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Regulatory Submittal for Kingston Fossil Plant

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Submitted to whom
Craig Zeller

Concurrence

Reviewed	Not Applicable	TVA
☒	☐	Neil Carriker NEC
☒	☐	Bill Rogers WQR
☒	☐	Michelle Cagley MC

Reviewed	Not Applicable	Jacobs
☒	☐	Paul Clay PFC
☒	☐	
☐	☐	
☐	☐	
☐	☐	

Transmitted to EPA **Date** 3/25/11

cc:

cc:

- ☒ Anda Ray, TVA
- ☒ Barbara Scott, TDEC
- ☒ Brenda Brickhouse, TVA
- ☒ John Dizer, TVA
- ☒ Craig Zeller, EPA
- ☒ Dennis Yankee, TVA
- ☒ Kathryn Nash, TVA
- ☒ Cynthia Anderson, TVA
- ☒ Steve McCracken, TVA
- ☒ EDM
- ☒ Diane Odom, Jacobs
- ☒ Jack Howard, Jacobs
- ☒ Michelle Cagley, TVA
- ☒ Greg Signer, TVA
- ☒ KIF Incident Document Control
- ☒ Katie Kline, TVA
- ☒ Dannena Bowman, EPA
- ☒ Robert Pullen, Jacobs
- ☒ Document Control, Jacobs (Jude Bousquet and Terry Crabtree-Hagemann)

Document No. EPA-AO-035

Kingston Ash Recovery Project
Non-Time-Critical Removal Action

River System Sampling and Analysis Plan
Task Completion Technical Memorandum
Surface Water

Prepared by:
Jacobs

for the Tennessee Valley Authority

Revision	Description	Date
0	Issued for TVA Review	March 7, 2011
0	Issued for TVA to forward to EPA / TDEC	March 22. 2011
1	Revised Section 1. Purpose – deleted last sentence. Revised Section 6. Data Quality Summary – added the word "greater"	March 23, 2011

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Figure 1. Surface Water Sampling Locations

List of Acronyms

CRM	Clinch River Mile
COC	chain of custody
DOC	dissolved organic carbon
DQO	data quality objective
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
ERM	Emory River Mile
FCN	Field Change Notice
Frontier	Frontier Global Services (formerly Frontier GeoSciences)
GEL	GEL Laboratories, LLC
Jacobs	Jacobs Engineering Group Inc.
KIF	Kingston Fossil Plant
MDL	method detection limit
mg/L	milligram per liter
NA	not applicable
ND	not detected
pCi/L	picocurie per liter
PVC	polyvinyl chloride
QAPP	Quality Assurance Project Plan
QC	quality control
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
TDEC	Tennessee Department of Environment and Conservation
TDS	total dissolved solid
TM	technical memorandum
TRM	Tennessee River Mile
TSS	total suspended solid
TVA	Tennessee Valley Authority

1. PURPOSE

The purpose of this Technical Memorandum (TM) is to summarize the completion of the surface water sampling task as described in the approved *Kingston Ash Recovery Project Non-Time-Critical Removal Action for the River System Sampling and Analysis Plan* (SAP), Rev. 3, May 24, 2010, Document No. EPA-AO-021. This TM is one of a series being prepared to summarize the field work and data collection activities as SAP tasks are completed. The TM series is intended to provide interim presentations of data that are the bases for the nature and extent of contamination section of the River System Engineering Evaluation/Cost Analysis (EE/CA) Report. No data evaluation or conclusions are presented.

2. BACKGROUND

The Data Quality Objective (DQO) problem statement for surface water sampling is:

> Ash/sediment contains naturally-occurring metals (e.g., arsenic, selenium) and radionuclides (e.g., radium 226, thorium 228). Sediment may also contain legacy constituents (e.g., polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides, mercury, cesium 137, chromium) from other sources. These constituents may dissolve or become suspended in surface water within the river system where exposure by humans or ecological receptors (benthos, fish, birds, mammals, reptiles, and amphibians) may occur. Conditions occurring after the dredging has been completed may be different than those observed during the ongoing dredging operations. Therefore, the focus of this sampling event was surface water following completion of dredging.

Section 2.2.5 of the SAP presents the design of the surface water sampling study. People may be exposed to surface water if they use the river system for recreation or as an untreated drinking water source. Aquatic biota are directly exposed to surface water, and birds and mammals that inhabit or forage in the river system may be exposed to surface water in their diet. In an effort to estimate the potential intake of ash-related constituents in the surface water by human or ecological receptors, sampling of those constituents was needed to determine those concentrations.

Samples of surface water were collected at fixed station monitoring locations in the Emory, Clinch, and Tennessee Rivers. TVA had established 10 fixed stations that were monitored during the time-critical removal action. These locations were adjusted to correlate with approximate locations of submerged sediment samples and with historical TVA fish health and bioaccumulation studies and to provide representative measurement of water quality evenly distributed across the study area. An additional sample location was added at Emory River Mile (ERM) 0.3 at the request of the On-Scene Coordinator for the time-critical removal action.

Surface water samples were collected at two discrete depth intervals using a peristaltic pump. One sample was collected at each location at mid-depth for use in evaluating human, pelagic fish, and wildlife exposures. The second sample was collected approximately one-half meter (1.5 feet) above the bottom for use in evaluating epibenthic water for bottom-dwelling organisms. When thermal stratification of the water column was detected (see Field Guide for Determination of Thermal Stratification), samples were collected at mid-depth in the epilimnion, mid-depth in the hypolimnion, and at the epibenthic depth. The 11 fixed station monitoring locations were sampled once each week for 8 weeks to obtain sufficient quantity of data to demonstrate variability. A total of 296 samples were collected.

3. SAMPLING AND ANALYSIS ACTIVITIES

Samples of surface water were collected at 11 fixed station monitoring locations in the Emory, Clinch and Tennessee Rivers (Figure 1). Three upstream reference locations were sampled (ERM 8.0, Clinch River Mile [CRM] 6.0, and Tennessee River Mile [TRM] 568.5). Within the Emory River, five locations (ERM 0.3, ERM 1.0, ERM 2.0, ERM 3.0, and ERM 4.0) were sampled. Two locations within the Clinch River (CRM 2.0 and CRM 3.5), and one location within the Tennessee River, TRM 566.0, were sampled.

Surface water sampling began on August 31, 2010 and concluded on October 21, 2010. Water-quality parameters (temperature, milligrams per liter dissolved oxygen, percent saturation dissolved oxygen, specific conductance, turbidity, pH, and oxidation-reduction potential) were measured in the field at each sampling location using a standardized HACH® Hydrolab® DS5x (TVA-KIF-SOP-01, TVA-KIF-SOP-14).

Samples were collected using a MP-V400 Rola Tec peristaltic pump, new dedicated tubing, and dedicated PVC weights. The dedicated tubing was used for no more than 32 days before being replaced with new dedicated tubing.

Surface water samples were analyzed for the following constituents: total and dissolved metals, hardness as calcium carbonate, total suspended solids (TSS), total dissolved solids (TDS), dissolved organic carbon (DOC). Twenty-five percent of the surface water samples were randomly selected to also include the following analysis: radionuclides (potassium-40, radium-226/228, isotopic thorium, isotopic uranium, cesium-137, cobalt-60), and speciation of dissolved metals (inorganic arsenic, organic arsenic, arsenic III, arsenic V, inorganic selenium, organic selenium, selenium IV, and selenium VI).

Samples were analyzed by Test America-Nashville for metals (total and dissolved), TSS, TDS, DOC, and hardness as calcium carbonate. Radionuclides (potassium-40, radium-226/228, isotopic thorium, isotopic uranium, cesium-137, cobalt-60) samples were analyzed by GEL Laboratories, LLC. All metals speciation samples were analyzed by Frontier Global Services (formerly Frontier GeoSciences).

Sampling and analysis were performed in accordance with the *Quality Assurance Project Plan for the Tennessee Valley Authority Kingston Ash Recovery Project* (*QAPP*) (TVA-KIF-QAPP), the listed SOPs, field guides, and Work Package WP-1045 Table 1 identifies the applicable TVA Documents and SOPs associated with this surface water sampling event. Field duplicates, equipment blanks, matrix spikes, and matrix spike duplicates were all collected at 1/20 frequency (5%). Duplicate field measurements (turbidity, temperature, dissolved oxygen, specific conductance, oxygen reduction potential, and pH) were not collected.

Table 1. Applicable TVA Documents and Standard Operating Procedures

Document	Document Number
TVA KIF Ash Recovery Project Quality Assurance Project Plan (QAPP)	TVA-KIF-QAPP, December 2009
Non-Time-Critical Removal Action Surface Water Sampling Plan for the Emory, Clinch, and Tennessee Rivers	EPA-AO-013
Field Guide for Determination of Thermal Stratification	no document number
TVA-KIF Work Package WP-1045	WP-1045
STANDARD OPERATING PROCEDURES	
Surface Water Sampling	TVA-KIF-SOP-01
Field Documentation	TVA-KIF-SOP-06
Sample Labeling, Packing, and Shipping	TVA-KIF-SOP-07, Revision 3

Document	Document Number
Decontamination of Equipment	TVA-KIF-SOP-08, Revision 2
Field Quality Control Sampling	TVA-KIF-SOP-11
Management of Investigation-Derived Waste	TVA-KIF-SOP-12
Hydrolab Standardization and Field Parameter Measurement	TVA-KIF-SOP-14, Revision 2
Management and Implementation of EQuIS™-based Chain of Custody	TVA-KIF-SOP-18

4. SUMMARY OF CHANGES

Field Change Notices (FCNs) were prepared to document deviations from the SAP. FCNs were prepared and approved for the addition of strontium analysis and the elimination of chromium and mercury speciation analysis.

In order to support ongoing ecological studies at the ash recovery project, strontium was added to the SAP's list of requested metals analyzed in all sample media, including surface water. Strontium is an element found in ash that is also strongly associated with calcium metabolism. As such, strontium is an indicator of potential exposure of organisms to ash. Samples of abiotic media will be analyzed for strontium to evaluate potential sources of any observed uptake in organisms. This addition did not increase analytical costs. The data for strontium is already generated in the lab analyses, but until now those results have not been extracted from the instrument signals (FCN-011).

The SAP specifies that chromium VI and mercury speciation would be attained from 25% of the surface water samples collected. FCN-013 documents the elimination of both chromium VI and mercury speciation from surface water sample analysis

Mercury speciation was determined to be unnecessary for surface water collected in the river system because mercury and methylmercury were infrequently detected in the surface water samples from time-critical sampling activities. Mercury in the water column bonds strongly to silts and organic matter, which settle out and accumulate in sediments, therefore sediment samples collected under the SAP will still include 25% speciation of mercury. Methylmercury biomagnifies in aquatic food webs making it easy to detect in fish tissues. Fish samples collected for Kingston Ash Recovery Project will continue to be analyzed for mercury (FCN-013).

Chromium speciation analysis of surface water samples was also eliminated based on water sampling results from time-critical sampling activities and the nature of chromium VI. Speciation of chromium was intended to quantify potential exposures to hexavalent chromium (chromium VI). Chromium VI was identified as a contaminant of concern in the Department of Energy's Remedial Investigation and Record of Decision for the Clinch River/Poplar Creek Operable Unit based on a conservative assumption that chromium detected in abiotic media was the more toxic chromium VI. However, only analysis for total chromium had been performed. Chromium VI is more toxic than trivalent chromium (chromium III). Chromium VI is a strong oxidizing agent and readily reduces to form chromium III. Standards for metals in surface water are based on dissolved concentrations, which is the bioavailable fraction for aquatic biota. All of the detections of dissolved chromium in surface water were below the Ambient Water Quality Criterion for both chromium III and chromium VI (FCN-013).

5. ANALYTICAL DATA REVIEW

TVA's contract laboratories were required to submit three types of deliverables: a limited (Level 1) data package containing sample results and batch quality control (QC) sample results; a fully-documented (Level 4) data package including raw data for all analyses; and electronic data deliverables (EDDs) for storage in TVA's EarthSoft EQuIS® database.

EDDs were subjected to completeness and correctness testing during loading to TVA's EQuIS database; once loaded to the EQuIS database, the data were subjected to verification. As defined in the TVA-KIF-QAPP, data verification involved comparison of the data loaded in the EQuIS database to the results reported in the Level 1 data package. In addition, data verification included review of the batch QC summary forms for compliance with the applicable methods and for data usability with respect to the project DQOs and the TVA-KIF-QAPP.

Following receipt of the Level 4 data package, data were subjected to validation. As defined in the TVA-KIF-QAPP, data validation included review of raw data and associated QC summary forms for compliance with the applicable methods and for data usability with respect to the appropriate guidance documents. As stated in the QAPP: "Initially, 100% of the chemical analysis data will be reported in full documentation data packages for independent data validation. Depending on the nature and frequency of issues identified during data validation, the percentage of data undergoing full data validation may be reduced to a lesser percentage (such as 20%) or data verification may be substituted. The reduction in full data validation may be matrix specific, laboratory specific, or analyte specific. If after the percentage of full data validation has decreased, a trend in frequency of reporting issues, method non-compliances, or data usability issues is identified, data validation will be conducted for specific data points or the percentage of full data validation percentage may be increased until the issues have been minimized to their initial frequency." Data validation expands upon the completeness, correctness, and usability assessment performed during verification to include evaluation of instrumental QC analyses, review of sample preparation information, and recalculation of reported results from raw data.

TestAmerica Nashville has analyzed surface water samples for TVA since March 2009; surface water data from TestAmerica Nashville is considered to be a mature data stream. A mature data stream will primarily undergo verification. Frontier and GEL are new to the project having been contracted during 2010; therefore, 100% of data generated from Frontier and GEL were validated. Table 2 summarizes the data from the three laboratories.

Table 2. Data Review Summary

Laboratory	Number of COCs	Number of Normal and Field Duplicate Samples by Lab	Number of Equipment Blanks by Lab	Number of Analytical Results	Percentage Final-Verified	Percentage Validated
TestAmerica Nashville	11	198	8	11,550	91%	9%
Frontier	3	48	2	500	0%	100%
GEL	5	50	2	936	0%	100%
Total Count	**19**	**207***	**8***	**12,986**	-	-

Note:

*"Total Count" for normal, field duplicate and equipment blank samples is the number of discrete samples sent to each lab. Each sample requiring metals speciation (Frontier) and/or radiological (GEL) analyses in addition to metals analysis (TAN) was split, with each split counted in this table as one sample per receiving lab ("Number of Samples by Lab").

6. DATA QUALITY SUMMARY

Data verification and/or validation was performed based on the sample results, summary QC data, and raw data provided by the laboratory. Data verification and validation includes a review of the following QC measures (where applicable):

- Sample condition upon laboratory receipt;
- Initial calibration linearity (data validation only);
- Field and equipment blank analysis results greater than the method detection limit (MDL);
- Blank analysis results greater than the MDL (data validation only);
- Sample preparation and holding times;
- Initial calibration verification/continuing calibration verification (ICV/CCV) standard recoveries (data validation only);
- Inductively coupled plasma (ICP) interference check standard results (data validation only);
- MDLs and linear ranges (data validation only);
- Internal standard recoveries (data validation only);
- Matrix spike/matrix spike duplicate (MSMSD);
- Laboratory and field duplicate precision;
- Quantitation of positive results (data validation only);
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recoveries and precision;
- Total vs. dissolved sample precision;
- Analytical sequence (data validation only);
- Reporting limit (RL) standard recoveries (data validation only); and
- MDL verification standards (data validation only).

The data met the DQOs defined for this task and are acceptable for use. Table 3 summarizes the data quality based on the review performed and as compared to the data quality measures identified in the TVA-KIF-QAPP. The text of the data validation reports for the samples included in this TM will be included in the EE/CA Report.

Table 3. Summary of Surface Water Data Quality

Laboratory	Analytical Results (Total Count)	Acceptable (No Qualification)[a]		Acceptable (Estimated)[b]		Blank Qualified[c]		Rejected[d]	
TestAmerica Nashville	11,661	9,141	78%	2,397	21%	121	1%	2	<1%[e]
Frontier	500	339	68%	161	32%	0	0%	0	0%
GEL	936	914	98%	0	0%	22	2%	0	0%

Notes:

[a]Acceptable, No Qualification – Qualification of data was not warranted based on a review of the applicable QC measures.

[b]Acceptable, Estimated – Quantitation or detection limit is approximate due to limitations or bias identified during a review of the applicable QC measures.

[c]Blank Qualified – Result is considered "not-detected" because it was detected in an associated blank at a similar level.

[d]Rejected – Unreliable result or detection limit; analyte may or may not be present in sample.

[e]Rejected results were due to dissolved metals results that were significantly greater than the associated total metals results. Therefore, both results were rejected.

7. DATA SUMMARY

Summary statistics are provided in Tables 4 through 9 for each river segregated by mid-depth and epibenthic samples.

Table 4. Summary Statistics for Emory River Mid-depth and Epilimnion Surface Water Samples

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Aluminum, Dissolved	mg/L	0.05 / 0.05	ND	ND	NA	NA	0 / 48	NA
Aluminum, Total	mg/L	0.05 / 0.215	0.0809	0.339	ERM4.0	09/08/2010	33 / 48	0.1711
Antimony, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 48	NA
Antimony, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 48	NA
Arsenic, Dissolved	mg/L	NA	0.00034	0.00232	ERM2.0	09/28/2010	60 / 60	0.001209
Arsenic, Total	mg/L	NA	0.00038	0.00278	ERM2.0	10/05/2010	48 / 48	0.001553
Arsenate, Dissolved	mg/L	NA	0.00009	0.00082	ERM3.0	10/12/2010	12 / 12	0.0005318
Arsenite, Dissolved	mg/L	NA	0.0001	0.00041	ERM3.0	10/19/2010	12 / 12	0.00028
Inorganic Arsenic, Dissolved	mg/L	NA	0.00027	0.0012	ERM3.0	10/12/2010	12 / 12	0.0008129
Organic Arsenic, Dissolved	mg/L	NA	0.00028	0.00073	ERM3.0	10/12/2010	12 / 12	0.0004771
Barium, Dissolved	mg/L	NA	0.0332	0.0524	ERM8.0	10/19/2010	48 / 48	0.04212
Barium, Total	mg/L	NA	0.0344	0.0544	ERM4.0	10/05/2010	48 / 48	0.04572
Beryllium, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 48	NA
Beryllium, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 48	NA
Boron, Dissolved	mg/L	0.0125 / 0.0125	0.0131	0.0274	ERM1.0	10/12/2010	47 / 48	0.02025
Boron, Total	mg/L	NA	0.0142	0.0298	ERM1.0	10/12/2010	48 / 48	0.02019
Cadmium, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 48	NA

Table 4. Summary Statistics for Emory River Mid-depth and Epilimnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Cadmium, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 48	NA
Calcium, Dissolved	mg/L	NA	25.3	39.6	ERM0.3	10/19/2010	48 / 48	35.58
Calcium, Total	mg/L	NA	26.1	39.5	ERM1.0	10/19/2010	48 / 48	35.84
Chromium, Dissolved	mg/L	0.00033 / 0.00033	0.00037	0.00039	ERM1.0	09/28/2010	1 / 48	0.00039
Chromium, Total	mg/L	0.00033 / 0.00033	0.00033	0.00271	ERM1.0	10/05/2010	14 / 48	0.0005979
Cobalt, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 48	NA
Cobalt, Total	mg/L	0.00033 / 0.00033	0.00046	0.00046	ERM4.0	09/08/2010	1 / 48	0.00046
Copper, Dissolved	mg/L	0.00033 / 0.00046	0.00034	0.00292	ERM3.0	08/31/2010	40 / 48	0.0008325
Copper, Total	mg/L	0.00033 / 0.00033	0.00033	0.00212	ERM1.0	09/08/2010	47 / 48	0.001036
Dissolved Organic Carbon	mg/L	NA	1.51	2.61	ERM4.0	10/05/2010	48 / 48	1.87
Hardness (As CaCO3)	mg/L	NA	95.7	147	ERM0.3	10/19/2010	48 / 48	131.8
Iron, Dissolved	mg/L	0.025 / 0.025	0.0251	0.0304	ERM3.0	10/12/2010	2 / 48	0.02775
Iron, Total	mg/L	0.025 / 0.025	0.0554	0.316	ERM4.0	09/08/2010	47 / 48	0.1372
Lead, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 48	NA
Lead, Total	mg/L	0.00033 / 0.00033	0.00033	0.00058	ERM4.0	09/08/2010	9 / 48	0.0003989

Table 4. Summary Statistics for Emory River Mid-depth and Epilimnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Magnesium, Dissolved	mg/L	NA	7.18	11.7	ERM0.3	10/19/2010	48 / 48	10.18
Magnesium, Total	mg/L	NA	7.42	11.7	ERM0.3	10/19/2010	48 / 48	10.28
Manganese, Dissolved	mg/L	0.00033 / 0.00214	0.00037	0.15	ERM4.0	09/14/2010	44 / 48	0.0124
Manganese, Total	mg/L	NA	0.00825	0.225	ERM4.0	09/14/2010	48 / 48	0.06661
Mercury, Dissolved	mg/L	0.00015 / 0.00015	ND	ND	NA	NA	0 / 48	NA
Mercury, Total	mg/L	0.00015 / 0.00015	0.00016	0.00019	ERM1.0	09/08/2010	4 / 48	0.0001745
Molybdenum, Dissolved	mg/L	0.00033 / 0.00101	0.00049	0.00145	ERM0.3	10/05/2010	43 / 48	0.0009095
Molybdenum, Total	mg/L	0.00033 / 0.00112	0.00045	0.0015	ERM0.3	10/05/2010	43 / 48	0.0009251
Nickel, Dissolved	mg/L	0.00033 / 0.00054	0.00033	0.00063	ERM8.0	10/05/2010	22 / 48	0.0004295
Nickel, Total	mg/L	0.00033 / 0.00033	0.00035	0.00086	ERM2.0	10/05/2010	47 / 48	0.0005543
Potassium, Dissolved	mg/L	NA	1.47	1.72	ERM8.0	10/05/2010	48 / 48	1.563
Potassium, Total	mg/L	NA	1.49	1.73	ERM8.0	10/05/2010	48 / 48	1.594
Selenium, Dissolved	mg/L	0.00033 / 0.388	0.00033	0.00102	ERM2.0	10/12/2010	26 / 60	0.0005068
Selenium, Total	mg/L	0.00033 / 0.00033	0.00033	0.00093	ERM1.0	10/12/2010	16 / 48	0.0004475
Selenate	mg/L	0.157 / 0.157	0.00021	0.00054	ERM2.0	10/12/2010	6 / 12	0.0003343
Selenite	mg/L	0.285 / 0.285	ND	ND	NA	NA	0 / 12	NA

Table 4. Summary Statistics for Emory River Mid-depth and Epilimnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Inorganic Selenium, Dissolved	mg/L	0.285 / 0.285	0.00048	0.00054	ERM2.0	10/12/2010	2 / 12	0.0005135
Organic Selenium, Dissolved	mg/L	0.388 / 0.388	0.00039	0.00056	ERM0.3	10/12/2010	7 / 12	0.0004864
Silver, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 48	NA
Silver, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 48	NA
Sodium, Dissolved	mg/L	NA	5.35	7.12	ERM1.0	10/12/2010	48 / 48	6.371
Sodium, Total	mg/L	NA	5.44	7.09	ERM1.0	10/12/2010	48 / 48	6.411
Strontium, Dissolved	mg/L	NA	0.0808	0.125	ERM2.0	10/12/2010	48 / 48	0.1094
Strontium, Total	mg/L	NA	0.0824	0.126	ERM1.0	10/12/2010	48 / 48	0.1107
Thallium, Dissolved	mg/L	0.0005 / 0.0005	ND	ND	NA	NA	0 / 48	NA
Thallium, Total	mg/L	0.0005 / 0.0005	ND	ND	NA	NA	0 / 48	NA
Total Dissolved Solids	mg/L	NA	117	181	ERM0.3	10/19/2010	48 / 48	155.8
Total Suspended Solids	mg/L	1 / 11.1	2.5	11.9	ERM2.0	09/14/2010	42 / 48	6.205
Vanadium, Dissolved	mg/L	0.001 / 0.001	0.00102	0.00252	ERM1.0	09/28/2010	14 / 48	0.001488
Vanadium, Total	mg/L	0.001 / 0.001	0.00109	0.00301	ERM1.0	09/28/2010	29 / 48	0.001699
Zinc, Dissolved	mg/L	0.0083 / 0.0083	0.00851	0.00851	ERM1.0	09/08/2010	1 / 48	0.00851
Zinc, Total	mg/L	0.0083 / 0.0083	0.00993	0.0137	ERM1.0	08/31/2010	2 / 48	0.01182
Actinium-228	pCi/L	10.9 / 17.4	ND	ND	NA	NA	0 / 12	NA
Americium-241	pCi/L	6.06 / 26.6	ND	ND	NA	NA	0 / 12	NA
Bismuth-214	pCi/L	7.34 / 10.4	27.3	34.6	ERM1.0	10/05/2010	1 / 12	34.6

Table 4. Summary Statistics for Emory River Mid-depth and Epilimnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Cesium-137	pCi/L	2.58 / 4.25	ND	ND	NA	NA	0 / 12	NA
Cobalt-60	pCi/L	2.8 / 5.72	ND	ND	NA	NA	0 / 12	NA
Lead-212	pCi/L	5.81 / 11.2	ND	ND	NA	NA	0 / 12	NA
Lead-214	pCi/L	7.15 / 25.3	ND	ND	NA	NA	0 / 12	NA
Potassium-40	pCi/L	38.7 / 54.6	ND	ND	NA	NA	0 / 12	NA
Radium-226	pCi/L	0.261 / 1.64	0.592	0.88	ERM1.0	09/22/2010	2 / 12	0.736
Radium-228	pCi/L	0.327 / 1.72	3.77	3.77	ERM4.0	09/28/2010	1 / 12	3.77
Thallium-208	pCi/L	3.29 / 5.77	ND	ND	NA	NA	0 / 12	NA
Thorium-228	pCi/L	0.0609 / 0.127	ND	ND	NA	NA	0 / 12	NA
Thorium-230	pCi/L	0.0204 / 0.102	0.132	0.132	ERM3.0	09/28/2010	1 / 12	0.132
Thorium-232	pCi/L	0.0126 / 0.0933	ND	ND	NA	NA	0 / 12	NA
Thorium-234	pCi/L	75.4 / 266	ND	ND	NA	NA	0 / 12	NA
Uranium-234	pCi/L	0.0632 / 0.174	0.142	0.265	ERM0.3	09/28/2010	6 / 12	0.1938
Uranium-235	pCi/L	0.0672 / 0.147	ND	ND	NA	NA	0 / 12	NA
Uranium-238	pCi/L	0.0543 / 0.174	0.104	0.252	ERM4.0	09/28/2010	9 / 12	0.1504

Note: For definitions, see the Acronyms section.

Table 5. Summary Statistics for Emory River Epibenthic and Hypolymnion Surface Water Samples

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Aluminum, Dissolved	mg/L	0.05 / 0.05	ND	ND	NA	NA	0 / 49	NA
Aluminum, Total	mg/L	0.05 / 0.374	0.0551	1.22	ERM3.0	09/22/2010	46 / 49	0.4032
Antimony, Dissolved	mg/L	0.00033 / 0.00033	0.00039	0.00039	ERM2.0	09/28/2010	1 / 49	0.00039
Antimony, Total	mg/L	0.00033 / 0.00033	0.00042	0.00043	ERM2.0	09/28/2010	2 / 49	0.000425
Arsenic, Dissolved	mg/L	NA	0.00034	0.00363	ERM3.0	10/12/2010	61 / 61	0.001341
Arsenic, Total	mg/L	NA	0.0004	0.00638	ERM3.0	09/22/2010	49 / 49	0.002191
Arsenate, Dissolved	mg/L	NA	0.00009	0.00147	ERM3.0	10/12/2010	12 / 12	0.0006901
Arsenite, Dissolved	mg/L	NA	0.00011	0.00087	ERM4.0	10/12/2010	12 / 12	0.0003942
Inorganic Arsenic, Dissolved	mg/L	NA	0.00027	0.00231	ERM3.0	10/12/2010	12 / 12	0.001083
Organic Arsenic, Dissolved	mg/L	NA	0.0002	0.00132	ERM3.0	10/12/2010	12 / 12	0.0004669
Barium, Dissolved	mg/L	NA	0.033	0.0576	ERM4.0	09/28/2010	49 / 49	0.04221
Barium, Total	mg/L	NA	0.036	0.0862	ERM3.0	09/28/2010	49 / 49	0.05111
Beryllium, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 49	NA
Beryllium, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 49	NA
Boron, Dissolved	mg/L	0.0125 / 0.0125	0.0128	0.0231	ERM3.0	10/12/2010	47 / 49	0.0181
Boron, Total	mg/L	NA	0.0126	0.0264	ERM2.0	10/12/2010	49 / 49	0.01917
Cadmium, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 49	NA
Cadmium, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 49	NA
Calcium, Dissolved	mg/L	NA	30	39.1	ERM0.3	10/05/2010	49 / 49	36.44
Calcium, Total	mg/L	NA	29.9	40.3	ERM1.0	10/05/2010	49 / 49	36.86
Chromium, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 49	NA
Chromium, Total	mg/L	0.00033 / 0.00033	0.00033	0.00108	ERM3.0	09/22/2010	26 / 49	0.0006196
Cobalt, Dissolved	mg/L	0.00033 / 0.00033	0.00036	0.00036	ERM8.0	09/22/2010	1 / 49	0.00036
Cobalt, Total	mg/L	0.00033 / 0.00033	0.00033	0.00105	ERM3.0	09/22/2010	26 / 49	0.0006108
Copper, Dissolved	mg/L	0.00033 / 0.00051	0.00033	0.00204	ERM4.0	08/31/2010	39 / 49	0.0005646

Table 5. Summary Statistics for Emory River Epibenthic and Hypolymnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Copper, Total	mg/L	0.00033 / 0.00033	0.00041	0.00311	ERM3.0	09/22/2010	47 / 49	0.001409
Dissolved Organic Carbon	mg/L	NA	1.5	3.01	ERM8.0	08/31/2010	49 / 49	1.829
Hardness (As CaCO3)	mg/L	NA	109	149	ERM0.3	10/19/2010	49 / 49	135.8
Iron, Dissolved	mg/L	0.025 / 0.025	0.0522	0.198	ERM8.0	09/22/2010	5 / 49	0.1188
Iron, Total	mg/L	NA	0.0932	0.779	ERM3.0	09/22/2010	49 / 49	0.3244
Lead, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 49	NA
Lead, Total	mg/L	0.00033 / 0.00033	0.00034	0.00167	ERM3.0	09/22/2010	36 / 49	0.0007228
Magnesium, Dissolved	mg/L	NA	8.37	11.5	ERM0.3	10/19/2010	49 / 49	10.45
Magnesium, Total	mg/L	NA	8.43	11.9	ERM0.3	10/19/2010	49 / 49	10.62
Manganese, Dissolved	mg/L	NA	0.00308	0.822	ERM4.0	09/28/2010	49 / 49	0.1178
Manganese, Total	mg/L	NA	0.0359	0.866	ERM4.0	09/28/2010	49 / 49	0.1854
Mercury, Dissolved	mg/L	0.00015 / 0.00015	ND	ND	NA	NA	0 / 49	NA
Mercury, Total	mg/L	0.00015 / 0.00015	0.00015	0.00023	ERM1.0	09/08/2010	2 / 49	0.000192
Molybdenum, Dissolved	mg/L	0.00033 / 0.00106	0.00033	0.00117	ERM2.0	10/05/2010	44 / 49	0.0007934
Molybdenum, Total	mg/L	0.00033 / 0.00122	0.0005	0.00125	ERM3.0	10/05/2010	44 / 49	0.0007993
Nickel, Dissolved	mg/L	0.00033 / 0.00043	0.00033	0.00083	ERM2.0	09/08/2010	26 / 49	0.0004308
Nickel, Total	mg/L	NA	0.00044	0.00202	ERM3.0	09/22/2010	49 / 49	0.0009006
Potassium, Dissolved	mg/L	NA	1.46	1.68	ERM8.0	10/05/2010	49 / 49	1.543
Potassium, Total	mg/L	NA	1.53	1.72	ERM3.0	08/31/2010	49 / 49	1.617
Selenium, Dissolved	mg/L	0.00033 / 0.388	0.00033	0.00098	ERM2.0	10/12/2010	21 / 61	0.0005256
Selenium, Total	mg/L	0.00033 / 0.00033	0.00033	0.0007	ERM2.0	10/12/2010	19 / 49	0.0004216
Selenate	mg/L	0.157 / 0.157	0.00018	0.00035	ERM4.0	10/19/2010	6 / 12	0.0002555
Selenite	mg/L	0.285 / 0.285	ND	ND	NA	NA	0 / 12	NA
Inorganic Selenium, Dissolved	mg/L	0.285 / 0.285	0.00029	0.00035	ERM4.0	10/19/2010	3 / 12	0.000325

Table 5. Summary Statistics for Emory River Epibenthic and Hypolymnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Organic Selenium, Dissolved	mg/L	0.388 / 0.388	0.00044	0.00064	ERM2.0	10/12/2010	7 / 12	0.0005144
Silver, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 49	NA
Silver, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 49	NA
Sodium, Dissolved	mg/L	NA	5.66	7.02	ERM2.0	10/12/2010	49 / 49	6.402
Sodium, Total	mg/L	NA	5.79	7.13	ERM0.3	10/19/2010	49 / 49	6.479
Strontium, Dissolved	mg/L	NA	0.0915	0.121	ERM2.0	10/12/2010	49 / 49	0.1103
Strontium, Total	mg/L	NA	0.0929	0.128	ERM3.0	09/22/2010	49 / 49	0.114
Thallium, Dissolved	mg/L	0.0005 / 0.0005	ND	ND	NA	NA	0 / 49	NA
Thallium, Total	mg/L	0.0005 / 0.0005	ND	ND	NA	NA	0 / 49	NA
Total Dissolved Solids	mg/L	NA	138	184	ERM2.0	10/19/2010	49 / 49	160
Total Suspended Solids	mg/L	1 / 24.4	3.6	37.3	ERM3.0	10/05/2010	43 / 49	15.6
Vanadium, Dissolved	mg/L	0.001 / 0.001	0.00101	0.00128	ERM3.0	09/14/2010	9 / 49	0.00107
Vanadium, Total	mg/L	0.001 / 0.001	0.00109	0.00467	ERM3.0	09/22/2010	35 / 49	0.002204
Zinc, Dissolved	mg/L	0.0083 / 0.0083	ND	ND	NA	NA	0 / 49	NA
Zinc, Total	mg/L	0.0083 / 0.0083	0.0122	0.0122	ERM3.0	08/31/2010	1 / 49	0.0122
Actinium-228	pCi/L	10.1 / 17.5	ND	ND	NA	NA	0 / 12	NA
Americium-241	pCi/L	10.4 / 30.9	ND	ND	NA	NA	0 / 12	NA
Bismuth-214	pCi/L	5.94 / 10.9	27	27	ERM1.0	10/05/2010	1 / 12	27
Cesium-137	pCi/L	2.63 / 4.08	ND	ND	NA	NA	0 / 12	NA
Cobalt-60	pCi/L	2.54 / 4.18	ND	ND	NA	NA	0 / 12	NA
Lead-212	pCi/L	5.35 / 10.8	ND	ND	NA	NA	0 / 12	NA
Lead-214	pCi/L	6.24 / 10.1	9.73	9.73	ERM1.0	10/05/2010	1 / 12	9.73
Potassium-40	pCi/L	33.2 / 56.4	ND	ND	NA	NA	0 / 12	NA
Radium-226	pCi/L	0.321 / 1.01	0.369	0.425	ERM0.3	09/22/2010	2 / 12	0.397
Radium-228	pCi/L	0.54 / 2.08	3.27	3.27	ERM3.0	09/28/2010	1 / 12	3.27

Table 5. Summary Statistics for Emory River Epibenthic and Hypolymnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Thallium-208	pCi/L	2.95 / 5.81	ND	ND	NA	NA	0 / 12	NA
Thorium-228	pCi/L	0.0548 / 0.144	ND	ND	NA	NA	0 / 12	NA
Thorium-230	pCi/L	0.0437 / 0.173	ND	ND	NA	NA	0 / 12	NA
Thorium-232	pCi/L	0.0131 / 0.0973	0.0569	0.0569	ERM3.0	09/22/2010	1 / 12	0.0569
Thorium-234	pCi/L	111 / 261	ND	ND	NA	NA	0 / 12	NA
Uranium-234	pCi/L	0.0668 / 0.138	0.105	0.273	ERM4.0	09/22/2010	10 / 12	0.1764
Uranium-235	pCi/L	0.0694 / 0.153	ND	ND	NA	NA	0 / 12	NA
Uranium-238	pCi/L	0.0616 / 0.123	0.09	0.3	ERM3.0	09/22/2010	10 / 12	0.1548

Note: For definitions, see the Acronyms section.

Table 6. Summary Statistics for Clinch River Mid-depth and Epilimnion Surface Water Samples

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Aluminum, Dissolved	mg/L	0.05 / 0.05	0.065	0.142	CRM3.5	09/08/2010	2 / 88	0.1035
Aluminum, Total	mg/L	0.05 / 0.215	0.061	0.339	ERM4.0	09/08/2010	68 / 88	0.1377
Antimony, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 88	NA
Antimony, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 88	NA
Arsenic, Dissolved	mg/L	0.00033 / 0.00033	0.00033	0.00232	ERM2.0	09/28/2010	108 / 110	0.0009654
Arsenic, Total	mg/L	0.00033 / 0.00033	0.00036	0.00278	ERM2.0	10/05/2010	88 / 88	0.001181
Arsenate, Dissolved	mg/L	NA	0.00009	0.00082	ERM3.0	10/12/2010	22 / 22	0.0004425
Arsenite, Dissolved	mg/L	NA	0.00004	0.00041	ERM3.0	10/19/2010	22 / 22	0.0001944
Inorganic Arsenic, Dissolved	mg/L	NA	0.00022	0.0012	ERM3.0	10/12/2010	22 / 22	0.0006376
Organic Arsenic, Dissolved	mg/L	NA	0.00015	0.00073	ERM3.0	10/12/2010	22 / 22	0.0003902
Barium, Dissolved	mg/L	NA	0.0214	0.0524	ERM8.0	10/19/2010	88 / 88	0.03738
Barium, Total	mg/L	NA	0.023	0.0544	ERM4.0	10/05/2010	88 / 88	0.04012
Beryllium, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 88	NA
Beryllium, Total	mg/L	0.00033 / 0.00033	0.00048	0.00048	TRM566.0	10/12/2010	1 / 88	0.00048
Boron, Dissolved	mg/L	0.0125 / 0.0125	0.0127	0.0274	ERM1.0	10/12/2010	83 / 88	0.0187
Boron, Total	mg/L	0.0125 / 0.0125	0.0126	0.0298	ERM1.0	10/12/2010	81 / 88	0.01879
Cadmium, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 88	NA
Cadmium, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 88	NA
Calcium, Dissolved	mg/L	NA	18.7	39.6	ERM0.3	10/19/2010	88 / 88	33.64
Calcium, Total	mg/L	NA	18.8	39.6	CRM2.0	10/19/2010	87 / 87	33.79
Chromium, Dissolved	mg/L	0.00033 / 0.00033	0.00037	0.00039	ERM1.0	09/28/2010	1 / 88	0.00039
Chromium, Total	mg/L	0.00033 / 0.00033	0.00033	0.00271	ERM1.0	10/05/2010	20 / 88	0.0005435
Cobalt, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 88	NA
Cobalt, Total	mg/L	0.00033 / 0.00033	0.00033	0.00046	ERM4.0	09/08/2010	2 / 88	0.000395
Copper, Dissolved	mg/L	0.00033 / 0.0014	0.00033	0.00318	TRM566.0	08/31/2010	74 / 87	0.0008549

Table 6. Summary Statistics for Clinch River Mid-depth and Epilimnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Copper, Total	mg/L	0.00033 / 0.00033	0.00033	0.00256	CRM3.5	08/31/2010	87 / 88	0.001011
Dissolved Organic Carbon	mg/L	1 / 2.39	1.48	2.61	ERM4.0	10/05/2010	81 / 88	1.845
Hardness (As CaCO3)	mg/L	NA	66.2	147	CRM2.0	10/19/2010	87 / 87	124
Hex. Chromium, Dissolved	mg/L	NA	0.0012	0.0021	CRM2.0	09/21/2010	5 / 5	0.0018
Iron, Dissolved	mg/L	0.025 / 0.025	0.0251	0.129	CRM3.5	09/08/2010	5 / 88	0.06922
Iron, Total	mg/L	0.025 / 0.025	0.0554	0.316	ERM4.0	09/08/2010	85 / 87	0.1241
Lead, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 88	NA
Lead, Total	mg/L	0.00033 / 0.0004	0.00033	0.00058	ERM4.0	09/08/2010	11 / 88	0.0003909
Magnesium, Dissolved	mg/L	NA	4.62	11.7	ERM0.3	10/19/2010	87 / 87	9.498
Magnesium, Total	mg/L	NA	4.65	11.7	CRM2.0	10/19/2010	87 / 87	9.602
Manganese, Dissolved	mg/L	0.00033 / 0.00256	0.00035	0.15	ERM4.0	09/14/2010	76 / 87	0.008812
Manganese, Total	mg/L	0.00033 / 0.00033	0.00825	0.225	ERM4.0	09/14/2010	86 / 87	0.05455
Mercury, Dissolved	mg/L	0.00015 / 0.00015	0.0002	0.0002	CRM6.0	10/19/2010	1 / 88	0.0002
Mercury, Total	mg/L	0.00015 / 0.00015	0.00016	0.00023	CRM2.0	09/08/2010	5 / 88	0.0001854
Molybdenum, Dissolved	mg/L	0.00033 / 0.00101	0.00035	0.00145	ERM0.3	10/05/2010	77 / 88	0.0008045
Molybdenum, Total	mg/L	0.00033 / 0.00112	0.00035	0.0015	ERM0.3	10/05/2010	75 / 88	0.0008195
Nickel, Dissolved	mg/L	0.00033 / 0.00065	0.00033	0.00063	ERM8.0	10/05/2010	32 / 88	0.0004156
Nickel, Total	mg/L	0.00033 / 0.00033	0.00033	0.00113	TRM566.0	10/05/2010	74 / 87	0.0005353
Potassium, Dissolved	mg/L	NA	1.46	1.72	ERM8.0	10/05/2010	88 / 88	1.549
Potassium, Total	mg/L	NA	1.49	1.73	ERM8.0	10/05/2010	88 / 88	1.579
Selenium, Dissolved	mg/L	0.00033 / 0.388	0.00033	0.00102	ERM2.0	10/12/2010	41 / 110	0.0004974
Selenium, Total	mg/L	0.00033 / 0.00033	0.00033	0.00093	ERM1.0	10/12/2010	24 / 88	0.0004383
Selenate	mg/L	0.157 / 0.157	0.00017	0.00054	ERM2.0	10/12/2010	9 / 22	0.0003133
Selenite	mg/L	0.285 / 0.285	ND	ND	NA	NA	0 / 22	NA

Table 6. Summary Statistics for Clinch River Mid-depth and Epilimnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Inorganic Selenium, Dissolved	mg/L	0.285 / 0.285	0.0004	0.00054	ERM2.0	10/12/2010	3 / 22	0.0004753
Organic Selenium, Dissolved	mg/L	0.388 / 0.388	0.00039	0.00056	CRM2.0	10/12/2010	12 / 22	0.0004862
Silver, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 88	NA
Silver, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 88	NA
Sodium, Dissolved	mg/L	NA	5.35	8.22	TRM568.5	10/05/2010	87 / 87	6.665
Sodium, Total	mg/L	NA	5.44	8.3	TRM568.5	10/05/2010	87 / 87	6.7
Strontium, Dissolved	mg/L	NA	0.066	0.125	ERM2.0	10/12/2010	88 / 88	0.1039
Strontium, Total	mg/L	NA	0.0671	0.126	ERM1.0	10/12/2010	88 / 88	0.105
Thallium, Dissolved	mg/L	0.0005 / 0.0005	ND	ND	NA	NA	0 / 88	NA
Thallium, Total	mg/L	0.0005 / 0.0005	ND	ND	NA	NA	0 / 88	NA
Total Dissolved Solids	mg/L	NA	84	190	CRM2.0	10/19/2010	87 / 87	147.5
Total Suspended Solids	mg/L	1 / 11.1	2.5	11.9	ERM2.0	09/14/2010	81 / 87	5.865
Vanadium, Dissolved	mg/L	0.001 / 0.001	0.00102	0.00252	ERM1.0	09/28/2010	20 / 88	0.001447
Vanadium, Total	mg/L	0.001 / 0.001	0.00102	0.00301	ERM1.0	09/28/2010	43 / 88	0.001594
Zinc, Dissolved	mg/L	0.0083 / 0.0083	0.00851	0.00851	ERM1.0	09/08/2010	1 / 88	0.00851
Zinc, Total	mg/L	0.0083 / 0.0083	0.00993	0.0137	ERM1.0	08/31/2010	2 / 88	0.01182
Actinium-228	pCi/L	10.9 / 17.4	ND	ND	NA	NA	0 / 21	NA
Americium-241	pCi/L	6.06 / 26.6	ND	ND	NA	NA	0 / 21	NA
Bismuth-214	pCi/L	7.34 / 15.3	27.3	34.6	ERM1.0	10/05/2010	1 / 21	34.6
Cesium-137	pCi/L	2.58 / 4.25	ND	ND	NA	NA	0 / 21	NA
Cobalt-60	pCi/L	2.8 / 5.72	ND	ND	NA	NA	0 / 22	NA
Lead-212	pCi/L	5.81 / 11.2	ND	ND	NA	NA	0 / 21	NA
Lead-214	pCi/L	7.15 / 25.3	ND	ND	NA	NA	0 / 21	NA
Potassium-40	pCi/L	36 / 54.6	ND	ND	NA	NA	0 / 22	NA

Table 6. Summary Statistics for Clinch River Mid-depth and Epilimnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Radium-226	pCi/L	0.261 / 1.64	0.408	0.88	ERM1.0	09/22/2010	5 / 21	0.5976
Radium-228	pCi/L	0.327 / 1.72	3.77	3.77	ERM4.0	09/28/2010	1 / 21	3.77
Thallium-208	pCi/L	3.29 / 5.77	ND	ND	NA	NA	0 / 21	NA
Thorium-228	pCi/L	0.0609 / 0.141	ND	ND	NA	NA	0 / 21	NA
Thorium-230	pCi/L	0.0204 / 0.102	0.132	0.235	TRM566.0	09/29/2010	2 / 21	0.1835
Thorium-232	pCi/L	0.0126 / 0.125	ND	ND	NA	NA	0 / 21	NA
Thorium-234	pCi/L	75.4 / 266	ND	ND	NA	NA	0 / 21	NA
Uranium-234	pCi/L	0.0632 / 0.264	0.142	0.268	CRM6.0	09/29/2010	10 / 21	0.1902
Uranium-235	pCi/L	0.0672 / 0.257	ND	ND	NA	NA	0 / 21	NA
Uranium-238	pCi/L	0.0543 / 0.264	0.104	0.252	ERM4.0	09/28/2010	10 / 22	0.1483

Note: For definitions, see the Acronyms section.

Table 7. Summary Statistics for Clinch River Epibenthic and Hypolymnion Surface Water Samples

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Aluminum, Dissolved	mg/L	0.05 / 0.05	ND	ND	NA	NA	0 / 94	NA
Aluminum, Total	mg/L	0.05 / 0.374	0.0551	1.22	ERM3.0	09/22/2010	87 / 94	0.3123
Antimony, Dissolved	mg/L	0.00033 / 0.00033	0.00039	0.00039	ERM2.0	09/28/2010	1 / 94	0.00039
Antimony, Total	mg/L	0.00033 / 0.00033	0.00042	0.00043	CRM2.0	09/29/2010	3 / 94	0.0004267
Arsenic, Dissolved	mg/L	0.00033 / 0.00033	0.00034	0.00363	ERM3.0	10/12/2010	115 / 116	0.00107
Arsenic, Total	mg/L	NA	0.0004	0.00638	ERM3.0	09/22/2010	94 / 94	0.001605
Arsenate, Dissolved	mg/L	NA	0.00009	0.00147	ERM3.0	10/12/2010	22 / 22	0.0005771
Arsenite, Dissolved	mg/L	0.003 / 0.009	0.00005	0.00087	ERM4.0	10/12/2010	21 / 22	0.0002769
Inorganic Arsenic, Dissolved	mg/L	NA	0.00027	0.00231	ERM3.0	10/12/2010	22 / 22	0.0008427
Organic Arsenic, Dissolved	mg/L	NA	0.00016	0.00132	ERM3.0	10/12/2010	22 / 22	0.000371
Barium, Dissolved	mg/L	NA	0.023	0.0576	ERM4.0	09/28/2010	94 / 94	0.03842
Barium, Total	mg/L	NA	0.026	0.0862	ERM3.0	09/28/2010	94 / 94	0.04469
Beryllium, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 94	NA
Beryllium, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 94	NA
Boron, Dissolved	mg/L	0.0125 / 0.0125	0.0128	0.0231	ERM3.0	10/12/2010	89 / 94	0.0174
Boron, Total	mg/L	0.0125 / 0.0125	0.0125	0.0264	ERM2.0	10/12/2010	93 / 94	0.01784
Cadmium, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 94	NA
Cadmium, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 94	NA
Calcium, Dissolved	mg/L	NA	19.7	39.9	CRM6.0	10/19/2010	94 / 94	36.06
Calcium, Total	mg/L	NA	20.2	40.3	ERM1.0	10/05/2010	95 / 95	36.45
Chromium, Dissolved	mg/L	0.00033 / 0.00033	0.00039	0.00039	CRM3.5	09/14/2010	1 / 94	0.00039
Chromium, Total	mg/L	0.00033 / 0.00049	0.00033	0.00108	ERM3.0	09/22/2010	41 / 94	0.0005549
Cobalt, Dissolved	mg/L	0.00033 / 0.00033	0.00036	0.00036	ERM8.0	09/22/2010	1 / 94	0.00036
Cobalt, Total	mg/L	0.00033 / 0.00033	0.00033	0.00105	ERM3.0	09/22/2010	37 / 94	0.0005551
Copper, Dissolved	mg/L	0.00033 / 0.00155	0.00033	0.00253	TRM566.0	08/31/2010	72 / 95	0.0006521

Table 7. Summary Statistics for Clinch River Epibenthic and Hypolymnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Copper, Total	mg/L	0.00033 / 0.00033	0.00041	0.00318	CRM2.0	09/29/2010	92 / 94	0.0013
Dissolved Organic Carbon	mg/L	1 / 2.03	1.5	3.01	ERM8.0	08/31/2010	86 / 94	1.807
Hardness (As CaCO3)	mg/L	NA	71.1	149	CRM6.0	10/19/2010	95 / 95	134.2
Hex. Chromium, Dissolved	mg/L	NA	0.0016	0.0021	CRM3.5	09/21/2010	7 / 7	0.001843
Iron, Dissolved	mg/L	0.025 / 0.025	0.0522	0.198	ERM8.0	09/22/2010	7 / 94	0.1181
Iron, Total	mg/L	NA	0.0621	0.779	ERM3.0	09/22/2010	95 / 95	0.2662
Lead, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 94	NA
Lead, Total	mg/L	0.00033 / 0.0006	0.00034	0.00167	ERM3.0	09/22/2010	57 / 94	0.0006516
Magnesium, Dissolved	mg/L	NA	4.84	11.7	CRM6.0	10/19/2010	95 / 95	10.32
Magnesium, Total	mg/L	NA	5.01	11.9	ERM0.3	10/19/2010	95 / 95	10.49
Manganese, Dissolved	mg/L	NA	0.00061	0.822	ERM4.0	09/28/2010	95 / 95	0.06808
Manganese, Total	mg/L	NA	0.0253	0.866	ERM4.0	09/28/2010	95 / 95	0.1294
Mercury, Dissolved	mg/L	0.00015 / 0.00015	ND	ND	NA	NA	0 / 94	NA
Mercury, Total	mg/L	0.00015 / 0.00015	0.00015	0.00023	ERM1.0	09/08/2010	2 / 94	0.000192
Molybdenum, Dissolved	mg/L	0.00033 / 0.00106	0.00033	0.00117	ERM2.0	10/05/2010	87 / 94	0.0007186
Molybdenum, Total	mg/L	0.00033 / 0.00122	0.00036	0.00125	ERM3.0	10/05/2010	86 / 94	0.0007108
Nickel, Dissolved	mg/L	0.00033 / 0.00057	0.00033	0.00083	ERM2.0	09/08/2010	41 / 94	0.0004132
Nickel, Total	mg/L	0.00033 / 0.00033	0.00034	0.00202	ERM3.0	09/22/2010	90 / 95	0.0007621
Potassium, Dissolved	mg/L	NA	1.46	1.68	ERM8.0	10/05/2010	94 / 94	1.536
Potassium, Total	mg/L	NA	1.5	1.72	ERM3.0	08/31/2010	94 / 94	1.597
Selenium, Dissolved	mg/L	0.00033 / 0.388	0.00033	0.00098	ERM2.0	10/12/2010	36 / 116	0.0004944
Selenium, Total	mg/L	0.00033 / 0.00033	0.00033	0.0007	ERM2.0	10/12/2010	31 / 94	0.0004148
Selenate	mg/L	0.157 / 0.157	0.00016	0.00035	ERM4.0	10/19/2010	10 / 22	0.0002433
Selenite	mg/L	0.285 / 0.285	ND	ND	NA	NA	0 / 22	NA

Table 7. Summary Statistics for Clinch River Epibenthic and Hypolymnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Inorganic Selenium, Dissolved	mg/L	0.285 / 0.285	0.00029	0.00035	ERM4.0	10/19/2010	4 / 22	0.0003255
Organic Selenium, Dissolved	mg/L	0.388 / 0.388	0.0004	0.00064	ERM2.0	10/12/2010	11 / 22	0.000491
Silver, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 94	NA
Silver, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 94	NA
Sodium, Dissolved	mg/L	NA	5.66	8.31	TRM568.5	10/05/2010	95 / 95	6.558
Sodium, Total	mg/L	NA	5.79	8.38	TRM568.5	10/05/2010	95 / 95	6.622
Strontium, Dissolved	mg/L	NA	0.0735	0.121	ERM2.0	10/12/2010	94 / 94	0.1085
Strontium, Total	mg/L	NA	0.0746	0.128	ERM3.0	09/22/2010	94 / 94	0.1113
Thallium, Dissolved	mg/L	0.0005 / 0.0005	ND	ND	NA	NA	0 / 94	NA
Thallium, Total	mg/L	0.0005 / 0.0005	ND	ND	NA	NA	0 / 94	NA
Total Dissolved Solids	mg/L	NA	93	186	CRM2.0	10/19/2010	95 / 95	157.5
Total Suspended Solids	mg/L	1 / 24.4	3.6	37.3	ERM3.0	10/05/2010	89 / 95	13.39
Vanadium, Dissolved	mg/L	0.001 / 0.001	0.001	0.00128	ERM3.0	09/14/2010	13 / 94	0.001067
Vanadium, Total	mg/L	0.001 / 0.001	0.001	0.00467	ERM3.0	09/22/2010	62 / 94	0.001874
Zinc, Dissolved	mg/L	0.0083 / 0.0083	ND	ND	NA	NA	0 / 94	NA
Zinc, Total	mg/L	0.0083 / 0.0083	0.0122	0.0122	ERM3.0	08/31/2010	1 / 94	0.0122
Actinium-228	pCi/L	10.1 / 18.5	ND	ND	NA	NA	0 / 25	NA
Americium-241	pCi/L	4.28 / 30.9	ND	ND	NA	NA	0 / 25	NA
Bismuth-214	pCi/L	5.94 / 12.8	27	27	ERM1.0	10/05/2010	1 / 25	27
Cesium-137	pCi/L	2.63 / 4.27	ND	ND	NA	NA	0 / 25	NA
Cobalt-60	pCi/L	2.3 / 4.18	ND	ND	NA	NA	0 / 24	NA
Lead-212	pCi/L	4.79 / 10.8	ND	ND	NA	NA	0 / 25	NA
Lead-214	pCi/L	5.4 / 20.7	9.73	9.73	ERM1.0	10/05/2010	1 / 25	9.73
Potassium-40	pCi/L	32.3 / 56.4	ND	ND	NA	NA	0 / 24	NA

Table 7. Summary Statistics for Clinch River Epibenthic and Hypolymnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Radium-226	pCi/L	0.321 / 1.01	0.369	0.425	ERM0.3	09/22/2010	2 / 25	0.397
Radium-228	pCi/L	0.384 / 2.08	3.27	3.27	ERM3.0	09/28/2010	1 / 25	3.27
Thallium-208	pCi/L	2.91 / 5.81	ND	ND	NA	NA	0 / 25	NA
Thorium-228	pCi/L	0.0416 / 0.149	ND	ND	NA	NA	0 / 25	NA
Thorium-230	pCi/L	0.0414 / 0.173	ND	ND	NA	NA	0 / 25	NA
Thorium-232	pCi/L	0.0131 / 0.147	0.0569	0.0569	ERM3.0	09/22/2010	1 / 25	0.0569
Thorium-234	pCi/L	61.3 / 298	ND	ND	NA	NA	0 / 25	NA
Uranium-234	pCi/L	0.0668 / 0.252	0.105	0.365	CRM6.0	09/29/2010	17 / 25	0.2011
Uranium-235	pCi/L	0.0694 / 0.291	ND	ND	NA	NA	0 / 25	NA
Uranium-238	pCi/L	0.0596 / 0.236	0.09	0.3	ERM3.0	09/22/2010	13 / 24	0.1503

Note: For definitions, see the Acronyms section.

Table 8. Summary Statistics for Tennessee River Mid-depth and Epilimnion Surface Water Samples

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Aluminum, Dissolved	mg/L	0.05 / 0.05	0.065	0.065	TRM566.0	09/14/2010	1 / 16	0.065
Aluminum, Total	mg/L	0.05 / 0.122	0.0676	0.151	TRM566.0	10/05/2010	14 / 16	0.107
Antimony, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 16	NA
Antimony, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 16	NA
Arsenic, Dissolved	mg/L	NA	0.00035	0.00098	TRM566.0	10/05/2010	20 / 20	0.0005561
Arsenic, Total	mg/L	NA	0.00036	0.00092	TRM566.0	10/12/2010	16 / 16	0.0006069
Arsenate, Dissolved	mg/L	NA	0.0002	0.0004	TRM566.0	10/12/2010	4 / 4	0.0003053
Arsenite, Dissolved	mg/L	NA	0.00004	0.00009	TRM566.0	10/12/2010	4 / 4	0.00005625
Inorganic Arsenic, Dissolved	mg/L	NA	0.00023	0.00048	TRM566.0	10/12/2010	4 / 4	0.0003618
Organic Arsenic, Dissolved	mg/L	NA	0.00015	0.00027	TRM566.0	10/19/2010	4 / 4	0.0002013
Barium, Dissolved	mg/L	NA	0.0214	0.0299	TRM566.0	09/08/2010	16 / 16	0.02479
Barium, Total	mg/L	NA	0.023	0.0326	TRM566.0	09/08/2010	16 / 16	0.027
Beryllium, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 16	NA
Beryllium, Total	mg/L	0.00033 / 0.00033	0.00048	0.00048	TRM566.0	10/12/2010	1 / 16	0.00048
Boron, Dissolved	mg/L	0.0125 / 0.0125	0.0127	0.0169	TRM566.0	09/08/2010	12 / 16	0.01434
Boron, Total	mg/L	0.0125 / 0.0125	0.0126	0.0182	TRM566.0	10/12/2010	10 / 16	0.01463
Cadmium, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 16	NA
Cadmium, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 16	NA
Calcium, Dissolved	mg/L	NA	18.7	28.7	TRM566.0	09/08/2010	16 / 16	21.66
Calcium, Total	mg/L	NA	18.8	29.3	TRM566.0	09/08/2010	16 / 16	21.76
Chromium, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 16	NA
Chromium, Total	mg/L	0.00033 / 0.00033	0.00043	0.00043	TRM566.0	10/12/2010	1 / 16	0.00043
Cobalt, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 16	NA
Cobalt, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 16	NA
Copper, Dissolved	mg/L	0.00033 / 0.00041	0.00033	0.00318	TRM566.0	08/31/2010	14 / 16	0.00086

Table 8. Summary Statistics for Tennessee River Mid-depth and Epilimnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Copper, Total	mg/L	NA	0.00037	0.00219	TRM566.0	08/31/2010	16 / 16	0.0007413
Dissolved Organic Carbon	mg/L	1 / 2.39	1.7	2.16	TRM566.0	10/05/2010	13 / 16	1.939
Hardness (As CaCO3)	mg/L	NA	66.2	107	TRM566.0	09/08/2010	16 / 16	77.34
Hex. Chromium, Dissolved	mg/L	NA	0.0012	0.0016	TRM566.0	09/21/2010	2 / 2	0.0014
Iron, Dissolved	mg/L	0.025 / 0.025	0.0839	0.0839	TRM566.0	09/14/2010	1 / 16	0.0839
Iron, Total	mg/L	0.025 / 0.025	0.0629	0.199	TRM568.5	10/05/2010	15 / 16	0.1208
Lead, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 16	NA
Lead, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 16	NA
Magnesium, Dissolved	mg/L	NA	4.62	7.92	TRM566.0	09/08/2010	16 / 16	5.506
Magnesium, Total	mg/L	NA	4.65	8.11	TRM566.0	09/08/2010	16 / 16	5.57
Manganese, Dissolved	mg/L	0.00033 / 0.00067	0.00035	0.0387	TRM566.0	09/14/2010	11 / 16	0.004459
Manganese, Total	mg/L	0.00033 / 0.00033	0.038	0.0772	TRM566.0	10/05/2010	15 / 16	0.05355
Mercury, Dissolved	mg/L	0.00015 / 0.00015	ND	ND	NA	NA	0 / 16	NA
Mercury, Total	mg/L	0.00015 / 0.00015	ND	ND	NA	NA	0 / 16	NA
Molybdenum, Dissolved	mg/L	0.00033 / 0.00033	0.00035	0.00072	TRM566.0	10/12/2010	10 / 16	0.00048
Molybdenum, Total	mg/L	0.00033 / 0.00033	0.00035	0.0006	TRM566.0	09/14/2010	8 / 16	0.00048
Nickel, Dissolved	mg/L	0.00033 / 0.00033	0.0004	0.0004	TRM566.0	10/12/2010	1 / 16	0.0004
Nickel, Total	mg/L	0.00033 / 0.00033	0.00035	0.00113	TRM566.0	10/05/2010	7 / 16	0.0005043
Potassium, Dissolved	mg/L	NA	1.48	1.63	TRM568.5	10/05/2010	16 / 16	1.544
Potassium, Total	mg/L	NA	1.5	1.65	TRM566.0	10/05/2010	16 / 16	1.57
Selenium, Dissolved	mg/L	0.00033 / 0.388	0.0004	0.0004	TRM566.0	10/12/2010	1 / 20	0.0004
Selenium, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 16	NA
Selenate	mg/L	0.157 / 0.157	ND	ND	NA	NA	0 / 4	NA
Selenite	mg/L	0.285 / 0.285	ND	ND	NA	NA	0 / 4	NA

Table 8. Summary Statistics for Tennessee River Mid-depth and Epilimnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Inorganic Selenium, Dissolved	mg/L	0.285 / 0.285	ND	ND	NA	NA	0 / 4	NA
Organic Selenium, Dissolved	mg/L	0.388 / 0.388	ND	ND	NA	NA	0 / 4	NA
Silver, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 16	NA
Silver, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 16	NA
Sodium, Dissolved	mg/L	NA	6.88	8.22	TRM568.5	10/05/2010	16 / 16	7.566
Sodium, Total	mg/L	NA	6.86	8.3	TRM568.5	10/05/2010	16 / 16	7.583
Strontium, Dissolved	mg/L	NA	0.066	0.0946	TRM566.0	09/08/2010	16 / 16	0.07518
Strontium, Total	mg/L	NA	0.0671	0.0946	TRM566.0	09/08/2010	16 / 16	0.07578
Thallium, Dissolved	mg/L	0.0005 / 0.0005	ND	ND	NA	NA	0 / 16	NA
Thallium, Total	mg/L	0.0005 / 0.0005	ND	ND	NA	NA	0 / 16	NA
Total Dissolved Solids	mg/L	NA	84	122	TRM566.0	09/08/2010	16 / 16	99.63
Total Suspended Solids	mg/L	NA	4.2	8.5	TRM568.5	10/05/2010	16 / 16	5.838
Vanadium, Dissolved	mg/L	0.001 / 0.001	ND	ND	NA	NA	0 / 16	NA
Vanadium, Total	mg/L	0.001 / 0.001	0.00102	0.00102	TRM566.0	10/05/2010	1 / 16	0.00102
Zinc, Dissolved	mg/L	0.0083 / 0.0083	ND	ND	NA	NA	0 / 16	NA
Zinc, Total	mg/L	0.0083 / 0.0083	ND	ND	NA	NA	0 / 16	NA
Actinium-228	pCi/L	12.5 / 14.6	ND	ND	NA	NA	0 / 4	NA
Americium-241	pCi/L	11.2 / 24.3	ND	ND	NA	NA	0 / 4	NA
Bismuth-214	pCi/L	7.66 / 8.61	ND	ND	NA	NA	0 / 4	NA
Cesium-137	pCi/L	3.17 / 4.03	ND	ND	NA	NA	0 / 4	NA
Cobalt-60	pCi/L	3.15 / 3.26	ND	ND	NA	NA	0 / 4	NA
Lead-212	pCi/L	6.57 / 7.4	ND	ND	NA	NA	0 / 4	NA
Lead-214	pCi/L	7.75 / 11.3	ND	ND	NA	NA	0 / 4	NA
Potassium-40	pCi/L	36 / 54.3	ND	ND	NA	NA	0 / 4	NA

Table 8. Summary Statistics for Tennessee River Mid-depth and Epilimnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Radium-226	pCi/L	0.393 / 0.5	0.609	0.609	TRM566.0	09/29/2010	1 / 4	0.609
Radium-228	pCi/L	0.515 / 0.98	ND	ND	NA	NA	0 / 4	NA
Thallium-208	pCi/L	3.33 / 3.89	ND	ND	NA	NA	0 / 4	NA
Thorium-228	pCi/L	0.0912 / 0.139	ND	ND	NA	NA	0 / 4	NA
Thorium-230	pCi/L	0.0413 / 0.0751	0.235	0.235	TRM566.0	09/29/2010	1 / 4	0.235
Thorium-232	pCi/L	0.0407 / 0.125	ND	ND	NA	NA	0 / 4	NA
Thorium-234	pCi/L	128 / 238	ND	ND	NA	NA	0 / 4	NA
Uranium-234	pCi/L	0.108 / 0.232	0.16	0.16	TRM568.5	09/21/2010	1 / 4	0.16
Uranium-235	pCi/L	0.0723 / 0.18	ND	ND	NA	NA	0 / 4	NA
Uranium-238	pCi/L	0.108 / 0.193	ND	ND	NA	NA	0 / 4	NA

Note: For definitions, see the Acronyms section.

Table 9. Summary Statistics for Tennessee River Epibenthic and Hypolymnion Surface Water Samples

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Aluminum, Dissolved	mg/L	0.05 / 0.05	ND	ND	NA	NA	0 / 20	NA
Aluminum, Total	mg/L	NA	0.111	0.592	TRM566.0	09/08/2010	20 / 20	0.2434
Antimony, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 20	NA
Antimony, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 20	NA
Arsenic, Dissolved	mg/L	0.00033 / 0.00033	0.00059	0.00161	TRM566.0	09/21/2010	23 / 24	0.0009549
Arsenic, Total	mg/L	NA	0.00044	0.00198	TRM566.0	09/21/2010	20 / 20	0.001172
Arsenate, Dissolved	mg/L	NA	0.00037	0.00071	TRM566.0	10/19/2010	4 / 4	0.0005445
Arsenite, Dissolved	mg/L	NA	0.00011	0.00019	TRM568.5	10/12/2010	4 / 4	0.0001463
Inorganic Arsenic, Dissolved	mg/L	NA	0.00049	0.00088	TRM566.0	10/19/2010	4 / 4	0.0006905
Organic Arsenic, Dissolved	mg/L	NA	0.00018	0.00038	TRM568.5	10/12/2010	4 / 4	0.0002955
Barium, Dissolved	mg/L	NA	0.023	0.0375	TRM568.5	10/12/2010	20 / 20	0.03304
Barium, Total	mg/L	NA	0.026	0.0431	TRM566.0	09/08/2010	20 / 20	0.03744
Beryllium, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 20	NA
Beryllium, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 20	NA
Boron, Dissolved	mg/L	0.0125 / 0.0125	0.0137	0.0219	TRM568.5	10/12/2010	19 / 20	0.01709
Boron, Total	mg/L	0.0125 / 0.0125	0.0132	0.0215	TRM568.5	10/12/2010	19 / 20	0.01638
Cadmium, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 20	NA
Cadmium, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 20	NA
Calcium, Dissolved	mg/L	NA	19.7	36.7	TRM568.5	10/12/2010	20 / 20	32.47
Calcium, Total	mg/L	NA	20.2	37.5	TRM568.5	09/14/2010	20 / 20	32.89

Table 9. Summary Statistics for Tennessee River Epibenthic and Hypolymnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Chromium, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 20	NA
Chromium, Total	mg/L	0.00033 / 0.00049	0.00035	0.00067	TRM566.0	09/08/2010	9 / 20	0.0004178
Cobalt, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 20	NA
Cobalt, Total	mg/L	0.00033 / 0.00033	0.00033	0.0005	TRM566.0	09/08/2010	6 / 20	0.0003917
Copper, Dissolved	mg/L	0.00033 / 0.00073	0.00038	0.00253	TRM566.0	08/31/2010	15 / 20	0.0008787
Copper, Total	mg/L	NA	0.00056	0.00194	TRM566.0	08/31/2010	20 / 20	0.001302
Dissolved Organic Carbon	mg/L	1 / 1.82	1.61	2.11	TRM566.0	10/05/2010	17 / 20	1.816
Hardness (As CaCO3)	mg/L	NA	71.1	137	TRM568.5	09/14/2010	20 / 20	120.5
Hex. Chromium, Dissolved	mg/L	NA	0.0016	0.0017	TRM566.0	09/21/2010	3 / 3	0.001667
Iron, Dissolved	mg/L	0.025 / 0.025	ND	ND	NA	NA	0 / 20	NA
Iron, Total	mg/L	NA	0.123	0.542	TRM566.0	09/08/2010	20 / 20	0.247
Lead, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 20	NA
Lead, Total	mg/L	0.00033 / 0.0006	0.00034	0.00083	TRM566.0	09/08/2010	12 / 20	0.0005317
Magnesium, Dissolved	mg/L	NA	4.84	10.5	TRM568.5	09/21/2010	20 / 20	9.116
Magnesium, Total	mg/L	NA	5.01	10.8	TRM568.5	09/21/2010	20 / 20	9.329
Manganese, Dissolved	mg/L	NA	0.00138	0.131	TRM566.0	09/21/2010	20 / 20	0.02544
Manganese, Total	mg/L	NA	0.0518	0.231	TRM566.0	09/21/2010	20 / 20	0.09862
Mercury, Dissolved	mg/L	0.00015 / 0.00015	ND	ND	NA	NA	0 / 20	NA
Mercury, Total	mg/L	0.00015 / 0.00015	ND	ND	NA	NA	0 / 20	NA

Table 9. Summary Statistics for Tennessee River Epibenthic and Hypolymnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Molybdenum, Dissolved	mg/L	0.00033 / 0.00033	0.00039	0.00096	TRM568.5	10/12/2010	19 / 20	0.0005995
Molybdenum, Total	mg/L	0.00033 / 0.00033	0.00037	0.00087	TRM568.5	09/29/2010	18 / 20	0.0006006
Nickel, Dissolved	mg/L	0.00033 / 0.00054	0.00033	0.00041	TRM568.5	09/29/2010	3 / 20	0.00036
Nickel, Total	mg/L	0.00033 / 0.00033	0.00034	0.00079	TRM568.5	09/29/2010	18 / 20	0.0006028
Potassium, Dissolved	mg/L	NA	1.47	1.62	TRM568.5	10/05/2010	20 / 20	1.536
Potassium, Total	mg/L	NA	1.52	1.7	TRM568.5	10/05/2010	20 / 20	1.595
Selenium, Dissolved	mg/L	0.00033 / 0.388	0.00039	0.00078	TRM568.5	10/12/2010	4 / 24	0.0005015
Selenium, Total	mg/L	0.00033 / 0.00033	0.00033	0.00055	TRM568.5	10/12/2010	5 / 20	0.000418
Selenate	mg/L	0.157 / 0.157	0.00033	0.00033	TRM568.5	10/12/2010	1 / 4	0.000327
Selenite	mg/L	0.285 / 0.285	ND	ND	NA	NA	0 / 4	NA
Inorganic Selenium, Dissolved	mg/L	0.285 / 0.285	0.00033	0.00033	TRM568.5	10/12/2010	1 / 4	0.000327
Organic Selenium, Dissolved	mg/L	0.388 / 0.388	0.00045	0.00045	TRM568.5	10/12/2010	1 / 4	0.000449
Silver, Dissolved	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 20	NA
Silver, Total	mg/L	0.00033 / 0.00033	ND	ND	NA	NA	0 / 20	NA
Sodium, Dissolved	mg/L	NA	6.17	8.31	TRM568.5	10/05/2010	20 / 20	6.862
Sodium, Total	mg/L	NA	6.29	8.38	TRM568.5	10/05/2010	20 / 20	6.938
Strontium, Dissolved	mg/L	NA	0.0735	0.114	TRM568.5	10/12/2010	20 / 20	0.1004
Strontium, Total	mg/L	NA	0.0746	0.117	TRM568.5	10/12/2010	20 / 20	0.1027
Thallium, Dissolved	mg/L	0.0005 / 0.0005	ND	ND	NA	NA	0 / 20	NA

Table 9. Summary Statistics for Tennessee River Epibenthic and Hypolymnion Surface Water Samples
(continued)

Analyte	Units	Detection Limit Range	Minimum Detected Result	Maximum Detected Result	Location of Maximum Detected Result	Date of Maximum Detected Result	Number of Detections / Samples	Mean of Detections
Thallium, Total	mg/L	0.0005 / 0.0005	ND	ND	NA	NA	0 / 20	NA
Total Dissolved Solids	mg/L	NA	93	167	TRM568.5	10/12/2010	20 / 20	144
Total Suspended Solids	mg/L	NA	5.8	21.3	TRM566.0	10/19/2010	20 / 20	13.17
Vanadium, Dissolved	mg/L	0.001 / 0.001	0.001	0.00111	TRM568.5	09/29/2010	2 / 20	0.001055
Vanadium, Total	mg/L	0.001 / 0.001	0.001	0.00223	TRM566.0	09/08/2010	15 / 20	0.00149
Zinc, Dissolved	mg/L	0.0083 / 0.0083	ND	ND	NA	NA	0 / 20	NA
Zinc, Total	mg/L	0.0083 / 0.0083	ND	ND	NA	NA	0 / 20	NA
Actinium-228	pCi/L	10.5 / 15.5	ND	ND	NA	NA	0 / 5	NA
Americium-241	pCi/L	4.28 / 24.1	ND	ND	NA	NA	0 / 5	NA
Bismuth-214	pCi/L	6.19 / 10.7	ND	ND	NA	NA	0 / 5	NA
Cesium-137	pCi/L	2.73 / 4.27	ND	ND	NA	NA	0 / 5	NA
Cobalt-60	pCi/L	2.3 / 3.86	ND	ND	NA	NA	0 / 5	NA
Lead-212	pCi/L	4.79 / 8.54	ND	ND	NA	NA	0 / 5	NA
Lead-214	pCi/L	5.4 / 20.7	ND	ND	NA	NA	0 / 5	NA
Potassium-40	pCi/L	35.6 / 50.4	ND	ND	NA	NA	0 / 5	NA
Radium-226	pCi/L	0.464 / 0.606	ND	ND	NA	NA	0 / 5	NA
Radium-228	pCi/L	0.384 / 0.992	ND	ND	NA	NA	0 / 5	NA
Thallium-208	pCi/L	2.91 / 4.7	ND	ND	NA	NA	0 / 5	NA
Thorium-228	pCi/L	0.0728 / 0.149	ND	ND	NA	NA	0 / 5	NA
Thorium-230	pCi/L	0.0574 / 0.163	ND	ND	NA	NA	0 / 5	NA
Thorium-232	pCi/L	0.0528 / 0.147	ND	ND	NA	NA	0 / 5	NA
Thorium-234	pCi/L	61.3 / 245	ND	ND	NA	NA	0 / 5	NA
Uranium-234	pCi/L	0.0952 / 0.252	0.159	0.297	TRM568.5	09/29/2010	3 / 5	0.2183
Uranium-235	pCi/L	0.0736 / 0.269	ND	ND	NA	NA	0 / 5	NA
Uranium-238	pCi/L	0.0596 / 0.218	ND	ND	NA	NA	0 / 5	NA

Note: For definitions, see the Acronyms section.

Figures

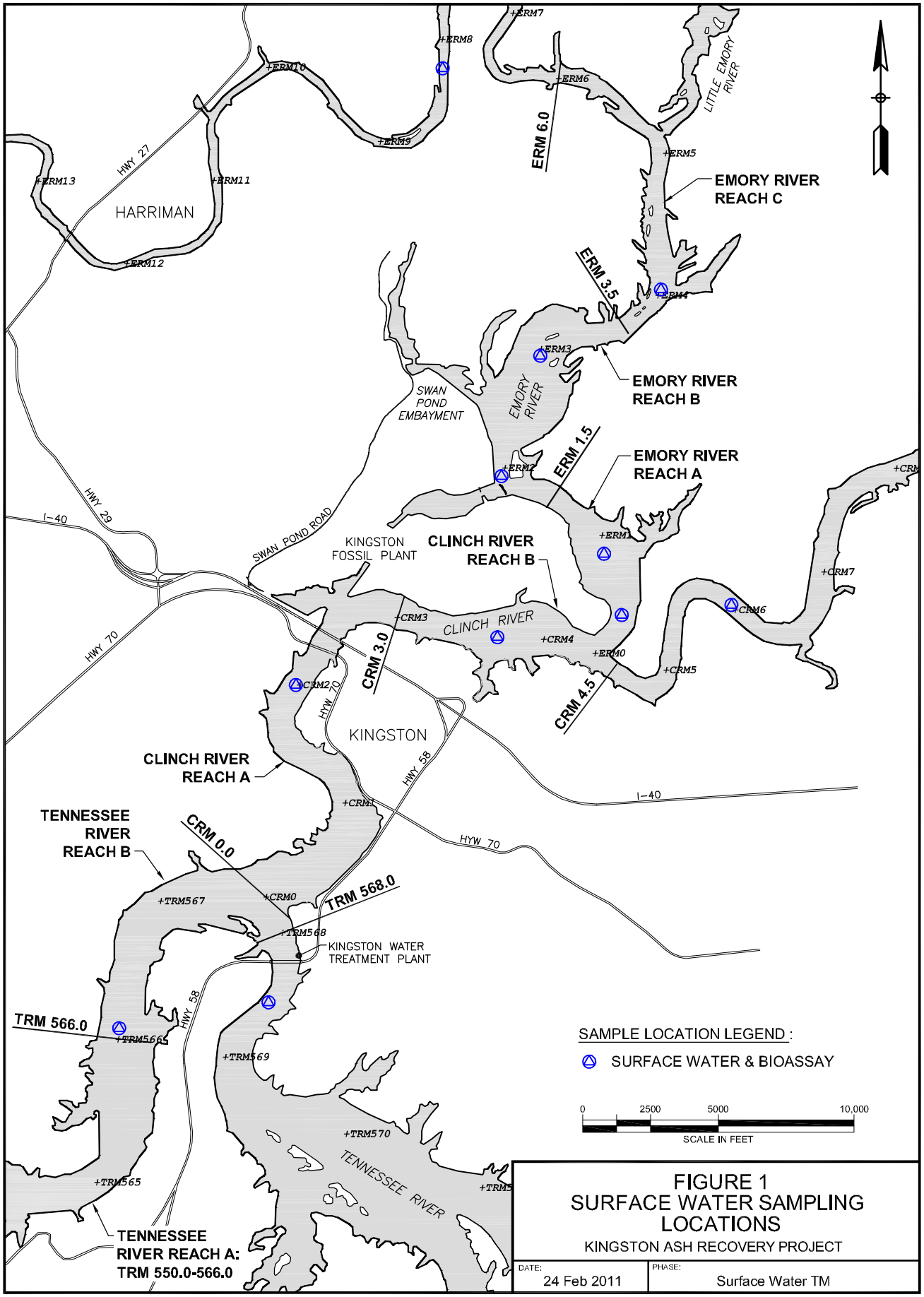

FIGURE 1
SURFACE WATER SAMPLING LOCATIONS
KINGSTON ASH RECOVERY PROJECT

DATE:	PHASE:
24 Feb 2011	Surface Water TM