the quality of the data are described below.

The MS/MSD recoveries for mercury in sample SDCR10-CE-092609 (SDG 700-41709-1) were below QC limits, and the associated mercury result in that sample was qualified as estimated and flagged "J".

The RPDs between the parent and the duplicate sample results were outside of QC limits for mercury in SDCR11-CD-092609/SDCR-CDUP09-092609, and for mercury, 2,4-DDE and 2,4-DDD in SDCR9-CA-092609/SDCR-CDUP07-092609 (SDG 700-41709-1). The associated results in both the parent and duplicate samples were qualified as estimated and flagged "J".

One sample, SDCR-CDUP06-092809 (SDG 700-41727-1) required re-extraction, clean up, and re-analysis for pesticides outside of holding time due to matrix interference in the initial and diluted analyses. The associated results for 2,4'-DDE and 2,4'-DDD in SDCR-CDUP06-092809 were qualified as estimated and flagged "J". The initial analyses data for 2,4'-DDE and 2,4'-DDD in this sample were qualified as unusable and flagged "R".

The RPD between the parent and the duplicate sample results was outside of QC limits for mercury in SDCR7-CA-092709/SDCR-CDUP05-092709 and for hexachlorobenzene in SDCR3-CB-092709/SDCR-CDUP02-092709 (SDG 700-41727-1). The associated results in both the parent and duplicate samples were qualified as estimated and flagged "J".

The pesticide extractions for the samples in SDG 700-41726-3 were performed outside of the holding time due to the samples being archived upon arrival at the lab and subsequently not released for analysis until the holding time had expired. The analysis was subsequently performed within analysis holding time. The associated pesticide results were qualified as estimated and flagged "J" or "UJ".

Sediment Core Pore Water

Six sediment cores and three duplicate cores were selected for pore water analysis and were sent to the laboratories to be sectioned, and the pore water extracted and analyzed. The laboratories

(Test America and Battelle) sectioned the cores and extracted the pore water from the appropriate sediment intervals.

Test America processed the sediment cores into 18 samples, along with 6 field duplicates, and 3 MS/MSDs. No field blank or equipment blank samples were collected. The analytical testing performed by Test America (SDGs 700-42347-1 and 700-42348-1) included dissolved organic carbon (DOC). Only issues affecting the quality of the data are described below.

An MS/MSD was performed on SDPW3-4-8-0909 (SDG 700-42347-1) and the recoveries were above QC limits, therefore the DOC result in that sample was qualified as estimated and flagged "J".

The RPDs between the samples and the field duplicates were outside of QC limits for SDPW1-0-4-0909/SDPWDUP2-0-4-0909, and SDPW1-8-18-0909/SDPWDUP2-8-18-0909 (SDG 700-42347-1), and the associated DOC results in the parent and duplicate samples were qualified as estimated and flagged "J".

Battelle processed the sediment cores into 30 samples, along with 10 field duplicates. No MS/MSDs or field and equipment blanks were collected. The analytical testing performed by Battelle (SDG 3077_2-42PW) included mercury and methylmercury. One of the duplicate cores sent to Battelle (SDPWDUP4) did not yield sufficient water to perform the requested analysis, therefore the extracts from that sample were combined with the extracts from the parent sample (SDPW2), and the duplicate analyses were cancelled. There was no overall effect on the quality of the data. Only issues affecting the quality of the data are described below.

Two of the nine laboratory method blanks contained methylmercury below the reporting limit (RL) but above the method detection limit (MDL). Associated sample results less than five times the blank value (methylmercury in SDPWDUP01-12-18-0909) were qualified as estimated with possible method blank contamination and flagged "JB".

The RPD was outside of QC limits in the following field duplicate pairs, and the associated results in the samples and the duplicates were qualified as estimated and flagged "J".

Sample	Duplicate	Analyte
SDPW11-0-2	SDPWDUP3-0-2	Mercury
SDPW11-2-4	SDPWDUP3-2-4	Mercury
SDPW11-4-8	SDPWDUP3-4-8	Methylmercury
SDPW11-4-8	SDPWDUP3-4-8	Mercury

SDPW11-8-12	SDPWDUP3-8-12	Mercury
SDPW11-12-18	SDPWDUP3-12-18	Mercury
SDPW12-8-12	SDPWDUP1-8-12	Mercury

<u>Sediment Age Dating</u>

Three sediment cores were collected and sent to the laboratory for sectioning and sediment age dating analysis. Battelle processed the three cores into 152 separate sections, and 42 of the sections were archived and placed on hold. The analytical testing performed by Battelle on the remaining 110 samples (SDG 3078) included lead-210 (Pb-210). Samples to be analyzed for cesium-137 (Cs-137) were selected following analysis of the Pb-210. A total of 24 sediment intervals were eventually analyzed for Cs-137. Sedimentation rates for each core were estimated by modeling the Pb-210 results where applicable. There were no issues affecting the quality of the data, and the data are usable without qualification.

G.7 FISH TISSUE

Fish tissue samples were collected on October 15, 2008 and preserved on dry ice until they were shipped to the laboratory, however the results were not included in the ESSP Annual Report – Year 1. A total of 85 samples were collected, and the analytical testing performed by Pace (SDG 4012642) included mercury and hexachlorobenzene (HCB). Only issues affecting the quality of the data are described below.

Both surrogates in sample McI-0082-08WB-NE were recovered outside of QC limits, and the sample could not be reanalyzed due to insufficient sample volume. The HCB result for this sample is qualified as estimated and is flagged "J."

An MS/MSD was performed for mercury on samples McI-0011-08F-NW, McI-0051-08WB-SW, and McI-0061-08WB-NE and the recoveries were outside of QC limits. The mercury results for the associated samples were qualified as estimated and flagged "J."

G.8 GATE EFFLUENT

Surface water samples were collected at the outfall of the gate and in the river nearby following the storm and subsequent flood events that occurred in October 2009. Samples were collected on November 2 and between November 30 and December 2, 2009. The analytical testing performed by Pace (SDGs 2010459 and 20102684) included total suspended solids (TSS) and total dissolved solids (TDS) on 6 samples. The analytical testing performed by Battelle (SDG 3091_1-4 and 3091_5-20M) included filtered and unfiltered mercury and methylmercury on samples that were collected in triplicate. However, due to a sample labeling error in SDG 3091_1-4, some of the samples were processed before the triplicate samples were identified. Only a duplicate analysis could be performed on unfiltered mercury in samples OU2B-SW-TBR-1-110209 and OU2B-GATE-1-110209 and filtered mercury in sample OU2B-GATE-1-110209. The methylmercury analysis was cancelled upon discovery of the error. A total of 12 samples representing 4 field samples collected in triplicate, along with three field blanks and one equipment blank were collected (SDG 3091_5-20M). Only issues affecting the quality of the data are described below.

The results of the laboratory method blanks indicated low levels of methylmercury in one of the analytical batches (SDG 3091_5-20M). The associated unfiltered methylmercury result in OU2B-SW-EB1-120209 was less than five times the blank value, and qualified as estimated with possible method blank contamination and flagged "JB".

The laboratory supplied water used to collect the field and equipment blanks was found to contain low levels of mercury. The equipment blanks and field blanks also contained low levels of mercury below the RL. Therefore, the filtered and unfiltered mercury results for the field and equipment blanks (SDG 3091_5-20M) were qualified as estimated due to blank contamination and flagged "JB". The equipment blank also contained low levels of methylmercury below the RL. The filtered methylmercury result for OU2B-SW-TBR-1C-120109 was less than five times the blank value, and qualified as estimated due to blank contamination and flagged "JB".

The results of the triplicate mercury and methylmercury analyses were used to calculate a relative standard deviation (RSD) to evaluate precision. The RSDs for unfiltered mercury and methylmercury in sample OU2B-SW-TBR-2-120209 were noticeably higher than in either of the gate sample sets or OU2B-SW-TBR-1-120109. The larger RSD of the unfiltered mercury are suspected to be affected by the solids in the unfiltered sample. The associated unfiltered mercury and methylmercury results in each replicate for OU2B-SW-TBR-2-120209 were qualified as estimated and flagged "J".

APPENDIX H

ANALYTICAL RESULTS TABLES (2006, 2008, 2009, AND 2010)

TABLE H-1

SURFACE WATER ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect 1						Transect 1					
	Deep Samples			Shallow Samples			Deep Samples			Shallow Samples		
Sample ID:	OU2B-SW-101DD-06	OU2B-SW-101DD-08	OU2B-SW-101DD-09	OU2B-SW-101DS-06	OU2B-SW-101DS-08	OU2B-SW-101DS-09	OU2B-SW-103DD-06	OU2B-SW-103DD-08	OU2B-SW-103DD-09	OU2B-SW-103DS-06	OU2B-SW-103DS-08	OU2B-SW-103DS-09
Sample Date:	05/22/2006	06/04/2008	06/04/2009	05/22/2006	06/04/2008	06/04/2009	05/23/2006	06/04/2008	06/04/2009	05/23/2006	06/04/2008	06/04/2009
Sample Depth (ft.):	8	9	13	2	2	3.5	9	10	15	2	3	4
Depth to Bottom (ft.):	10	11.3	16.6	10	11.3	16.6	11.9	13.4	19.3	11.9	13.4	19.3
FIXED BASE LABORATORY ANALYSIS:												
Alkalinity - EPA 310.1, SM 2320B, mg/L	39	53.5	31.8	39	53.5	31.8	37.4	53.5	33.9	39	55.8	31.8
Dissolved Organic Carbon - SM 5310B, SW846 9060, mg/L	13	8.7	16	10	8.9	16	3.3	7.6	16	3.4	4.3	16
Hardness, Total - EPA 130.2, SM 2340C, mg/L	64	72	36	60	74	36	62	72	36	58	78	38
Mercury - SW846 7470, EPA 1631, µg/L[1]												
Mercury, Filtered	< 0.2	0.0121	0.0142	< 0.2	0.014	0.00457	< 0.2	0.0109	0.0124	< 0.2	0.0183	0.00427
Mercury, Unfiltered	< 0.2	0.292	0.0547	< 0.2	0.137	0.0106	< 0.2	0.269	0.095	< 0.2	0.264	0.0128
Methylmercury - EPA 1630, µg/L												
Methylmercury, Filtered	0.000396	0.000883	0.00048	0.000244	0.000867	0.000461	0.000234	0.000838	0.000452	0.000209	0.0000807	0.000426
Methylmercury, Unfiltered	0.000487	0.00301	0.000693	0.000435	0.00308	0.000782	0.000514	0.00291	0.000613	0.000505	0.00249	0.000734
Sulfate, Total - SW846 9038, mg/L	35.1	NA	NA	29.9	NA	NA	31.4	NA	NA	29	NA	NA
Sulfide, Total - SW846 9030A, mg/L	< 1	NA	NA	4.4	NA	NA	< 1	NA	NA	1.9	NA	NA
Total Dissolved Solids - EPA 160.1, SM 2540C, mg/L	140	420	55	136	410	57.5	160	445	55	164	415	45
Total Suspended Solids - EPA 160.2, SM 2540D, mg/L	7	7	< 4	12	12	4.5	34	7	< 4	6	13	4
FIELD PARAMETERS:												
Dissolved Oxygen - EPA 360.1, mg/L	4.25	1.78	1.86	9.64	11.1	5.3	4.8	0.68	2.28	6.4	9.04	9.15
Oxidation Reduction Potential - A2580A, mV	215	33.4	304	204	-19.1	292	192	38.2	289	140	3.70	269
pH - EPA 150.1, pH Units	6.78	7.46	6.35	7.29	8.06	6.72	6.99	7.29	6.30	8.73	7.99	6.76
Specific Conductance - EPA 120.1, mS/cm	2.95	0.668	0.129	2.67	0.655	0.123	3.77	0.689	0.132	3.71	0.660	0.125
Temperature - EPA 170.1, °C	21.9	27.0	22.9	25.0	29.9	24.4	21.8	26.6	22.8	29.6	29.9	25.2
Turbidity - EPA 180.1, NTU	17.8	4.3	11.8	14.4	8.8	6.8	20.1	6.8	11.4	11.2	10.4	6.3

Notes:
°C - degrees Celsius
EPA - Environmental Protection Agency
J - estimated concentration based on data quality evaluation or result between method detection limit and reporting detection limit
mg/L - milligram per liter
mS/cm - milliSiemens per centimeter
mV - millivolt
NA - not analyzed
NTU - nephelometric turbidity unit
SM - Standard Methods
µg/L - microgram per liter
< - result less than the reporting limit
[1] Mercury analyzed by 7471 in 2006 and EPA 1631 in 2008

TABLE H-1

SURFACE WATER ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect 1					**Transect 2**				
	Deep Sample		Shallow Samples			Deep Sample		Shallow Samples		
Sample ID:	OU2B-SW-105DD-08	OU2B-SW-105DD-09	OU2B-SW-105DS-06	OU2B-SW-105DS-08	OU2B-SW-105DS-09	OU2B-SW-201DD-08	OU2B-SW-201DD-09	OU2B-SW-201DS-06	OU2B-SW-201DS-08	OU2B-SW-201DS-09
Sample Date:	06/03/2008	06/08/2009	05/23/2006	06/03/2008	06/08/2009	06/04/2008	06/03/2009	05/22/2006	06/04/2008	06/04/2009
Sample Depth (ft.):	4	4.8	2	1	1.2	4	8.8	2	1	2.2
Depth to Bottom (ft.):	5.8	6.17	3.15	5.8	6.17	5.7	11.3	3	5.7	11.3
FIXED BASE LABORATORY ANALYSIS:										
Alkalinity - EPA 310.1, SM 2320B, mg/L	53.5	31.8	39	58	31.8	55.8	31.8	39	53.5	31.8
Dissolved Organic Carbon - SM 5310B, SW846 9060, mg/L	16	17	2.9	16	17	16	16	< 2	17	16
Hardness, Total - EPA 130.2, SM 2340C, mg/L	76	38	58	70	36	80	44	60	70	46
Mercury - SW846 7470, EPA 1631, µg/L[1]										
Mercury, Filtered	0.0121	0.0129	< 0.2	0.0124	0.0116	0.019	0.0127	< 0.2	0.0143	0.0053
Mercury, Unfiltered	0.0918	0.155	< 0.2	0.0914	0.0879	0.275	0.0957	< 0.2	0.18	0.0087
Methylmercury - EPA 1630, µg/L										
Methylmercury, Filtered	0.000679	0.000649	0.000227	0.000960	0.000419	0.000858	0.000468	0.000261	0.000843	0.000422
Methylmercury, Unfiltered	0.00245	0.00171	0.000508	0.00228	0.00119	0.00316	0.000756	0.000480	0.00257	0.000748
Sulfate, Total - SW846 9038, mg/L	NA	NA	33.2	NA	NA	NA	NA	30.3	NA	NA
Sulfide, Total - SW846 9030A, mg/L	NA	NA	< 1	NA	NA	NA	NA	2.6	NA	NA
Total Dissolved Solids - EPA 160.1, SM 2540C, mg/L	420	72.5	140	400	72.5	385	82.5	136	405	65
Total Suspended Solids - EPA 160.2, SM 2540D, mg/L	12	22	15	12	16	< 4	4.5	6	7	6.5
FIELD PARAMETERS:										
Dissolved Oxygen - EPA 360.1, mg/L	7.16	7.20	5.7	11.2	9.31	7.47	3.17	9.7	8.99	9.36
Oxidation Reduction Potential - A2580A, mV	-17.1	264	165	-52.1	257	405	277	192	372	263
pH - EPA 150.1, pH Units	8.58	6.72	8.41	8.7	6.92	6.96	6.53	7.35	7.21	6.96
Specific Conductance - EPA 120.1, mS/cm	0.635	0.143	3.71	0.631	0.144	0.742	0.117	2.66	0.747	0.121
Temperature - EPA 170.1, °C	28.7	24.6	27.0	31.9	25.9	27.7	23.1	24.6	28.2	26.4
Turbidity - EPA 180.1, NTU	18.8	26.7	13.8	9.3	9.8	< 0.1	10.8	20.5	< 0.1	8.4

Notes:
°C - degrees Celsius
EPA - Environmental Protection Agency
J - estimated concentration based on data quality evaluation or
mg/L - milligram per liter
mS/cm - milliSiemens per centimeter
mV - millivolt
NA - not analyzed
NTU - nephelometric turbidity unit
SM - Standard Methods
µg/L - microgram per liter
< - result less than the reporting limit
[1] Mercury analyzed by 7471 in 2006 and EPA 1631 in 2008

TABLE H-1

SURFACE WATER ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect 2						Transect 2				
	Deep Samples			Shallow Samples			Deep Sample		Shallow Samples		
Sample ID:	OU2B-SW-203DD-06	OU2B-SW-203DD-08	OU2B-SW-203DD-09	OU2B-SW-203DS-06	OU2B-SW-203DS-08	OU2B-SW-203DS-09	OU2B-SW-205DD-08	OU2B-SW-205DD-09	OU2B-SW-205DS-06	OU2B-SW-205DS-08	OU2B-SW-205DS-09
Sample Date:	05/22/2006	06/04/2008	06/04/2009	05/22/2006	06/04/2008	06/04/2009	06/03/2008	06/08/2009	05/22/2006	06/03/2008	06/03/2009
Sample Depth (ft.):	5	7	12	1	2	3	4	4	1	1	1
Depth to Bottom (ft.):	6.15	9.5	14.7	6.15	9.5	14.7	4.9	5.83	1.5	4.9	5.83
FIXED BASE LABORATORY ANALYSIS:											
Alkalinity - EPA 310.1, SM 2320B, mg/L	35.9	53.5	31.8	42.1	53.5	31.8	53.5	31.8	37.4	55.8	33.9
Dissolved Organic Carbon - SM 5310B, SW846 9060, mg/L	4.8	16	16	3.4	16	16	18	17	< 2	16	17
Hardness, Total - EPA 130.2, SM 2340C, mg/L	58	80	34	60	78	34	70	36	56	76	34
Mercury - SW846 7470, EPA 1631, µg/L[1]											
Mercury, Filtered	< 0.2	0.0158	0.0147	< 0.2	0.0227	0.00458	0.0111	0.00824	< 0.2	0.0123	0.0116 J
Mercury, Unfiltered	< 0.2	0.308	0.0925	< 0.2	0.36	0.0119	0.319	0.0623	< 0.2	0.0942	0.0563
Methylmercury - EPA 1630, µg/L											
Methylmercury, Filtered	0.000249	0.000625	0.000506	0.000249	0.000606	0.000468	0.000609	0.000413	0.000148	0.000673	0.000468
Methylmercury, Unfiltered	0.000416	0.00238	0.000702	0.000429	0.00271	0.000767	0.00310	0.00106	0.000399	0.00236	0.00087
Sulfate, Total - SW846 9038, mg/L	31.1	NA	NA	29.1	NA	NA	NA	NA	29.9	NA	NA
Sulfide, Total - SW846 9030A, mg/L	< 1	NA	NA	3.5	NA	NA	NA	NA	< 1	NA	NA
Total Dissolved Solids - EPA 160.1, SM 2540C, mg/L	136	400	72.5	144	410	45	400	70	136	400	55 J
Total Suspended Solids - EPA 160.2, SM 2540D, mg/L	9	7	< 4	7	8	4	19	15	14	8	10 J
FIELD PARAMETERS:											
Dissolved Oxygen - EPA 360.1, mg/L	4.64	0.78	2.25	8.09	6.62	9.98	8.94	9.16	10.59	12.9	10.32
Oxidation Reduction Potential - A2580A, mV	197	47.4	251	191	46.5	197	381	287	195	328	282
pH - EPA 150.1, pH Units	7.13	6.69	6.44	7.15	6.78	7.20	7.37	7.04	7.51	8.74	7.24
Specific Conductance - EPA 120.1, mS/cm	2.67	0.622	0.127	2.61	0.613	0.125	0.760	0.141	2.80	0.758	0.145
Temperature - EPA 170.1, °C	23.2	27.2	22.9	25.1	29.3	25.6	28.0	25.2	26.7	30.6	27.1
Turbidity - EPA 180.1, NTU	18.9	6.8	13.5	12.8	11.7	5.4	18.8	26.8	17.5	8.9	7.5

Notes:
°C - degrees Celsius
EPA - Environmental Protection Agency
J - estimated concentration based on data quality evaluation or
mg/L - milligram per liter
mS/cm - milliSiemens per centimeter
mV - millivolt
NA - not analyzed
NTU - nephelometric turbidity unit
SM - Standard Methods
µg/L - microgram per liter
< - result less than the reporting limit
[1] Mercury analyzed by 7471 in 2006 and EPA 1631 in 2008

TABLE H-1

SURFACE WATER ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect 3					**Transect 3**				
	Deep Sample		Shallow Samples			Deep Sample		Shallow Samples		
Sample ID:	OU2B-SW-301DD-08	OU2B-SW-301DD-09	OU2B-SW-301DS-06	OU2B-SW-301DS-08	OU2B-SW-301DS-09	OU2B-SW-303DD-08	OU2B-SW-303DD-09	OU2B-SW-303DS-06	OU2B-SW-303DS-08	OU2B-SW-303DS-09
Sample Date:	06/03/2008	06/03/2009	05/23/2006	06/03/2008	06/03/2009	06/03/2008	06/03/2009	05/22/2006	06/03/2008	06/03/2009
Sample Depth (ft.):	3.2	8	1	0.8	2	4	8	2	1	2
Depth to Bottom (ft.):	4.3	10.2	1.4	4.3	10.2	5.7	10.8	3.03	5.7	10.8
FIXED BASE LABORATORY ANALYSIS:										
Alkalinity - EPA 310.1, SM 2320B, mg/L	53.5	31.8	37.4	53.5	31.8	53.5	31.8	40.6	53.5	31.8
Dissolved Organic Carbon - SM 5310B, SW846 9060, mg/L	17	16	2.5	16	16	15	16	6.8	16	16
Hardness, Total - EPA 130.2, SM 2340C, mg/L	72	50	61	72	40	68	44	58	72	40
Mercury - SW846 7470, EPA 1631, µg/L[1]										
Mercury, Filtered	0.0209	0.00444	< 0.2	0.0146	0.00358	0.0249	0.00693	< 0.2	0.0138	0.00405
Mercury, Unfiltered	0.471	0.0142	0.329	0.181	0.00961	0.909	0.0608	< 0.2	0.131 J	0.0114
Methylmercury - EPA 1630, µg/L										
Methylmercury, Filtered	0.000952	0.00046	0.000295	0.000643	0.00042	0.000731	0.000476	0.000214	0.000893	0.000413
Methylmercury, Unfiltered	0.00403	0.000714	0.000970	0.00311	0.000786	0.00345	0.000652	0.000354	0.00191	0.000918
Sulfate, Total - SW846 9038, mg/L	NA	NA	30.6	NA	NA	NA	NA	29.4	NA	NA
Sulfide, Total - SW846 9030A, mg/L	NA	NA	< 1	NA	NA	NA	NA	< 1	NA	NA
Total Dissolved Solids - EPA 160.1, SM 2540C, mg/L	384	87.5	160	392	72.5	404	105	124	404	87.5
Total Suspended Solids - EPA 160.2, SM 2540D, mg/L	13	4.5	48	15	5	23	< 4 UJ	8	12 J	7
FIELD PARAMETERS:										
Dissolved Oxygen - EPA 360.1, mg/L	9.71	3.11	NA	11.66	8.93	7.82	3.29	8.48	12.73	7.71
Oxidation Reduction Potential - A2580A, mV	427	259	198	401	236	380	277	205	326	262
pH - EPA 150.1, pH Units	7.03	6.45	6.99	7.57	6.68	7.61	6.47	7.66	8.81	6.86
Specific Conductance - EPA 120.1, mS/cm	0.738	0.116	NA	0.744	0.122	0.756	0.117	2.62	0.754	0.120
Temperature - EPA 170.1, °C	28.0	23.2	26.1	28.8	26.2	27.6	23.2	26.1	29.9	25.9
Turbidity - EPA 180.1, NTU	11.9	10.5	32.3	7.3	8.6	23.8	11.5	17.8	5.5	9.0

Notes:
°C - degrees Celsius
EPA - Environmental Protection Agency
J - estimated concentration based on data quality evaluation or
mg/L - milligram per liter
mS/cm - milliSiemens per centimeter
mV - millivolt
NA - not analyzed
NTU - nephelometric turbidity unit
SM - Standard Methods
µg/L - microgram per liter
< - result less than the reporting limit
[1] Mercury analyzed by 7471 in 2006 and EPA 1631 in 2008

TABLE H-1

SURFACE WATER ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect 3					Round Pond					Deeper Portion of the Basin	
	Deep Sample		Shallow Sample			Deep Sample		Shallow Samples			Deep Samples	Shallow Samples
Sample ID:	OU2B-SW-304DD-08	OU2B-SW-304DD-09	OU2B-SW-304DS-06	OU2B-SW-304DS-08	OU2B-SW-304DS-09	OU2R-SW-101DD-08	OU2R-SW-101DD-09	OU2R-SW-101DS-06	OU2R-SW-101DS-08	OU2R-SW-101DS-09	OU2B-SW-DHDD-09	OU2B-SW-DHDS-09
Sample Date:	06/03/2008	06/03/2009	05/22/2006	06/03/2008	06/03/2009	06/03/2008	06/04/2009	05/23/2006	06/03/2008	06/04/2009	06/04/2009	06/04/2009
Sample Depth (ft.):	4	8	2	1	8	4.5	8.8	2	1	2.2	36	9
Depth to Bottom (ft.):	5.6	10.4	3.2	5.6	10.4	6.1	10.8	2.5	6.1	10.8	44.1	44.1
FIXED BASE LABORATORY ANALYSIS:												
Alkalinity - EPA 310.1, SM 2320B, mg/L	53.5	31.8	40.6	53.5	31.8	55.8	31.8	39	55.8	31.8	44.5	31.8
Dissolved Organic Carbon - SM 5310B, SW846 9060, mg/L	15	16	4.2	16	16	18	16	5.4	18	15	18	16
Hardness, Total - EPA 130.2, SM 2340C, mg/L	78	46	60	66	46	80	48	61	80	46	52	40
Mercury - SW846 7470, EPA 1631, µg/L[1]												
Mercury, Filtered	0.0141	0.00579	< 0.2	0.0114	0.00416	0.0109	0.00463	< 0.2	0.00858	0.00357	0.0117	0.00588
Mercury, Unfiltered	0.335	0.0223 J	0.2	0.0838	0.0121	0.0834	0.0139	< 0.2	0.0443	0.00731	0.110	0.0347
Methylmercury - EPA 1630, µg/L												
Methylmercury, Filtered	0.000586	0.000491	0.000204	0.000883	0.000476	0.00342	0.000556	0.000108	0.00225	0.000532	0.000638	0.00047
Methylmercury, Unfiltered	0.00269	0.000833	0.000550	0.00238	0.000791	0.00553	0.000788	0.000239	0.00484	0.000825	0.00108	0.000735
Sulfate, Total - SW846 9038, mg/L	NA	NA	30	NA	NA	NA	NA	28.9	NA	NA	NA	NA
Sulfide, Total - SW846 9030A, mg/L	NA	NA	< 1	NA	NA	NA	NA	< 1	NA	NA	NA	NA
Total Dissolved Solids - EPA 160.1, SM 2540C, mg/L	435	115	140	360	97.5	280	125	120	328	112	62.5	52.5
Total Suspended Solids - EPA 160.2, SM 2540D, mg/L	20	6.5	24	7	12	8	9.5	16	18	< 4	8	4
FIELD PARAMETERS:												
Dissolved Oxygen - EPA 360.1, mg/L	9.68	2.93	NA	NA	10.44	2.85	2.16	5.1	7.78	9.5	0.16	2.45
Oxidation Reduction Potential - A2580A, mV	386	239	196	385	200	38.7	286	176	41.6	268	72.8	248
pH - EPA 150.1, pH Units	7.54	6.53	7.29	8.39	7.14	7.12	6.50	6.96	7.38	7.01	6.40	6.41
Specific Conductance - EPA 120.1, mS/cm	0.756	0.116	NA	0.763	0.122	0.453	0.119	2.40	0.493	0.120	0.188	0.126
Temperature - EPA 170.1, °C	28.5	23.4	25.5	29.9	26.9	26.8	23.1	25.8	28.5	26.4	20.9	23.2
Turbidity - EPA 180.1, NTU	15.2	11.5	30.6	4.8	9.3	12.8	15.8	74.1	4.0	9.2	26.6	9.0

Notes:
°C - degrees Celsius
EPA - Environmental Protection Agency
J - estimated concentration based on data quality evaluation or
mg/L - milligram per liter
mS/cm - milliSiemens per centimeter
mV - millivolt
NA - not analyzed
NTU - nephelometric turbidity unit
SM - Standard Methods
µg/L - microgram per liter
< - result less than the reporting limit
[1] Mercury analyzed by 7471 in 2006 and EPA 1631 in 2008

PREPARED BY/DATE: AES 9/2/2009
CHECKED BY/DATE: RMR 12/9/2009

TABLE H-2

SEDIMENT ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect 0			Transect 1			Transect 1			Transect 1		
Sample ID:	OU2B-SED-004C-06	OU2B-SED-004C-08	OU2-SED 004C-09	OU2B-SED-101C-06	OU2B-SED-101C-08	OU2B-SED-101C-09	OU2B-SED-102C-06	OU2B-SED-102C-08	OU2B-SED-102C-09	OU2B-SED-103DC-06	OU2B-SED-103DC-08	OU2B-SED-103DC-09
Sample Date:	05/20/2006	06/07/2008	06/05/2009	05/21/2006	06/07/2008	06/05/2009	05/20/2006	06/07/2008	06/05/2009	05/23/2006	06/07/2008	06/06/2009
Sample Depth (in.):	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4
FIXED BASE LABORATORY ANALYSIS:												
Acid Volatile Sulfide, Allan et. al., 1991, umole/g	54.1	78.6	43.7	108	89.2	83.2	156	85.4 J	90.9	77.2	84	144
Grain Size - ASTMD422, %												
Grain Size - Clay	63.9	62.8	36	63.3	62.5	35.8	62.7	73.6	54.9	58.8	59.6	35.5
Grain Size - Gravel	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01
Grain Size - Sand	1.7	1.6	3.1	2.4	1.5	2.1	1.7	0.7	0.2	2.3	1.5	4.7
Grain Size - Silt	34.4	35.5	60.9	34.3	36	62	35.6	25.7	44.9	38.9	38.9	59.7
Bulk Density - SM 2710FM, g/cm^3	1.34	0.951	1.21	1.3	1.06	1.23	1.1	1.01	0.921	1.22	1.2	1.3
Mercury, Total - SW846 7471, mg/kg	25.8	37.8	38.3	17.3	21.8	22.6	10	26.5	33.1	16.2	25.9	30.9
Methylmercury - E1630, mg/kg	0.00623	0.00517	0.00487	0.00316	0.00308	0.00265	0.00419	0.00488	0.00462	0.00681	0.00523	0.0039
Metals, Total - EPA 6010BM, mg/kg												
Iron	40,967	NA	N/A	47,195	NA	NA	48,593	NA	NA	41,425	NA	NA
Manganese	634	NA	N/A	690	NA	NA	1165	NA	NA	679	NA	NA
Molybdenum	NA	< 17.9	N/A	NA	< 18.8	NA	NA	< 21.1	NA	NA	< 20.4	NA
Selenium	NA	< 12.5	N/A	NA	< 13.1	NA	NA	< 14.8	NA	NA	< 14.3	NA
Percent Moisture - D2216, %	71.3	54.62	70	77.6	55.5	73.2	79.3	59.11	78.3	77.9	58.35	69.8
Pesticides - SW846 8081, mg/kg												
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.0144	0.0541
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.0144	0.0839
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.0144	<0.025
2,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0394
2,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.128
2,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.0126
Hexachlorobenzene, - SW846 8270, mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously Extracted Metals - EPA 1638M-SEM, umole/g												
Cadmium	0.0029	0.000809	0.00257	0.00293	0.00126	0.00222	0.0041	< 0.000198	0.00141	0.00306	0.000832	0.00351
Copper	< 0.00178	< 0.00772	0.0325	< 0.00178	< 0.00772	0.0223	0.0301	0.0529 J	0.0605 J	0.0399	0.0127	0.0218
Lead	0.0653	0.0718	0.0576	0.0614	0.0619	0.0483	0.0663	0.0716	0.0542	0.0649	0.0723	0.0698
Nickel	0.11	0.255	0.121	0.157	0.132	0.103	0.195	0.145	0.0988	0.196	0.159	0.187
Zinc	1.52	1.77	1.15	1.44	1.21	0.815	1.28	1.25	0.703	1.69	1.46	1.33
Sulfate, Total - SW846 9038, mg/kg	5,380 J	6,150	< 1660	6,850 J	6,800	< 1850	10,200 J	9,250	NA	8,200	4,540	NA
Sulfide, Total - SW846 9030A, mg/kg	1,400 J	1,700	1,600	1,500 J	1,800	2,500 J	8,100 J	2,600	NA	1,600 J	2,000	NA
Total Organic Carbon - SW846 9060, mg/kg	14,000	16,100	16,300	20,000	16,100	12,900	34,000	21,200	16,200	21,000	16,900	10,900
FIELD PARAMETER:												
Oxidation-Reduction Potential - A2580A, mV	-355	-297	-393	-504	-384	-384	-411	-280	-403	-385	-339	-393
pH - EPA 150.1, pH Units	6.98	7.15	7.2	6.94	6.76	6.75	6.67	6.82	6.59	6.97	6.97	6.78
Temperature - EPA 170.1, °C	22.7	29.1	22.9	24.1	28.9	24	18.9	23.4	22.4	23.3	26.1	25.1

Notes:
ASTM - American Standard Test Method
°C - degrees Celsius
EPA - Environmental Protection Agency
g/cm^3 - grams per cubic centimeter
in - inch
J - estimated concentration based on data quality evaluation or result between method detection limit and reporting detection limit
mg/kg - milligram per kilogram
mV - millivolt
NA - Not Analyzed
SW846 - *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
ug/kg - microgram per kilogram
umole/g - micromole per gram
% - percent
< - Result less than the Reporting Limit

TABLE H-2

SEDIMENT ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect 1			Transect 1			Transect 1			Transect 1		
Sample ID:	OU2B-SED-103DNE-06	OU2B-SED-103DNE-08	OU2B-SED-103DNE-09	OU2B-SED-103DNW-06	OU2B-SED-103DNW-08	OU2B-SED-103DNW-09	OU2B-SED-103DSE-06	OU2B-SED-103DSE-08	OU2B-SED-103DSE-09	OU2B-SED-103DSW-06	OU2B-SED-103DSW-08	OU2B-SED-103DSW-09
Sample Date:	05/23/2006	06/07/2008	06/0/2009	05/23/2006	06/07/2008	06/06/2009	05/23/2006	06/07/2008	06/06/2009	05/23/2006	06/07/2008	06/06/2009
Sample Depth (in.):	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4
<u>FIXED BASE LABORATORY ANALYSIS:</u>												
Acid Volatile Sulfide, Allan et. al., 1991, umole/g	81.7	57.4	89.9	85.7	95.5	91.9	95	39.5	48.8	60.6	71.4	90.8
<u>Grain Size - ASTMD422, %</u>												
Grain Size - Clay	63.3	62.8	46.3	67.9	64.1	46	59.2	62	36.3	63.3	58.6	35.8
Grain Size - Gravel	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01
Grain Size - Sand	1.9	1.3	1.4	0.9	1.2	1.1	2.7	1.5	3.8	2	1.2	3.4
Grain Size - Silt	34.8	35.9	52.3	31.2	34.6	52.9	38.1	36.6	59.9	34.7	40.2	60.8
Bulk Density - SM 2710FM, g/cm^3	0.982	0.993	1.27	1.01	1.03	1.23	0.985	1.01	1.23	1.03	1.03	1.03
Mercury, Total - SW846 7471, mg/kg	13.9	24.6	28.9	13.4	25.3	29	19.6	26.3	32.2	17.7	26.5	32.2
Methylmercury - E1630, mg/kg	0.00685	0.00319	0.00393	0.00737	0.00294	0.00512	0.00772	0.00367	0.00374	0.0074	0.00435	0.00379
<u>Metals, Total - EPA 6010BM, mg/kg</u>												
Iron	40,390	NA	NA	42,515	NA	NA	38,669	NA	NA	40,465	NA	NA
Manganese	669	NA	NA	721	NA	NA	634	NA	NA	703	NA	NA
Molybdenum	NA	< 18	NA	NA	< 18.5	NA	NA	< 16.8	NA	NA	< 19.6	NA
Selenium	NA	< 12.6	NA	NA	< 13	NA	NA	< 11.7	NA	NA	< 13.8	NA
Percent Moisture - D2216, %	78.3	56.83	70.4	76.6	58.94	71.1	80.0	55.62	72.5	77.7	57.48	73.1
<u>Pesticides - SW846 8081, mg/kg</u>												
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene, - SW846 8270, mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<u>Simultaneously Extracted Metals - EPA 1638M-SEM, umole/g</u>												
Cadmium	0.00227	0.000723	0.00226	0.00283	0.000345	0.00253	0.00338	0.000786	0.00243	0.0032	0.00313	<0.0000770
Copper	0.0455	0.0387	0.0121	0.0251	0.161	0.0456	0.0417	0.233	0.00598	0.0781	0.116	0.0209
Lead	0.0693	0.074	0.0506	0.0652	0.0704	0.0556	0.07	0.0733	0.0561	0.0698	0.0714	0.0544
Nickel	0.162	0.159	0.124	0.195	0.188	0.146	0.204	0.181	0.29	0.198	0.138	0.174
Zinc	1.52	1.46	0.983	1.57	1.62	1.04	1.73	1.46	1.05	1.58	1.55	1.05
Sulfate, Total - SW846 9038, mg/kg	10,500	5,770	NA	8,510	5,810	NA	10,900	5,630	NA	8,690	5,360	NA
Sulfide, Total - SW846 9030A, mg/kg	1,400 J	2,000	NA	1,000 J	2,000	NA	1,500 J	2,400	NA	1,600 J	2,800	NA
Total Organic Carbon - SW846 9060, mg/kg	22,000	14,800	13,300	24,000	15,700	16,000	24,000	14,300	15,400	22,000	18,600	13,500
<u>FIELD PARAMETER:</u>												
Oxidation-Reduction Potential - A2580A, mV	-371	-355	-388	-309	-350	-380	-361	-335	-382	-349	-378	-394
pH - EPA 150.1, pH Units	6.97	6.95	6.89	6.84	6.95	6.79	6.84	6.99	6.78	6.87	7.05	6.8
Temperature - EPA 170.1, °C	22.9	27.1	24.3	22.5	27.4	24.9	22.5	23.5	25.6	22.7	24.1	24.9

<u>Notes:</u>
ASTM - American Standard Test Method
°C - degrees Celsius
EPA - Environmental Protection Agency
g/cm^3 - grams per cubic centimeter
in - inch
J - estimated concentration based on data quality evaluation or result between methc
mg/kg - milligram per kilogram
mV - millivolt
NA - Not Analyzed
SW846 - *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
ug/kg - microgram per kilogram
umole/g - micromole per gram
% - percent
< - Result less than the Reporting Limit

TABLE H-2

SEDIMENT ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect 1			**Transect 1**			**Transect 1**			**Transect 1**		
Sample ID:	OU2B-SED-104DC-06	OU2B-SED-104DC-08	OU2B-SED-104DC-09	OU2B-SED-104DNE-06	OU2B-SED-104DNE-08	OU2B-SED-104DNE-09	OU2B-SED-104DNW-06	OU2B-SED-104DNW-08	OU2B-SED-104DNW-09	OU2B-SED-104DSE-06	OU2B-SED-104DSE-08	OU2B-SED-104DSE-09
Sample Date:	05/24/2006	06/08/2008	06/06/2009	05/24/2006	06/08/2008	06/06/2009	05/24/2006	06/08/2008	06/06/2009	05/24/2006	06/08/2008	06/06/2009
Sample Depth (in.):	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4
<u>FIXED BASE LABORATORY ANALYSIS:</u>												
Acid Volatile Sulfide, Allan et. al., 1991, umole/g	39.9	78.2	88.6	54.4	76.5	82.3	37.7	52.3	74.6	24.8	99.3	33.8
<u>Grain Size - ASTMD422, %</u>												
Grain Size - Clay	63.3	55.9	32.9	63.3	53.2	32.9	59.9	55.1	43.7	63.9	56.2	41.3
Grain Size - Gravel	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01
Grain Size - Sand	2.2	2.4	3.8	1.5	2.5	3.9	2	2.3	4.3	1.5	2.1	2.5
Grain Size - Silt	34.5	41.7	63.3	35.2	44.3	63.2	38.1	42.6	52.1	34.6	41.7	56.2
Bulk Density - SM 2710FM, g/cm^3	0.945	0.987	1.16	1.14	1.08	0.996	1.18	1.16	1.12	1.18	1.17	1.23
Mercury, Total - SW846 7471, mg/kg	21.7	33.5	77.6	17.5	35.9	46.3	18.5	38.4	46.8	21.1	47	47.7
Methylmercury - E1630, mg/kg	0.00921	0.00873	0.00592	0.00969	0.00771	0.00667	0.00789	0.00654	0.00599	0.00892	0.00696	0.00613
<u>Metals, Total - EPA 6010BM, mg/kg</u>												
Iron	42,189	NA	NA	40,521	NA	NA	39,964	NA	NA	37,732	NA	NA
Manganese	790	NA	NA	669	NA	NA	706	NA	NA	710	NA	NA
Molybdenum	NA	< 15.1	NA	NA	< 15.9	NA	NA	< 18	NA	NA	< 17.3	NA
Selenium	NA	< 10.6	NA	NA	< 11.2	NA	NA	< 12.6	NA	NA	< 12.1	NA
Percent Moisture - D2216, %	76.3	50.7	71	77.7	53.92	70.7	76.4	54.11	70.4	77.8	53.41	71.5
<u>Pesticides - SW846 8081, mg/kg</u>												
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene, - SW846 8270, mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<u>Simultaneously Extracted Metals - EPA 1638M-SEM, umole/g</u>												
Cadmium	0.00328	0.00101	0.00307	0.00287	0.00112	0.00257	0.00314	0.00215	0.00325	0.00323	0.00284	0.00348
Copper	0.138	0.0102	0.0144	0.0501	< 0.00772	0.0347	0.0633	0.0574	0.0513	0.112	0.0531	0.0488
Lead	0.0677	0.0629	0.0513	0.0768	0.0711	0.0541	0.0611	0.0687	0.0637	0.0578	0.0743	0.0606
Nickel	0.172	0.146	0.162	0.25	0.199	0.21	0.193	0.165	0.165	0.161	0.287	0.156
Zinc	1.54	1.36	1.42	1.58	1.57	1.43	1.53	1.54	1.57	2.26	1.95	1.3
Sulfate, Total - SW846 9038, mg/kg	3,510	7,290	NA	8,070	4,240	NA	8,030	7,100	NA	7,840	8,930	NA
Sulfide, Total - SW846 9030A, mg/kg	1,000 J	1,700	NA	1,200 J	2,300	NA	1,000 J	2,100	NA	1,100 J	2,800	NA
Total Organic Carbon - SW846 9060, mg/kg	18,000	16,700	14,700	17,000	14,000	14,200	22,000	16,500	14,100	18,000	13,800	14,800
<u>FIELD PARAMETER:</u>												
Oxidation-Reduction Potential - A2580A, mV	-117	-457	-370	-299	-455	-375	-383	-459	-382	-383	-457	-417
pH - EPA 150.1, pH Units	6.81	6.59	6.91	6.88	6.6	6.94	6.93	6.68	7.01	6.79	6.22	6.96
Temperature - EPA 170.1, °C	22.5	30.6	26.1	22.8	29.3	24.6	23	29.4	25.7	23.3	29.3	25.1

<u>Notes:</u>
ASTM - American Standard Test Method
°C - degrees Celsius
EPA - Environmental Protection Agency
g/cm^3 - grams per cubic centimeter
in - inch
J - estimated concentration based on data quality evaluation or result between metho
mg/kg - milligram per kilogram
mV - millivolt
NA - Not Analyzed
SW846 - *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
ug/kg - microgram per kilogram
umole/g - micromole per gram
% - percent
< - Result less than the Reporting Limit

TABLE H-2

SEDIMENT ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect 1			Transect 1			Transect 1		Transect 2		
Sample ID:	OU2B-SED-104DSW-06	OU2B-SED-104DSW-08	OU2B-SED-104DSW-09	OU2B-SED-105C-06	OU2B-SED-105C-08	OU2B-SED-105C-09	OU2B-SED-106C-08	OU2B-SED-106C-09	OU2B-SED-201C-06	OU2B-SED-201C-08	OU2B-SED-201C-09
Sample Date:	05/24/2006	06/08/2008	06/06/2009	05/23/2006	06/08/2008	06/08/2009	06/08/2008	06/08/2009	05/21/2006	06/08/2008	06/08/2009
Sample Depth (in.):	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4
FIXED BASE LABORATORY ANALYSIS:											
Acid Volatile Sulfide, Allan et. al., 1991, umole/g	42.2	98.2	57.7	22.7	73.3	21	NA	NA	12.6	6.77	4.21
Grain Size - ASTMD422, %											
Grain Size - Clay	67.9	53.2	42.2	48.1	46.8	35.9	NA	34.3	33.7	32.2	18.1
Grain Size - Gravel	NA	< 0.010	< 0.01	NA	< 0.010	2.7	NA	< 0.01	NA	< 0.010	< 0.01
Grain Size - Sand	1.8	2.3	2.8	3.6	7.3	14.5	NA	1.2	22.8	38.7	21.5
Grain Size - Silt	30.3	44.5	55	48.3	45.9	46.9	NA	64.4	43.5	29.1	60.4
Bulk Density - SM 2710FM, g/cm^3	1.17	1.1	1.12	1.16	1.0	1.32	NA	NA	1.62	1.38	1.42
Mercury, Total - SW846 7471, mg/kg	20.3	99.4	47.4	32.9	35.6	23.1	37.3	38.7	51.8	63.9 J	33
Methylmercury - E1630, mg/kg	0.00942	0.00879	0.0068	0.00958	0.0134	0.0212	0.00435 J	0.00569	0.00804	0.00983	0.00524
Metals, Total - EPA 6010BM, mg/kg											
Iron	39,372	NA	NA	34,210	NA	NA	NA	NA	19,596	NA	NA
Manganese	692	NA	NA	582	NA	NA	NA	NA	222	NA	NA
Molybdenum	NA	< 15.7	NA	NA	< 17	NA	NA	NA	NA	< 80	NA
Selenium	NA	< 11	NA	NA	< 11.9	NA	NA	NA	NA	< 56	NA
Percent Moisture - D2216, %	77.2	54.69	68.8	65.8	60.92	72.3	55.41	70.2	44.9	32.27	39.7
Pesticides - SW846 8081, mg/kg											
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene, - SW846 8270, mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00729	5.97
Simultaneously Extracted Metals - EPA 1638M-SEM, umole/g											
Cadmium	0.00291	< 0.000198	0.0025 J	0.0015	0.00105	0.00255	NA	NA	< 0.000541	< 0.000198	0.000954
Copper	0.0732	0.0794	0.0332 J	0.0435	0.157	0.1146	NA	NA	0.0155	0.0167 J	0.055 J
Lead	0.0623	0.0728	0.0603	0.0585	0.0934	0.0622	NA	NA	0.0381	0.0442	0.0287
Nickel	0.163	0.38	0.132	0.0919	0.168	0.0942	NA	NA	0.0384	0.0414 J	0.0308
Zinc	1.69	1.85	1.43	1.33	1.56	0.851	NA	NA	0.16	0.133 J	0.226
Sulfate, Total - SW846 9038, mg/kg	7,240	3,210	NA	4,760	2,350	NA	NA	NA	2,160 J	2,490	NA
Sulfide, Total - SW846 9030A, mg/kg	1,100 J	1,700	NA	< 72 J	1,000	NA	NA	NA	160 J	210 J	NA
Total Organic Carbon - SW846 9060, mg/kg	20,000	14,400	12,000	20,000	31,200	57,700	16,900	10,700	7,200	14,400 J	5,700
FIELD PARAMETER:											
Oxidation-Reduction Potential - A2580A, mV	-381	-457	-366	-154	-418	-386	-391	-314	-223	-349	-397
pH - EPA 150.1, pH Units	6.82	6.63	6.82	6.9	6.87	6.91	6.96	6.87	7.11	7.41	7.19
Temperature - EPA 170.1, °C	22.7	29.9	28.3	25.5	31.3	27.3	30.4	25	23.7	32.1	24.2

Notes:
ASTM - American Standard Test Method
°C - degrees Celsius
EPA - Environmental Protection Agency
g/cm^3 - grams per cubic centimeter
in - inch
J - estimated concentration based on data quality evaluation or result between metho
mg/kg - milligram per kilogram
mV - millivolt
NA - Not Analyzed
SW846 - *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
ug/kg - microgram per kilogram
umole/g - micromole per gram
% - percent
< - Result less than the Reporting Limit

TABLE H-2

SEDIMENT ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect 2			Transect 2			Transect 2			Transect 2		
Sample ID:	OU2B-SED-202DC-06	OU2B-SED-202DC-08	OU2B-SED-202DC-09	OU2B-SED-202DNE-06	OU2B-SED-202DNE-08	OU2B-SED-202DNE-09	OU2B-SED-202DNW-06	OU2B-SED-202DNW-08	OU2B-SED-202DNW-09	OU2B-SED-202DSE-06	OU2B-SED-202DSE-08	OU2B-SED-202DSE-09
Sample Date:	05/20/2006	06/09/2008	06/06/2009	05/20/2006	06/09/2008	06/06/2009	05/20/2006	06/09/2008	06/06/2009	05/20/2006	06/09/2008	06/06/2009
Sample Depth (in.):	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4
FIXED BASE LABORATORY ANALYSIS:												
Acid Volatile Sulfide, Allan et. al., 1991, umole/g	15.3	46.9	6.19	26.5	71.2	9.3	15.8	81.6	5.6	14.4	15.2	11.1
Grain Size - ASTMD422, %												
Grain Size - Clay	27.5	15.2	14.3	25.7	25.4	9.6	22.4	21.5	9.4	23.4	13.8	11.5
Grain Size - Gravel	NA	< 0.010	< 0.01	NA	< 0.010	1.3	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01
Grain Size - Sand	26.5	25.9	42.8	20.4	18.8	53.4	29.4	20.6	56.2	31.9	39.1	54.3
Grain Size - Silt	46	58.9	42.9	53.9	55.8	35.6	48.2	57.9	34.4	44.7	47.1	34.2
Bulk Density - SM 2710FM, g/cm^3	1.17	1.22	1.59	1.5	1.23	1.6	1.68	1.27	2	1.55	1.36	1.67
Mercury, Total - SW846 7471, mg/kg	22.3	79.9	34	26	100	22.5	12.3	172	12.6	17	139	60.5
Methylmercury - E1630, mg/kg	0.00579	0.0076	0.00432	0.00455	0.0067	0.0034	0.00425	0.00713	0.00219	0.00469	0.00806	0.00445
Metals, Total - EPA 6010BM, mg/kg												
Iron	16,343	NA	NA	17,990	NA	NA	15,505	NA	NA	16,418	NA	NA
Manganese	242	NA	NA	302	NA	NA	256	NA	NA	260	NA	NA
Molybdenum	NA	< 8.56	NA	NA	< 9.28	NA	NA	< 11.3	NA	NA	< 9.37	NA
Selenium	NA	< 5.99	NA	NA	< 6.49	NA	NA	< 7.93	NA	NA	< 6.56	NA
Percent Moisture - D2216, %	45.7	36.52	60.2	55.3	38.51	44.6	43.6	41.95	33.1	50.2	34.83	70.6
Pesticides - SW846 8081, mg/kg												
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene, - SW846 8270, mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously Extracted Metals - EPA 1638M-SEM, umole/g												
Cadmium	0.000556	< 0.000198	0.000756	0.00126	0.000488	0.000341	0.000706	< 0.000198	0.000799	< 0.000541	< 0.000198	0.000457
Copper	0.0206	0.0743	0.0336	0.0287	< 0.00772	0.0189	0.0363	< 0.00772	0.0162	0.0159	0.0029 J	0.0194
Lead	0.0315	0.0456	0.0214	0.034	0.0582	0.0244	0.0276	0.0771	0.0109	0.0266	0.0245	0.0182
Nickel	0.0361	0.0697	0.0302	0.0572	0.0916	0.0222	0.0548	0.1	0.0199	0.0409	0.0316	0.0258
Zinc	0.34	0.619	0.235	0.72	0.756	0.184	0.89	0.97	0.136	0.33	0.312	0.157
Sulfate, Total - SW846 9038, mg/kg	2,370 J	2,440	< 1240	3,420 J	2,540	NA	2,730 J	4,840	NA	3,160 J	3,940	NA
Sulfide, Total - SW846 9030A, mg/kg	360 J	550	800	800 J	1,000	NA	560 J	590	NA	640 J	590	NA
Total Organic Carbon - SW846 9060, mg/kg	5,500	9,140	3,210	7,600	9,890	644	7,300	7,800	10,500	7,200	10,500	2,940
FIELD PARAMETER:												
Oxidation-Reduction Potential - A2580A, mV	-396	-459	-377	-419	-450	-382	-382	-448	-413	-366	-448	-402
pH - EPA 150.1, pH Units	6.94	6.6	7.01	6.97	6.67	7.06	6.73	6.56	7.17	6.85	6.53	7.02
Temperature - EPA 170.1, °C	23.3	31.9	25.2	24.1	31.3	26.5	24.3	30.1	26.5	22.7	29.8	26

Notes:
ASTM - American Standard Test Method
°C - degrees Celsius
EPA - Environmental Protection Agency
g/cm^3 - grams per cubic centimeter
in - inch
J - estimated concentration based on data quality evaluation or result between methc
mg/kg - milligram per kilogram
mV - millivolt
NA - Not Analyzed
SW846 - *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
ug/kg - microgram per kilogram
umole/g - micromole per gram
% - percent
< - Result less than the Reporting Limit

TABLE H-2

SEDIMENT ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect 2			Transect 2			Transect 2			Transect 2		
Sample ID:	OU2B-SED-202DSW-06	OU2B-SED-202DSW-08	OU2B-SED-202DSW-09	OU2B-SED-203DC-06	OU2B-SED-203DC-08	OU2-SED-203DC-09	OU2B-SED-203DNE-06	OU2B-SED-203DNE-08	OU2B-SED-203DNE-09	OU2B-SED-203DNW-06	OU2B-SED-203DNW-08	OU2B-SED-203DNW-09
Sample Date:	05/20/2006	06/09/2008	06/06/2009	05/21/2006	06/10/2008	06/07/2009	05/21/2006	06/10/2008	06/07/2009	05/21/2006	06/10/2008	06/07/2009
Sample Depth (in.):	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4
FIXED BASE LABORATORY ANALYSIS:												
Acid Volatile Sulfide, Allan et. al., 1991, umole/g	19.3	22.6	9.7 J	39.4	31.6	43.8	19.1	38.4	87.4	20.8	28.1	84.1
Grain Size - ASTMD422, %												
Grain Size - Clay	24.5	15.5	16.6	31.7	36.1	26.5	29.1	40.3	35.6	37.9	30.2	34
Grain Size - Gravel	NA	< 0.010	0.3	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01
Grain Size - Sand	28.6	43.7	48.9	6	8.4	7.2	5.3	7.3	7.9	4.9	10.3	10.5
Grain Size - Silt	46.9	40.8	34.2	62.3	55.5	66.3	65.6	52.3	56.6	57.2	59.5	55.4
Bulk Density - SM 2710FM, g/cm^3	1.46	1.46	1.71	1.4	1.22	1.21	1.24	1.28	1.31	1.24	1.2	1.26
Mercury, Total - SW846 7471, mg/kg	21.3	31.2	46.4	53.3	37.8	85.1	33.1	37.6	96.5	32	37	116
Methylmercury - E1630, mg/kg	0.00525	0.00541	0.00487	0.0086	0.00818	0.0115	0.00802	0.00754	0.0128	0.00887	0.00903	0.0119
Metals, Total - EPA 6010BM, mg/kg												
Iron	16,768	NA	NA	26,766	NA	NA	25,668	NA	NA	25,102	NA	NA
Manganese	247	NA	NA	387	NA	NA	439	NA	NA	441	NA	NA
Molybdenum	NA	< 7.32	NA	NA	< 9.43	NA	NA	< 7.77	NA	NA	< 9.75	NA
Selenium	NA	< 5.12	NA	NA	< 6.6	NA	NA	< 5.44	NA	NA	< 6.82	NA
Percent Moisture - D2216, %	44.4	31.83	35.7	59.4	40.93	53.4	57.0	40.63	55.5	56.0	42.32	55.8
Pesticides - SW846 8081, mg/kg												
4,4'-DDD	NA	NA	NA	NA	0.110	0.172	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	0.171	0.191	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	0.0434	0.0368	NA	NA	NA	NA	NA	NA
2,4'-DDD	NA	NA	NA	NA	NA	0.233	NA	NA	NA	NA	NA	NA
2,4'-DDE	NA	NA	NA	NA	NA	0.507	NA	NA	NA	NA	NA	NA
2,4'-DDT	NA	NA	NA	NA	NA	<0.0067	NA	NA	NA	NA	NA	NA
Hexachlorobenzene, - SW846 8270, mg/kg	NA	NA	NA	NA	0.980	0.867	NA	NA	NA	NA	NA	NA
Simultaneously Extracted Metals - EPA 1638M-SEM, umole/g												
Cadmium	< 0.000541	< 0.000198	0.00038	0.00082	0.000205	0.00106	0.00142	< 0.000198	0.000894	0.000558	< 0.000198	0.00102
Copper	0.00907	0.0476	0.0229	0.0671	< 0.00772	0.0113 J	0.295	0.0556	0.0208	0.0629	0.0347	0.031
Lead	0.0261	0.0355	0.02	0.0687	0.0709	0.0475	0.0768	0.0767	0.0668	0.0979	0.063	0.0457
Nickel	0.0482	0.0358	0.0181	0.164	0.0713	0.0703	0.0924	0.131	0.0968	0.0758	0.0756	0.0965
Zinc	0.34	0.251	0.105	0.665	0.435	0.377	0.711	0.429	0.448	0.55	0.423	0.366
Sulfate, Total - SW846 9038, mg/kg	2,610 J	2,410	NA	2,880 J	1,540	NA	< 924 J	< 918	NA	< 861 J	1,500	NA
Sulfide, Total - SW846 9030A, mg/kg	420 J	480	NA	510 J	980	NA	800 J	980	NA	730 J	1,000	NA
Total Organic Carbon - SW846 9060, mg/kg	5,800	8,100	2,940	8,600	6,610	5,740	9,200	14,900	5,970	8,100	8,190	5,880
FIELD PARAMETER:												
Oxidation-Reduction Potential - A2580A, mV	-393	-426	-419	-197	-333	-296	-246	-344	-304	-376	-340	-313
pH - EPA 150.1, pH Units	6.98	6.55	7.09	7.07	6.63	6.98	6.95	6.87	6.99	7.06	6.71	7.02
Temperature - EPA 170.1, °C	22.6	30.2	26.5	22.5	35	25.6	22.8	29.4	24.8	22.9	30	24.5

Notes:
ASTM - American Standard Test Method
°C - degrees Celsius
EPA - Environmental Protection Agency
g/cm^3 - grams per cubic centimeter
in - inch
J - estimated concentration based on data quality evaluation or result between methc
mg/kg - milligram per kilogram
mV - millivolt
NA - Not Analyzed
SW846 - *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
ug/kg - microgram per kilogram
umole/g - micromole per gram
% - percent
< - Result less than the Reporting Limit

TABLE H-2

SEDIMENT ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect 2			Transect 2			Transect 2			Transect 2		
Sample ID:	OU2B-SED-203DSE-06	OU2B-SED-203DSE-08	OU2B-SED-203DSE-09	OU2B-SED-203DSW-06	OU2B-SED203DSW-08	OU2-SED203DSW-09	OU2B-SED-204C-06	OU2B-SED-204C-08	OU2B-SED-204C-09	OU2B-SED-205C-06	OU2B-SED-205C-08	OU2B-SED-205C-09
Sample Date:	05/21/2006	06/10/2008	06/07/2009	05/21/2006	06/10/2008	06/07/2009	06/29/2006	06/09/2008	06/07/2009	05/21/2006	06/09/2008	06/08/2009
Sample Depth (in.):	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4
FIXED BASE LABORATORY ANALYSIS:												
Acid Volatile Sulfide, Allan et. al., 1991, umole/g	26.5	26.5	35.7	25	26.1	55.1	103.5 J	108	62.7 J	26.5	38.2	30
Grain Size - ASTMD422, %												
Grain Size - Clay	23.4	33.3	35.4	31.6	34.4	28	61.8	47.1	30.6	40.4	41.2	29.6
Grain Size - Gravel	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01	NA	< 0.010	0.3
Grain Size - Sand	6.3	8.5	6.4	6.4	7.6	8.7	1.6	2.7	2.6	4.1	2.3	3.7
Grain Size - Silt	70.3	58.2	58.2	62	58	63.4	36.6	50.2	66.8	55.5	56.5	66.4
Bulk Density - SM 2710FM, g/cm^3	1.12	1.46	1.24	1.11	1.29	1.39	1.3	0.845	1.13	1.06	1.19	1.29
Mercury, Total - SW846 7471, mg/kg	38.9	34.8	103	41.5	31.7	84.2	95.3	93.2 J	39.7	7.04	7.98	7.1
Methylmercury - E1630, mg/kg	0.0101	0.00661	0.0127	0.001	0.0097	0.0127	0.00973	0.00746	0.00469	0.00345	0.00405	0.00302
Metals, Total - EPA 6010BM, mg/kg												
Iron	23,860	NA	NA	25,543	NA	NA	40,318	NA	NA	31,880	NA	NA
Manganese	424	NA	NA	468	NA	NA	649	NA	NA	691	NA	NA
Molybdenum	NA	< 9.01	NA	NA	< 8.39	NA	NA	< 14	NA	NA	< 10.7	NA
Selenium	NA	< 6.31	NA	NA	< 5.87	NA	NA	< 9.79	NA	NA	< 7.51	NA
Percent Moisture - D2216, %	54.6	40.83	52.8	57.6	41.18	53.6	62.9	50.5	69.9	59.2	48.69	55.5
Pesticides - SW846 8081, mg/kg												
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene, - SW846 8270, mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	0.628	NA	NA	NA
Simultaneously Extracted Metals - EPA 1638M-SEM, umole/g												
Cadmium	0.000882	0.000168 J	0.000857	0.00157	0.000455	0.00105	0.0021 J	0.0007 J	0.00252	0.00145	< 0.000198	0.00131
Copper	0.14	0.102	0.0268	0.157	0.0876	0.0169	0.0508 J	0.121 J	0.0144 J	0.0141	< 0.00772	0.0129
Lead	0.103	0.0658	0.0572	0.104	0.0848	0.0543	0.0732 J	0.0558	0.0465	0.0397	0.0393	0.0358
Nickel	0.122	0.0764	0.0747	0.124	0.0908	0.0801	0.153 J	0.128	0.105	0.077	0.0762	0.074
Zinc	0.484	0.475	0.313	0.544	0.49	0.38	0.841 J	1.28	0.904	0.631	0.717	0.534
Sulfate, Total - SW846 9038, mg/kg	1,400 J	1,110	NA	< 1010 J	914	NA	5,280 JL	4,110	< 1650	4,020 J	1,670	NA
Sulfide, Total - SW846 9030A, mg/kg	90 J	950	NA	< 59 J	910	NA	1,500 JL	70 J	1,600	310 J	790	NA
Total Organic Carbon - SW846 9060, mg/kg	7,300	8,080	6,520	8,000	8,360	6,350	15,000	15,400	10,600	11,000	12,300	7,450
FIELD PARAMETER:												
Oxidation-Reduction Potential - A2580A, mV	-334	-351	-368	-334	-352	-371	-287	-378	-364	-264	-380	-333
pH - EPA 150.1, pH Units	6.89	7.11	6.98	6.89	6.94	6.97	6.29	6.81	6.65	6.97	6.48	6.81
Temperature - EPA 170.1, °C	22.6	28.8	25.4	23.4	29.2	25.1	31	30.8	23.8	24.1	33	26.5

Notes:
ASTM - American Standard Test Method
°C - degrees Celsius
EPA - Environmental Protection Agency
g/cm^3 - grams per cubic centimeter
in - inch
J - estimated concentration based on data quality evaluation or result between methc
mg/kg - milligram per kilogram
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NA - Not Analyzed
SW846 - *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
ug/kg - microgram per kilogram
umole/g - micromole per gram
% - percent
< - Result less than the Reporting Limit

TABLE H-2

SEDIMENT ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect 3			Transect 3			Transect 3			Transect 3		
Sample ID:	OU2B-SED-301C-06	OU2B-SED-301C-08	OU2B-SED-301C-09	OU2B-SED-302C-06	OU2B-SED-302C-08	OU2B-SED-302C-09	OU2B-SED-303DC-06	OU2B-SED-303DC-08	OU2B-SED-303DC-09	OU2B-SED-303DNE-06	OU2B-SED-303DNE-08	OU2-SED-303DNE-09
Sample Date:	05/23/2006	06/10/2008	06/03/2009	05/20/2006	06/10/2008	06/08/2009	05/21/2006	06/10/2008	06/07/2009	05/21/2006	06/10/2008	06/07/2009
Sample Depth (in.):	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4
FIXED BASE LABORATORY ANALYSIS:												
Acid Volatile Sulfide, Allan et. al., 1991, umole/g	3.73	3.5	5.4	3.5	2.38 J	1.13	11.7	17.7	11.8	6.67	18.3	8.93
Grain Size - ASTMD422, %												
Grain Size - Clay	12.4	7.3	10.8	14.3	5.3	2.7	23.4	24.1	6.7	27.4	21.8	13.8
Grain Size - Gravel	NA	0.7	< 0.01	NA	2.4	< 0.01	NA	< 0.010	< 0.01	NA	8.9	< 0.01
Grain Size - Sand	63.4	78.2	26.4	67.4	81.2	84.1	17.1	19.3	33.8	13.9	17	29.5
Grain Size - Silt	24.2	13.7	62.8	18.3	11.1	13.2	59.5	56.6	59.5	58.7	52.3	56.6
Bulk Density - SM 2710FM, g/cm^3	1.31	1.02	1.43	1.82	1	1.77	1.45	1.02	1.53	1.51	1.02	1.38
Mercury, Total - SW846 7471, mg/kg	11	5.82	20.9	27.1	3.46	2.01	6.81	19.8	18.1	8.2	19.8	13.2
Methylmercury - E1630, mg/kg	0.0026	0.004	0.00337	0.00328	0.00206 J	0.00142	0.00503	0.00573	0.00445	0.00464	0.00717	0.00756
Metals, Total - EPA 6010BM, mg/kg												
Iron	11,150	NA	NA	11,000	NA	NA	18,124	NA	NA	18,854	NA	NA
Manganese	135	NA	NA	146	NA	NA	285	NA	NA	297	NA	NA
Molybdenum	NA	< 6.13	NA	NA	< 5.43	NA	NA	< 7	NA	NA	< 6.75	NA
Selenium	NA	< 4.29	NA	NA	< 3.8	NA	NA	< 4.9	NA	NA	< 4.73	NA
Percent Moisture - D2216, %	27.0	25.02	36.7	33.2	23.63	30.5	47.1	35.58	40.4	49.0	35.62	38.3
Pesticides - SW846 8081, mg/kg												
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	0.061	0.259	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	0.181	0.480	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	0.0214	<0.0569	NA	NA	NA
2,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	0.336	NA	NA	NA
2,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	1.60	NA	NA	NA
2,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	<0.0284	NA	NA	NA
Hexachlorobenzene, - SW846 8270, mg/kg	NA	NA	NA	NA	3.35	< 0.0069	NA	34.1	8.90	NA	NA	NA
Simultaneously Extracted Metals - EPA 1638M-SEM, umole/g												
Cadmium	< 0.000541	< 0.000198	0.00103	< 0.000541	< 0.000198 J	0.000314 J	0.001	0.000825	0.000921	0.00128	0.000599	0.000834
Copper	0.0197	0.00344 J	0.0376	0.0062	0.0307 J	0.0128 J	0.0459	0.0479	0.0238	0.0279	0.0606	0.0277
Lead	0.0189	0.0117	0.0217	0.0142	0.00845 J	0.00603 J	0.0271	0.0397	0.0222	0.0321	0.0361	0.0215
Nickel	0.0136	0.00988	0.0333	0.0121	0.00965 J	0.00868	0.0573	0.0683	0.03	0.0592	0.0422	0.028
Zinc	0.358	0.162	0.247	0.136	0.119	0.086	0.561	0.511	0.274	0.601	0.478	0.24
Sulfate, Total - SW846 9038, mg/kg	2,030	< 677	NA	1,310 J	< 678	NA	2,750 J	884	NA	2,460 J	1,220	NA
Sulfide, Total - SW846 9030A, mg/kg	87 J	110 J	NA	87 J	250 J	NA	< 47 J	580 J	NA	330 J	< 38 J	NA
Total Organic Carbon - SW846 9060, mg/kg	6,100	3,990	3,720	2,800	2,220 J	1,550	7,200	6,750	7,240	8,600	6,570	4,440
FIELD PARAMETER:												
Oxidation-Reduction Potential - A2580A, mV	-146	-329	-165	-184.3	-314	-368	-317.8	-323	-368	-387	-326	-395
pH - EPA 150.1, pH Units	6.58	6.77	7	6.98	7.22	7	7.15	7.27	6.81	6.79	7.19	6.95
Temperature - EPA 170.1, °C	26.7	32.3	24.3	24.1	32.5	26.5	23.5	29.9	26.2	23.2	29.4	26.7

Notes:
ASTM - American Standard Test Method
°C - degrees Celsius
EPA - Environmental Protection Agency
g/cm^3 - grams per cubic centimeter
in - inch
J - estimated concentration based on data quality evaluation or result between methc
mg/kg - milligram per kilogram
mV - millivolt
NA - Not Analyzed
SW846 - *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
ug/kg - microgram per kilogram
umole/g - micromole per gram
% - percent
< - Result less than the Reporting Limit

TABLE H-2

SEDIMENT ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect 3			Transect 3			Transect 3			Transect 3		
Sample ID:	OU2B-SED-303DNW-06	OU2B-SED-303DNW-08	OU2B-SED-303DNW-09	OU2B-SED-303DSE-06	OU2B-SED-303DSE-08	OU2B-SED-303DSE-09	OU2B-SED-303DSW-06	OU2B-SED-303DSW-08	OU2B-SED-303DSW-09	OU2B-SED-304C-06	OU2B-SED-304C-08	OU2B-SED-304C-09
Sample Date:	05/21/2006	06/10/2008		05/21/2006	06/10/2008	06/07/2009	05/21/2006	06/10/2008	06/07/2009	05/22/2006	06/10/2008	06/09/2009
Sample Depth (in.):	0-4	0-4		0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4
FIXED BASE LABORATORY ANALYSIS:												
Acid Volatile Sulfide, Allan et. al., 1991, umole/g	11.1	17.2	7.99	23	23.8	17.3	19.2	27.1	5.7	28	40.2	32.3
Grain Size - ASTMD422, %												
Grain Size - Clay	19.2	29.6	14.3	25.4	27.6	11.1	31.7	21.3	28	31.7	27.2	27.3
Grain Size - Gravel	NA	1.1	< 0.01	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01
Grain Size - Sand	16.3	17.2	32.9	16.1	17.5	40.4	14.2	2.3	8.7	11.3	17.8	4.3
Grain Size - Silt	64.5	52.1	52.8	58.5	54.9	48.5	54.1	57.4	63.4	57	55	68.4
Bulk Density - SM 2710FM, g/cm^3	1.34	1.02	1.59	1.42	1.58	1.67	1.73	1.36	1.63	1.42	1.17	1.38
Mercury, Total - SW846 7471, mg/kg	7.35	22.8	14.8	6.45	37	15.4	14.6	18.3	7.5	10.9	25 J	18.6
Methylmercury - E1630, mg/kg	0.00431	0.00495	0.00634	0.00463	0.00618	0.00669	0.00521	0.00496	0.00377	0.00544	0.00465	0.00359
Metals, Total - EPA 6010BM, mg/kg												
Iron	19,138	NA	NA	20,955	NA	NA	22,195	NA	NA	26,796	NA	NA
Manganese	327	NA	NA	294	NA	NA	311	NA	NA	489	NA	NA
Molybdenum	NA	< 5.82	NA	NA	< 6.51	NA	NA	< 7.45	NA	NA	< 8.87	NA
Selenium	NA	< 4.07	NA	NA	< 4.56	NA	NA	< 5.21	NA	NA	< 6.21	NA
Percent Moisture - D2216, %	53.6	36.34	41.8	44.0	38.8	42.3	51.2	36.0	30.7	60.4	46.6	59.7
Pesticides - SW846 8081, mg/kg												
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene, - SW846 8270, mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously Extracted Metals - EPA 1638M-SEM, umole/g												
Cadmium	0.00159	< 0.000198	0.000883	0.00103	0.000783	0.000715	0.00123	0.000794	0.000745	0.00201	0.000985	0.0024
Copper	0.0413	0.0697	0.0308	0.0288	0.0345	0.0137	0.0283	0.0241	0.0217	0.0511	< 0.00772 J	0.0291 J
Lead	0.0273	0.0405	0.0187	0.0294	0.0408	0.0256	0.0361	0.0358	0.0155	0.0384	0.036	0.0395
Nickel	0.0541	0.0362	0.0235	0.0662	0.0508	0.0241	0.0649	0.0465	0.019	0.102	0.0661	0.103
Zinc	0.537	0.361	0.285	0.59	0.485	0.247	0.518	0.541	0.172	1.15	0.976 J	0.941
Sulfate, Total - SW846 9038, mg/kg	2,800 J	< 858	NA	2,500 J	< 813	NA	3,100 J	808	NA	3,200 J	1,330 J	NA
Sulfide, Total - SW846 9030A, mg/kg	400 J	930 J	NA	190 J	670	NA	250 J	590	NA	500 J	1,100 J	NA
Total Organic Carbon - SW846 9060, mg/kg	8,500	7,850	3,930	8,600	10,300	4,350	10,000	6,520	4,540	14,000	11,300	11,200
FIELD PARAMETER:												
Oxidation-Reduction Potential - A2580A, mV	-242	-327	-410	-525	-326	-395	-519	-324	-410	-210	-307	-380
pH - EPA 150.1, pH Units	7.07	7.21	6.99	7.05	7.14	6.88	7.03	7.14	6.97	6.7	7.21	6.83
Temperature - EPA 170.1, °C	24	29.5	27.9	23.6	29.5	27.4	24	29.5	22.9	25.1	30.8	25.3

Notes:
ASTM - American Standard Test Method
°C - degrees Celsius
EPA - Environmental Protection Agency
g/cm^3 - grams per cubic centimeter
in - inch
J - estimated concentration based on data quality evaluation or result between methc
mg/kg - milligram per kilogram
mV - millivolt
NA - Not Analyzed
SW846 - *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
ug/kg - microgram per kilogram
umole/g - micromole per gram
% - percent
< - Result less than the Reporting Limit

PREPARED BY/DATE: AES 12/17/09
CHECKED BY/DATE: JAB 1/28/10

TABLE H-2

SEDIMENT ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect 4		Transect 4		Transect 4		Transect 4		Transect 5		Transect 5	
Sample ID:	OU2B-SED-401C-08	OU2B-SED-401C-09	OU2B-SED-402C-08	OU2B-SED-402C-09	OU2B-SED-403C-08	OU2B-SED-403C-09	OU2B-SED-404C-08	OU2B-SED-404C-09	OU2B-SED-501DC-08	OU2B-SED-501DC-09	OU2B-SED-501DNE-08	OU2B-SED-501DNE-09
Sample Date:	06/06/2008	06/09/2009	06/06/2008	06/09/2009	06/06/2008	06/09/2009	06/06/2008	06/09/2009	06/06/2008	06/07/2009	06/06/2008	06/07/2009
Sample Depth (in.):	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4
FIXED BASE LABORATORY ANALYSIS:												
Acid Volatile Sulfide, Allan et. al., 1991, umole/g	NA	NA	NA	NA	73.4	53.5	NA	NA	NA	NA	NA	NA
Grain Size - ASTMD422, %												
Grain Size - Clay	29.2	25.6	64.9	54.8	59.3	37.6	64.8	31	79.5	54.6	68.5	< 0.01
Grain Size - Gravel	< 0.010	< 0.01	10.1	< 0.01	< 0.010	< 0.01	0.4	0.5	< 0.010	< 0.01	7.6	0.6
Grain Size - Sand	22.4	3.6	4.6	8.8	2.7	1.4	11.6	15.6	1.4	0.7	7.4	50
Grain Size - Silt	48.4	70.8	20.4	36.4	38	61	23.2	52.9	19.1	44.6	16.5	49.4
Bulk Density - SM 2710FM, g/cm^3	NA	NA	NA	NA	1.08	1.31	NA	NA	NA	NA	NA	NA
Mercury, Total - SW846 7471, mg/kg	33.6	24.6	18.2	27.1	33.1	35.7	0.965	18.9	18.1	24.9	27.4	24.7
Methylmercury - E1630, mg/kg	0.00893	0.00286	0.00436	0.00381	0.00631	0.00538	0.00281	0.0257	0.00346	0.0031	0.00322	0.00329
Metals, Total - EPA 6010BM, mg/kg												
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	NA	NA	< 21.1	NA	< 18.5	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	< 14.8	NA	< 13	NA	NA	NA	NA	NA	NA	NA
Percent Moisture - D2216, %	63.7	75.3	77.7	77.6	74.5	74.2	42.1	76.7	79.6	76.9	80.3	77
Pesticides - SW846 8081, mg/kg												
4,4'-DDD	NA	NA	<0.0149	<0.0147	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	0.0185	0.019	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	<0.0149	<0.0147	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDD		NA		0.0099	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDE		NA		0.0311	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDT		NA		<0.0074	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene, - SW846 8270, mg/kg	NA	NA	<1.48	0.0221	<1.30	0.0313	NA	NA	NA	NA	NA	NA
Simultaneously Extracted Metals - EPA 1638M-SEM, umole/g												
Cadmium	NA	NA	NA	NA	0.00108	0.00303	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	0.0703	0.0315	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	0.0757	0.0572	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	0.142	0.128	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	1.53	1.1	NA	NA	NA	NA	NA	NA
Sulfate, Total - SW846 9038, mg/kg	NA	NA	7,160	NA	5,910	NA	NA	NA	NA	NA	NA	NA
Sulfide, Total - SW846 9030A, mg/kg	NA	NA	2,400	NA	1,900	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon - SW846 9060, mg/kg	30,000	2,630	17,100	12,300	14,400	13,800	15,700	60,500	20,700	41,600	17,200	13,800
FIELD PARAMETER:												
Oxidation Reduction Potential - A2580A, mV	-396	-423	-396	-440	-369	-436	-371	-431	-350	-384	-342	-386
pH - EPA 150.1, pH Units	6.63	6.88	6.7	8.81	6.65	6.81	6.77	6.93	6.68	6.63	6.69	6.67
Temperature - EPA 170.1, °C	30.0	24.9	26.7	26.6	33.5	26.4	33.8	26.6	25.6	27.8	25.2	24.2

Notes:
ASTM - American Standard Test Method
°C - degrees Celsius
EPA - Environmental Protection Agency
g/cm^3 - grams per cubic centimeter
in - inch
J - estimated concentration based on data quality evaluation or result between method detection limit and reporting detection limit
mg/kg - milligram per kilogram
mV - millivolt
NA - Not Analyzed
SW846 - *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
ug/kg - microgram per kilogram
umole/g - micromole per gram
% - percent
< - Result less than the Reporting Limit

TABLE H-2

SEDIMENT ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect 5		Transect 5		Transect 5		Transect 5		Transect 5		Transect 5	
Sample ID:	OU2B-SED-501DNW-08	OU2B-SED-501DNW-09	OU2B-SED-501DSE-08	OU2B-SED-501DSE-09	OU2B-SED-501DSW-08	OU2B-SED-501DSW-09	OU2B-SED-502DC-08	OU2B-SED-502DC-09	OU2B-SED-502DNE-08	OU2B-SED-502DNE-09	OU2B-SED-502DNW-08	OU2B-SED-502DNW-09
Sample Date:	06/06/2008	06/07/2009	06/06/2008	06/07/2009	06/06/2008	06/07/2009	06/05/2008	05/07/2009	06/05/2008	06/07/2009	06/05/2008	06/07/2009
Sample Depth (in.):	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4
FIXED BASE LABORATORY ANALYSIS:												
Acid Volatile Sulfide, Allan et. al., 1991, umole/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Grain Size - ASTMD422, %												
Grain Size - Clay	79.5	49.7	74.7	52.6	73.3	54.9	51.1	28.4	50	34.6	NA	39
Grain Size - Gravel	< 0.010	< 0.01	< 0.010	< 0.01	< 0.010	< 0.01	< 0.010	0.3	1.6	< 0.01	NA	< 0.01
Grain Size - Sand	1	0.1	1	0.1	0.8	0.3	18	15.2	15	15.6	NA	13.8
Grain Size - Silt	19.5	50.2	24.2	47.3	25.9	44.8	30.9	56.1	33.4	49.8	NA	47.2
Bulk Density - SM 2710FM, g/cm^3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, Total - SW846 7471, mg/kg	17.5	26.2	23.4	25.5	18.2	26.5	22.4	88.7	213	86.2	59.2	112
Methylmercury - E1630, mg/kg	0.00295	0.00352	0.00399	0.00378	0.00336	0.0195	0.0189	0.0186	0.0234	0.0238	0.0117	0.0147
Metals, Total - EPA 6010BM, mg/kg												
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Percent Moisture - D2216, %	79.8	77.4	79.9	78	78.9	77.7	72.2	73.3	70.3	74.4	70.8	75.4
Pesticides - SW846 8081, mg/kg												
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDD	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA
2,4'-DDE	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA
2,4'-DDT	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene, - SW846 8270, mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously Extracted Metals - EPA 1638M-SEM, umole/g												
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate, Total - SW846 9038, mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfide, Total - SW846 9030A, mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon - SW846 9060, mg/kg	16,100	14,200	17,800	13,800	16,800	15,200	59,900	12,600	36,200	53,600	41,600	41,700
FIELD PARAMETER:												
Oxidation Reduction Potential - A2580A, mV	-329	-389	-354	-393	-353	-397	-290	-352	-292	-377	-295	-387
pH - EPA 150.1, pH Units	6.66	6.71	6.69	6.69	6.7	6.71	7.06	6.77	7.08	6.77	7.02	6.81
Temperature - EPA 170.1, °C	24.2	23.7	24	22.7	24.1	22.6	32.1	25.3	31.2	25.4	29.4	24.3

Notes:
ASTM - American Standard Test Method
°C - degrees Celsius
EPA - Environmental Protection Agency
g/cm^3 - grams per cubic centimeter
in - inch
J - estimated concentration based on data quality evaluation or result between metho
mg/kg - milligram per kilogram
mV - millivolt
NA - Not Analyzed
SW846 - *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
ug/kg - microgram per kilogram
umole/g - micromole per gram
% - percent
< - Result less than the Reporting Limit

TABLE H-2

SEDIMENT ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Transect 5		Transect 5		Round Pond			Round Pond		
Sample ID:	OU2B-SED-502DSE-08	OU2B-SED-502DSE-09	OU2B-SED-502DSW-08	OU2B-SED-502DSW-09	OU2R-SED-101DC-06	OU2R-SED-101DC-08	OU2R-SED-101DC-09	OU2R-SED-101DNE-06	OU2R-SED-101DNE-08	OU2R-SED-101DNE-09
Sample Date:	06/05/2008	06/07/2009	06/05/2008	06/07/2009	05/23/2006	06/05/2008	06/05/2009	05/23/2006	06/05/2008	06/05/2009
Sample Depth (in.):	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4
FIXED BASE LABORATORY ANALYSIS:										
Acid Volatile Sulfide, Allan et. al., 1991, umole/g	NA	NA	NA	NA	53.7	120	83.8	73.4	137	51.4
Grain Size - ASTMD422, %										
Grain Size - Clay	55.2	35.2	55.2	37.4	51.6	54.9	47.2	54.8	54.9	51.6
Grain Size - Gravel	< 0.010	< 0.01	< 0.010	< 0.01	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01
Grain Size - Sand	4.4	12.4	6.8	8.7	7.1	1.1	3.6	2.9	17.1	2.2
Grain Size - Silt	40.4	52.4	38	53.9	41.3	44.1	49.1	42.3	28.1	46.2
Bulk Density - SM 2710FM, g/cm^3	NA	NA	NA	NA	1.14	1.26	1.13	1	0.839	1.12
Mercury, Total - SW846 7471, mg/kg	72	90.8	96.9	37.9	8.61	26.3	21.9	8.42	26.7	24.8
Methylmercury - E1630, mg/kg	0.00867	0.0214	0.0125	0.00378	0.00531	0.00466	0.00599	0.00561	0.0052	0.00584
Metals, Total - EPA 6010BM, mg/kg										
Iron	NA	NA	NA	NA	56372	NA	NA	54963	NA	NA
Manganese	NA	NA	NA	NA	586	NA	NA	558	NA	NA
Molybdenum	NA	NA	NA	NA	NA	< 23.5	NA	NA	< 22.7	NA
Selenium	NA	NA	NA	NA	NA	< 16.5	NA	NA	< 15.9	NA
Percent Moisture - D2216, %	67.6	71.4	68.7	< 0.1	80.2	79.2	77.4	79.3	80.7	81.4
Pesticides - SW846 8081, mg/kg										
4,4'-DDD	NA	NA	NA	NA	NA	<0.016	0.0438 J	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	<0.0434	0.0509 J	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	<0.016	0.0292 J	NA	NA	NA
2,4'-DDD	NA	NA	NA	NA	NA	NA	0.0325 J	NA	NA	NA
2,4'-DDE	NA	NA	NA	NA	NA	NA	0.0652 J	NA	NA	NA
2,4'-DDT	NA	NA	NA	NA	NA	NA	< 0.0085	NA	NA	NA
Hexachlorobenzene, - SW846 8270, mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously Extracted Metals - EPA 1638M-SEM, umole/g										
Cadmium	NA	NA	NA	NA	0.00435	0.0042	NA	0.00482	0.00445	0.00377
Copper	NA	NA	NA	NA	0.121	0.0936	NA	0.189	0.0077 J	0.0946
Lead	NA	NA	NA	NA	0.0686	0.0884	NA	0.0717	0.0803	0.0599
Nickel	NA	NA	NA	NA	0.15	0.21	NA	0.169	0.274	0.134
Zinc	NA	NA	NA	NA	1.61	2.17	NA	1.74	2.02	1.35
Sulfate, Total - SW846 9038, mg/kg	NA	NA	NA	NA	6,500	5,050	< 2200	5,920	6,480	NA
Sulfide, Total - SW846 9030A, mg/kg	NA	NA	NA	NA	< 130 J	1,400	2,100	< 120	3,200	NA
Total Organic Carbon - SW846 9060, mg/kg	28,400	38,800	38,100	45,100	34,000	25,500	30,400	34,000	26,600	32,800
FIELD PARAMETER:										
Oxidation Reduction Potential - A2580A, mV	-298	-368	-359	-363	-488	-253	-366	-513	-285	-372
pH - EPA 150.1, pH Units	7.01	6.85	7.22	6.91	6.97	6.68	6.85	6.84	6.68	6.91
Temperature - EPA 170.1, °C	28.5	24.6	28.0	24.3	24.7	30.9	22.5	24.4	27.6	22.6

Notes:
ASTM - American Standard Test Method
°C - degrees Celsius
EPA - Environmental Protection Agency
g/cm^3 - grams per cubic centimeter
in - inch
J - estimated concentration based on data quality evaluation or result between methc
mg/kg - milligram per kilogram
mV - millivolt
NA - Not Analyzed
SW846 - *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
ug/kg - microgram per kilogram
umole/g - micromole per gram
% - percent
< - Result less than the Reporting Limit

TABLE H-2

SEDIMENT ANALYTICAL RESULTS - 2006, 2008, AND 2009
Updated RI Addendum
Olin McIntosh OU-2

	Round Pond			Round Pond			Round Pond			Round Pond		Deeper Portion of Basin
Sample ID:	OU2R-SED-101DNW-06	OU2R-SED-101DNW-08	OU2R-SED-101DNW-09	OU2R-SED-101DSE-06	OU2R-SED-101DSE-08	OU2R-SED-101DSE-09	OU2R-SED-101DSW-06	OU2R-SED-101DSW-08	OU2R-SED-101DSW-09	OU2R-SED-102DC-08	OU2R-SED-102DC-09	OU2B-SED-DHC-09
Sample Date:	05/23/2006	06/05/2008	06/05/2009	05/23/2006	06/05/2008	06/05/2009	05/23/2006	06/05/2008	06/05/2009	06/05/2008	06/05/2009	06/05/2009
Sample Depth (in.):	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4	0-4
FIXED BASE LABORATORY ANALYSIS:												
Acid Volatile Sulfide, Allan et. al., 1991, umole/g	70.5	147	40.8	67.5	106	105	67.9	141	118	NA	NA	87.9
Grain Size - ASTMD422, %												
Grain Size - Clay	38.8	48	40.6	50.7	55.2	51.6	44.8	57.4	56.1	57.1	40.7	66
Grain Size - Gravel	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01	NA	< 0.010	< 0.01	< 0.010	< 0.01	< 0.01
Grain Size - Sand	5.8	21.6	2.2	9.2	9.1	1.7	8.9	9.9	2.2	6.7	6.3	< 0.01
Grain Size - Silt	55.4	30.3	57.2	40.1	35.7	45.8	46.3	32.7	41.6	36.1	53	34
Bulk Density - SM 2710FM, g/cm^3	0.996	1.02	1.19	1.15	0.929	1.12	1.31	1.08	1.07	NA	NA	1.13
Mercury, Total - SW846 7471, mg/kg	7.96	20.3	20.1	7.77	15.8	22.8	8.58	21.9	32.1	15.6	14.1	29.1
Methylmercury - E1630, mg/kg	0.0048	0.00319	0.00565	0.0108	0.00447	0.0064	0.011	0.00309	0.00451	0.00715	0.00535	0.00431
Metals, Total - EPA 6010BM, mg/kg												
Iron	54927	NA	NA	57005	NA	NA	56020	NA	NA	NA	NA	NA
Manganese	552	NA	NA	633	NA	NA	619	NA	NA	NA	NA	NA
Molybdenum	NA	NA	NA	NA	< 22.6	NA	NA	< 24.4	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	< 15.8	NA	NA	< 17.1	NA	NA	NA	NA
Percent Moisture - D2216, %	80.4	79.4	78.7	79.9	79.5	80.9	80.2	79.9	78	76.6	78.1	79.6
Pesticides - SW846 8081, mg/kg												
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene, - SW846 8270, mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Simultaneously Extracted Metals - EPA 1638M-SEM, umole/g												
Cadmium	0.00454	0.00339	0.00335	0.00629	0.0036	0.00404	0.00951	0.00336	0.00363	NA	NA	0.00246
Copper	0.0801	0.276	0.077	0.153	0.0427	0.0355	0.0595	0.285	0.0366	NA	NA	0.0152
Lead	0.0693	0.0814	0.0517	0.0921	0.0785	0.0606	0.0847	0.0946	0.0583	NA	NA	0.0616
Nickel	0.206	0.223	0.128	0.233	0.185	0.185	0.243	0.189	0.159	NA	NA	0.118
Zinc	1.71	2.2	1.25	2.13	2.14	1.58	2.15	2.28	1.43	NA	NA	0.896
Sulfate, Total - SW846 9038, mg/kg	4,390	5,560	NA	5,450	7,310	NA	5,810	6,720	NA	NA	NA	< 2,440
Sulfide, Total - SW846 9030A, mg/kg	1,200 J	2,600	NA	430 J	3,000	NA	1,300 J	2,900	NA	NA	NA	3,300
Total Organic Carbon - SW846 9060, mg/kg	39,000	23,700	29,000	41,000	20,700	30,100	41,000	25,600	30,600	45,700	39,000	14,400
FIELD PARAMETER:												
Oxidation Reduction Potential - A2580A, mV	-505	-260	-382	-421	-293	-380	-441	-329	-373	-345	-360	-393
pH - EPA 150.1, pH Units	6.74	6.72	6.9	6.78	6.94	6.29	6.89	6.85	6.88	6.64	6.67	6.55
Temperature - EPA 170.1, °C	24.3	27.6	23.5	24.3	26.9	23.1	24.4	26.4	24.2	31.1	23.6	24.4

Notes:
ASTM - American Standard Test Method
°C - degrees Celsius
EPA - Environmental Protection Agency
g/cm^3 - grams per cubic centimeter
in - inch
J - estimated concentration based on data quality evaluation or result between methc
mg/kg - milligram per kilogram
mV - millivolt
NA - Not Analyzed
SW846 - *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
ug/kg - microgram per kilogram
umole/g - micromole per gram
% - percent
< - Result less than the Reporting Limit

Prepared by: AES 12/17/09
Checked by: JAB 1/28/10

TABLE H-3

2007-2010 SEDIMENT TRAP ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Zone	**1**							**1**		**1**		
Trap ID:	**ST-15**							**ST-15**		**ST-31**		
Sample ID:	OU2B-SED-ST15-1107	OU2B-SED-ST15-0408	OU2B-SED-ST15-0708	OU2B-SED-ST15-10/08	OU2B-SED-ST15-02/09	OU2B-SED-ST15-0509	OU2B-SED-ST15-0809	OU2B-SED-ST15-1109	OU2B-SED-ST15-0210	OU2B-SED-ST31-0809	OU2B-SED-ST31-1109	OU2B-SED-ST31-0210
Sample Date:	11/28/2007	04/02/2008	07/23/2008	10/07/2008	02/18/2009	05/28/2009	08/11/2009	11/11/2009	02/24/2010	08/12/2009	11/11/2009	02/24/2010
Duration (days)	274	128	113	77	135	99	77	93	105	77	93	105
Water Level Maintained? Depth (ft NAVD 88)[a]	No	No	No	No	No	6	5.2	6	6	5.2	6	6
Minimum Total Depth if Gate is Maintained at 6 Feet Elevation	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	21.8	21.8	21.8
Water Depth Below Trap (ft):	9	8	7	7	7-8	7-8	7-8	7-8	7-8	3-4	3-4	3-4
Density - SM 2710FMod, g/cm^3												
Bulk Density	1.01	0.990	0.945	0.988	1.00	1.04	0.960	1.00	NR	1.00	0.997	NR
Grain Size - ASTM D422, %												
Grain Size - Clay	--	24.2	30.8	--	--	--	--	97.7	--	--	76.9	--
Grain Size - Gravel	--	<0.010	< 0.010	--	--	--	--	0	--	--	0	--
Grain Size - Sand	--	0.6	3	--	--	--	--	1.4	--	--	0.6	--
Grain Size - Silt	--	75.2	66.2	--	--	--	--	0.9	--	--	22.5	--
Filtration by Vaccuum, %												
Filter size: 25 µm	--	--	--	99.99	99.48	99.3	1	--	--	98.9	--	--
Filter size: 2 µm	--	--	--	0.031	0.06	0.4	98.6	--	--	0.8	--	--
Filter size: 0.5 µm	--	--	--	0.067	0.46	0.3	0.4	--	--	0.3	--	--
Mercury, Total - SW846 7471, mg/kg												
Mercury	21.1	14.4	22.7	6.50	15.9	7.31	18.5	16.2	3.5	32.9	21.8	11.2
Percent Moisture - D2216, %												
Moisture	89.2	83.6	87.6	84.3	87.7	82.4	86.3	87.6	92.6	85.0	81.4	90.6
Total Organic Carbon (TOC) - SW846 9060, mg/kg												
Total Organic Carbon (TOC)	59,000	70,300	35,400	56,200	67,900	21,800	24,500	25,200	--	16,500	23,200	--
Total Suspended Solids (TSS) - SM 2540D, mg/L												
Total Suspended Solids (TSS)	980	--	--	10,800	2,520	100	820	790	95,000 J	23,600	63,000	NR
Total Volatile Solids (TVS) - SM 2540G, %												
Total Volatile Solids	--	--	--	--	--	13.0			--	11.7	--	--
Field Parameters												
Calculated Average Depth Accumulation (in) per Jar per Day	0.017	0.009	0.041	0.034	0.013	0.028	0.040	0.031	0.025	0.056	0.046	0.019
Calculated Approximate Mass (g) per Jar per Day	2.7	1.5	6.3	6.2	0.2	4.2	7.6	3.0	1.4	8.6	8.2	1.2
pH (SU)	6.87	6.82	6.62	6.54	6.91	6.70	6.89	6.87	7.59	6.62	6.92	7.73
ORP (mV)	-53.6	-168	401	-49.9	-194	-407	-259	--	-333	-358	--	-304
Temperature °C	14.9	21.7	31.8	25.5	18.8	26.0	33.1	19.4	6.9	30.1	19.6	6.1

Notes:
ASTM - American Society for Testing Materials
°C - degree Celsius
SM - Standard Method
SW846 - *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
ORP - oxidation-reduction potential
ft - feet
g- gram
g/cm³ - gram per cubic centimeter
in - inch
mg/kg - milligram per kilogram
mg/L - milligram per liter
mV - millivolt
NAVD 88 - North American Vertical Datum of 1988
NR - Results not reported; validation not complete
SU - standard unit
% - percent
-- - not analyzed
< - result is less than the reporting limit
a - Water level maintained at a minimum of the value listed
b - Locations ST26, ST27, and ST28 were retired in February 2009. Sediment traps were relocated to ST31, ST32, and ST33.

TABLE H-3

2007-2010 SEDIMENT TRAP ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Zone	**2**		**2**							**2**			
Trap ID:	**ST-13**		**ST-13**							**ST-14**			
Sample ID:	OU2B-SED-ST13-1107	OU2B-SED-ST13-0408	OU2B-SED-ST13-0708	OU2B-SED-ST13-10/08	OU2B-SED-ST13-02/09	OU2B-SED-ST13-0509	OU2B-SED-ST13-0809	OU2B-SED-ST13-1109	OU2B-SED-ST13-0210	OU2B-SED-ST14-1107	OU2B-SED-ST14-10/08	OU2B-SED-ST14-1109	OU2B-SED-ST14-0210
Sample Date:	11/27/2007	04/02/2008	07/23/2008	10/07/2008	02/18/2009	05/28/2009	08/11/2009	11/11/2009	02/23/2010	11/28/2007	10/07/2008	11/11/2009	02/23/2010
Duration (days)	274	128	113	77	135	99	77	93	105	274	77	93	105
Water Level Maintained? Depth (ft NAVD 88)[a]	No	No	No	No	No	6	5.2	6	6	No	No	6	6
Minimum Total Depth if Gate is Maintained at 6 Feet Elevation	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	23.0	23.0	23.0	23.0
Water Depth Below Trap (ft):	2.5	2.5	5	5	5-6	5-6	5-6	5-6	5-6	10	5	3-4	3-4
Density - SM 2710FMod, g/cm^3													
Bulk Density	1.00	1.01	1.03	0.979	1.00	1.00	1.03	1.01	NR	1.26	0.988	--	NR
Grain Size - ASTM D422, %													
Grain Size - Clay	--	--	22.4	--	--	--	--	81.2	--	--	--	--	--
Grain Size - Gravel	--	--	< 0.010	--	--	--	--	0	--	--	--	--	--
Grain Size - Sand	--	--	5	--	--	--	--	1.4	--	--	--	--	--
Grain Size - Silt	--	--	72.6	--	--	--	--	17.5	--	--	--	--	--
Filtration by Vaccuum, %													
Filter size: 25 µm	--	--	--	34.66	--	--	98.086	--	--	--	99.92	--	--
Filter size: 2 µm	--	--	--	65.31	--	--	1.146	--	--	--	0.018	--	--
Filter size: 0.5 µm	--	--	--	0.027	--	--	0.768	--	--	--	0.065	--	--
Mercury, Total - SW846 7471, mg/kg													
Mercury	23.2	37.4	28.9	25.7	39.4	11.9	29.6	14.9	6.1	23.3	33.8	23.2	12.1
Percent Moisture - D2216, %													
Moisture	84.2	91.2	90.5	95.5	94.4	82.4	87.4	87.5	91.5	84.2	84.9	84.8	87.8
Total Organic Carbon (TOC) - SW846 9060, mg/kg													
Total Organic Carbon (TOC)	47,000	47,000	76,800	82,000	66,000	38,600	19,100	30,700	--	52,000	21,000	21,100	--
Total Suspended Solids (TSS) - SM 2540D, mg/L													
Total Suspended Solids (TSS)	19,600	--	--	4,820	1,700	29,900	5,270	6,120	--	6,300	60,800	--	--
Total Volatile Solids (TVS) - SM 2540G, %													
Total Volatile Solids	--	--	--	--	--	11.3	10.9	--	--	--	--	--	--
Field Parameters													
Calculated Average Depth Accumulation (in) per Jar per Day	0.018	0.004	0.039	0.005	0.007	0.007	0.057	0.036	0.043	0.018	0.053	0.017	0.014
Calculated Approximate Mass (g) per Jar per Day	3.1	0.9	6.4	1.8	0.5	0.6	8.5	5.1	--	--	8.5	2.4	--
pH (SU)	4.87	6.89	6.71	6.67	7.09	6.60	6.84	6.91	7.22	6.70	6.63	6.98	6.36
ORP (mV)	-279	-182	473	197	-197	-384	-216	--	-304	-130	-22.1	--	-363
Temperature °C	15.8	26.4	31.5	25.0	18.8	29.5	32.8	19.1	13.8	14.7	29.3	18.7	13.9

Notes:
ASTM - American Society for Testing Materials
°C - degree Celsius
SM - Standard Method
SW846 - *Test Methods for Evaluating Solid Waste, Physical/Chemical Met.*
ORP - oxidation-reduction potential
ft - feet
g- gram
g/cm^3 - gram per cubic centimeter
in - inch
mg/kg - milligram per kilogram
mg/L - milligram per liter
mV - millivolt
NAVD 88 - North American Vertical Datum of 1988
NR - Results not reported; validation not complete
SU - standard unit
% - percent
-- - not analyzed
< - result is less than the reporting limit
a - Water level maintained at a minimum of the value listed
b - Locations ST26, ST27, and ST28 were retired in February 2009. Sedim

TABLE H-3

2007-2010 SEDIMENT TRAP ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Zone	**2**			**2**	**2**						**2**	**2**	
Trap ID:	**ST-16 becomes ST-28[b]**			**ST-16 becomes ST-28b**	**ST-21 becomes ST-29**						**ST-21 becomes ST-29**	**ST-32**	
Sample ID:	OU2B-SED-ST16-0408	OU2B-SED-ST28-0708	OU2B-SED-ST28-10/08	OU2B-SED-ST28-02/09	OU2B-SED-ST21-1107	OU2B-SED-ST21-0408	OU2B-SED-ST29-0708	OU2B-SED-ST29-10/08	OU2B-SED-ST29-0809	OU2B-SED-ST29-1109	OU2B-SED-ST29-0210	OU2B-SED-ST32-1109	OU2B-SED-ST32-0210
Sample Date:	04/02/2008	07/24/2008	10/07/2008	02/19/2009	11/27/2007	04/01/2008	07/24/2008	10/07/2008	08/11/2009	11/11/2009	02/24/2010	11/11/2009	02/24/2010
Duration (days)	128	113	77	135	274	128	113	77	77	93	105	93	105
Water Level Maintained? Depth (ft NAVD 88)[a]	No	No	No	No	No	No	No	No	5.2	6	6	6	6
Minimum Total Depth if Gate is Maintained at 6 Feet Elevatio	9.9	10.3	10.3	10.3	9.2	9.2	9.5	9.5	9.5	9.5	9.5	39.0	39.0
Water Depth Below Trap (ft):	4	4	4	4-5	2.5	3	4.5	4.5	4-5	4-5	4-5	18-19	18-19
Density - SM 2710FMod, g/cm^3													
Bulk Density	0.990	0.996	1.01	1.00	1.14	0.993	1.04	0.984	1.00	1.00	NR	--	NR
Grain Size - ASTM D422, %													
Grain Size - Clay	97.7	8.38	--	--	--	33.6	24.5	--	--	77.8	--	--	--
Grain Size - Gravel	--	<0.010	--	--	--	<0.010	< 0.010	--	--	0	--	--	--
Grain Size - Sand	1.4	29.8	--	--	--	0.5	10.1	--	--	2.1	--	--	--
Grain Size - Silt	0.9	61.8	--	--	--	65.9	65.4	--	--	20.1	--	--	--
Filtration by Vaccuum, %													
Filter size: 25 µm	--	--	--	--	--	--	--	99.95	99.6	--	--	--	--
Filter size: 2 µm	--	--	--	--	--	--	--	0.015	0.1	--	--	--	--
Filter size: 0.5 µm	--	--	--	--	--	--	--	0.036	3	--	--	--	--
Mercury, Total - SW846 7471, mg/kg													
Mercury	16.2	23.7 J	20.3	11.9	33.7	20.2	25.4	28.5	26.4	15.6	2	6.67	1.30
Percent Moisture - D2216, %													
Moisture	87.6	88.9	87.5	90.4	87.9	85.7	84.9	87.2	88.6	88.4	81.6	86.6	81.1
Total Organic Carbon (TOC) - SW846 9060, mg/kg													
Total Organic Carbon (TOC)	25,200	63,000 J	85,000	239,000	42,000	43,100	31,500	47,600	41,200	34,600	--	35,700	41,700
Total Suspended Solids (TSS) - SM 2540D, mg/L													
Total Suspended Solids (TSS)	790	--	15,200	1,340	22,600	--	--	26,600	720	1,870	162,000 J	--	170,000 J
Total Volatile Solids (TVS) - SM 2540G, %													
Total Volatile Solids	--	--	--	--	--	--	--	--	--	--	--	--	--
Field Parameters													
Calculated Average Depth Accumulation (in) per Jar per Day	0.011	0.025	0.033	0.011	0.018	0.010	0.035	0.037	0.040	0.015	0.019	0.027	0.083
Calculated Approximate Mass (g) per Jar per Day	1.9	4.1	5.5	1.3	3.0	1.8	5.7	5.9	6.2	3.3	1.4	5.0	3.1
pH (SU)	6.71	6.51	6.52	6.11	5.96	6.70	6.67	6.56	6.69	6.98	7.74	6.93	7.48
ORP (mV)	-188	333	309	-254	-244	8.40	314	192	-338	--	-236	--	-330
Temperature °C	21.9	30.9	25.4	15.0	12.8	19.0	31.5	24.7	33.5	18.5	5.8	19.5	9.4

Notes:
ASTM - American Society for Testing Material:
°C - degree Celsius
SM - Standard Method
SW846 - *Test Methods for Evaluating Solid Waste, Physical/Chemical Met.*
ORP - oxidation-reduction potential
ft - feet
g- gram
g/cm³ - gram per cubic centimete
in - inch
mg/kg - milligram per kilogran
mg/L - milligram per lite
mV - millivol
NAVD 88 - North American Vertical Datum of 1988
NR - Results not reported; validation not complete
SU - standard unit
% - percent
-- - not analyzed
< - result is less than the reporting limi
a - Water level maintained at a minimum of the value listec
b - Locations ST26, ST27, and ST28 were retired in February 2009. Sedim

TABLE H-3

2007-2010 SEDIMENT TRAP ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Zone	**2**		**3**		**3**				**3**		
Trap ID:	**ST-33**		**ST-17**		**ST-17**				**ST-19**		
Sample ID:	OU2B-SED-ST33-0809	OU2B-SED-ST33-1109	OU2B-SED-ST17-1107	OU2B-SED-ST17-0408	OU2B-SED-ST17-0708	OU2B-SED-ST17-10/08	OU2B-SED-ST17-1109	OU2B-SED-ST17-0210	OU2B-SED-ST19-1107	OU2B-SED-ST19-0408	OU2B-SED-ST19-0708
Sample Date:	08/12/2009	11/11/2009	11/27/2007	04/01/2008	07/22/2008	10/07/2008	11/11/2009	02/24/2010	11/27/2007	04/01/2008	07/23/2008
Duration (days)	77	93	274	128	113	77	93	105	274	128	113
Water Level Maintained? Depth (ft NAVD 88)[a]	5.2	6	No	No	No	No	6	6	No	No	No
Minimum Total Depth if Gate is Maintained at 6 Feet Elevation	39.0	39.0	11.8	11.8	11.8	11.8	11.8	11.8	9.8	9.8	9.8
Water Depth Below Trap (ft):	6-7	6-7	3	4	4	4	4-5	4-5	3	2.5	3
Density - SM 2710FMod, g/cm³											
Bulk Density	1.01	0.992	1.09	0.995	1.03	0.994	--	NR	1.09	1.01	1.03
Grain Size - ASTM D422, %											
Grain Size - Clay	--	94.2	--	--	32.8	--	--	--	--	--	26.5
Grain Size - Gravel	--	0	--	--	< 0.010	--	--	--	--	--	< 0.010
Grain Size - Sand	--	0.4	--	--	7.4	--	--	--	--	--	9.3
Grain Size - Silt	--	5.5	--	--	59.8	--	--	--	--	--	64.2
Filtration by Vaccuum, %											
Filter size: 25 µm	98.9	--	--	--	--	99.84	--	--	--	--	--
Filter size: 2 µm	0.7	--	--	--	--	0.049	--	--	--	--	--
Filter size: 0.5 µm	0.4	--	--	--	--	0.11	--	--	--	--	--
Mercury, Total - SW846 7471, mg/kg											
Mercury	43.3	26.8	31.1	18.7	23.8	18.4	5.94	3.80	28.6	21.6	21.9
Percent Moisture - D2216, %											
Moisture	89.3	81.6	89.6	86.0	88.7	93.6	86.0	84.7	85.5	84.6	91.8
Total Organic Carbon (TOC) - SW846 9060, mg/kg											
Total Organic Carbon (TOC)	19,600	22,400	46,000	65,900	31,600	64,200	48,800	52,200	49,000	81,200	42,100
Total Suspended Solids (TSS) - SM 2540D, mg/L											
Total Suspended Solids (TSS)	6,910	49,600	4,950	--	--	2,540	--	126,000 J	15,300	--	--
Total Volatile Solids (TVS) - SM 2540G, %											
Total Volatile Solids	--	--	--	--	--	--	--	--	--	--	--
Field Parameters											
Calculated Average Depth Accumulation (in) per Jar per Day	0.054	0.032	0.013	0.008	--	0.016	0.012	0.033	0.018	0.006	0.038
Calculated Approximate Mass (g) per Jar per Day	7.9	5.4	2.5	1.3	--	3.1	3.1	2.4	3.0	1.3	5.8
pH (SU)	6.68	6.80	5.84	6.93	--	6.50	7.04	7.62	6.78	6.55	6.68
ORP (mV)	-350	--	-315	-10.6	--	-55.2	--	-351	-265	12.9	318
Temperature °C	27.8	19.3	14.1	18.9	--	25.2	16.8	10.0	15.5	18.8	34.0

Notes:
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ORP - oxidation-reduction potential
ft - feet
g- gram
g/cm³ - gram per cubic centimeter
in - inch
mg/kg - milligram per kilogram
mg/L - milligram per liter
mV - millivolt
NAVD 88 - North American Vertical Datum of 1988
NR - Results not reported; validation not complete
SU - standard unit
% - percent
-- - not analyzed
< - result is less than the reporting limit
a - Water level maintained at a minimum of the value listed
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TABLE H-3

2007-2010 SEDIMENT TRAP ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Zone	3				3			3	
Trap ID:	ST-19				ST-20 becomes ST-26[b]			ST-20 becomes ST-26b	
Sample ID:	OU2B-SED-ST19-10/08	OU2B-SED-ST19-02/09	OU2B-SED-ST19-1109	OU2B-SED-ST19-0210	OU2B-SED-ST20-1107	OU2B-SED-ST26-0408	OU2B-SED-ST26-0708	OU2B-SED-ST26-10/08	OU2B-SED-ST26-02/09
Sample Date:	10/07/2008	02/19/2009	11/12/2009	02/23/2010	11/28/2007	04/01/2008	07/24/2008	10/07/2008	02/19/2009
Duration (days)	77	135	93	105	274	128	113	77	135
Water Level Maintained? Depth (ft NAVD 88)[a]	No	No	6	6	No	No	No	No	No
Minimum Total Depth if Gate is Maintained at 6 Feet Elevation	9.8	9.8	9.8	9.8	9.0	9.8	9.8	9.8	9.8
Water Depth Below Trap (ft):	3	4-5	4-5	4-5	2.5	3.5	4	4	4-5
Density - SM 2710FMod, g/cm³									
Bulk Density	0.992	1.00	--	NR	1.25	0.999	0.891	1.02	1.00
Grain Size - ASTM D422, %									
Grain Size - Clay	--	--	--	--	--	29.9	19.4	--	--
Grain Size - Gravel	--	--	--	--	--	<0.010	< 0.010	--	--
Grain Size - Sand	--	--	--	--	--	0.5	3.2	--	--
Grain Size - Silt	--	--	--	--	--	69.6	77.3	--	--
Filtration by Vaccuum, %									
Filter size: 25 µm	99.95	99.61	--	--	--	--	--	--	99.68
Filter size: 2 µm	0.022	0.13	--	--	--	--	--	--	0.02
Filter size: 0.5 µm	0.033	0.27	--	--	--	--	--	--	0.3
Mercury, Total - SW846 7471, mg/kg									
Mercury	16.0	16.7	7.43	3.5	17.5	16.8	29.8	25.3	25.2
Percent Moisture - D2216, %									
Moisture	88.9	87.9	84.5	82.8	87.4	82.7	89.4	92.4	84.6
Total Organic Carbon (TOC) - SW846 9060, mg/kg									
Total Organic Carbon (TOC)	54,500	66,300	27,600	43,300	31,000	92,600	54,100	113,000	71,300
Total Suspended Solids (TSS) - SM 2540D, mg/L									
Total Suspended Solids (TSS)	19,100	5,960	--	210,000 J	7,330	--	--	13,300	57,100
Total Volatile Solids (TVS) - SM 2540G, %									
Total Volatile Solids	--	--	--	--	--	--	--	--	--
Field Parameters									
Calculated Average Depth Accumulation (in) per Jar per Day	0.030	0.012	0.032	0.038	0.018	0.013	0.021	0.023	0.015
Calculated Approximate Mass (g) per Jar per Day	5.1	1.1	5.8	--	3.0	2.5	3.4	4.2	1.6
pH (SU)	6.52	6.74	6.90	6.97	7.73	6.77	6.49	6.65	6.78
ORP (mV)	-58.7	-171	-26.9	-304	-278	-2.30	402	-79.7	-192
Temperature °C	25.0	14.1	18.5	15.2	14.5	19.6	30.4	28.0	14.4

Notes:
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SU - standard unit
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TABLE H-3

2007-2010 SEDIMENT TRAP ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Zone	**3**					**3**							**3**	
Trap ID:	**ST-22 becomes ST-27[b]**					**ST-23**							**ST-23**	
Sample ID:	OU2B-SED-ST22-1107	OU2B-SED-ST27-0408	OU2B-SED-ST27-0708	OU2B-SED-ST27-10/08	OU2B-SED-ST27-02/09	OU2B-SED-ST23-1107	OU2B-SED-ST23-0408	OU2B-SED-ST23-0708	OU2B-SED-ST23-10/08	OU2B-SED-ST23-02/09	OU2B-SED-ST23-0509	OU2B-SED-ST23-0809	OU2B-SED-ST23-1109	OU2B-SED-ST23-0210
Sample Date:	11/28/2007	04/01/2008	07/24/2008	10/07/2008	02/19/2009	11/28/2007	04/01/2008	07/23/2008	10/07/2008	02/19/2009	05/28/2009	08/11/2009	11/11/2009	02/23/2010
Duration (days)	274	128	113	77	135	274	128	113	77	135	99	77	93	105
Water Level Maintained? Depth (ft NAVD 88)[a]	No	No	No	No	No	No	No	No	No	No	6	5.2	6	6
Minimum Total Depth if Gate is Maintained at 6 Feet Elevation	9.6	10.8	10.8	10.8	10.8	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
Water Depth Below Trap (ft):	3	3.5	4	4	4-5	4	3.5	4	4	5-6	5-6	5-6	5-6	5-6
Density - SM 2710FMod, g/cm³														
Bulk Density	1.18	1.01	0.995	0.986	0.998	1.24	1.000	0.868	0.988	1.00	0.956	0.997	1.01	NR
Grain Size - ASTM D422, %														
Grain Size - Clay	--	37.7	--	--	--	--	31.6	18.9	--	--	--	--	72.9	--
Grain Size - Gravel	--	<0.010	--	--	--	--	<0.010	< 0.010	--	--	--	--	0	--
Grain Size - Sand	--	0.3	--	--	--	--	0.8	5	--	--	--	--	2.4	--
Grain Size - Silt	--	62	--	--	--	--	67.6	76.1	--	--	--	--	24.7	--
Filtration by Vaccuum, %														
Filter size: 25 µm	--	--	--	99.83	--	--	--	--	99.95	--	99.2	97.1	--	--
Filter size: 2 µm	--	--	--	0	--	--	--	--	0.023	--	0.3	1.8	--	--
Filter size: 0.5 µm	--	--	--	0.17	--	--	--	--	0.025	--	0.5	1.1	--	--
Mercury, Total - SW846 7471, mg/kg														
Mercury	26.5	28.3	25.6 J	15.5	16.8	26.7	19.7	27.2	20.6	10.4	5.0	24.2	5.15	2.5
Percent Moisture - D2216, %														
Moisture	86.1	88.5	91.4	92.9	87.2	86.6	84.2	86.2	86.2	81.2	74.3	89.1	85.5	83.5
Total Organic Carbon (TOC) - SW846 9060, mg/kg														
Total Organic Carbon (TOC)	72,000	49,700	256,000 J	127,000	54,800	65,000	35,400	32,100	43,500	147,000	19,700	36,000	34,400	51,200
Total Suspended Solids (TSS) - SM 2540D, mg/L														
Total Suspended Solids (TSS)	2,020	--	--	14,700	2,700	50,700	--	--	29,500	1,240	200	1,110	23,800	180,000 J
Total Volatile Solids (TVS) - SM 2540G, %														
Total Volatile Solids	--	--	--	--	--	--	--	--	--		11.4	18.0	--	--
Field Parameters														
Calculated Average Depth Accumulation (in) per Jar per Day	0.018	0.011	0.029	0.017	0.010	0.017	0.011	0.035	0.042	0.010	0.021	0.028	0.023	0.038
Calculated Approximate Mass (g) per Jar per Day	2.9	1.8	4.5	2.7	1.4	3.1	2.0	5.7	7.2	1.1	3.1	4.4	4.2	--
pH (SU)	7.93	6.07	6.46	6.47	6.92	5.09	6.76	6.55	6.47	6.76	6.64	6.58	7.11	7.41
ORP (mV)	-270	-21.8	335	142	-216	-330	-20.7	368	-177	-155	-421	-216	--	-270
Temperature °C	16.1	18.7	31.1	27.4	15.0	16.0	19.3	33.1	27.3	13.4	26.0	32.6	17.9	11.5

Notes:
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g- gram
g/cm³ - gram per cubic centimeter
in - inch
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% - percent
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TABLE H-3

2007-2010 SEDIMENT TRAP ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Zone	**3**					**3**				**3**		
Trap ID:	**ST-24**					**ST-24**				**ST-25 becomes ST-30**		
Sample ID:	OU2B-SED-ST24-1107	OU2B-SED-ST24-0408	OU2B-SED-ST24-0708	OU2B-SED-ST24-10/08	OU2B-SED-ST24-02/09	OU2B-SED-ST24-0509	OU2B-SED-ST24-0809	OU2B-SED-ST24-1109	OU2B-SED-ST24-0210	OU2B-SED-ST25-0408	OU2B-SED-ST30-0708	OU2B-SED-ST30-10/08
Sample Date:	11/27/2007	04/01/2008	07/23/2008	10/07/2008	02/19/2009	05/28/2009	08/11/2009	11/11/2009	02/23/2010	04/01/2008	07/24/2008	10/07/2008
Duration (days)	274	128	113	77	135	99	77	93	105	128	113	77
Water Level Maintained? Depth (ft NAVD 88)[a]	No	No	No	No	No	6	5.2	6	6	No	No	No
Minimum Total Depth if Gate is Maintained at 6 Feet Elevation	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	10.4	12.0	12.0
Water Depth Below Trap (ft):	2.5	3	3.5	3.5	4-5	4-5	4-5	4-5	4-5	3	3	4.5
Density - SM 2710FMod, g/cm^3												
Bulk Density	1.01	0.991	0.946	0.952	1.00	0.978	0.996	1.05	NR	0.996	0.981	0.991
Grain Size - ASTM D422, %												
Grain Size - Clay	72.9	25.7	32.8	--	--	--	--	86.8	--	32	16.9	--
Grain Size - Gravel	--	<0.010	< 0.010	--	--	--	--	0	--	<0.010	< 0.010	--
Grain Size - Sand	2.4	0.4	8	--	--	--	--	2.1	--	0.7	12.6	--
Grain Size - Silt	24.7	73.9	59.2	--	--	--	--	11.2	--	67.3	70.5	--
Filtration by Vaccuum, %												
Filter size: 25 µm	--	--	--	99.94	99.57	99.68	97.5	--	--	--	--	--
Filter size: 2 µm	--	--	--	0.013	0.02	0.07	1.7	--	--	--	--	--
Filter size: 0.5 µm	--	--	--	0.044	0.41	0.25	0.8	--	--	--	--	--
Mercury, Total - SW846 7471, mg/kg												
Mercury	<6.88	28.7	25.7	24.0	18.2	9.88	22.4	6.77	2.1	19.4	33.2	24.5
Percent Moisture - D2216, %												
Moisture	85.5	88.7	88.8	91.5	84.7	81.1	88.5	87.5	86.1	83.2	92.6	91.3
Total Organic Carbon (TOC) - SW846 9060, mg/kg												
Total Organic Carbon (TOC)	34,400	38,700	41,800	43,000	66,500	5,080	40,500	34,300	56,400	50,200	31,800	60,500
Total Suspended Solids (TSS) - SM 2540D, mg/L												
Total Suspended Solids (TSS)	23,800	--	--	12,200	40,000	2,050	870	880	152,000 J	--	--	10,600
Total Volatile Solids (TVS) - SM 2540G, %												
Total Volatile Solids	--	--	--	--	--	11.1	19.4	--	--	--	--	--
Field Parameters												
Calculated Average Depth Accumulation (in) per Jar per Day	0.016	0.012	--	0.039	0.014	0.019	0.041	0.015	0.019	0.012	0.024	0.040
Calculated Approximate Mass (g) per Jar per Day	2.7	2.2	4.8	6.4	2.0	2.9	5.4	2.5	--	1.8	3.9	6.0
pH (SU)	5.40	6.83	6.56	6.54	6.77	6.69	6.59	7.08	6.89	6.69	6.70	6.52
ORP (mV)	-288	-2.1	432	-91.8	-187	-438	-342	--	-347	-0.500	341	203
Temperature °C	13.9	19.1	32.9	25.4	14.8	27.3	33.8	17.7	11.9	19.1	31.5	25.6

Notes:
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SU - standard unit
% - percent
-- - not analyzed
< - result is less than the reporting limit
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TABLE H-3

2007-2010 SEDIMENT TRAP ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Zone	**3**		
Trap ID:	**ST-25 becomes ST-30**		
Sample ID:	OU2B-SED-ST30-02/09	OU2B-SED-ST30-0809	OU2B-SED-ST30-1109
Sample Date:	02/19/2009	08/11/2009	11/11/2009
Duration (days)	135	77	93
Water Level Maintained? Depth (ft NAVD 88)[a]	No	5.2	6
Minimum Total Depth if Gate is Maintained at 6 Feet Elevation	12.0	12.0	12.0
Water Depth Below Trap (ft):	4-5	4-5	4-5
Density - SM 2710FMod, g/cm^3			
Bulk Density	0.999	1.03	1.01
Grain Size - ASTM D422, %			
Grain Size - Clay	--	--	78.1
Grain Size - Gravel	--	--	0
Grain Size - Sand	--	--	3.8
Grain Size - Silt	--	--	18.1
Filtration by Vaccuum, %			
Filter size: 25 µm	--	98.9	--
Filter size: 2 µm	--	0.678	--
Filter size: 0.5 µm	--	0.422	--
Mercury, Total - SW846 7471, mg/kg			
Mercury	26.0	27.9	16.7
Percent Moisture - D2216, %			
Moisture	95.0	87.5	87.0
Total Organic Carbon (TOC) - SW846 9060, mg/kg			
Total Organic Carbon (TOC)	72,400	25,100	35,000
Total Suspended Solids (TSS) - SM 2540D, mg/L			
Total Suspended Solids (TSS)	23,500	3,760	5,070
Total Volatile Solids (TVS) - SM 2540G, %			
Total Volatile Solids	--	--	--
Field Parameters			
Calculated Average Depth Accumulation (in) per Jar per Day	0.005	0.040	0.028
Calculated Approximate Mass (g) per Jar per Day	0.4	6.5	3.2
pH (SU)	7.46	6.69	7.04
ORP (mV)	-216	-264	--
Temperature °C	13.2	34.2	17.3

Notes:
ASTM - American Society for Testing Materials
°C - degree Celsius
SM - Standard Method
SW846 - *Test Methods for Evaluating Solid Waste, Physical/Chemical Met*
ORP - oxidation-reduction potential
ft - feet
g- gram
g/cm³ - gram per cubic centimeter
in - inch
mg/kg - milligram per kilogram
mg/L - milligram per liter
mV - millivolt
NAVD 88 - North American Vertical Datum of 1988
NR - Results not reported; validation not complete
SU - standard unit
% - percent
-- - not analyzed
< - result is less than the reporting limit
a - Water level maintained at a minimum of the value listed
b - Locations ST26, ST27, and ST28 were retired in February 2009. Sedim

PREPARED BY/DATE: RMR 5/5/2010
CHECKED BY/DATE: KPH 5/6/2010

TABLE H-4

SEDIMENT TRAP ANALYTICAL SUMMARY, SHOWING AVERAGE AND RANGES OF CONCENTRATIONS
Updated RI Addendum
Olin McIntosh OU-2

Sample Collection Date	November 27-28, 2007	April 1-2, 2008	July 23-24, 2008	October 7-8, 2008	February 18-19, 2009	May 28, 2009	August 11-12, 2009	November 11-12, 2009	February 24-25, 2010
Duration (days)	**274**	**128**	**113**	**77**	**135**	**99**	**77**	**93**	**105**
Water Level Maintained? Depth (ft NAVD 88)[a]	**No**	**No**	**No**	**No**	**No**	**6.0**	**5.2**	**6.0**	**6.0**
Total Number of Traps Included in Analysis	10[b]	11[c]	11[d]	12	9[e]	4[f]	8[g]	12	10[h]
Zone 1 North									
n	1	1	1	1	1	1	2	2	2
Mercury, Total (mg/kg, dw)	21.1	14.4	22.7	6.5	15.9	7.31	25.7 (18.5 - 32.9)	19 (16.2 - 21.8)	7.35 (3.5 - 11.2)
TOC (mg/kg)	59,000	70,300	35,400	56,200	67,900	21,800	20,500 (16,500 - 24,500)	24,200 (23,200 - 25,200)	NA[i]
Bulk Density (g/cm^3)	1.01	0.990	0.945	0.988	1.00	1.04	0.980 (0.960 - 1.00)	0.999 (0.997 - 1.00)	NR
Grain Size	Silt/Clay	Silt/Clay	Silt/Clay	Silt/Clay	Silt/Clay	Silt/Clay	Silt/Clay	Clay	NA
Percent Moisture	89.2	83.6	87.6	84.3	87.7	82.4	85.7 (85.0 - 86.3)	84.5 (81.4 - 87.6)	91.6 (90.6 - 92.6)
TSS (mg/L)	NA	NA	NA	NA	2,520	100	12,200 (820 - 23,600)	31,900 (790 - 63,000)	NR
Calculated Approximate Mass (g) per Jar per Day	2.7	1.5	6.3	6.2	0.2	4.2	8.1 (7.5 - 8.6)	5.6 (3.0 - 8.2)	1.3 (1.2 - 1.4)
Calculated Average Depth Accumulation (in) per Jar per Day	0.012	0.009	0.041	0.034	0.013	0.028	0.048 (0.040 - 0.056)	0.038 (0.031 - 0.046)	0.022 (0.019 - 0.025)
Zone 2 Central									
n	3	3	3	4	2	1	3	5	4
Mercury, Total (mg/kg, dw)	26.7 (23.2 - 33.7)	31.8 (20.2 - 37.8)	26.0 (23.7 J - 28.9)	27.1 (20.3 - 33.8)	25.7 (11.9 - 39.4)	11.9	33.1 (26.4 - 43.3)	17.4 (6.67-26.8)	5.4 (1.3 - 12.1)
TOC (mg/kg)	47,000 (42,000 - 52,000)	51,100 (43,100 - 63,300)	57,100 (31,500 - 76,800)	58,900 (21,000 - 85,000)	153,000 (66,000 - 239,000)	38,600	26,600 (19,100 - 41,200)	28,900 (21,100 - 35,700)	41700
Bulk Density (g/cm^3)	1.13 (1.00 - 1.26)	0.998 (0.990 - 1.01)	1.02 (0.996 - 1.04)	0.990 (0.979 - 1.01)	1.00	1.00	1.01 (0.999 - 1.03)	1.00 (0.992 - 1.01)	NR
Grain Size	Silt/Clay	Silt/Clay	Silt/Clay	Silt/Clay	NA	NA	Silt/Clay	Clay	NA
Percent Moisture	85.4 (84.2 - 87.9)	88.8 (85.7 - 91.2)	88.1 (84.9 - 90.5)	88.8 (84.9 - 95.5)	92.4 (90.4 - 94.4)	82.4	88.4 (87.4 - 89.3)	85.8 (81.6 - 88.4)	85.5 (81.1 - 91.5)
TSS (mg/L)	NA	NA	NA	NA	1,520 (1,340 - 1,700)	29,900	4,300 (720 - 6,910)	19,200 (1,870 - 49,600)	NR
Calculated Approximate Mass (g) per Jar per Day	3.0 (3.0 - 3.1)	1.5 (0.9 - 1.9)	5.4 (4.1 - 6.4)	5.4 (1.8 - 8.5)	0.9 (0.5-1.3)	0.6	7.5 (6.1 - 8.5)	4.2 (2.4 - 5.4)	2.3 (1.4 - 3.1)
Calculated Average Depth Accumulation (in) per Jar per Day	0.02	0.008 (0.004 - 0.011)	0.033 (0.025 - 0.039)	0.032 (0.005 - 0.053)	0.009 (0.007 - 0.011)	0.007	0.050 (0.040 - 0.057)	0.025 (0.015 - 0.036)	0.040 (0.014 - 0.083)
Zone 3 South									
n	6	7	7	7	6	2	3	5	4
Mercury, Total (mg/kg, dw)	25.9 (17.5 - 31.1)	21.9 (16.8 - 28.7)	26.7 (21.9 - 33.2)	20.6 (15.5 - 25.3)	18.9 (10.4 - 26)	7.46 (5.03 - 9.88)	24.8 (22.4 - 27.9)	8.40 (5.15 - 16.7)	3.0 (2.1 - 3.8)
TOC (mg/kg)	54,500 (31,000 - 72,000)	59,100 (35,400 - 92,600)	69,900 (31,600 - 256,000 J)	72,200 (43,000 - 127,000)	79,700 (54,800 - 147,000)	12,400 (5,080 - 19,700)	33,900 (25,100 - 40,500)	36,000 (27,600 - 48,800)	50,800 (43,300 - 56,400)
Bulk Density (g/cm^3)	1.18 (1.09 - 1.25)	1.00 (0.991 - 1.01)	0.963 (0.868 - 1.03)	0.989 (0.952 - 1.02)	1.00 (0.998 - 1.00)	0.967 (0.956 - 0.978)	1.01 (0.996 - 1.03)	1.02 (1.01 - 1.05)	NR
Grain Size	Silt/Clay	Silt/Clay	Silt/Clay	Silt/Clay	Silt/Clay	Silt/Clay	Silt/Clay	Clay	NA
Percent Moisture	87.1 (85.5 - 89.6)	85.4 (82.7 - 88.7)	89.8 (86.2 - 92.6)	91.0 (86.2 - 93.6)	86.8 (81.2 - 95.0)	77.7 (74.3 - 81.1)	88.4 (87.5 - 89.1)	86.1 (84.5 - 87.5)	84.3 (82.8 - 86.1)
TSS (mg/L)	NA	NA	NA	NA	21,800 (1,240 - 57,100)	1,130 (200 - 2,050)	1,910 (870 - 3,760)	9,920 (880 - 23,800)	NR
Calculated Approximate Mass (g) per Jar per Day	2.9 (2.5 - 3.1)	1.8 (1.3 - 2.5)	4.7 (3.4 - 5.8)	4.9 (2.7 - 7.2)	1.3 (0.4 - 2.0)	3.0 (2.9 - 3.1)	5.4 (4.4 - 6.5)	3.7 (2.5 - 5.8)	2.4
Calculated Average Depth Accumulation (in) per Jar per Day	0.017 (0.013 - 0.018)	0.010 (0.006 - 0.013)	0.029 (0.021 - 0.038)	0.030 (0.016 - 0.042)	0.011 (0.005 - 0.015)	0.020 (0.019 - 0.022)	0.036 (0.028 - 0.041)	0.022 (0.012 - 0.032)	0.032 (0.019 - 0.038)

Notes:
dw - dry weight
g - gram
g/cm^3 - gram per cubic centimeter
in - inch
mg/kg - milligram per kilogram
mg/L - milligram per liter
NA - not analyzed due to insufficient quantity of sample
n - number of samples collected per zone per event
TOC - total organic carbon
TSS - total suspended solids
NR - Results not reported; data validation ongoing.
Zone 1 (North) - samples ST15, ST31
Zone 2 (Central) - samples ST13, ST14, ST16, ST21, ST28, ST29, ST32, ST33
Zone 3 (South) - samples ST17, ST19, ST20, ST22, ST23, ST24, ST25, ST26, ST27, ST30
a - Water level maintained at a minimum of the value listed.
b - Samples were collected from 10 sediment traps in November 2007. One trap was on the Basin bottom and was not sampled. A second trap was found with all jars missing.
c - Samples were collected from 11 sediment traps in April 2008. One trap was on the Basin bottom and was not sampled.
d - Samples were collected from 11 sediement traps in July 2008. One trap was on the Basin bottom and was not sampled.
e - Samples were collected from 9 sediment traps in February 2009. Three sediment traps were on the Basin bottom and were not sampled.
f - Samples were collected from 4 sediment traps in May 2009. Four traps were designated as wind traps during this event (ST14, ST17, ST19, and ST32). Four sediment traps were on the Basin bottom and were not sampled.
g - Samples were collected from 8 sediment traps in August 2009. Four sedimnet traps were designated as wind study traps during this event (ST14, ST17, ST19, and ST32).
h - Samples were collected from 10 sediment traps in February 2010. One sediment trap was found on the Basin bottom. The jars from one sediment trap could not be retrieved.
i - Not analyzed due to insufficient sample volume.

Prepared by: RMR 5/5/2010
Checked by: KPH 5/6/2010

TABLE H-5

SEDIMENT PIN ACCUMULATION
Updated RI Addendum
Olin McIntosh OU-2

Date	**November 2007**			**April 2008**		
Sediment Pin	**Notches Counted[a]**	**Diver Observations**	**Accumulation (inches)**	**Notches Counted**	**Diver Observations**	**Accumulation (inches)**
R-SP-101	NM	NM	NM	47	no accumulation	1[b]
B-SP-101	43	NC	3	46	NC	1.5
B-SP-102	41	NC	4	39	NC	5
B-SP-103	NM	NM	NM	46	NC	1.5
B-SP-104	46	pin broken, removed	1.5	NM	no measurement, pin under repair	NM
B-SP-105	NM	NM	NM	E	crane mat resting on pin plate, no accumulation	0
B-SP-201	NM	NM	NM	48	no accumulation	0
B-SP-202	NM	NM	NM	48	< 0.5" of accumulation	<0.5
B-SP-203	NM	NM	NM	48	no accumulation	0
B-SP-204	NM	NM	NM	48	0.5" of accumulation	0.5
B-SP-205	NM	NM	NM	E	pin broken, removed	1
B-SP-301	NM	NM	NM	48	< 0.5" of accumulation	<0.5
B-SP-302	NM	NM	NM	48	no accumulation	0
B-SP-303	NM	installed during this event	NM	46	NC	1.5
B-SP-304	NM	NM	NM	48	< 0.5" of accumulation	<0.5
B-SP-403	NM	NM	NM	NM	NM	NM

Notes:
E - Diver was unable to count notches, crane mat on pin.
NC - No comment made
NM - Not measured
R - Retired location
Each pin has 48 notches at 0.5-inch increments.
a - Notches are counted from top of the pin to bottom of the pin.
b - Discrepancy between notches counted and diver notes. 47 noches = 1 inch accumulation; however, diver stated no accumulation.

TABLE H-5

SEDIMENT PIN ACCUMULATION
Updated RI Addendum
Olin McIntosh OU-2

Date	July 2008			October 2008		
Sediment Pin	Notches Counted	Diver Observations	Accumulation (inches)	Notches Counted	Diver Observations	Accumulation (inches)
R-SP-101	47	NC	1	NM	unable to access via boat	NM
B-SP-101	44	NC	2.5	37	4" of silt on pin plate	6
B-SP-102	41	NC	4	35	NC	7
B-SP-103	41	NC	4	36	NC	6.5
B-SP-104	NM	installed during this event	NM	48	no accumulation	0
B-SP-105	45	crane mat to side of pin plate	2	48	no accumulation	0
B-SP-201	48	no accumulation	0	48	< 0.5" of accumulation	<0.5
B-SP-202	45	NC	2	48	< 0.5" of accumulation	<0.5
B-SP-203	47	NC	1	48	no accumulation	0
B-SP-204	44	NC	2.5	48	< 0.5" of accumulation	<0.5
B-SP-205	NM	installed during this event	NM	48	< 0.5" of accumulation	<0.5
B-SP-301	47	NC	1	E	pin broken, removed, < 0.5" of accumulation	< 0.5
B-SP-302	48	< 0.5" of accumulation	0.5	48	< 0.5" of accumulation	<0.5
B-SP-303	41	NC	4	41	NC	4
B-SP-304	E	pin broken, removed, ~0.5" of accumulation	0.5	NM	pin broken, removed July 2008	NM
B-SP-403	NM	NM	NM	NM	NM	NM

Notes:
E - Diver was unable to count notches, crane mat on pin.
NC - No comment made
NM - Not measured
R - Retired location
Each pin has 48 notches at 0.5-inch increments.
a - Notches are counted from top of the pin to bottom of the pin.
b - Discrepancy between notches counted and diver notes. 47 noches = 1 inch accumulation; however, diver stated no accumulation.

TABLE H-5

SEDIMENT PIN ACCUMULATION
Updated RI Addendum
Olin McIntosh OU-2

Date	February 2009			May - June 2009		
Sediment Pin	**Notches Counted**	**Diver Observations**	**Accumulation (inches)**	**Notches Counted**	**Diver Observations**	**Accumulation (inches)**
R-SP-101	48	no accumulation, some slime present	0	44	sediment is fluffy	2.5
B-SP-101	42	NC	3.5	41	NC	4
B-SP-102	40	NC	4.5	40	diver estimated approximately 4" of soft sediment	4.5
B-SP-103	41	NC	4	42	diver estimated approximately 4" of accumulation	3.5
B-SP-104	48	<0.5" of accumulation, ~1/8" of accumulation	<0.5	48	barely any noticable sediment	<0.5
B-SP-105	46	NC	1.5	46	NC	1.5
B-SP-201	48	~0.5" of accumulation	0.5	48	light dusting of sediment present	<0.5
B-SP-202	48	<0.5" of accumulation	<0.5	46	NC	1.5
B-SP-203	48	no accumulation, some growth present	0	48	small amount of fluff, <0.5" of accumulation	<0.5
B-SP-204	46	NC	1.5	45	NC	2
B-SP-205	46	NC	1.5	47	NC	1
B-SP-301	R	R	R	R	R	R
B-SP-302	48	light dusting of accumulation	<0.5	48	growth present on pin plate	<0.5
B-SP-303	43	NC	3	43	sediment is harder packed at this location	3
B-SP-304	NM	installed during this event	NM	45	diver miscounted and estimated <0.5" accumulation	<0.5
B-SP-403	NM	installed during this event	NM	48	diver estimated ~1/16" accumulation	<0.5

Notes:
E - Diver was unable to count notches, crane mat on pin.
NC - No comment made
NM - Not measured
R - Retired location
Each pin has 48 notches at 0.5-inch increments.
a - Notches are counted from top of the pin to bottom of the pin.
b - Discrepancy between notches counted and diver notes. 47 noches = 1 inch accumulation; however, diver stated no accumulation.

TABLE H-5

SEDIMENT PIN ACCUMULATION
Updated RI Addendum
Olin McIntosh OU-2

Date	August 2009			November 2009		
Sediment Pin	Notches Counted	Diver Observations	Accumulation (inches)	Notches Counted	Diver Observations	Accumulation (inches)
R-SP-101	NM	pin broken, approximately 2" of sediment observed upon removal	2	NM	pin installed and surveyed	NM
B-SP-101	41	NC	4	39	NC	5
B-SP-102	38	NC	5.5	35	NC	7
B-SP-103	36	NC	6.5	39	NC	5
B-SP-104	40	NC	4.5	48	no accumulation on plate	0
B-SP-105	48	NC	<0.5	48	light dusting	<0.5
B-SP-201	48	NC	<0.5	48	no accumulation on plate	0
B-SP-202	48	NC	<0.5	48	light dusting	<0.5
B-SP-203	48	no accumulation	0	48	no accumulation on plate	0
B-SP-204	40	NC	4.5	47	NC	1
B-SP-205	48	diver estimated <0.25" of accumulation	<0.5	48	no accumulation on plate	0
B-SP-301	R	R	R	R	R	R
B-SP-302	48	diver estimated <0.25" of accumulation	<0.5	48	a small amount of fuzzy growth on plate, no accumulation	0
B-SP-303	39	NC	5	44	NC	2.5
B-SP-304	NM	unable to locate pin plate, broken pin rod found 400 feet from B-SP-304	NM	NM	pin installed and surveyed	NM
B-SP-403	45	diver estimated 1" of soft fluffly sediment	2	48	no accumulation, light dusting on outside edges of plate	0

Notes:
E - Diver was unable to count notches, crane mat on pin.
NC - No comment made
NM - Not measured
R - Retired location
Each pin has 48 notches at 0.5-inch increments.
a - Notches are counted from top of the pin to bottom of the pin.
b - Discrepancy between notches counted and diver notes. 47 noches = 1 inch accumulation; however, diver stated no accumulation.

TABLE H-5

SEDIMENT PIN ACCUMULATION
Updated RI Addendum
Olin McIntosh OU-2

Date	**February 2010**		
Sediment Pin	**Notches Counted**	**Diver Observations**	**Accumulation (inches)**
R-SP-101	48	light dusting of sediment present	<0.5
B-SP-101	41	NC	4
B-SP-102	36	mud accumulation	6.5
B-SP-103	37	NC	6
B-SP-104	48	light dusting of sediment present	<0.5
B-SP-105	48	light dusting of sediment present	<0.5
B-SP-201	48	light dusting of sediment present	<0.5
B-SP-202	48	light dusting of sediment present	<0.5
B-SP-203	46	mud accumulation	1.5
B-SP-204	48	light dusting of sediment present	<0.5
B-SP-205	44	NC	2.5
B-SP-301	R	R	R
B-SP-302	48	light dusting of sediment present	<0.5
B-SP-303	44	NC	2.5
B-SP-304	NM	unable to locate pin	NM
B-SP-403	48	light dusting of sediment present	<0.5

Notes:
E - Diver was unable to count notches, crane mat on pin.
NC - No comment made
NM - Not measured
R - Retired location
Each pin has 48 notches at 0.5-inch increments.
a - Notches are counted from top of the pin to bottom of the pin.
b - Discrepancy between notches counted and diver notes. 47 noches = 1 inch accumulation; however, diver stated no accumulation.

Prepared by: RMR 04/13/2010
Checked by: AES 04/13/2010

TABLE H-6

SEDIMENT CORE ANALYTICAL RESULTS - COARSE CORES
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	Beginning Depth (ft)	Ending Depth (ft)	Sample Date	Sample ID:	2,4'-DDD mg/kg	2,4'-DDE mg/kg	2,4'-DDT mg/kg	4,4'-DDD mg/kg	4,4'-DDE mg/kg	4,4'-DDT mg/kg	Density g/cm^3	Grain Size - Clay %	Grain Size - Coarse Sand %	Grain Size - Fine Sand %	Grain Size - Gravel %	Grain Size - Medium Sand %	Grain Size - Sand %	Grain Size - Silt %	Hexachlorobenzene mg/kg	Mercury mg/kg	Percent Moisture %	Percent Solids %	Mercury SPLP mg/l
SDCR-1	0	1.2	06/03/2009	SDCR-1-CA-060309	NA	NA	NA	NA	NA	NA	1.51	55.1	NA	NA	0	NA	5.4	39.4	1.3	121	41.75	58.25	NA
SDCR-1	1.2	2.3	06/03/2009	SDCR-1-CB-060309	NA	NA	NA	NA	NA	NA	1.18	59.1	NA	NA	0	NA	9.1	31.8	0.0153 J	29.6	41.44	58.56	NA
SDCR-1	2.3	3.5	06/03/2009	SDCR-1-CC-060309	NA	NA	NA	NA	NA	NA	1.32	41.6	NA	NA	0	NA	35.9	22.5	0.0055	51.6	39.77	60.23	NA
SDCR-1	2.3	3.5	06/03/2009	SDCR1-C-FD-060309	NA	NA	NA	NA	NA	NA	1.32	41.6	NA	NA	0	NA	35.9	22.5	0.005	53.7	37.99	62.01	NA
SDCR-1	3.5	4.6	06/03/2009	SDCR-1-CD-060309	NA	NA	NA	NA	NA	NA	1.32	49.2	NA	NA	0	NA	10	40.8	<0.0031	115	46.81	53.19	NA
SDCR-1	4.6	5.8	06/03/2009	SDCR-1-CE-060309	NA	NA	NA	NA	NA	NA	1.28	61.5	NA	NA	0	NA	0.6	37.9	<0.0028	22.2	39.64	60.36	NA
SDCR-1	5.8	6.96	06/03/2009	SDCR-1-CF-060309	NA	NA	NA	NA	NA	NA	1.11	75.4	NA	NA	0	NA	0	24.6	0.0036	0.166	46.98	53.02	NA
SDCR-2	0	1	09/24/2009	SDCR2-CA-092409	NA	NA	NA	NA	NA	NA	1.73	16.9	0.8	57.3	0	5.2	NA	19.9	330	NA	31	69	NA
SDCR-2	1	2	09/24/2009	SDCR2-CB-092409	NA	NA	NA	NA	NA	NA	1.53	22.4	0.1	45.9	0	3.2	NA	28.5	320	NA	36	64	NA
SDCR-2	1.5	2	09/24/2009	SDCR2-CC-092409	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	23	37	63	NA
SDCR-2	2	3	09/24/2009	SDCR2-CD-092409	NA	NA	NA	NA	NA	NA	1.49	24.7	0	9.3	0	0.4	NA	65.6	120	42	46	54	NA
SDCR-2	3	4	09/24/2009	SDCR2-CE-092409	NA	NA	NA	NA	NA	NA	1.46	55.8	0	5	0	0.5	NA	38.7	9.9	18	44	56	NA
SDCR-2	4	5	09/24/2009	SDCR2-CF-092409	NA	NA	NA	NA	NA	NA	1.60	66.2	0	0.4	0	0	NA	33.3	0.25	0.17	43	57	NA
SDCR-2	5	6	09/24/2009	SDCR2-CG-092409	NA	NA	NA	NA	NA	NA	1.41	65.4	0	1.7	0	0	NA	32.8	0.46	0.38	41	59	NA
SDCR-2	6	7	09/24/2009	SDCR2-CH-092409	NA	NA	NA	NA	NA	NA	1.55	63.3	0	1.9	0	0	NA	34.8	0.031	0.07	41	59	NA
SDCR-2	7	8	09/24/2009	SDCR2-CI-092409	NA	NA	NA	NA	NA	NA	1.38	62.1	0	0.4	0	0	NA	37.5	<0.022	0.06	40	60	NA
SDCR-2	8	9	09/24/2009	SDCR2-CJ-092409	NA	NA	NA	NA	NA	NA	1.43	64.9	0	0.2	0	0	NA	35	<0.022	0.057	41	59	NA
SDCR-2	9	10	09/24/2009	SDCR2-CK-092409	NA	NA	NA	NA	NA	NA	1.42	66	0	0.2	0	0	NA	33.7	<0.022	0.055	41	59	NA
SDCR-3	0	1	09/27/2009	SDCR3-CA-092709	0.11	0.31	<0.034	0.44	<0.034	<0.034	1.33	55.9	0.2	1.4	0.5	0.6	NA	41.4	<0.034	76	62	38	0.034
SDCR-3	1	2	09/27/2009	SDCR3-CB-092709	<0.035	<0.035	<0.035	0.33	<0.035	<0.035	1.32	66.2	0.1	0.6	0	0.8	NA	32.3	<0.035	NA	62	38	NA
SDCR-3	1.5	2	09/27/2009	SDCR3-CC-092709	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.2	58	42	NA
SDCR-3	2	3	09/27/2009	SDCR3-CD-092709	<0.0072	<0.0072	<0.0072	0.0041 JQ	<0.0072	<0.0072	1.39	76.1	0	0.2	0	0.2	NA	23.5	<0.0072	0.53	54	46	NA
SDCR-3	3	4	09/27/2009	SDCR3-CE-092709	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026	1.41	72.5	0.1	0.2	0	0.1	NA	27.2	<0.026	0.5	49	51	NA
SDCR-3	4	5	09/27/2009	SDCR3-CF-092709	<0.0068	<0.0068	<0.0068	0.0023 JQ	<0.0068	<0.0068	1.43	74.2	0	0.1	0	0.1	NA	25.7	<0.0068	0.13	51	49	NA
SDCR-3	5	6	09/27/2009	SDCR3-CG-092709	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	1.44	72	0	0.1	0	0.1	NA	27.8	<0.025	0.19	47	53	NA
SDCR-3	6	7	09/27/2009	SDCR3-CH-092709	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	1.39	67.6	0	0.2	0	0.1	NA	32.1	<0.025	0.13	48	52	NA
SDCR-3	7	8	09/27/2009	SDCR3-CI-092709	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	1.38	54.4	0	0.3	0	0.1	NA	45.2	<0.024	0.07	45	55	NA
SDCR-3	8	9	09/27/2009	SDCR3-CJ-092709	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	1.53	39	0	1.2	0	0.1	NA	59.8	<0.023	0.074	43	57	NA
SDCR-3	9	10	09/27/2009	SDCR3-CK-092709	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	1.74	26.2	0	10.6	0	0.1	NA	63.1	<0.021	0.14	36	64	NA
SDCR-4	0	1	09/27/2009	SDCR4-CA-092709	NA	NA	NA	NA	NA	NA	1.24	48.6	0	1.3	0	0.7	NA	49.4	NA	23	71	29	NA
SDCR-4	1	2	09/27/2009	SDCR4-CB-092709	NA	NA	NA	NA	NA	NA	1.21	50.7	0.1	0.5	0	0.4	NA	48.2	NA	16	72	28	NA
SDCR-4	2	3	09/27/2009	SDCR4-CC-092709	NA	NA	NA	NA	NA	NA	1.34	70.4	0	0.3	0	0.3	NA	29.1	NA	230	60	40	NA
SDCR-4	3	4	09/27/2009	SDCR4-CD-092709	NA	NA	NA	NA	NA	NA	1.40	64.8	0	1.2	0	0.4	NA	33.5	NA	64	54	46	NA
SDCR-4	4	5	09/27/2009	SDCR4-CE-092709	NA	NA	NA	NA	NA	NA	1.40	76	0	0.4	0	0.2	NA	23.5	NA	17	56	44	NA
SDCR-4	5	6	09/27/2009	SDCR4-CF-092709	NA	NA	NA	NA	NA	NA	1.32	83.1	0	0.2	0	0.1	NA	16.7	NA	1.7	55	45	NA
SDCR-4	6	7	09/27/2009	SDCR4-CG-092709	NA	NA	NA	NA	NA	NA	1.37	83.1	0	0.1	0	0.2	NA	16.6	NA	0.69	55	45	NA
SDCR-4	7	8	09/27/2009	SDCR4-CH-092709	NA	NA	NA	NA	NA	NA	1.33	81	0	0.1	0	0.1	NA	18.7	NA	0.43	54	46	NA
SDCR-4	8	9	09/27/2009	SDCR4-CI-092709	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.11	52	48	NA
SDCR-5	0	1	09/27/2009	SDCR5-CA-092709	NA	NA	NA	NA	NA	NA	1.14	54.3	0.2	0.4	0	0.2	NA	44.9	NA	20	76	24	NA
SDCR-5	1	2	09/27/2009	SDCR5-CB-092709	NA	NA	NA	NA	NA	NA	1.12	45.1	0	0.1	0	0	NA	54.8	NA	18	75	25	NA
SDCR-5	2	3	09/27/2009	SDCR5-CC-092709	NA	NA	NA	NA	NA	NA	1.20	42.5	0	0.2	0	0.6	NA	56.7	NA	19	73	27	NA
SDCR-5	3	4	09/27/2009	SDCR5-CD-092709	NA	NA	NA	NA	NA	NA	1.29	58.6	0.1	0.3	0	0	NA	41	NA	300	64	36	NA
SDCR-5	4	5	09/27/2009	SDCR5-CE-092709	NA	NA	NA	NA	NA	NA	1.45	72.3	0.1	0.8	0	0.4	NA	26.4	NA	96	53	47	NA
SDCR-5	5	6	09/27/2009	SDCR5-CF-092709	NA	NA	NA	NA	NA	NA	1.47	75.9	0	0.5	0	0.2	NA	23.4	NA	120	52	48	NA
SDCR-5	6	7	09/27/2009	SDCR5-CG-092709	NA	NA	NA	NA	NA	NA	1.36	79.2	0	0.3	0	0.1	NA	20.4	NA	9	57	43	NA
SDCR-5	7	8	09/27/2009	SDCR5-CH-092709	NA	NA	NA	NA	NA	NA	1.38	74.5	0	0.3	0	0.1	NA	25.2	NA	1	57	43	NA
SDCR-5	8	9	09/27/2009	SDCR5-CI-092709	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.55	52	48	NA
SDCR-6	0	1	09/27/2009	SDCR6-CA-092709	NA	NA	NA	NA	NA	NA	1.26	50	0	1.4	0	1.8	NA	46.7	NA	61	70	30	NA
SDCR-6	1	2	09/27/2009	SDCR6-CB-092709	NA	NA	NA	NA	NA	NA	1.38	73.3	0	0.7	0	0.6	NA	25.5	NA	52	62	38	NA
SDCR-6	2	3	09/27/2009	SDCR6-CC-092709	NA	NA	NA	NA	NA	NA	1.38	77.3	0	0.3	0	0.1	NA	22.3	NA	1.5	54	46	NA
SDCR-6	3	4	09/27/2009	SDCR6-CD-092709	NA	NA	NA	NA	NA	NA	1.30	78	0	0.3	0	0.1	NA	21.6	NA	1.7	52	48	NA
SDCR-6	4	5	09/27/2009	SDCR6-CE-092709	NA	NA	NA	NA	NA	NA	1.40	76.6	0	0.2	0	0.1	NA	23.1	NA	0.64	53	47	NA
SDCR-6	5	6	09/27/2009	SDCR6-CF-092709	NA	NA	NA	NA	NA	NA	1.40	84.9	0	0.1	0	0.1	NA	14.9	NA	0.49	51	49	NA
SDCR-6	6	7	09/27/2009	SDCR6-CG-092709	NA	NA	NA	NA	NA	NA	1.47	78.9	0	0.1	0	0	NA	21	NA	0.06	49	51	NA
SDCR-6	7	8	09/27/2009	SDCR6-CH-092709	NA	NA	NA	NA	NA	NA	1.37	76.5	0	0.2	0	0.1	NA	23.3	NA	0.073	51	49	NA
SDCR-7	0	1	09/27/2009	SDCR7-CA-092709	NA	NA	NA	NA	NA	NA	1.28	63.2	0.1	0.6	0	0.9	NA	35.2	NA	88	65	35	NA
SDCR-7	1	2	09/27/2009	SDCR7-CB-092709	NA	NA	NA	NA	NA	NA	1.44	78.4	0	0.2	0	0.1	NA	21.3	NA	2.6	55	45	NA
SDCR-7	2	3	09/27/2009	SDCR7-CC-092709	NA	NA	NA	NA	NA	NA	1.48	74.8	0.1	0.1	0	0.1	NA	25	NA	0.55	52	48	NA
SDCR-7	3	4	09/27/2009	SDCR7-CD-092709	NA	NA	NA	NA	NA	NA	1.40	74.4	0	0	0	0.1	NA	25.5	NA	0.16	49	51	NA
SDCR-7	4	5	09/27/2009	SDCR7-CE-092709	NA	NA	NA	NA	NA	NA	1.45	59	0	0.1	0	0	NA	40.9	NA	0.076	48	52	NA
SDCR-7	5	6	09/27/2009	SDCR7-CF-092709	NA	NA	NA	NA	NA	NA	1.50	33.4	0	1.6	0	0.2	NA	64.8	NA	0.018 JQ	39	61	NA
SDCR-7	6	7	09/27/2009	SDCR7-CG-092709	NA	NA	NA	NA	NA	NA	1.47	29.3	0	6.2	0	0.3	NA	64.3	NA	0.063	34	66	NA
SDCR-7	7	8	09/27/2009	SDCR7-CH-092709	NA	NA	NA	NA	NA	NA	1.44	28.1	0	10.1	0	0.4	NA	61.4	NA	0.059	36	64	NA

TABLE H-6

SEDIMENT CORE ANALYTICAL RESULTS - COARSE CORES
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	Beginning Depth (ft)	Ending Depth (ft)	Sample Date	Sample ID:	2,4'-DDD mg/kg	2,4'-DDE mg/kg	2,4'-DDT mg/kg	4,4'-DDD mg/kg	4,4'-DDE mg/kg	4,4'-DDT mg/kg	Density g/cm³	Grain Size - Clay %	Grain Size - Coarse Sand %	Grain Size - Fine Sand %	Grain Size - Gravel %	Grain Size - Medium Sand %	Grain Size - Sand %	Grain Size - Silt %	Hexachlorobenzene mg/kg	Mercury mg/kg	Percent Moisture %	Percent Solids %	Mercury SPLP mg/l
SDCR-8	0	1	09/28/2009	SDCR8-CA-092809	<0.11	<0.11	<0.11	0.094 JQ	<0.11	<0.11	1.18	76.8	0	0.4	0	0.1	NA	22.6	<0.11	NA	71	29	NA
SDCR-8	1	2	09/28/2009	SDCR8-CB-092809	0.049 JQ	0.15	0.013 JQ	0.094	<0.05	<0.05	1.14	45.2	0	0.5	0	0.5	NA	53.8	0.11	NA	73	27	NA
SDCR-8	1.5	2	09/28/2009	SDCR8-CC-092809	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	39	71	29	NA
SDCR-8	2	3	09/28/2009	SDCR8-CD-092809	<0.051	0.23	<0.051	<0.051	<0.051	<0.051	1.07	43.5	0	0.9	0	0.1	NA	55.4	<0.051	24	74	26	NA
SDCR-8	3	4	09/28/2009	SDCR8-CE-092809	0.069	0.93	<0.048	0.42	0.58	<0.048	1.20	36.5	0	0.4	0	0	NA	63.1	<0.048	15	73	27	NA
SDCR-8	4	5	09/28/2009	SDCR8-CF-092809	<0.048	1.5	<0.048	<0.048	<0.048	<0.048	1.23	63.8	0	0.2	0	0.1	NA	35.8	0.093	94	72	28	NA
SDCR-8	5	6	09/28/2009	SDCR8-CG-092809	<0.39	2.3	<0.39	<0.39	2	<0.39	1.35	77.8	0	1.8	0	0.2	NA	20.1	0.62	440	58	42	NA
SDCR-8	6	7	09/28/2009	SDCR8-CH-092809	0.58	1.1	<0.24	<0.24	0.79	<0.24	1.50	59.9	0	4.9	0	0.2	NA	34.9	0.51	120	45	55	NA
SDCR-8	7	8	09/28/2009	SDCR8-CI-092809	0.53	1.6	0.12 JQ	<0.25	1	<0.25	1.46	65.2	0	3.5	0	0.4	NA	30.8	0.29	120	46	54	NA
SDCR-8	8	9	09/28/2009	SDCR8-CJ-092809	<6.4	17	<6.4	2.2 JQ	15	<6.4	1.42	73.3	0	0.6	0	0.1	NA	26	<6.4	230	49	51	NA
SDCR-8	9	10	09/28/2009	SDCR8-CK-092809	0.48	1.1	<0.26	0.56	1.1	<0.26	1.43	79.1	0	0.1	0	0	NA	20.7	<0.26	170	49	51	NA
SDCR-8	10	11	09/28/2009	SDCR8-CL-092809	0.088 J	0.48 J	<0.065 J	0.093 J	0.36 J	<0.065 J	1.53	76.2	0	0	0	0.3	NA	23.5	NA	63	49	51	NA
SDCR-9	0	1	09/26/2009	SDCR9-CA-092609	0.6 J	0.96 J	<0.13	<0.13	<0.13	<0.13	1.16	69.1	1.6	2.2	0	1.6	NA	25.5	NA	120 J	74	26	0.03
SDCR-9	1	2	09/26/2009	SDCR9-CB-092609	0.55	0.4	0.038 JQ	0.0048 JQ	<0.045	0.021 JQ	1.22	79.6	0.2	0.8	0	0.7	NA	18.7	NA	170	71	29	NA
SDCR-9	2	3	09/26/2009	SDCR9-CC-092609	0.0087 JQ	<0.0091	<0.0091	0.016	<0.0091	<0.0091	1.27	82.5	0	0.8	0	0.3	NA	16.4	NA	15	64	36	NA
SDCR-9	3	4	09/26/2009	SDCR9-CD-092609	<0.0080	<0.0080	<0.0080	0.021	<0.008	<0.0080	1.39	84.2	0.1	0.5	0	0.2	NA	15	NA	3.1	59	41	NA
SDCR-9	4	5	09/26/2009	SDCR9-CE-092609	<0.0077	<0.0077	<0.0077	0.0032 JQ	<0.0077	<0.0077	1.38	85.8	0.1	0.4	0	0.2	NA	13.5	NA	0.25	57	43	NA
SDCR-9	5	6	09/26/2009	SDCR9-CF-092609	<0.0074 J	<0.0074 J	<0.0074 J	<0.0074 J	<0.0074 J	<0.0074 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.14	56	44	NA
SDCR-10	0	1	09/26/2009	SDCR10-CA-092609	NA	NA	NA	NA	NA	NA	1.19	51.3	0	1.6	0	0.8	NA	46.3	NA	19	77	23	NA
SDCR-10	1	2	09/26/2009	SDCR10-CB-092609	NA	NA	NA	NA	NA	NA	1.27	70.4	0	0.4	0	0.1	NA	29.1	NA	25	71	29	NA
SDCR-10	2	3	09/26/2009	SDCR10-CC-092609	NA	NA	NA	NA	NA	NA	1.18	70.5	0	0.2	0	0.1	NA	29.1	NA	24	71	29	NA
SDCR-10	3	4	09/26/2009	SDCR10-CD-092609	NA	NA	NA	NA	NA	NA	1.22	80.1	0	0.5	0	0.2	NA	19.3	NA	30	65	35	NA
SDCR-10	4	5	09/26/2009	SDCR10-CE-092609	NA	NA	NA	NA	NA	NA	1.39	86	0	0	0	0.1	NA	14	NA	2.6 J	58	42	NA
SDCR-10	5	6	09/26/2009	SDCR10-CF-092609	NA	NA	NA	NA	NA	NA	1.34	86.1	0	0.2	0	0.4	NA	13.3	NA	0.35	58	42	NA
SDCR-11	0	1	09/26/2009	SDCR11-CA-092609	NA	NA	NA	NA	NA	NA	1.33	70.4	0	0.5	0	0.2	NA	28.9	NA	NA	NA	NA	NA
SDCR-11	1	2	09/26/2009	SDCR11-CB-092609	NA	NA	NA	NA	NA	NA	1.39	76.9	0	0.3	0	0	NA	22.8	NA	NA	NA	NA	NA
SDCR-11	1.5	2	09/26/2009	SDCR11-CC-092609	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.14	53	47	NA
SDCR-11	2	3	09/26/2009	SDCR11-CD-092609	NA	NA	NA	NA	NA	NA	1.55	30.7	0	1.6	0	0.1	NA	67.6	NA	0.13 J	40	60	NA
SDCR-11	3	4	09/26/2009	SDCR11-CE-092609	NA	NA	NA	NA	NA	NA	1.65	23.5	0	4.9	0	0	NA	71.6	NA	1.3	35	65	NA
SDCR-11	4	5	09/26/2009	SDCR11-CF-092609	NA	NA	NA	NA	NA	NA	1.61	25.2	0	4.5	0	0.1	NA	70.1	NA	0.066	37	63	NA
SDCR-12	0	1	09/25/2009	SDCR12-CA-092509	NA	NA	NA	NA	NA	NA	1.27	83.2	0	0.4	0	0.2	NA	16.2	NA	NA	NA	NA	NA
SDCR-12	1	2	09/25/2009	SDCR12-CB-092509	NA	NA	NA	NA	NA	NA	1.25	78.5	0.2	1.1	0	0.7	NA	19.5	NA	NA	NA	NA	NA
SDCR-12	1.5	2	09/25/2009	SDCR12-CC-092509	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.38	70	30	NA
SDCR-12	2	3	09/25/2009	SDCR12-CD-092509	NA	NA	NA	NA	NA	NA	1.19	69	0.5	5.2	0	4.7	NA	20.7	NA	0.68	69	31	NA
SDCR-12	3	4	09/25/2009	SDCR12-CE-092509	NA	NA	NA	NA	NA	NA	1.31	68.9	0	1.9	0	1.7	NA	27.5	NA	0.17	62	38	NA
SDCR-12	4	5	09/25/2009	SDCR12-CF-092509	NA	NA	NA	NA	NA	NA	1.28	62.3	0.5	1	0	0.5	NA	35.7	NA	0.094	64	36	NA
SDCR-12	5	6	09/25/2009	SDCR12-CG-092509	NA	NA	NA	NA	NA	NA	1.33	60.4	0	0.2	0	0.2	NA	39.2	NA	0.088	62	38	NA
SDCR-13	0	1	09/26/2009	SDCR13-CA-092609	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051	1.16	78.3	0.4	3.7	0	3.8	NA	13.8	NA	18	74	26	NA
SDCR-13	1	2	09/26/2009	SDCR13-CB-092609	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	1.21	81.8	0.3	0.9	0	0.8	NA	16.1	NA	0.3	68	32	NA
SDCR-13	2	3	09/26/2009	SDCR13-CC-092609	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	1.21	57.2	0.1	7.9	0	6.8	NA	28	NA	0.27	72	28	NA
SDCR-13	3	4	09/26/2009	SDCR13-CD-092609	<0.037	<0.037	<0.037	<0.037	<0.037	<0.037	1.30	65.7	0	5.8	0	4.2	NA	24.2	NA	0.17	64	36	NA
SDCR-13	4	5	09/26/2009	SDCR13-CE-092609	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	1.34	59	0.2	0.5	0	0.2	NA	40.1	NA	0.092	60	40	NA

Notes:

DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethylene
DDT - dichlorodiphenyltrichloroethane
ft - feet
g/cm^3 - gram per cubic centimeter
J - estimated; based on QC data
JQ - estimated; constituent was detected between the reporting limit and the method detection limit
mg/kg - milligrams per kilogram
mg/L - milligrams per liter
NA - not analyzed
SPLP - synthetic precipitation leaching procedure
% - percent
< - less than the reporting limit

PREPARED BY/DATE: RMR 4/7/2011
CHECKED BY/DATE: KPH 4/7/2011

TABLE H-7

SEDIMENT CORE ANALYTICAL RESULTS - AGING
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	Beginning Depth (cm)	Ending Depth (cm)	Sample Date	Sample ID:	Cs^{137} dpm/g	Pb^{210} dpm/g
SDCR-2	0	2.6	09/28/2009	SDCR2-092809-0-2.6	NA	1.35
SDCR-2	5.2	7.8	09/28/2009	SDCR2-092809-5.2-7.8	NA	1.25
SDCR-2	10.4	13.1	09/28/2009	SDCR2-092809-10.4-13.1	NA	1.08
SDCR-2	15.7	18.3	09/28/2009	SDCR2-092809-15.7-18.3	NA	0.814
SDCR-2	20.9	23.5	09/28/2009	SDCR2-092809-20.9-23.5	NA	1.04
SDCR-2	26.1	28.7	09/28/2009	SDCR2-092809-26.1-28.7	NA	0.837
SDCR-2	31.3	33.9	09/28/2009	SDCR2-092809-31.3-33.9	NA	0.543
SDCR-2	36.5	39.2	09/28/2009	SDCR2-092809-36.5-39.2	NA	0.431
SDCR-2	39.2	41.8	09/28/2009	SDCR2-092809-39.2-41.8	NA	0.418
SDCR-2	44.4	47	09/28/2009	SDCR2-092809-44.4-47	NA	0.453
SDCR-2	49.6	52.2	09/28/2009	SDCR2-092809-49.6-52.2	NA	0.665
SDCR-2	54.8	57.4	09/28/2009	SDCR2-092809-54.8-57.4	NA	0.741
SDCR-2	60	62.6	09/28/2009	SDCR2-092809-60-62.6	NA	0.846
SDCR-2	65.3	71.7	09/28/2009	SDCR2-092809-65.3-71.7	NA	1.84
SDCR-2	71.7	78.2	09/28/2009	SDCR2-092809-71.7-78.2	NA	1.85
SDCR-2	78.2	84.6	09/28/2009	SDCR2-092809-78.2-84.6	NA	1.37
SDCR-2	84.6	91.1	09/28/2009	SDCR2-092809-84.6-91.1	NA	1.23
SDCR-2	91.1	97.5	09/28/2009	SDCR2-092809-91.1-97.5	NA	2.01
SDCR-2	97.5	104	09/28/2009	SDCR2-092809-97.5-104	NA	2.88
SDCR-2	104	110.4	09/28/2009	SDCR2-092809-104-110.4	NA	2.71
SDCR-2	110.4	116.9	09/28/2009	SDCR2-092809-110.4-116.9	NA	2.95
SDCR-2	116.9	123.3	09/28/2009	SDCR2-092809-116.9-123.3	NA	2.67
SDCR-2	123.3	129.8	09/28/2009	SDCR2-092809-123.3-129.8	NA	3.28
SDCR-2	129.8	136.2	09/28/2009	SDCR2-092809-129.8-136.2	NA	3.43
SDCR-2	136.2	142.7	09/28/2009	SDCR2-092809-136.2-142.7	NA	3.38
SDCR-2	142.7	149.1	09/28/2009	SDCR2-092809-142.7-149.1	NA	2.87
SDCR-2	149.1	155.6	09/28/2009	SDCR2-092809-149.1-155.6	NA	2.88
SDCR-2	155.6	168.4	09/28/2009	SDCR2-092809-155.6-168.4	NA	2.85
SDCR-2	168.4	181.3	09/28/2009	SDCR2-092809-168.4-181.3	NA	2.53
SDCR-2	181.3	194.1	09/28/2009	SDCR2-092809-181.3-194.1	NA	2.74
SDCR-2	194.1	207	09/28/2009	SDCR2-092809-194.1-207	NA	3.01
SDCR-2	207	219.8	09/28/2009	SDCR2-092809-207-219.8	NA	2.98
SDCR-2	219.8	232.7	09/28/2009	SDCR2-092809-219.8-232.7	NA	4.1
SDCR-2	232.7	245.5	09/28/2009	SDCR2-092809-232.7-245.5	NA	3.34
SDCR-2	245.5	258.4	09/28/2009	SDCR2-092809-245.5-258.4	NA	3.69
SDCR-2	258.4	271.2	09/28/2009	SDCR2-092809-258.4-271.2	NA	3.69
SDCR-2	271.2	284.1	09/28/2009	SDCR2-092809-271.2-284.1	NA	3.54
SDCR-2	284.1	296.9	09/28/2009	SDCR2-092809-284.1-296.9	NA	3.42

TABLE H-7

SEDIMENT CORE ANALYTICAL RESULTS - AGING
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	Beginning Depth (cm)	Ending Depth (cm)	Sample Date	Sample ID:	Cs^{137} dpm/g	Pb^{210} dpm/g
SDCR-8	0	2.2	09/28/2009	SDCR8-092809-0-2.2	NA	5.51
SDCR-8	4.5	6.7	09/28/2009	SDCR8-092809-4.5-6.7	NA	5.18
SDCR-8	8.9	11.2	09/28/2009	SDCR8-092809-8.9-11.2	NA	5.87
SDCR-8	13.4	15.6	09/28/2009	SDCR8-092809-13.4-15.6	NA	5.23
SDCR-8	17.8	20.1	09/28/2009	SDCR8-092809-17.8-20.1	NA	5.48
SDCR-8	22.3	24.5	09/28/2009	SDCR8-092809-22.3-24.5	NA	5.83
SDCR-8	26.8	29	09/28/2009	SDCR8-092809-26.8-29	NA	6.13
SDCR-8	31.2	33.5	09/28/2009	SDCR8-092809-31.2-33.5	NA	5.57
SDCR-8	35.7	37.9	09/28/2009	SDCR8-092809-35.7-37.9	NA	6.06
SDCR-8	40.1	42.4	09/28/2009	SDCR8-092809-40.1-42.4	NA	5.56
SDCR-8	44.6	46.8	09/28/2009	SDCR8-092809-44.6-46.8	NA	5.89
SDCR-8	49.1	51.3	09/28/2009	SDCR8-092809-469.1-51.3	NA	5.13
SDCR-8	55.8	61.7	09/28/2009	SDCR8-092809-55.8-61.7	NA	5.19
SDCR-8	61.7	67.7	09/28/2009	SDCR8-092809-61.7-67.7	NA	5.48
SDCR-8	67.7	73.7	09/28/2009	SDCR8-092809-67.7-73.7	NA	5.92
SDCR-8	73.7	79.7	09/28/2009	SDCR8-092809-73.7-79.7	NA	5.23
SDCR-8	79.7	85.7	09/28/2009	SDCR8-092809-79.7-85.7	NA	5.52
SDCR-8	85.7	91.6	09/28/2009	SDCR8-092809-85.7-91.6	0.636	5.04
SDCR-8	91.6	97.6	09/28/2009	SDCR8-092809-91.6-97.6	0.643	5.01
SDCR-8	97.6	103.6	09/28/2009	SDCR8-092809-97.6-103.6	0.629	5.47
SDCR-8	103.6	109.6	09/28/2009	SDCR8-092809-103.6-109.6	0.695	4.56
SDCR-8	109.6	115.6	09/28/2009	SDCR8-092809-109.6-115.6	0.652	4.57
SDCR-8	115.6	121.5	09/28/2009	SDCR8-092809-115.6-121.5	0.983	3.37
SDCR-8	121.5	127.5	09/28/2009	SDCR8-092809-121.5-127.5	0.832	3.46
SDCR-8	127.5	133.5	09/28/2009	SDCR8-092809-127.5-133.5	1.04	3.39
SDCR-8	133.5	139.5	09/28/2009	SDCR8-092809-133.5-139.5	1.08	3.15
SDCR-8	139.5	151.7	09/28/2009	SDCR8-092809-139.5-151.7	1.55	2.96
SDCR-8	151.7	163.9	09/28/2009	SDCR8-092809-151.7-163.9	1.78	3.08
SDCR-8	163.9	176.2	09/28/2009	SDCR8-092809-163.9-176.2	1.4	2.17
SDCR-8	176.2	188.4	09/28/2009	SDCR8-092809-176.2-188.4	0.528	1.29
SDCR-8	188.4	200.6	09/28/2009	SDCR8-092809-188.4-200.6	0.486	1.33
SDCR-8	200.6	212.9	09/28/2009	SDCR8-092809-200.6-212.9	NA	1.15
SDCR-8	212.9	225.1	09/28/2009	SDCR8-092809-212.9-225.1	NA	1.07
SDCR-8	225.1	237.3	09/28/2009	SDCR8-092809-225.1-237.3	NA	1.41
SDCR-8	237.3	249.5	09/28/2009	SDCR8-092809-237.3-249.5	NA	1.35
SDCR-8	249.5	261.8	09/28/2009	SDCR8-092809-249.5-261.8	NA	1.55
SDCR-8	261.8	274	09/28/2009	SDCR8-092809-261.8-274	NA	1.47
SDCR-8	274	286.2	09/28/2009	SDCR8-092809-274-286.2	NA	1.44
SDCR-8	286.2	298.5	09/28/2009	SDCR8-092809-286.2-298.5	NA	1.35

TABLE H-7

SEDIMENT CORE ANALYTICAL RESULTS - AGING
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	Beginning Depth (cm)	Ending Depth (cm)	Sample Date	Sample ID:	Cs^{137} dpm/g	Pb^{210} dpm/g
SDCR-9	0	2.4	09/28/2009	SDCR9-092809-0-2.4	NA	7.13
SDCR-9	4.8	7.2	09/28/2009	SDCR9-092809-4.8-7.2	NA	5.53
SDCR-9	9.6	12.1	09/28/2009	SDCR9-092809-9.6-12.1	NA	7.7
SDCR-9	14.5	16.9	09/28/2009	SDCR9-092809-14.5-16.9	NA	6.59
SDCR-9	19.3	21.7	09/28/2009	SDCR9-092809-19.3-21.7	NA	7.12
SDCR-9	24.1	26.5	09/28/2009	SDCR9-092809-24.1-26.5	NA	5.96
SDCR-9	28.9	31.3	09/28/2009	SDCR9-092809-28.9-31.3	NA	7.25
SDCR-9	33.7	36.2	09/28/2009	SDCR9-092809-33.7-36.2	NA	6.04
SDCR-9	38.6	41	09/28/2009	SDCR9-092809-38.6-41.0	NA	5.57
SDCR-9	43.4	45.8	09/28/2009	SDCR9-092809-43.4-45.8	NA	4.31
SDCR-9	48.2	50.6	09/28/2009	SDCR9-092809-48.2-50.6	NA	4.52
SDCR-9	53	55.4	09/28/2009	SDCR9-092809-53-55.4	NA	3.72
SDCR-9	55.4	57.8	09/28/2009	SDCR9-092809-55.4-57.8	NA	3.91
SDCR-9	57.8	60.3	09/28/2009	SDCR9-092809-57.8-60.3	NA	4.82
SDCR-9	60.3	66	09/28/2009	SDCR9-092809-60.3-66.0	NA	5.01
SDCR-9	66	71.8	09/28/2009	SDCR9-092809-66.0-71.8	NA	4.59
SDCR-9	71.8	77.6	09/28/2009	SDCR9-092809-71.8-77.6	NA	4.39
SDCR-9	77.6	83.3	09/28/2009	SDCR9-092809-77.6-83.3	<0.193	4.74
SDCR-9	83.3	89.1	09/28/2009	SDCR9-092809-83.3-89.1	0.147	4.98
SDCR-9	89.1	94.9	09/28/2009	SDCR9-092809-89.1-94.9	0.166	4.28
SDCR-9	94.9	100.6	09/28/2009	SDCR9-092809-94.9-100.6	<0.157	4.67
SDCR-9	100.6	106.4	09/28/2009	SDCR9-092809-100.6-106.4	0.17	4.58
SDCR-9	106.4	112.2	09/28/2009	SDCR9-092809-106.4-112.2	<0.105	4.62
SDCR-9	112.2	118	09/28/2009	SDCR9-092809-112.2-118	<0.164	3.67
SDCR-9	118	123.7	09/28/2009	SDCR9-092809-118-123.7	0.168	5.22
SDCR-9	123.7	129.5	09/28/2009	SDCR9-092809-123.7-129.5	NA	3.82
SDCR-9	129.5	135.3	09/28/2009	SDCR9-092809-129.5-135.3	NA	4.44
SDCR-9	135.3	141	09/28/2009	SDCR9-092809-135.3-141	NA	3.44
SDCR-9	141	152.4	09/28/2009	SDCR9-092809-141-152.4	0.088	4.93
SDCR-9	152.4	163.8	09/28/2009	SDCR9-092809-152.4-163.8	<0.0862	4.78
SDCR-9	163.8	175.1	09/28/2009	SDCR9-092809-163.8-175.1	NA	3.7
SDCR-9	175.1	186.5	09/28/2009	SDCR9-092809-175.1-186.5	NA	3.83
SDCR-9	186.5	198.1	09/28/2009	SDCR9-092809-186.5-198.1	NA	3.55

Notes:

cm - centimeter

dpm/g - disintegration per minute per gram

NA - not analyzed

< - less than the reporting limit

PREPARED BY/DATE: RMR 4/5/2010
CHECKED BY/DATE: AES 4/5/2010

TABLE H-8
2010 FLOODPLAIN SOIL ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	FPSB-1	FPSB-1	FPSB-1	FPSB-1	FPSB-2	FPSB-2	FPSB-2	FPSB-2	FPSB-3/4	FPSB-3	FPSB-3	FPSB-3	FPSB-3	FPSB-4	FPSB-4
Sample ID:	OU2B-FPSB1-10-0-1	OU2B-FPSB1-10-1-2	OU2B-FPSB1-10-2-6	OU2B-FPSB1-10-6-12	OU2B-FPSB2-10-0-1	OU2B-FPSB2-10-1-2	OU2B-FPSB2-10-2-6	OU2B-FPSB2-10-6-12	OU2B-FPSB3/4-10-0-12	OU2B-FPSB3-10-0-1	OU2B-FPSB3-10-1-2	OU2B-FPSB3-10-2-6	OU2B-FPSB3-10-6-12	OU2B-FPSB4-10-0-1	OU2B-FPSB4-10-1-2
Sample Date:	7/11/2010	7/11/2010	7/11/2010	7/11/2010	7/11/2010	7/11/2010	7/11/2010	7/11/2010	7/10/2010	7/10/2010	7/10/2010	7/10/2010	7/10/2010	7/10/2010	7/10/2010
Sample Depth (in.):	0-1	1-2	2-6	6-12	0-1	1-2	2-6	6-12	0-12	0-1	1-2	2-6	6-12	0-1	1-2
Sample Type:	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Grain Size - ASTM D422, %															
Grain Size - Gravel	NA	NA	NA	NA	NA	NA	NA	NA	1.3	NA	NA	NA	NA	NA	NA
Grain Size - Sand	NA	NA	NA	NA	NA	NA	NA	NA	3.3	NA	NA	NA	NA	NA	NA
Grain Size - Silt, Clay, Colloids	NA	NA	NA	NA	NA	NA	NA	NA	95.4	NA	NA	NA	NA	NA	NA
Hydrometer 0.0015 mm	NA	NA	NA	NA	NA	NA	NA	NA	50	NA	NA	NA	NA	NA	NA
Hydrometer 0.005 mm	NA	NA	NA	NA	NA	NA	NA	NA	66	NA	NA	NA	NA	NA	NA
Hydrometer 0.03 mm	NA	NA	NA	NA	NA	NA	NA	NA	94	NA	NA	NA	NA	NA	NA
Sieve, 0.075 mm	NA	NA	NA	NA	NA	NA	NA	NA	95.4	NA	NA	NA	NA	NA	NA
Sieve, 0.15 mm	NA	NA	NA	NA	NA	NA	NA	NA	95.7	NA	NA	NA	NA	NA	NA
Sieve, 0.3 mm	NA	NA	NA	NA	NA	NA	NA	NA	95.9	NA	NA	NA	NA	NA	NA
Sieve, 0.375 in	NA	NA	NA	NA	NA	NA	NA	NA	98.7	NA	NA	NA	NA	NA	NA
Sieve, 0.6 mm	NA	NA	NA	NA	NA	NA	NA	NA	96.3	NA	NA	NA	NA	NA	NA
Sieve, 0.75 in	NA	NA	NA	NA	NA	NA	NA	NA	96.9	NA	NA	NA	NA	NA	NA
Sieve, 1.18 mm	NA	NA	NA	NA	NA	NA	NA	NA	96.8	NA	NA	NA	NA	NA	NA
Sieve, 1.5 in	NA	NA	NA	NA	NA	NA	NA	NA	100	NA	NA	NA	NA	NA	NA
Sieve, 2 mm	NA	NA	NA	NA	NA	NA	NA	NA	97.9	NA	NA	NA	NA	NA	NA
Sieve, 2.36 mm	NA	NA	NA	NA	NA	NA	NA	NA	98.2	NA	NA	NA	NA	NA	NA
Sieve, 3 in	NA	NA	NA	NA	NA	NA	NA	NA	100	NA	NA	NA	NA	NA	NA
Sieve, 4.75 mm	NA	NA	NA	NA	NA	NA	NA	NA	98.7	NA	NA	NA	NA	NA	NA
Mercury, SW846 7471, mg/Kg															
Mercury	0.31	0.43	0.78	0.12	0.38	0.35	0.37	0.36	NA	0.20 J	0.14	0.22	0.93	0.061	0.11
Methylmercury, EPA 1630, mg/Kg															
Methylmercury	0.00298	0.0018	NA	NA	0.00479	0.00221	NA	NA	NA	0.00257	0.00166	NA	NA	0.000367	0.000767
Methylmercury Percentage of Total Mercury, %	0.961%	0.419%	NA	NA	1.26%	0.631%	NA	NA	NA	1.29%	1.19%	NA	NA	0.602%	0.697%
Percent Solids - SM2540G, %															
Percent Solids	62.2	63.0	75.3	76.2	65.8	71.2	66.3	67.8	NA	62.0	48.0	64.4	65.1	65.8	62.6
Pesticides - SW846 8081, mg/Kg															
2,4'-DDD	0.0907 J	NA	NA	NA	0.0067	NA	NA	NA	NA	0.004	NA	NA	NA	< 0.00088 UJ	NA
2,4'-DDE	0.312 J	NA	NA	NA	0.0068	NA	NA	NA	NA	0.0042	NA	NA	NA	< 0.00088 UJ	NA
2,4'-DDT	0.0924 J	NA	NA	NA	0.0019	NA	NA	NA	NA	0.0017 J	NA	NA	NA	< 0.00088 UJ	NA
4,4'-DDD	0.184 J	NA	NA	NA	0.0250 J	NA	NA	NA	NA	0.0102 J	NA	NA	NA	0.0013 J	NA
4,4'-DDE	1.240 J	NA	NA	NA	0.0260 J	NA	NA	NA	NA	0.0166 J	NA	NA	NA	0.0011 J	NA
4,4'-DDT	0.290 J	NA	NA	NA	0.0207 J	NA	NA	NA	NA	0.0118 J	NA	NA	NA	0.0074 J	NA
DDTr[1]	1.714 J	NA	NA	NA	0.072 J	NA	NA	NA	NA	0.039 J	NA	NA	NA	0.0098 J	NA
DDTr[2]	1.71 J	NA	NA	NA	0.072 J	NA	NA	NA	NA	0.039 J	NA	NA	NA	0.0098 J	NA
DDTR[1]	2.21 J	NA	NA	NA	0.87 J	NA	NA	NA	NA	0.049 J	NA	NA	NA	0.0098 J	NA
DDTR[2]	2.21 J	NA	NA	NA	0.87 J	NA	NA	NA	NA	0.049 J	NA	NA	NA	0.011 J	NA
Hexachlorobenzene	0.0124 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0012 J	NA
Total Organic Carbon (TOC)- SW846 9060, mg/Kg															
Total Organic Carbon (TOC)	60100	34200	16600	9870	53300	33400	23300	14100	NA	41300	26300	20800	13100	17000	24600

Notes:
ASTM = American Society for Testing and Materials
DDTr = 4,4'-DDD, -DDE, and -DDT
DDTR = 2,4'- and 4,4'-DDD, -DDE, -DDT
SM = Standard Methods
SW846 = *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
mg/Kg = milligrams per kilogram dry weight
[1]When calculating DDTr and DDTR, a value of zero was used for results below the Method Detection Limit (MDL) and/or the Reporting Limit (RL).
[2]When calculating DDTr and DDTR, a value of half the detection limit was used for results below the method detection limit and/or the reporting limit.

Data Flag Definitions:
J = Estimated concentration based on qc data
JB = Estimated concentration due to blank contamination
JQ = Estimated concentration, result reported is between the Method Detection Limit (MDL) and the Reporting Limit (RL)
UJ = The analyte was not detected; however, the result is estimated due to not meeting certain analyte-specific quality control criteria
NA = Not Analyzed
< = Result is less than the Reporting Limit

TABLE H-8
2010 FLOODPLAIN SOIL ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	FPSB-4	FPSB-4	FPSB-5/6	FPSB-5	FPSB-5	FPSB-5	FPSB-5	FPSB-6	FPSB-6	FPSB-6	FPSB-6	FPSS-1	FPSS-2	FPSS-3	FPSS-4
Sample ID:	OU2B-FPSB4-10-2-6	OU2B-FPSB4-10-6-12	OU2B-FPSB5/6-10-0-12	OU2B-FPSB5-10-0-1	OU2B-FPSB5-10-1-2	OU2B-FPSB5-10-2-6	OU2B-FPSB5-10-6-12	OU2B-FPSB6-10-0-1	OU2B-FPSB6-10-1-2	OU2B-FPSB6-10-2-6	OU2B-FPSB6-10-6-12	OU2B-FPSS1-10	OU2B-FPSS2-10	OU2B-FPSS3-10	OU2B-FPSS4-10
Sample Date:	7/10/2010	7/10/2010	7/10/2010	7/9/2010	7/9/2010	7/9/2010	7/9/2010	7/10/2010	7/10/2010	7/10/2010	7/10/2010	7/9/2010	7/11/2010	7/11/2010	7/9/2010
Sample Depth (in.):	2-6	6-12	0-12	0-1	1-2	2-6	6-12	0-1	1-2	2-6	6-12	0-1	0-1	0-1	0-1
Sample Type:	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Grain Size - ASTM D422, %															
Grain Size - Gravel	NA	NA	0.060	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Grain Size - Sand	NA	NA	11.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Grain Size - Silt, Clay, Colloids	NA	NA	88.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydrometer 0.0015 mm	NA	NA	43	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydrometer 0.005 mm	NA	NA	56	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydrometer 0.03 mm	NA	NA	82	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve, 0.075 mm	NA	NA	88.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve, 0.15 mm	NA	NA	95.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve, 0.3 mm	NA	NA	97.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve, 0.375 in	NA	NA	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve, 0.6 mm	NA	NA	97.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve, 0.75 in	NA	NA	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve, 1.18 mm	NA	NA	98.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve, 1.5 in	NA	NA	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve, 2 mm	NA	NA	99.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve, 2.36 mm	NA	NA	99.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve, 3 in	NA	NA	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sieve, 4.75 mm	NA	NA	99.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, SW846 7471, mg/Kg															
Mercury	0.14	0.082	NA	2.4	2.1	2.8	3.6	0.36	0.14	0.19 J	0.17	0.69	8.9	1.6	0.2
Methylmercury, EPA 1630, mg/Kg															
Methylmercury	NA	NA	NA	0.00703	0.00822	NA	NA	0.000442	0.000176 JB	NA	NA	NA	NA	NA	NA
Methylmercury Percentage of Total Mercury, %	NA	NA	NA	0.293%	0.391%	NA	NA	0.123%	0.126%	NA	NA	NA	NA	NA	NA
Percent Solids - SM2540G, %															
Percent Solids	62.7	69.0	NA	50.9	58.7	71.1	66.4	58.1	66.7	66.0	78.3	73.9	68.8	15.1	46.3
Pesticides - SW846 8081, mg/Kg															
2,4'-DDD	NA	NA	NA	NA	NA	NA	NA	< 0.0010 UJ	NA	NA	NA	0.277	NA	0.0716	0.0062
2,4'-DDE	NA	NA	NA	NA	NA	NA	NA	< 0.0010 UJ	NA	NA	NA	0.606	NA	0.0541	0.0046
2,4'-DDT	NA	NA	NA	NA	NA	NA	NA	< 0.0010 UJ	NA	NA	NA	0.0792	NA	< 0.0066	< 0.0013
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	< 0.0020 UJ	NA	NA	NA	0.248	NA	0.104 J	0.0196
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	< 0.0020 UJ	NA	NA	NA	0.913	NA	0.0989 J	0.0103
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	< 0.0020 UJ	NA	NA	NA	0.107	NA	< 0.0066	0.0526 J
DDTr[1]	NA	NA	NA	NA	NA	NA	NA	<0.0020 UJ	NA	NA	NA	1.27	NA	0.20 J	0.083 J
DDTr[2]	NA	NA	NA	NA	NA	NA	NA	0.0030 J	NA	NA	NA	1.27	NA	0.21 J	0.083 J
DDTR[1]	NA	NA	NA	NA	NA	NA	NA	<0.0020 UJ	NA	NA	NA	2.23	NA	0.33 J	0.093 J
DDTR[2]	NA	NA	NA	NA	NA	NA	NA	0.0045 J	NA	NA	NA	2.23	NA	0.34 J	0.094 J
Hexachlorobenzene	NA	NA	NA	3.5	NA	NA	NA	< 0.0010 UJ	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (TOC)- SW846 9060, mg/Kg															
Total Organic Carbon (TOC)	25500	11400	NA	31800	32600	9290	15700	21700	13100	19500	4200	49600	24200	298000	50500

Notes:
ASTM = American Society for Testing and Materials
DDTr = 4,4'-DDD, -DDE, and -DDT
DDTR = 2,4'- and 4,4'-DDD, -DDE, -DDT
SM = Standard Methods
SW846 = *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
mg/Kg = milligrams per kilogram dry weight
[1]When calculating DDTr and DDTR, a value of zero was used for results below the Method Detection Limit (MDL) and/or the Reporting Limit (RL).
[2]When calculating DDTr and DDTR, a value of half the detection limit was used for results below the method detection limit and/or the reporting limit.

Data Flag Definitions:
J = Estimated concentration based on qc data
JB = Estimated concentration due to blank contamination
JQ = Estimated concentration, result reported is between the Method Detection Limit (MDL) and the Reporting Limit (RL)
UJ = The analyte was not detected; however, the result is estimated due to not meeting certain analyte-specific quality control criteria
NA = Not Analyzed
< = Result is less than the Reporting Limit

TABLE H-8
2010 FLOODPLAIN SOIL ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	FPSS-5	FPSS-6	FPSS-7	FPSS-8	FPSS-9	FPSS-10	FPSS-11	FPSS-12	FPSS-13/14	FPSS-13	FPSS-14	FPSS-15
Sample ID:	OU2B-FPSS5-10	OU2B-FPSS6-10	OU2B-FPSS7-10	OU2B-FPSS8-10	OU2B-FPSS9-10	OU2B-FPSS10-10	OU2B-FPSS11-10	OU2B-FPSS12-10	OU2B-FPSS13/14-10	OU2B-FPSS13-10	OU2B-FPSS14-10	OU2B-FPSS15-10
Sample Date:	7/11/2010	7/9/2010	7/9/2010	7/9/2010	7/11/2010	7/9/2010	7/9/2010	7/12/2010	7/8/2010	7/8/2010	7/8/2010	7/12/2010
Sample Depth (in.):	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
Sample Type:	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Grain Size - ASTM D422, %												
Grain Size - Gravel	NA	NA	NA	NA	NA	NA	NA	NA	2.5	NA	NA	NA
Grain Size - Sand	NA	NA	NA	NA	NA	NA	NA	NA	24.7	NA	NA	NA
Grain Size - Silt, Clay, Colloids	NA	NA	NA	NA	NA	NA	NA	NA	72.8	NA	NA	NA
Hydrometer 0.0015 mm	NA	NA	NA	NA	NA	NA	NA	NA	35	NA	NA	NA
Hydrometer 0.005 mm	NA	NA	NA	NA	NA	NA	NA	NA	49	NA	NA	NA
Hydrometer 0.03 mm	NA	NA	NA	NA	NA	NA	NA	NA	66	NA	NA	NA
Sieve, 0.075 mm	NA	NA	NA	NA	NA	NA	NA	NA	72.8	NA	NA	NA
Sieve, 0.15 mm	NA	NA	NA	NA	NA	NA	NA	NA	76.6	NA	NA	NA
Sieve, 0.3 mm	NA	NA	NA	NA	NA	NA	NA	NA	79.1	NA	NA	NA
Sieve, 0.375 in	NA	NA	NA	NA	NA	NA	NA	NA	100	NA	NA	NA
Sieve, 0.6 mm	NA	NA	NA	NA	NA	NA	NA	NA	80.3	NA	NA	NA
Sieve, 0.75 in	NA	NA	NA	NA	NA	NA	NA	NA	100	NA	NA	NA
Sieve, 1.18 mm	NA	NA	NA	NA	NA	NA	NA	NA	80.9	NA	NA	NA
Sieve, 1.5 in	NA	NA	NA	NA	NA	NA	NA	NA	100	NA	NA	NA
Sieve, 2 mm	NA	NA	NA	NA	NA	NA	NA	NA	82.6	NA	NA	NA
Sieve, 2.36 mm	NA	NA	NA	NA	NA	NA	NA	NA	86.0	NA	NA	NA
Sieve, 3 in	NA	NA	NA	NA	NA	NA	NA	NA	100	NA	NA	NA
Sieve, 4.75 mm	NA	NA	NA	NA	NA	NA	NA	NA	97.5	NA	NA	NA
Mercury, SW846 7471, mg/Kg												
Mercury	0.47	0.16	1.1 J	0.15	0.84	0.13	1.0 J	0.42	NA	1.6	1.7	2.5
Methylmercury, EPA 1630, mg/Kg												
Methylmercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylmercury Percentage of Total Mercury, %	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Percent Solids - SM2540G, %												
Percent Solids	54.2	56.4	57.4	55.6	28.7	55.0	67.5	76.9	NA	54.9	69.3	26.9
Pesticides - SW846 8081, mg/Kg												
2,4'-DDD	NA	0.0096	0.0052	0.0363	< 0.0020	0.0010 JQ	0.0049	0.00068 JQ	NA	NA	NA	NA
2,4'-DDE	NA	0.0083	0.007	0.0311	0.0034	< 0.0011	0.0077	0.00085	NA	NA	NA	NA
2,4'-DDT	NA	0.0115	0.0042	0.0057	< 0.0020	< 0.0011	< 0.00087	< 0.00076	NA	NA	NA	NA
4,4'-DDD	NA	0.0297	0.0143	0.0835	0.0031 J	< 0.0011	0.0078	0.0013 J	NA	NA	NA	NA
4,4'-DDE	NA	0.0186	0.019	0.074	0.0066 J	< 0.0011	0.0146	0.00095 J	NA	NA	NA	NA
4,4'-DDT	NA	0.138	0.0056	0.0641	< 0.0020	< 0.0011	< 0.00087	0.0018 J	NA	NA	NA	NA
DDTr[1]	NA	0.19	0.039	0.22	0.0097 J	< 0.0011	0.0224	0.0041 J	NA	NA	NA	NA
DDTr[2]	NA	0.19	0.039	0.22	0.011 J	< 0.0011	0.023	0.0041 J	NA	NA	NA	NA
DDTR[1]	NA	0.22	0.055	0.30	0.013 J	0.0010 JQ	0.035	0.0056 J, JQ	NA	NA	NA	NA
DDTR[2]	NA	0.22	0.055	0.30	0.016 J	0.0038 JQ	0.036	0.0060 J, JQ	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	0.0011	0.0057	< 0.00076	NA	NA	0.275 J	0.135
Total Organic Carbon (TOC)- SW846 9060, mg/Kg												
Total Organic Carbon (TOC)	61700	59600	42900	56400	33700	22100	31100 J	15900	NA	37300 J	42400	37500

Notes:
ASTM = American Society for Testing and Materials
DDTr = 4,4'-DDD, -DDE, and -DDT
DDTR = 2,4'- and 4,4'-DDD, -DDE, -DDT
SM = Standard Methods
SW846 = *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
mg/Kg = milligrams per kilogram dry weight
[1]When calculating DDTr and DDTR, a value of zero was used for results below the Method Detection Limit (MDL) and/or the Reporting Limit (RL).
[2]When calculating DDTr and DDTR, a value of half the detection limit was used for results below the method detection limit and/or the reporting limit.

Prepared By: KPH 03/14/11
Checked By: RRP 3/15/11

Data Flag Definitions:
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JB = Estimated concentration due to blank contamination
JQ = Estimated concentration, result reported is between the Method Detection Limit (MDL) and the Reporting Limit (RL)
UJ = The analyte was not detected; however, the result is estimated due to not meeting certain analyte-specific quality control criteria
NA = Not Analyzed
< = Result is less than the Reporting Limit

TABLE H-9
2010 VEGETATION ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	FPV-SB1	FPV-SB3	FPV-SB4	FPV-SB5	FPV-SS1	FPV-SS1
Sample ID:	OU2B-FPVSB1-10	OU2B-FPVSB3-10	OU2B-FPVSB4-10	OU2B-FPVSB5-10	OU2B-FPVSS1-10	OU2B-FPVSSDUP01-10
Sample Date:	7/7/2010	7/8/2010	7/8/2010	7/7/2010	7/7/2010	7/7/2010
Sample Type:	Normal	Normal	Normal	Normal	Normal	Duplicate
Mercury, EPA 245.6, mg/Kg						
Mercury	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
Methylmercury, EPA 1630, mg/Kg						
Methylmercury	0.000829 JQ	0.000704 JQ	0.000656 JQ	0.0147	0.00139 J	0.000643 JQ
Percent Lipids, %						
Percent Lipids	0.24	0.32	0.15	0.19	0.40	0.40
Pesticides - SW846 8081, mg/Kg						
2,4'-DDD	NA	< .0025	< 0.0025	NA	0.0011 JQ	< 0.0025
2,4'-DDE	NA	0.00082 JQ	< 0.0025	NA	< 0.0025	< 0.0025
2,4'-DDT	NA	< 0.0025	< 0.0025	NA	0.0034 J	< 0.0025 UJ
4,4'-DDD	NA	< 0.0050	< 0.0050	NA	< 0.0050	< 0.0050
4,4'-DDE	NA	< 0.0050	< 0.0050	NA	< 0.0050	< 0.0050
4,4'-DDT	NA	< 0.0050	<0.0050	NA	< 0.0050	< 0.0050
DDTr	NA	0.00082	<0.0050	NA	<0.0050	<0.0050
DDTR	NA	0.00082	<0.0050	NA	0.0045	<0.0050
Hexachlorobenzene	< .0025	NA	NA	< 0.0025	NA	NA

Notes:
DDTr = 4,4'-DDD, -DDE, and -DDT
DDTR = 2,4'- and 4,4'-DDD, -DDE, -DDT
SW846 = *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
mg/Kg = milligrams per kilogram dry weight
When calculating DDTr and DDTR, a value of zero was used for results below the Method Detection Limit (MDL) and/or the Reporting Limit (RL).

Data Flag Definitions:
J = Estimated concentration based on qc data
JQ = Estimated concentration, result reported is between the Method Detection Limit (MDL) and the Reporting Limit (RL)
UJ = The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria
NA = Not Analyzed
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TABLE H-9
2010 VEGETATION ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	FPV-SS4	FPV-SS10	FPV-SS11	FPV-SS11	FPV-SS12	FPV-SS14
Sample ID:	OU2B-FPVSS4-10	OU2B-FPVSS10-10	OU2B-FPVSS11-10	OU2B-FPVSSDUP02-10	OU2B-FPVSS12-10	OU2B-FPVSS14-10
Sample Date:	7/7/2010	7/8/2010	7/7/2010	7/7/2010	7/7/2010	7/7/2010
Sample Type:	Normal	Normal	Normal	Duplicate	Normal	Normal
Mercury, EPA 245.6, mg/Kg						
Mercury	< 0.017	< 0.017	< 0.017	NA	< 0.017	< 0.017
Methylmercury, EPA 1630, mg/Kg						
Methylmercury	0.000903 JQ	0.000927 JQ	0.00112	0.000748 JQ	0.000751 JQ	0.00226
Percent Lipids, %						
Percent Lipids	0.13	0.38 J	0.13	0.20	0.20	0.18
Pesticides - SW846 8081, mg/Kg						
2,4'-DDD	< 0.0025	NA	NA	NA	NA	NA
2,4'-DDE	< 0.0025	NA	NA	NA	NA	NA
2,4'-DDT	< 0.0025	NA	NA	NA	NA	NA
4,4'-DDD	0.0049 JQ	NA	NA	NA	NA	NA
4,4'-DDE	< 0.0050	NA	NA	NA	NA	NA
4,4'-DDT	< 0.0050	NA	NA	NA	NA	NA
DDTr	0.0049	NA	NA	NA	NA	NA
DDTR	0.0049	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	< 0.0025	< 0.0025	< 0.0025 UJ	0.00060 JQ	0.0048 J

Notes:
DDTr = 4,4'-DDD, -DDE, and -DDT
DDTR = 2,4'- and 4,4'-DDD, -DDE, -DDT
SW846 = *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
mg/Kg = milligrams per kilogram dry weight
When calculating DDTr and DDTR, a value of zero was used for results below the Method Detection Limit (MDL) and/or the Reporting Limit (RL).

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TABLE H-10
2010 SPIDER AND INSECT ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	INS-1B	INS-2C	INS-3B	INS-4B	INS-4C	INS-5B	INS-5C
Sample ID:	OU2B-INS1B-10	OU2B-INS2C-10	OU2B-INS3B-10	OU2B-INS4B-10	OU2B-INS4C-10	OU2B-INS5B-10	OU2B-INS5C-10
Sample Date:	7/12/2010	7/12/2010	7/12/2010	7/9/2010	7/12/2010	7/13/2010	7/13/2010
Sample Type:	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Mercury, EPA 245.6, mg/Kg							
Mercury	0.32	0.37	0.31	0.26	0.0075 JQ	0.14	0.067
Percent Lipids, %							
Percent Lipids	3.2	3.3	4.0	4.1	2.8	4.0	3.3
Pesticides - SW846 8081, mg/Kg							
2,4'-DDD	0.0054	0.0052	0.006	0.0044	< 0.0050	0.0045	< 0.0038
2,4'-DDE	0.0168 J	0.0138 J	0.0292	0.0225	0.0041 JQ	0.0226 J	< 0.0038
2,4'-DDT	0.00068 JQ	< 0.0025	0.00072 JQ	0.00070 JQ	< 0.0050	0.00091 JQ	< 0.0038
4,4'-DDD	0.014	0.0113	0.01	0.0121	< 0.0099	0.0033 JQ	0.0022 JQ
4,4'-DDE	0.606	0.318	0.288	0.233	<0.0099	0.0866 J	0.0053 JQ
4,4'-DDT	0.0166	0.0040 JQ	0.0033 JQ	0.0094	< 0.0099	0.0024 JQ	0.0020 JQ
DDTr[1]	0.64	0.33	0.30	0.25	<0.0099	0.092 J, JQ	0.0095 JQ
DDTr[2]	0.64	0.33	0.30	0.25	< 0.0099	0.092 J, JQ	0.0095 JQ
DDTR[1]	0.66 J, JQ	0.35 J, JQ	0.34 JQ	0.29	0.0041 JQ	0.12 J, JQ	0.0095 JQ
DDTR[2]	0.66 J, JQ	0.35 J, JQ	0.34 JQ	0.29	0.024 JQ	0.12 J, JQ	0.015 JQ
Hexachlorobenzene	0.0018 JQ	0.0088	0.0029 J	0.017	0.0025 JQ	0.0133	0.015

Notes:
DDTr = 4,4'-DDD, -DDE, and -DDT
DDTR = 2,4'- and 4,4'-DDD, -DDE, -DDT
SW846 = *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
mg/Kg = milligrams per kilogram dry weight
[1]When calculating DDTr and DDTR, a value of zero was used for results below the Method Detection Limit (MDL) and/or the Reporting Limit (RL).
[2]When calculating DDTr and DDTR, a value of half the detection limit was used for results below the method detection limit and/or the reporting limit.

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TABLE H-10
2010 SPIDER AND INSECT ANALYTICAL RESULTS
Updated RI Addendum
Olin McIntosh OU-2

Location ID:	INS-6A	INS-6B	INS-6C	INS-NEA	INS-NEC	INS-SEA
Sample ID:	OU2B-INS6A-10	OU2B-INS6B-10	OU2B-INS6C-10	OU2B-INSNEA-10	OU2B-INSNEC-10	OU2B-INSSEA-10
Sample Date:	7/9/2010	7/9/2010	7/9/2010	7/12/2010	7/12/2010	7/12/2010
Sample Type:	Normal	Normal	Normal	Normal	Normal	Normal
Mercury, EPA 245.6, mg/Kg						
Mercury	0.15 J	0.71	0.026	0.17	0.075	0.13
Percent Lipids, %						
Percent Lipids	3.9	3.3	3.6	3.5	4.4	3.6
Pesticides - SW846 8081, mg/Kg						
2,4'-DDD	0.0026 JQ	0.0020 JQ	< 0.0032	0.0019 JQ	0.0035 JQ	0.0013 JQ
2,4'-DDE	0.0095	< 0.0061	< 0.0032	0.0064	0.0054 J	0.0077
2,4'-DDT	0.0028 JQ	< 0.0061	< 0.0032	0.0010 JQ	< 0.0046	< 0.0025
4,4'-DDD	< 0.0122	< 0.0122	<0.0065	0.0206	0.0052 JQ	0.0057 J
4,4'-DDE	0.175	0.0337	0.0042 JQ	0.301	0.0307	0.121
4,4'-DDT	0.0078 JQ	0.0022 JQ	< 0.0065	0.0040 JQ	0.0015 JQ	0.0052
DDTr[1]	0.18 JQ	0.036 JQ	0.0042 JQ	0.33 JQ	0.037 JQ	0.13 J
DDTr[2]	0.20 JQ	0.042 JQ	0.011 JQ	0.33 JQ	0.037 JQ	0.13 J
DDTR[1]	0.20 JQ	0.038 JQ	0.0042 JQ	0.33 JQ	0.046 J, JQ	0.14 J, JQ
DDTR[2]	0.21 JQ	0.050 JQ	0.016 JQ	0.33 JQ	0.049 J, JQ	0.14 J, JQ
Hexachlorobenzene	0.0157	0.039	0.035	0.0023 JQ	0.0099	0.0010 JQ

Notes:
DDTr = 4,4'-DDD, -DDE, and -DDT
DDTR = 2,4'- and 4,4'-DDD, -DDE, -DDT
SW846 = *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*
mg/Kg = milligrams per kilogram dry weight
[1]When calculating DDTr and DDTR, a value of zero was used for results below the Method Detection Limit (MDL) and/or the Reporting Limit (RL).
[2]When calculating DDTr and DDTR, a value of half the detection limit was used for results below the method detection limit and/or the reporting limit.

Prepared By: KPH 03/14/11
Checked By: RRP 3/15/11

Data Flag Definitions:
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APPENDIX I

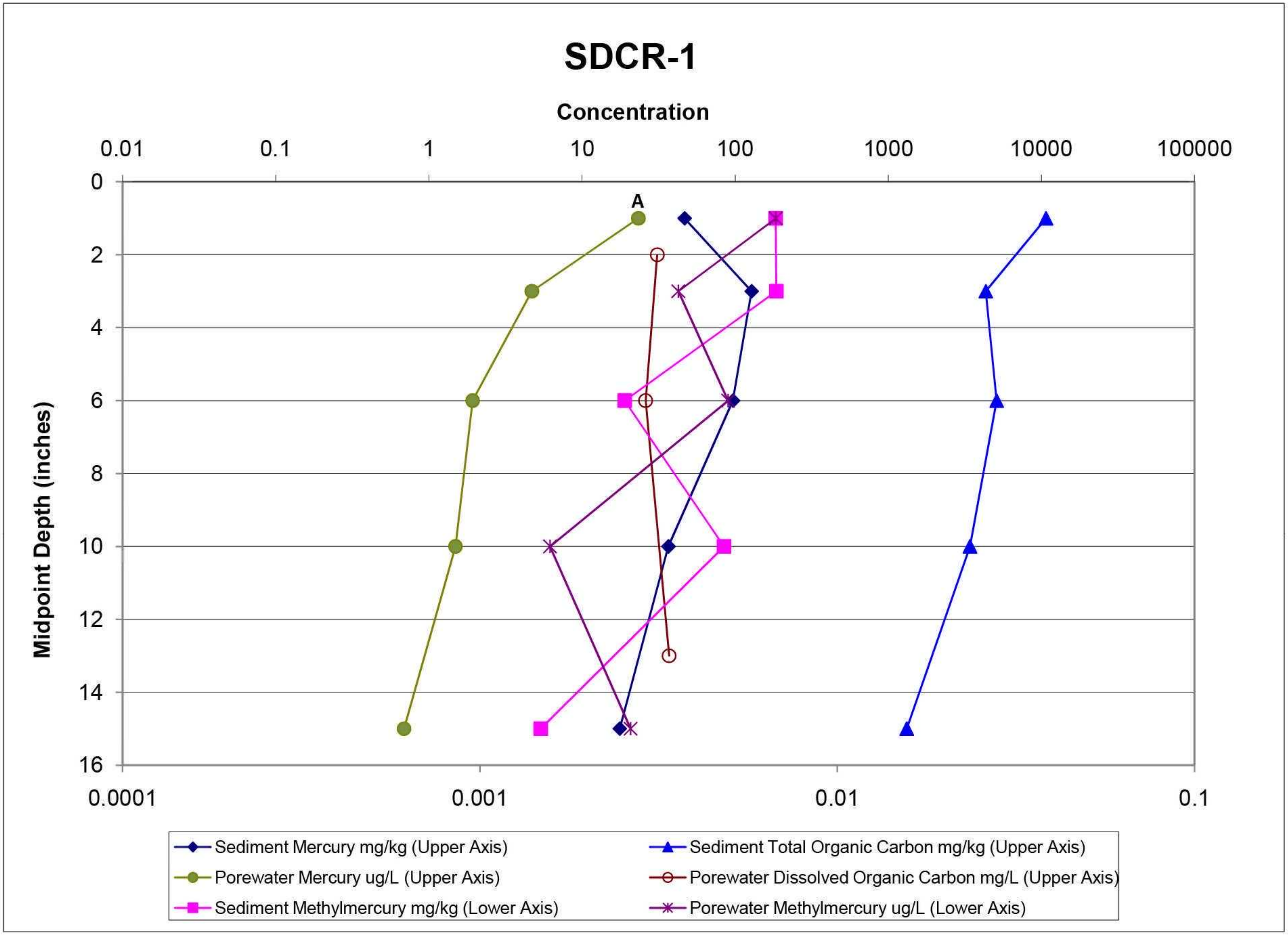
LABORATORY ANALYTICAL RESULTS (CD)

Appendix I

See Doc IDs 10902463 - 10902464

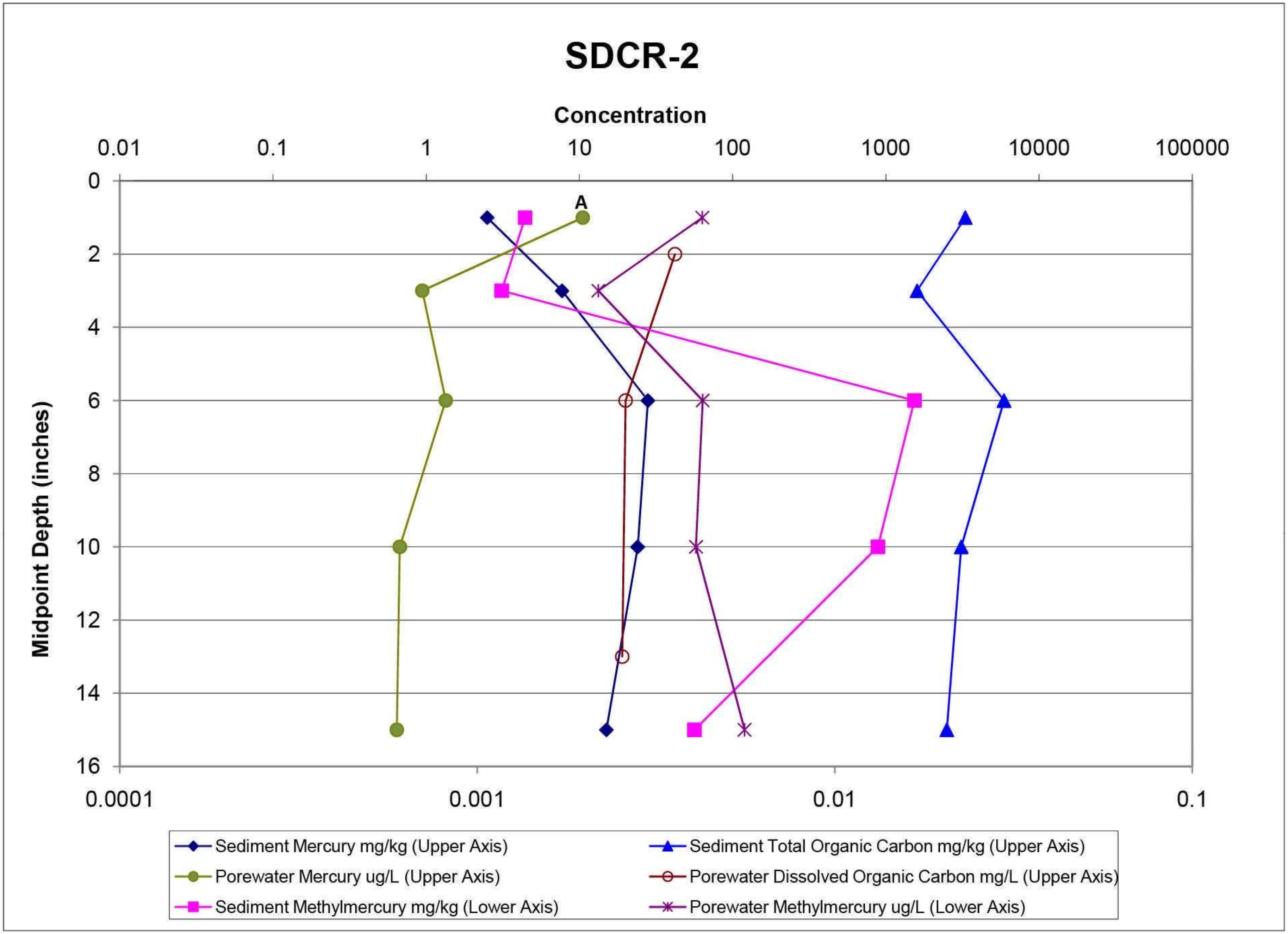
APPENDIX J

MASS BALANCE CALCULATIONS



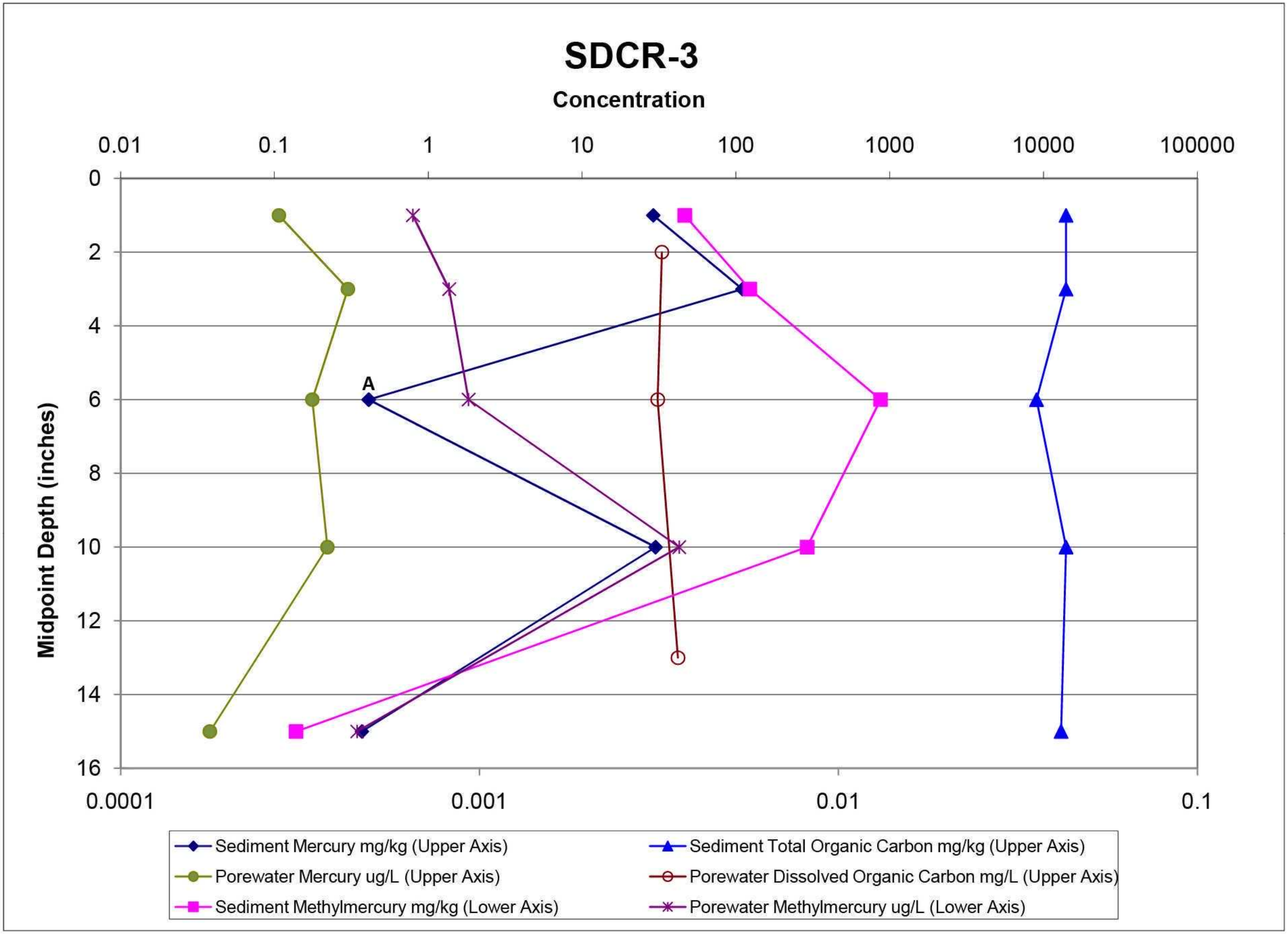
A - Anomalous Data Point

Prepared/Date: NTG 04/23/2010
Checked/Date: KPW 04/24/2010



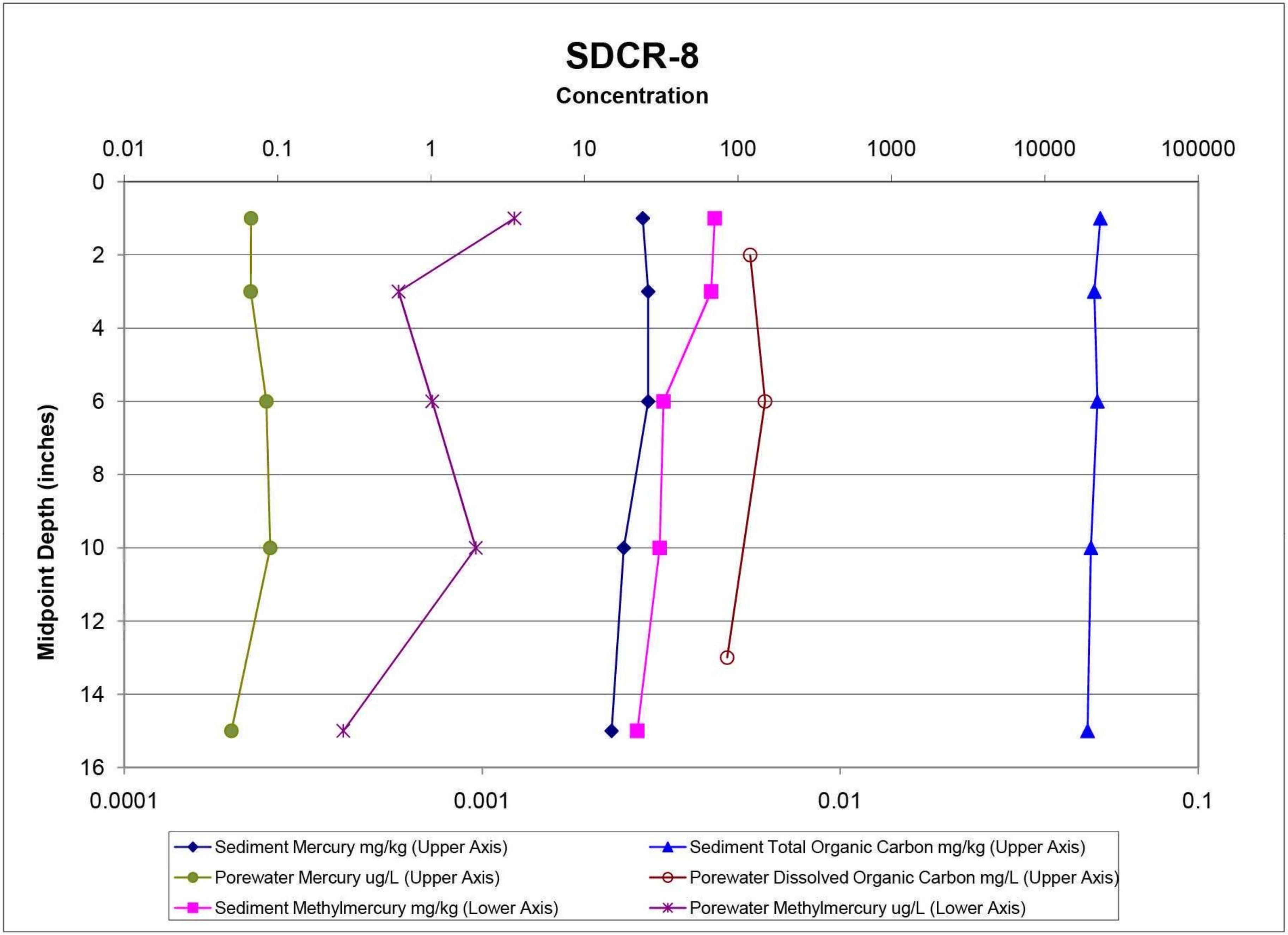
A - Anomalous Data Point

Prepared/Date: NTG 04/23/2010
Checked/Date: KPW 04/24/2010

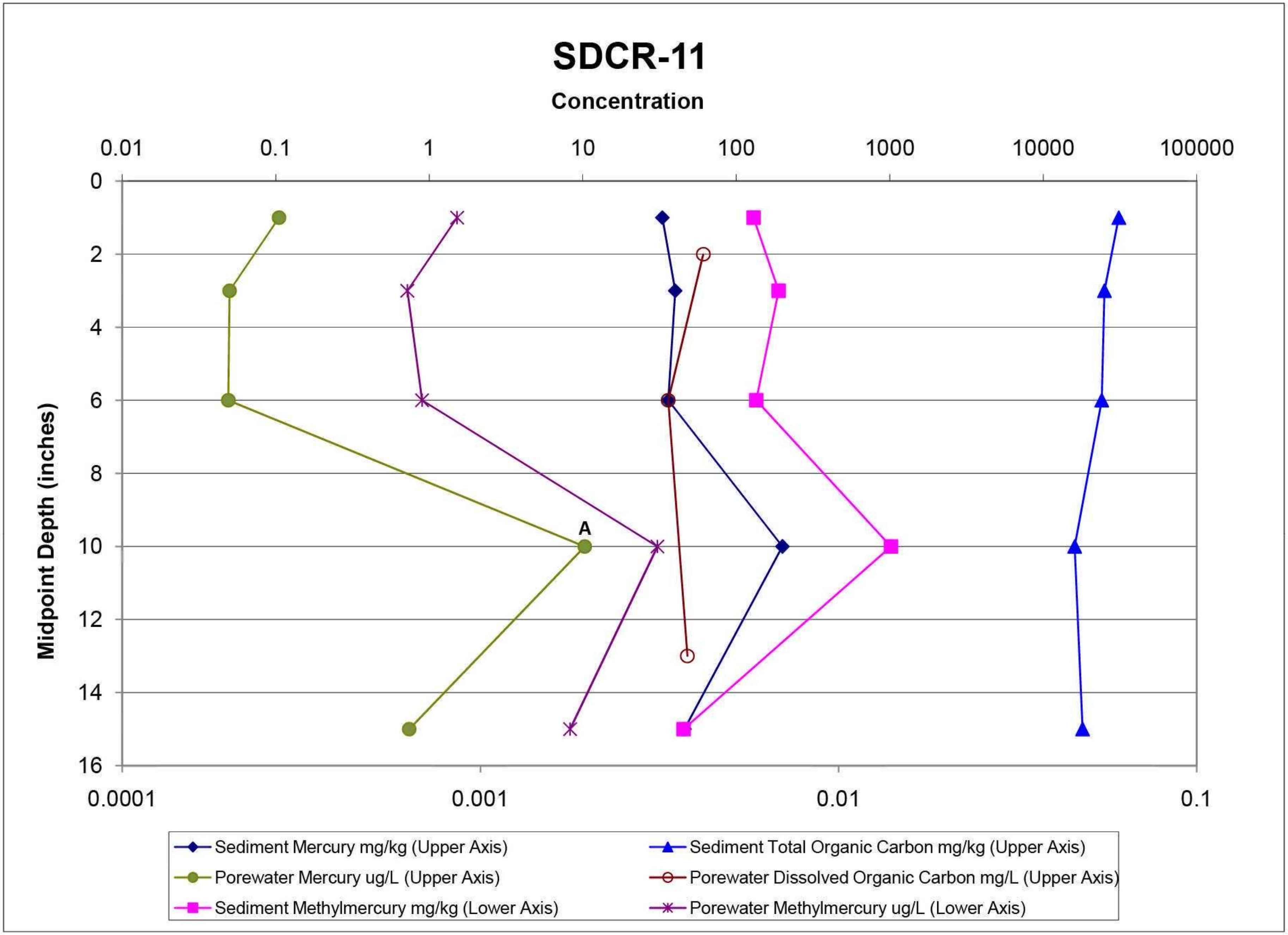


A - Anomalous Data Point

Prepared/Date: NTG 04/23/2010
Checked/Date: KPW 04/24/2010

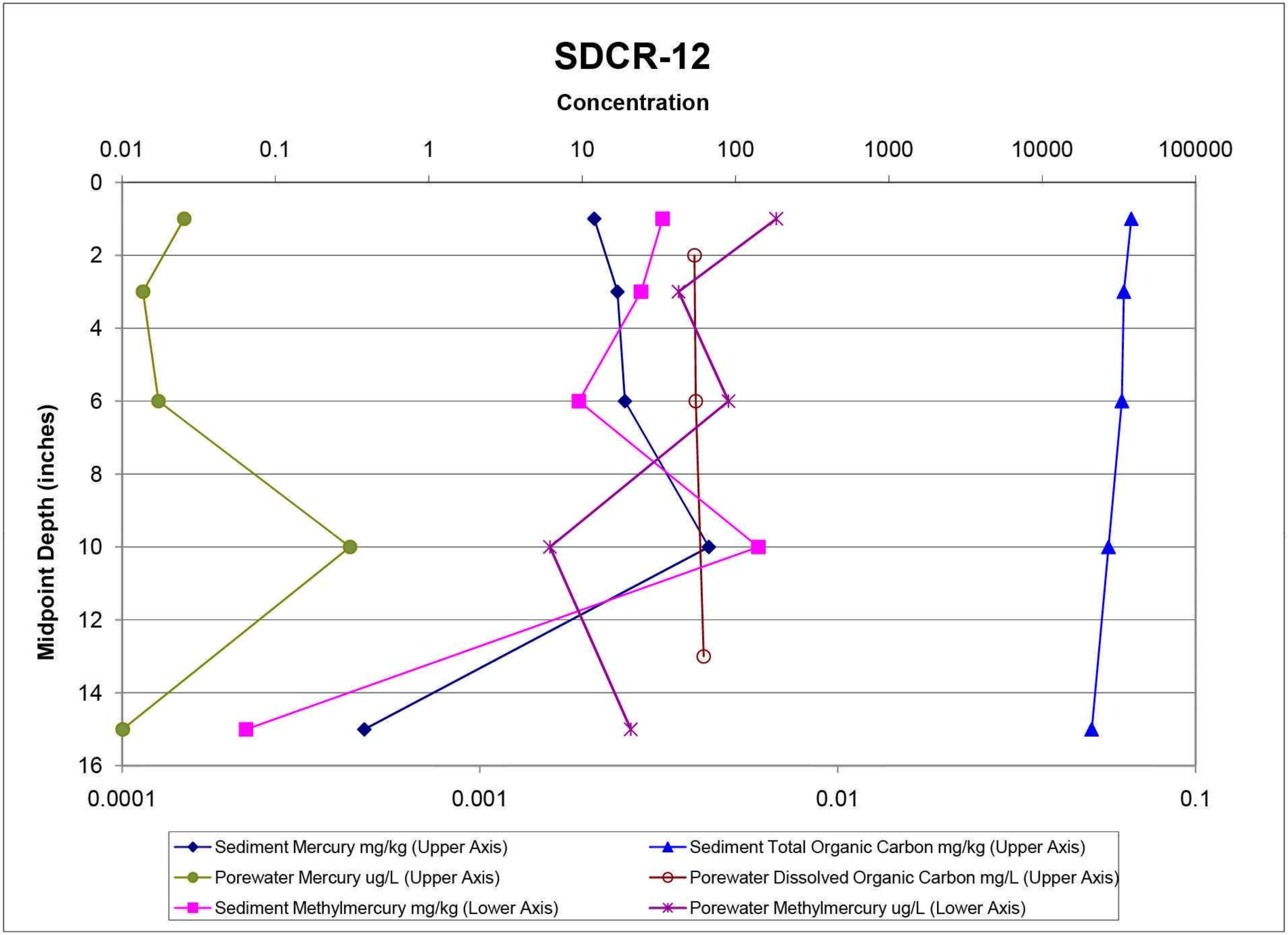


Prepared/Date: NTG 04/23/2010
Checked/Date: KPW 04/24/2010



A - Anomalous Data Point

Prepared/Date: NTG 04/23/2010
Checked/Date: KPW 04/24/2010



Prepared/Date: NTG 04/23/2010
Checked/Date: KPW 04/24/2010

APPENDIX K

CHARTS OF FINE SEDIMENT CORE AND POREWATER ANALYTICAL RESULTS

TABLE K-1

MERCURY CONCENTRATIONS IN TOMBIGBEE RIVER AT INLET CHANNEL CONFLUENCE
Updated RI Addendum
Olin McIntosh OU-2 Basin

Event Dates	Basin Elevation (ft NAVD88)	Basin Interval (ft NAVD88)	Basin Volume (ft^3)	ΔT (s)	ΔV (ft^3)	Effluent Flowrate (cfs) Q_E (3)	Hg Conc in Effluent (ng/L) C_E (4)	River Flowrate at Coffeeville (cfs) Q_{RC} (1)	River Flowrate at Basin (cfs) Q_{RB} (2)	Upstream Hg Conc in River (ng/L) C_R (5)	Total Flow Rate (cfs) Q_T (6)	Conc in River after Mixing (ng/L) C_T	AWQC
11/2/2009 16:30	10.5		69098951										
11/2/2009 23:00	10.4	10.5-10.4	68456356	23400	642595	27.5	37.1	46259	49497	6.21	49524	6.23	12.00
11/18/09 9:45	16.0		105356106										
11/19/09 21:30	15.0	16 - 15	98716664	128700	6639442	51.6	56.6	67132	71832	6.21	71883	6.25	
11/21/09 7:30	14.0	15 - 14	92077811	122400	6638853	54.2	56.6	62542	66920	6.21	66974	6.25	
11/22/09 13:00	13.0	14 - 13	85441961	106200	6635850	62.5	56.6	58022	62084	6.21	62146	6.26	
11/23/09 13:00	12.0	13 - 12	78849358	86400	6592603	76.3	56.6	53476	57219	6.21	57295	6.28	
11/25/09 1:00	11.0	12 - 11	72327800	129600	6521558	50.3	56.6	48968	52395	6.21	52446	6.26	
11/30/09 4:00	10.0	11 - 10	65896717	442800	6431083	14.5	56.6	44466	47578	6.21	47593	6.23	
12/2/09 4:15	9.0	10 - 9	59596486	173700	6300231	36.3	83.6	39939	42734	6.21	42771	6.28	
1/12/10 9:15	10.6		67814830										
1/14/10 9:30	8.3	10.6-8.3	55298823	173700	12516007	72.1	18.2	36787	39362	6.21	39434	6.23	
1/15/10 13:15	7.0	8.3-7.0	47625178	99900	7673645	76.8	18.6	30942	33108	6.21	33184	6.24	
1/18/10 12:30	6.5	7-6.5	44786682	256500	2838496	11.1	31.1	28868	30889	6.21	30900	6.22	
3/9/10 0:00	9.0		59596486										
3/9/10 11:15	8.7	9 - 8.7	57741196	40500	1855291	45.8	70.4	38702	41412	6.21	41457	6.28	

Prepared/Date: LMS 04/21/2010
Checked/Date: KPW 04/22/2010

Acronyms:

ft - feet
NAVD88 - North American Vertical Datum of 1988
ft^3 - cubic feet
s - seconds
cfs - cubic feet per second

ΔT - change in time
ΔV - change in volume
QE - Flowrate exiting basin through inlet channel
C_E - Concentration of unfiltered mercury in surface water collected at the gate
C_R - Upstream background conectration of unfiltered mercury in surface water

Q_{RC} - River flow at Coffeeville
Q_{RB} - River Flow at the Basin
Q_T - Total River Flow (Q_E + Q_{RB})
C_T - unfiltered mercury concentration after complete and instaneous mixing
ng/L - nanograms per liter
AWQC - Alabama Ambient Water Quality Standard for Mercury

Notes:

(1) River flowrate at Coffeeville (Q_{RC}) was calculated using the Olin Tombigbee Rating Curve: $y = 4286.4x^{1.0158}$ where x is the basin level and y is the flowrate of the Coffeeville Tombigbee discharge.

(2) River flowrate at the Basin (Q_{RB}) is calculated using the drainage area ratio of 1.07 using the Tombigbee Watershed Areas of the Coffeeville Lock and Dam and the Basin inlet channel.

(3) The flowrate exiting the basin to the Tombigbee River (Q_E) is calculated by dividing the change in basin volume (in cubic feet) by the amount of time (in seconds) taken for the volume change to occur ($\Delta V/\Delta T$).

(4) Average concentration of unfiltered mercury collected at the gate in triplicate, with exception of 11/2/2009 sample which is the average of duplicates, (C_E). Since the gate effluent sample interval does not exceed 10 to 11 feet, samples taken at greater than ten feet are considered appropriate to be applied to volume changes in the basin greater than 10 feet, other volume changes in the basin are correlated to the C_E collected at that interval.

(5) C_R is the background concentration of unfiltered mercury in the river; assumed to be 6.21 ng/L based on sample taken 11/2/2009 from the Tombigbee River.

(6) QTCT = QRBCR+QECE, where QT = total flow rate at the Basin inlet channel after confluence with the Tombigbee River (QE+QRB), CT = the unfiltered mercury concentration after the confluence of the Basin inlet channel and the Tombigbee River assuming complete and instantaneous mixing.