Tennessee Valley Authority
Regulatory Submittal for Kingston Fossil Plant

Documents submitted:
Non-Time-Critical Removal Action Surface Water Monitoring Plan
EPA-AO-038

Date Submitted:
March 27, 2012

Submitted to whom
Craig Zeller, EPA

Concurrence

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Tennessee Valley Authority, 1134 Swan Pond Road Trailer Park, Harriman, Tennessee 37748

March 27, 2012

Mr. Craig Zeller
U.S. Environmental Protection Agency
Region 4
61 Forsyth Street Southwest
Atlanta, Georgia 30303

Dear Mr. Zeller:

Please find enclosed the revised Site Storm Water Management Plan. The enclosed plan fulfills the requirements of Section IX, paragraph 28, item a. of the Administrative Order and Agreement on Consent. A description of what is being changed and documentation supporting the changes is included in with the submittal. Please contact me if you have any questions.

Sincerely,

Steven H. McCracken

Enclosures

TVA

Document No. EPA-AO-038

Kingston Ash Recovery Project
Non-Time-Critical Removal Action
Surface Water Monitoring Plan

Prepared by:
Jacobs

for the Tennessee Valley Authority

Revision	Description	Date
00	River Sampling Plan for TVA Review	July 26, 2011
01	River Sampling Plan for EPA Review	July 29, 2011
02	River Sampling Plan for EPA Review	March 26, 2012

This Surface Water Monitoring Plan for the non-time-critical removal action reflects changes to the monitoring scope as a result of the planned removal of Dike 2, the relocation of the Clean Water Ditch ISCO® sampling platform to accommodate the construction of Dike 3, and an evaluation of data from routine and rain-event samples collected from the Clean Water Ditch and Settling Basin.

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Appendix

List of Acronyms

µg/L	microgram per liter
BMP	best management practice
cfs	cubic feet per second
CoC	chain-of-custody
cy	cubic yard
DMP	Data Management Plan
DQO	data quality objective
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency
ERM	Emory River Mile
KIF	Kingston Fossil Plant
mg/L	milligram per liter
msl	mean sea level
NPDES	National Pollutant Discharge Elimination System
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
SOP	Standard Operating Procedure
TDEC	Tennessee Department of Environment and Conservation
TSS	total suspended solid
TVA	Tennessee Valley Authority

1. INTRODUCTION AND BACKGROUND

This Surface Water Monitoring Plan, hereinafter referred to as “this Plan”, was prepared pursuant to the May 2009 Administrative Order and Agreement on Consent (the Order) between the U.S. Environmental Protection Agency (EPA) Region 4 and the Tennessee Valley Authority (TVA) to address the December 2008 ash release from the TVA Kingston Fossil Plant (KIF) (EPA 2009). This plan revises and supersedes the *Kingston Ash Recovery Project Non-Time-Critical Removal Action Surface Water Monitoring Plan* (TVA 2011) issued by TVA and approved by the EPA in August 2011.

As TVA’s efforts progressed from completion of the time-critical removal action to implementation of the non-time-critical removal action for the Swan Pond Embayment and Dredge Cell, surface water monitoring has been tailored to collect data to assess the impact of these actions on the river system water quality. TVA has completed an evaluation of surface water monitoring data collected between January 1, 2011 and January 26, 2012 and has concluded that this Plan is warranted (see Appendix A).

The scope of this Plan considers the tasks that will be implemented in accordance with the approved *Kingston Ash Recovery Project, Non-Time-Critical Removal Action, Embayment/Dredge Cell Action Memorandum* (TVA 2010a). This Plan will be in effect until a post-removal action long-term monitoring plan is approved by EPA and the Tennessee Department of Environment and Conservation (TDEC). The principal modifications to this Plan are the reduction of the frequency of sampling of the Swan Pond Embayment and the KIF Stilling Pond, and elimination of analysis for dissolved inorganic constituents. Figure 1 shows the sampling locations.

The current surface water monitoring approach is being modified based on the planned removal of Dike 2, the relocation of the Clean Water Ditch ISCO® sampling platform to accommodate the construction of Dike 3, and an evaluation of analytical results from routine and rain-event surface water samples collected from the Swan Pond Embayment (see Appendix A).

This Plan does not address surface water monitoring for any future remedial actions that might occur as the result of the analysis of data collected in support of the Engineering Evaluation/Cost Analysis (EE/CA) for the Emory, Clinch, and Tennessee River systems. Should additional remedial action be necessary, a surface water monitoring plan will be prepared in conjunction with that remedial action work plan.

The principal objectives of this Plan are to monitor ash-related constituents not captured by engineered controls for Swan Pond Embayment ash removal.

Key elements of this Plan are:

KIF Stilling Pond Effluent – The KIF Stilling Pond National Pollutant Discharge Elimination System (NPDES)-permitted outfall will be monitored monthly for total suspended solids (TSS) and ash-related constituents.

Swan Pond Embayment – Manual grab samples will be collected monthly at key surface water drainage ditch locations and analyzed for TSS and ash-related constituents. In addition, an automated composite sample will be collected from the Clean Water Ditch (final point of surface water exit to the Emory River) following a local rainfall event of $\geq$0.5 inch in a 24-hour period.

TVA sampling and analyses will be performed in accordance with the EPA-approved *Quality Assurance Project Plan (QAPP) for the Tennessee Valley Authority Kingston Ash Recovery Project. TVA-KIF-QAPP* (Environmental Standards, Inc. 2010). The QAPP provides the detail for overall sampling and analysis quality assurance/quality control (QA/QC) that will be implemented for this Plan. Agency (TDEC and EPA) sampling and analyses will be performed in accordance with their respective quality assurance provisions.

This Plan is organized as follows:

- Section 1 Introduction and Background
- Section 2 Non-Time-Critical Surface Water Monitoring Plan Objectives
- Section 3 Evaluation of Existing Surface Water Monitoring Data
- Section 4 Non-Time-Critical Surface Water Monitoring
- Section 5 Data Management
- Section 6 Quality Assurance/Quality Control

Table 5-2 of this Plan is the completed cross-walk table required by the approved QAPP.

The remainder of Section 1 provides background information for the TVA KIF, the ash spill event, and time-critical actions completed. Figure 1 shows the key features associated with the KIF site. It also illustrates the general areas being addressed by time-critical and non time-critical actions.

1.1 DESCRIPTION OF THE AREA AND LOCATION

The KIF is located at the confluence of the Emory and Clinch Rivers on Watts Bar Reservoir near Kingston, Tennessee. The KIF is one of the TVA's larger fossil plants. It generates 10 billion kilowatt-hours of electricity a year, enough to supply the needs of about 670,000 homes in the Tennessee Valley. Plant construction began in 1951 and was completed in 1955. Kingston has nine coal-fired generating units. The winter net dependable generating capacity is 1,456 megawatts. The plant consumes some 14,000 tons of coal a day.

The KIF is located on the Emory River arm of Watts Bar Reservoir; the Emory River discharges into the Clinch River. The Emory River borders the KIF Ash Pond and Dredge Cells to the east. The Emory River rises on the Cumberland Plateau in Morgan County, Tennessee, and crosses into Roane County near Harriman, Tennessee. Flow on the Emory River in the vicinity of the KIF is not controlled by any upstream flood control or navigation structures. The river elevation is controlled by Watts Bar Dam, approximately 44 miles downstream. Normal summer pool elevation for the Emory River at the KIF is approximately 740 to741 feet mean sea level (msl) and normal winter pool elevation is 735 to 737 feet msl. The Watts Bar annual spring reservoir fill-period is from April 1 to April 15. The Emory River typical flow volume in the winter and spring ranges from 500 to 50,000 cubic feet per second (cfs). The 10-year probable flood flow rate is 110,000 cfs.

1.2 DESCRIPTION OF THE ASH RELEASE AND INITIAL RESPONSE ACTIONS

Just before 1 a.m. on Monday, December 22, 2008, a coal fly ash spill occurred at the KIF, allowing a large amount of fly ash to escape into the adjacent waters of the Emory River. Ash, a by-product of a coal-fired power plant, is stored in dredge cell containment areas. Failure of the Dredge Cell dike caused about 60 acres of ash in the 84-acre containment area to be displaced. At the time of the slide, the cells contained about 9.4 million cubic yards (cy) of ash. The dike failure released about 5.4 million cy of coal ash that covered about 275 acres.

Fly ash filled the Swan Pond Embayment on the north side of the KIF property adjacent to the failed Dredge Cell. During the emergency response phase of the recovery, a dike (Dike 2) was constructed in the eastern portion of the Swan Pond Embayment to contain approximately 2.4 million cy of fly ash to the west of the dike until a removal action plan could be developed, approved by the regulators, and implemented. Approximately 3 million cy of ash also entered the channel and overbank areas of the riverine section of the Emory River.

1.3 STATUS OF THE TIME-CRITICAL REMOVAL ACTION

In June 2009, TVA initiated aggressive dredging and excavation actions to recover the ash east of Dike 2 in accordance with the Order and following completion of a pilot project to evaluate hydraulic dredging as an ash removal method (see EPA productivity documents at http://www.epakingstontva.com/productivity). Removal of more than 3 million cy of ash from the Emory River was completed in August 2010. Offsite disposal of that ash was completed in November 2010.

A quantity of ash remained in the Emory River due to re-suspension and mixing with sediments (EPA 2010). It is estimated that approximately 175,000 to 350,000 cy remained in the river between Emory River Mile (ERM) 0.0 to ERM 6.0, including material re-suspended from dredging, mixed material in sand bars and shallows, and ash mixed with sediment containing legacy cesium-137 between ERM 1.8 and ERM 0.0 from the U.S. Department of Energy activities on the Oak Ridge Reservation. Additionally, sediment-transport modeling has estimated that approximately 150,000 cy of ash were transported from the Emory River into the Clinch and Tennessee Rivers by storm events following the spill. The potential impacts of the remaining ash are being addressed by the River System EE/CA.

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2. NON-TIME-CRITICAL SURFACE WATER MONITORING PLAN OBJECTIVES

2.1 DATA QUALITY OBJECTIVES

The data quality objective (DQO) process is a logical series of seven steps that guides investigators to a plan for the resource-effective acquisition of environmental data. The process is both flexible and iterative, and applies to both decision-making (e.g., compliance/non-compliance with a standard) and estimation (e.g., ascertaining the mean concentration of a contaminant). The DQO process establishes performance and acceptance criteria that drive the plan for collecting data of sufficient quality and quantity to support the goals of the study. The DQO process leads to efficient and effective expenditures of resources; consensus on the type, quality, and quantity of data needed to meet project goals; and full documentation of actions taken during project development (EPA 2006).

The steps in the DQO process are as follows:

1. State the problem
2. Identify the goal(s) of the study
3. Identify information inputs
4. Define the study boundaries
5. Develop the analytic approach
6. Specify performance or acceptance criteria
7. Develop the plan for data acquisition

The following paragraphs describe application of the DQO process to developing this Plan for the non-time-critical removal action.

2.1.1 Problem Statement

The August 4, 2009, Action Memorandum (TVA 2009) for the time-critical removal action provided direction for removal of the approximately 3 million cy of ash from the Emory River east of Dike 2 in order to reduce the potential for upstream flooding due to impairment of flow by the spilled ash; and to reduce the potential for ash migration downstream during high-flow events. Time-critical dredging in the Emory River was completed in August 2010. The Action Memorandum for the non-time-critical removal action for the Embayment/Dredge Cell (TVA 2010a) provides direction for removal of the approximately 2.4 million cy of ash west and upstream of Dike 2. Water quality monitoring will be needed to determine whether there are any water quality impacts from non-time-critical removal actions. This Plan for the non-time-critical phase of the project is being revised based on the planned removal of Dike 2, the relocation of the Clean Water Ditch ISCO® sampling platform to accommodate the construction of Dike 3, and an evaluation of routine and rain-event monitoring data (see Appendix A) in order to be resource-effective and meet project goals.

2.1.2 Project Goals

The primary objectives for water quality monitoring in support of non-time-critical removal actions are to:

- Evaluate the effectiveness of best management practices (e.g., settling basins and diversion ditches) in preventing or mitigating changes in surface water quality that might impact public health or the environment during the final stages of the non-time-critical ash excavation and removal from Swan Pond Embayment, particularly during rain events; and

- Monitor the KIF Stilling Pond outfall to detect any adverse trends during the closure of the Dredge Cell and Ash Pond.

2.2 MONITORING APPROACH

The following paragraphs state the key questions that must be addressed for each of these objectives, provides a brief basis for each question, and summarizes the monitoring approach required.

Questions 1 and 2: Do non-time-critical ash removal and processing activities cause water quality changes that would impair water-based recreation? Are the settling basins and other Best Management Practices (BMPs) effective in preventing offsite migration of ash-related contaminants?

Potential impacts of the non-time-critical ash recovery operations to water-based recreation and the effectiveness of BMPs for those operations are closely related. Collecting monthly grab samples to monitor the quality of water leaving the site from Swan Pond Embayment, along with rain-event-triggered automated sampling of water leaving the site will provide information on BMP effectiveness.

Question 3: Do activities associated with closure of the Dredge Cells, Lateral Expansion, and Ash Pond cause unacceptable changes in water quality or violations of NPDES permit limits for the Stilling Pond discharge?

River dredging ended in August 2010 and ash processing operations will continue until the closure of the Dredge Cell. Monthly grab samples of water from the NPDES-permitted outfall will provide continuing information on the quality of the Stilling Pond discharge.

2.3 INFORMATION INPUTS

The information necessary to achieve the objectives includes the following:

- Continuous rainfall measurements from the KIF meteorological station to trigger sampling;
- Results of analyses of samples from the Swan Pond Embayment monitoring locations, and the Stilling Pond outfall for general water quality parameters, total metals, and TSS; and
- Results of analyses of water samples associated with Stilling Pond management.

2.4 SPATIAL AND TEMPORAL BOUNDARIES, TARGET POPULATIONS, AND CHARACTERISTICS OF INTEREST

The spatial boundaries of the study are the Swan Pond Embayment, and the Stilling Pond. TVA has established two locations to monitor releases from the non-time-critical ash removal operations (Settling Basins effluent and Clean Water Ditch), and one location to monitor discharges from the Stilling Pond related to ash processing activities.

The temporal boundary of the study is during the non-time-critical removal action in Swan Pond Embayment.

The human populations of interest are recreational users of the Emory River.

The ecological populations of interest are flora and fauna that live in or depend on the river system for food.

The analytical characteristics of interest are general water quality parameters, metals, and TSS associated with coal fly ash.

2.5 ANALYTIC APPROACH

Coal fly ash contains numerous constituents that have been linked to adverse health effects in human or ecological receptors. Specific constituents of interest include arsenic and selenium. Available screening levels are the state drinking water standards and water quality criteria; therefore, the analytical parameter of interest for samples collected from the monitoring locations will be compared to their respective screening levels. Other parameters of interest are general water quality parameters (temperature and pH), TSS, and total metals as indicators of ash loading to the river system for evaluation of BMPs.

2.6 ACTION LEVEL AND DECISION RULE

Action levels for this project are the Tennessee Drinking Water Quality Criteria for Domestic Water Supplies, Federal Maximum Contaminant Levels, Tennessee Water Quality Criteria – Fish and Aquatic Life Continuous Chronic Criteria and Tennessee Water Quality Criteria – Human Consumption of Water and Organisms, and upstream reference concentrations. The decision rule for analytical results from surface water monitoring location samples is "If the concentration of any ash-related constituent demonstrates a sustained or increasing trend that indicates unacceptable loading of ash to the river system, then the need for modification of management practices will be evaluated, else continue monitoring."

2.7 PERFORMANCE OR ACCEPTANCE CRITERIA

The null hypothesis for Swan Pond Embayment surface water is: BMPs are adequate for controlling releases of ash-related contaminants during removal actions in the Swan Pond Embayment. The alternative hypothesis for Swan Pond Embayment surface water is: BMPs are not adequate for controlling releases of ash during removal actions in the Swan Pond Embayment.

The null hypothesis for the Stilling Pond discharge is: Closure of the Dredge Cells, Lateral Expansion, and Ash Pond do not result in an unacceptable release of ash-related contaminants. The alternative hypothesis for Stilling Pond surface waters is: Closure of the Dredge Cells, Lateral Expansion, and Ash Pond result in an unacceptable release of ash-related contaminants.

2.8 DATA ACCEPTANCE

DQOs are assessed by monitoring QA measures, such as accuracy, precision, representativeness, comparability, and completeness, as discussed in QAPP, Sections 14 and 22. Specific qualitative DQOs for the chemical analyses to be performed are presented in detail in Section 14.0 of the QAPP; in Appendix C; and in Tables D-3, E-3, F-4, and H-3. The objectives associated with accuracy and precision of laboratory results are assessed through an evaluation of the results of QC samples. The accuracy of field measurements for temperature and pH are assessed by instrument calibration and standardization, as described in the associated field Standard Operating Procedures (SOPs).

2.9 NON TIME-CRITICAL MONITORING PLAN DEVELOPMENT

Revision of the Surface Water Monitoring Plan (TVA 2011) to meet the DQOs described above is based on planned removal of Dike 2, the relocation of the Clean Water Ditch ISCO® sampling platform to accommodate the construction of Dike 3, a review of analytical data from routine and rain-event monitoring conducted from January 2011 through February 2012 (see Appendix A); evaluation of surface water data collected in that monitoring; and consultation with TDEC and EPA. The remaining sections of this Plan describe the non time-critical surface water monitoring plan scope, sampling design, data management, and QA/QC.

3. NON-TIME-CRITICAL SURFACE WATER MONITORING PLAN

When time-critical dredging operations ceased, the principal source of ash-related constituents to the Emory River was material not captured by BMPs in the Swan Pond Embayment. Accordingly, surface water monitoring during non-time-critical activities was triggered by local rainfall. An evaluation of analytical data from routine and rain-event surface water samples collected from January 2011 to January 2012 showed a downward temporal trend in concentrations of ash-related constituents in the Clean Water Ditch (see Appendix A) following completion of remedial actions in the North Embayment.

The automated sampling at the Swan Pond Embayment will continue to be triggered by a ≥0.5 inch rainfall in a 24-hour period. A 24-hour period with < 0.5 inch will be the minimum separation time for consecutive sampling events.

The scope of this monitoring is discussed in the following sections.

3.1 MONITORING SCOPE

3.1.1 KIF Stilling Pond Effluent

The KIF Stilling Pond NPDES-permitted outfall will be monitored monthly for TSS and ash-related metal constituents, until closure of the Dredge Cell and ash pond are completed. EPA will collect split samples at their discretion. TVA will continuously monitor pH and turbidity in the Stilling Pond as a best management practice. Substantial changes in pH or turbidity will serve as indicators of the potential need for additional sample collection.

3.1.2 Swan Pond Embayment

Manual grab samples will be collected at key surface water drainage ditch locations and analyzed for TSS and ash-related constituents. The Clean Water Ditch upstream of discharge to the Emory River will be sampled weekly and at the Sediment Basins effluent (“dirty water ditch”) will be sampled monthly. In addition, an automated composite sample will be collected from the Clean Water Ditch (final point of surface water exit to the Emory River) following a local rainfall event of ≥0.5 inch in a 24-hour period. Manual grab samples will be collected from the Sediment Basins effluent as quickly as a team can safely be mobilized following a rainfall event ≥0.5 inch. TVA will continuously monitor pH and turbidity in the Clean Water Ditch as a best management practice. Substantial changes in pH or turbidity will serve as indicators of the potential need for additional sample collection.

3.2 SAMPLE LOCATIONS, COLLECTION, AND ANALYSES

3.2.1 Sample Locations

Sample Location for KIF Stilling Pond Effluent

The location for sampling the KIF Stilling Pond is shown on Figure 1. A monthly grab sample will be collected at the NPDES-permitted outfall and analyzed for TSS and total metals.

Sample Locations for Swan Pond Embayment

The sample locations are shown on Figure 1. Grab samples will be collected at these locations and analyzed for TSS and total metals.

3.2.2 Sample Collection

Water sampling and analysis will be performed in accordance with the QAPP. The QAPP implementation includes sample collection in accordance with a set of project-specific SOPs that govern the conduct of work in the field. The TVA SOPs were prepared and reviewed by KIF project staff cognizant of and experienced in implementing EPA Region 4 and TDEC field procedures. The current revisions of the SOPs are maintained on a website available to EPA and TDEC.

Samples will be collected following the procedures outlined in the SOP for surface water sampling (TVA-KIF-SOP-01 *Surface Water Sampling, Revision 1*). Duplicate samples will also be collected on a 1/20 frequency for TSS and total metals. Additionally, a matrix spike/matrix spike duplicate pair will be taken on a 1/20 frequency and submitted to the laboratory.

Field parameters using a multi-analyte programmable data logger (Hydrolab®) collocated at each sample location will be collected. Parameters of interest that will be documented are temperature and pH. The apparent direction of surface water flow or lack of flow in Swan Pond Embayment will be noted in the logbook at the time of collection of the Clean Water Ditch Sample. Weather conditions for the week prior to collection of a rain-event sample will be noted in the logbook at the time of collection of the rain-event sample from the Clean Water Ditch ISCO® sampler.

Following collection, the surface water sample will be transferred into appropriately clean, preserved bottleware (as required) as described in QAPP Section 7.2. A chain-of-custody (CoC) record will be completed as samples are collected in the field and will remain with the samples until the samples arrive at the laboratory for analysis. The samples will be shipped to the laboratory(-ies) via overnight carrier or laboratory courier. Signatures indicating the succession of sample custody will be documented on the CoC record.

Sample collection by TDEC and EPA will be performed in accordance with their respective SOPs.

3.2.3 Sample Analyses

Surface water samples will be sent to TVA contract laboratories for analyses. TVA maintains a rigorous contract laboratory program that includes periodic assessments (by a TVA-appointed QA contractor) to ensure compliance with analytical specifications. Table 3-1 summarizes the analytical parameters, test methods, and reporting limits that will be used to fulfill the DQOs of the surface water monitoring program. The analyte list is based on initial characterization of the ash and affected environmental media for a broader range of constituents (e.g., organic compounds) that was performed by TVA, EPA, and TDEC immediately after the spill. Additional detail for analytical methods is found in the QAPP.

Data Review and Validation

Data review and validation will be performed by TVA's independent QA contractor, in accordance with QAPP Sections 21.0 and 22.0.

Table 3-1
Analytes, Methods, and Target Reporting Limits for Surface Water Monitoring

Test Parameter	Test Method	Limit of Quantitation
Basic Water Chemistry		
pH	150.1/SM 4500 H^+ B	0.1 pH Units
Total Suspended Solids	160.2/SM2540D	1.0 mg/L
Metals –Total		
Aluminum	6010B/6020/200.7/200.8	20 µg/L
Antimony	6010B/6020/200.7/200.8	2 µg/L
Arsenic	6010B/6020/200.7/200.8	2 µg/L
Barium	6010B/6020/200.7/200.8	10 µg/L
Beryllium	6010B/6020/200.7/200.8	2 µg/L
Boron	6010B/6020/200.7/200.8	50 µg/L
Cadmium	6010B/6020/200.7/200.8	1 µg/L
Calcium	6010B/6020/200.7/200.8	1,000 µg/L
Chromium	6010B/6020/200.7/200.8	2 µg/L
Cobalt	6010B/6020/200.7/200.8	2 µg/L
Copper	6010B/6020/200.7/200.8	5 µg/L
Iron	6010B/6020/200.7/200.8	50 µg/L
Lead	6010B/6020/200.7/200.8	2 µg/L
Magnesium	6010B/6020/200.7/200.8	1,000 µg/L
Manganese	6010B/6020/200.7/200.8	5 µg/L
Mercury	7470A/245.1	0.2 µg/L
Molybdenum	6010B/6020/200.7/200.8	5 µg/L
Nickel	6010B/6020/200.7/200.8	5 µg/L
Potassium	6010B/6020/200.7/200.8	1,000 µg/L
Selenium	6010B/6020/200.8	2 µg/L
Silver	6010B/6020/200.8	2 µg/L
Sodium	6010B/6020/200.8	1,000 µg/L
Thallium	6010B/6020/200.8	2 µg/L
Vanadium	6010B/6020/200.8	4 µg/L
Zinc	6010B/6020/200.8	50 µg/L

Note: For definitions, see the List of Acronyms section.

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4. DATA MANAGEMENT

An EPA-approved KIF Project Data Management Plan (DMP) is in place to address the challenges of managing technical data from a wide array of analysis processes. The DMP provides a basis for supporting a full technical data management cycle from pre-planning of sampling events to reporting and analysis with a particular emphasis on ensuring completeness, data usability, and most importantly, defensibility of the data. As the TVA data are verified and validated, the data will be migrated to the EPA Region 4 EQuIS data management system.

The major objectives of the DMP are to:

- Maintain data control, consistency, reliability, and reproducibility throughout the life of the project;
- Establish the framework for consistent documentation of the quality and validity of field and laboratory data compiled during all investigations;
- Describe in detail the data management procedures for all site-related data including groundwater, surface water, soil, sediment, air, biological, toxicological, and any other site-specific data collected;
- Describe how these new data will be integrated and comprehensively managed with previously collected and historical data;
- Include procedures and timelines for sharing data with stakeholders, and procedures for providing both electronic and hardcopies to specified recipients of each type of data; and
- Enable the use of project data in a consistent and easily shared format among appropriate internal and external parties (such as TVA, consultants, EPA, and TDEC.

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5. QUALITY ASSURANCE/QUALITY CONTROL AND QUALITY ASSURANCE PROJECT PLAN CROSS-WALK TABLE

The Kingston Ash Recovery Project has developed a comprehensive QAPP which governs the collection, analysis, reporting, and use of environmental data associated with the overall project. The QAPP (ENVIRONMENTAL STANDARDS, INC. 2010) has been approved by EPA and TDEC and is available in the Administrative Record, available at http://www.tva.gov/kingston/admin_record/index.htm. The QAPP was prepared in accordance with EPA's *Guidance for Quality Assurance Project Plans*, EPA QA/G-5 (EPA 2002). The QAPP provides the framework for implementation of the environmental sampling to support both time-critical and non-time-critical removal actions, as needed.

The QAPP details the requirements for the performance of all field sampling and laboratory analyses in support of the TVA Kingston Ash Recovery Project objectives. It also identifies the roles and responsibilities of TVA and contractor staff who implement the QAPP requirements. Embodied within the QAPP are the fundamental elements that ensure project objectives are met. These include:

- Data collection activities are documented in sampling and analysis plans.
- Field sampling and data plans are implemented following standard procedures.
- Field personnel are trained to the procedures.
- Independent assessments are performed and documented to ensure adherence to procedures in the field and to identify opportunities for continuous improvement.
- Sample analyses are performed by laboratories qualified to national standards.
- Periodic independent audits are performed on laboratories to ensure adherence to procedures and good practices.
- Data deliverables include the necessary documentation to perform independent, third-party validation of data in accordance with EPA national functional guidelines.
- Data are validated in accordance with EPA national functional guidelines.
- Data are managed in a controlled environment that also provides flexibility for data use and interpretation.

The primary goal of TVA's QA program is to generate defensible analytical data to characterize the extent of the fly ash deposition, to monitor the spill containment and removal and remedial operations, and to assess the potential short-term and long-term health hazards and biological impact. The QA program ensures that the data generated from site-wide sampling and monitoring activities are of sufficient quality to meet the objectives of the Kingston Ash Recovery Project.

The scope of the QAPP is to provide the appropriate QA procedures and QC measures to be applied to all sampling and monitoring activities associated with the Kingston Ash Recovery Project.

This section supplements the QAPP by providing task-specific information for the required elements that are not included in the approved QAPP (e.g., task-specific DQOs).

Task-specific sampling procedures are described in Section 3.2 of this Plan. Details are specified in the SOPs listed in Table 5-1.

Table 5-1
Standard Operating Procedures for the Surface Water Monitoring Plan

SOP Number	SOP Title
TVA-KIF-SOP-01	Surface Water Sampling
TVA-KIF-SOP-06	Field Documentation
TVA-KIF-SOP-07	Sample Labeling, Packing, and Shipping
TVA-KIF-SOP-08	Decontamination of Equipment
TVA-KIF-SOP-11	Field Quality Control Sampling
TVA-KIF-SOP-12	Management of Investigation-Derived Waste
TVA-KIF-SOP-13	Sample Retain Archive and Maintenance
TVA-KIF-SOP-14	Hydrolab Datasonde® Standardization and Field Parameter Measurement
TVA-KIF-SOP-18	Management and Implementation of EQuIS-Based Chain-of-Custody

Appendix C to the QAPP presents QA requirements for aqueous matrices. For this Plan, aqueous matrices include mid-depth surface water.

Sample containers, preservation, and holding times for aqueous samples are listed in Table C-1 of the QAPP.

Analytes, methods, and target reporting limits are listed in Table 3-1.

Precision and accuracy objectives for QC samples for aqueous matrices are listed in Table C-3 of the QAPP.

Table 5-2 provides a "cross-walk" that summarizes the document location where the task-specific QAPP-required elements may be found.

Table 5-2
Quality Assurance Project Plan Cross-Walk

QAPP Element	Location in Surface Water Monitoring Plan	Location in SOP
Data Quality Objectives	Section 2.1 Data Quality Objectives	
Sampling Design	Section 3.0 Non-Time-Critical Surface Water Monitoring Plan	
Sampling Methods	Section 3.2 Sample Location, Collection, and Analyses	Applicable SOPs[1]
Sample Collection	Section 3.2 Sample Location, Collection, and Analyses	Applicable SOPs[1]
Data Review and Validation (QAPP Sections 21.0 and 22.0)	Section 3.2 Sample Location, Collection, and Analyses	
Assessments and Response Actions (QAPP Section 19.0)		

Note: [1]Applicable SOPs are listed in Table 6-1.

6. REFERENCES

Tennessee Valley Authority (TVA) 2010a (May 18). *Action Memorandum for the Kingston Ash Recovery Project, Non-Time-Critical Removal Action, Embayment/Dredge Cell*. Document No. EPA-AO-024.

TVA 2010b (May 24). *Kingston Ash Recovery Project Non-Time-Critical Removal Action for the River System Sampling and Analysis Plan (SAP).* Document No. EPA-AO-021.

TVA 2010c (July 1). *Surface Water Monitoring Plan for the Emory, Clinch, and Tennessee Rivers, Kingston Fossil Plant Ash Recovery Project*. Document No. EPA-AO-013.

TVA 2009 (August 4). Action Memorandum: *Request for Removal Action at the TVA Kingston Fossil Fuel Plant Release Site, Roane County, Tennessee*. From Mike Scott, TVA General Manager, Kingston Project and TVA's Kingston Project Coordinator to Anda A. Ray, TVA Senior Vice President, Office of Environment and Research at Kingston Recovery Executive.

U.S. Environmental Protection Agency (EPA) 2010 (March 5) Memorandum: *Documentation of the decision process for EPA approval of the final dredge depth determination for the time-critical removal action*. From Leo Francendese, EPA On-Scene Coordinator to Steve McCracken, TVA Onsite General Manager.

EPA 2009 (May 11). *Administrative Order and Agreement on Consent, Docket No. CERCLA-04-2009-3766*, Region 4.

EPA 2006 (February). *Guidance on Systematic Planning Using the Data Quality Objectives Process EPA QA/G-4*, EPA/240/B-06/001, Washington, D.C.

EPA 2002 (December). *Guidance for Quality Assurance Project Plans*, *EPA QA/G-5*.

Environmental Standards, Inc. 2009 (December 18). *Quality Assurance Project Plan for the Tennessee Valley Authority Kingston Ash Recovery Project*. *TVA-KIF-QAPP*. Prepared for the Tennessee Valley Authority, Office of Environment and Research, Environmental Resources.

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Figures

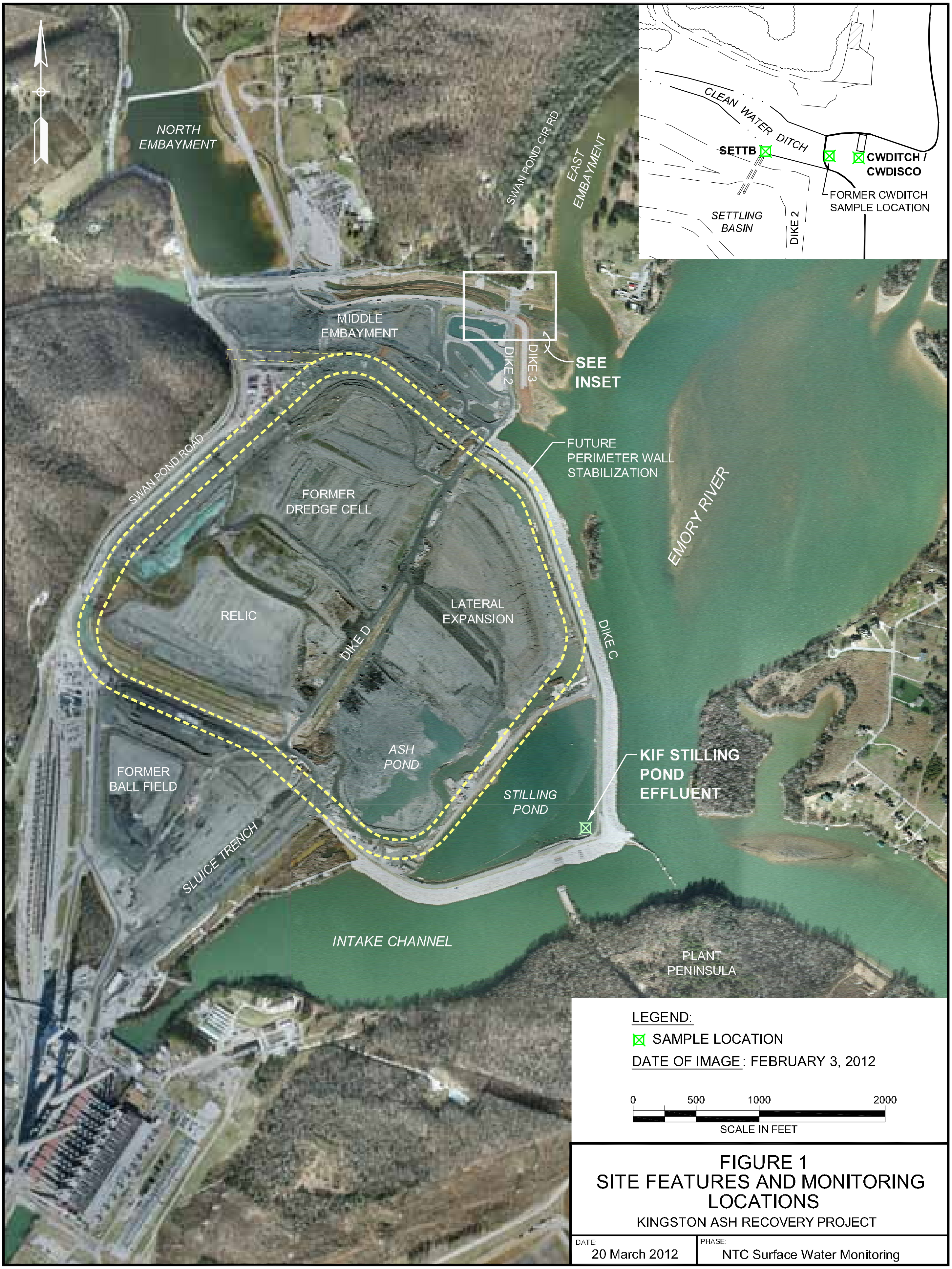

FIGURE 1
SITE FEATURES AND MONITORING LOCATIONS
KINGSTON ASH RECOVERY PROJECT

DATE:	PHASE:
20 March 2012	NTC Surface Water Monitoring

I:\0002 ENGINEERING\Civil\Report Graphics\NTC Surface Water Monitoring\250_Fig 1 Site Features and Monitoring Locations.dwg Mar 20,2012 -bperatro

APPENDIX A

Non-Time-Critical Surface Water Monitoring:

Evaluation of Routine and Rain-Event Surface Water Data

March 13, 2012

Non-Time-Critical Surface Water Monitoring:
Evaluation of Routine and Rain-Event Surface Water Data
March 13, 2012

Purpose

Runoff from the surrounding watershed naturally flows through the Swan Pond Embayment and into the Emory River. The Clean Water Ditch was built to intercept runoff before it reaches ash in the embayment and directs the water around the ash and into the Emory River. Another drainage ditch was constructed to direct water that contacts ash in the embayment through a series of settling basins, where ash can settle out before water is discharged into the Clean Water Ditch and then to the Emory River (http://www.tva.gov/kingston/water/). The Clean Water Ditch is a shallow channel with water depth varying according to the elevation of Watts Bar Reservoir. Water flow in the Clean Water Ditch is controlled by the amount of water entering the ditch from upstream runoff and the elevation of the Watts Bar Reservoir. Except for periods following rain-fall events, there is little or no flow in the Clean Water Ditch; consequently, there is minimal flow from the Clean Water Ditch to the Emory River.

This memorandum evaluates water quality data from the Stilling Pond and Swan Pond Embayment collected manually and by an automated sampler deployed on a floating platform (Swan Pond Embayment only) pursuant to the approved August 8, 2011, *Kingston Ash Recovery Project Non-Time-Critical Removal Action Surface Water Monitoring Plan* (EPA-AO-038).

The result of this evaluation is that there has been a reduction in the concentration of ash-related constituents entering the Emory River from the Swan Pond Embayment, and exceedences of water quality standards have decreased following completion of the removal of ash from the North Embayment. Concentrations of ash-related constituents are elevated in the Settling Basin with the highest concentrations related to ash removal operations in the Settling Basin or local rain events. These concentrations in the Clean Water Ditch are consistently much lower than in the Settling Basin, (i.e., the elevated Settling Basin concentrations are not necessarily reflected in corresponding Clean Water Ditch discharges).

Because of the findings of this evaluation, TVA requests approval to reduce the frequency of routine sampling in the Settling Basin and Clean Water Ditch to once a month. No change is recommended for stormwater sampling for the embayment. Additionally, TVA requests approval to discontinue analysis for dissolved metals. The basis for TVA's recommendation follows.

Discussion

TVA has been collecting samples from the Stilling Pond and from the Swan Pond Embayment at the Settling Basin and Clean Water Ditch under the current sampling and analysis plan since August 2010. Samples have been collected weekly at all locations and from an automated sampling platform in the Clean Water Ditch in response to 24-hour cumulative local rainfalls >0.5 inch.

Trends in concentrations of arsenic and selenium (representative of ash-related constituents) were used to evaluate potential transport of ash-related constituents between January 2011 and February 2012. Concentrations of arsenic and selenium have declined in the Clean Water Ditch and Stilling Pond since excavation of ash from the North Embayment was completed in November 2011 (Figures 1 and 2). Several arsenic peaks greater than 0.1 mg/L in the Settling Basin data were investigated further to determine potential causes (Figure 3). Discussions with field personnel and evaluation of rainfall data indicate that these elevated concentrations in the Settling Basin are related to ash removal operations (08/10/11, 02/08/12) in the Settling Basin or local rain events (07/15/11, 09/05/11, 02/19/12). These elevated concentrations do not result in equally high concentrations in the Clean Water Ditch (Figure 3). Rain-event samples collected from the Clean Water Ditch are shown in Figure 4.

Analytical results from routine samples collected at all locations demonstrate that total and dissolved constituent concentrations are nearly identical (Figures 5 to 7). Additionally, comparison of total constituent concentrations to Drinking Water Standards or recreational Ambient Water Quality Criteria is appropriate. Comparison of total concentrations to the Ambient Water Quality Criteria for Fish and Aquatic Life based on dissolved concentrations is unlikely to indicate a standard or criterion is not exceeded when it actually is exceeded; and is a conservative comparison.

Recommendation

Based on the analysis presented above, TVA recommends a reduction in the frequency of sampling at the Settling Basin, Clean Water Ditch, and Stilling Pond to once a month with continued rain-event associated sampling. Additionally, TVA recommends elimination of sampling for dissolved inorganic constituents.

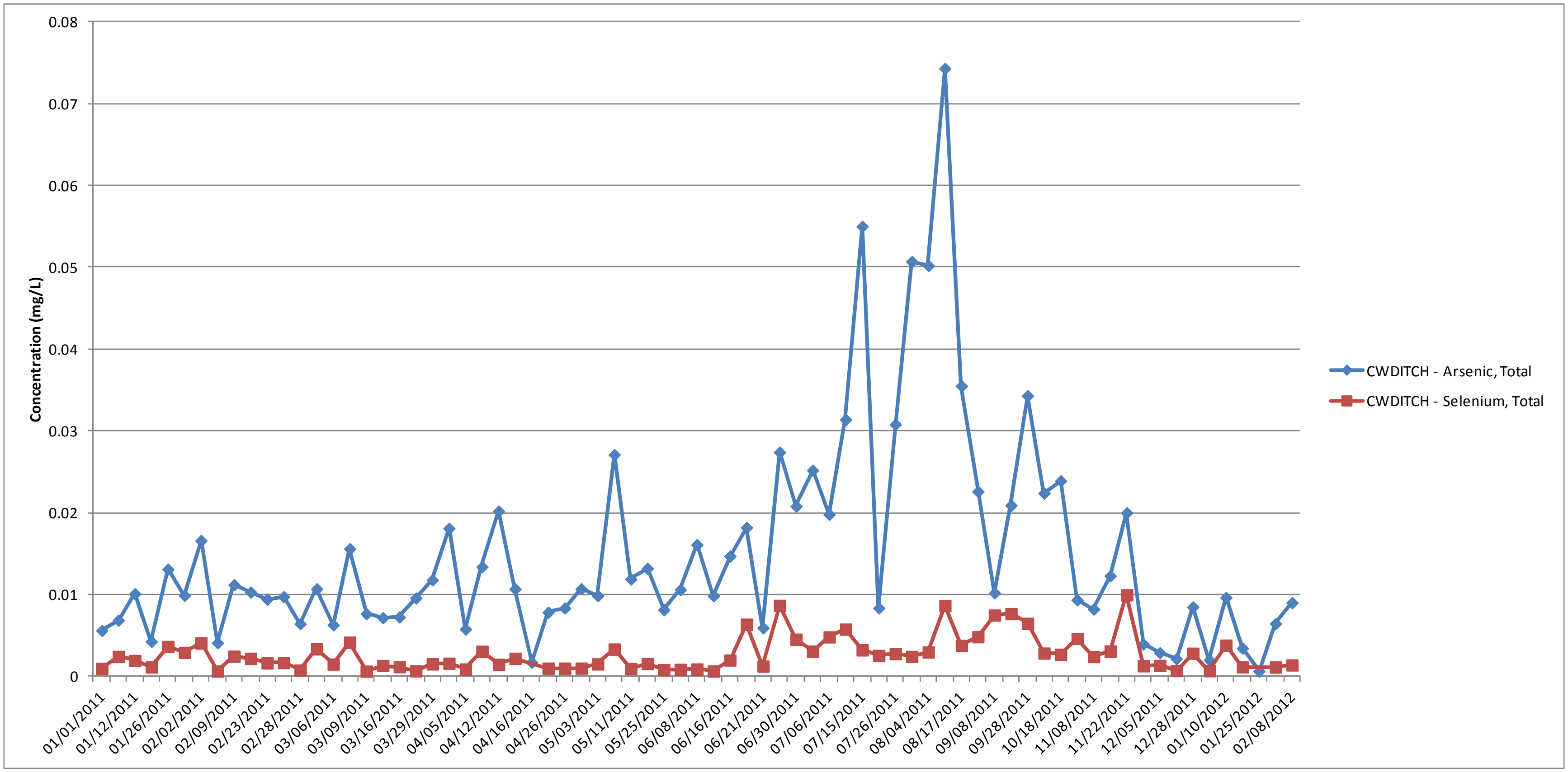

Figure 1. Trends in the Concentrations of Arsenic and Selenium in the Clean Water Ditch Surface Water Samples.

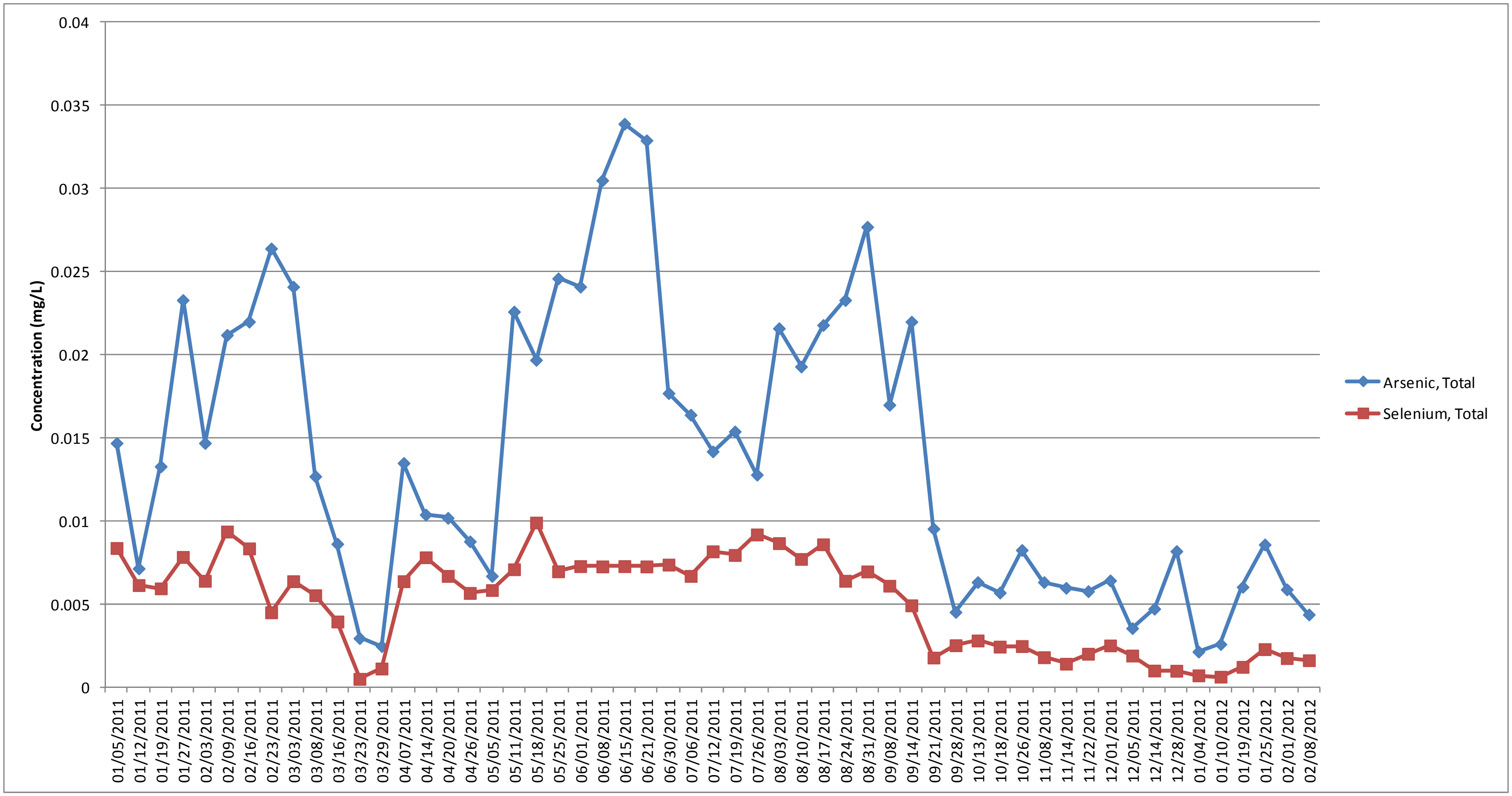

Figure 2. Trends in the Concentrations of Arsenic and Selenium in Stilling Pond Surface Water Samples.

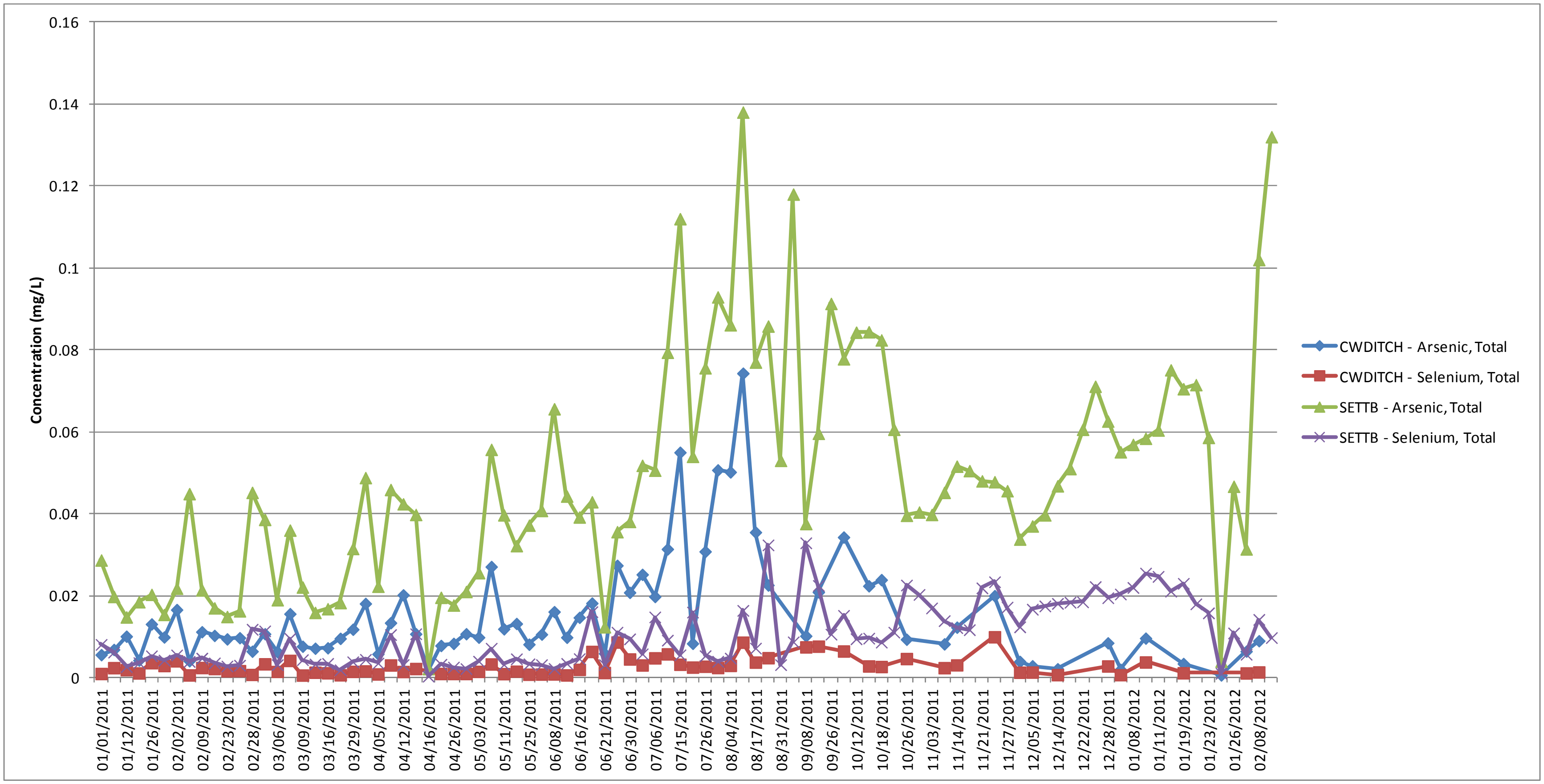

Figure 3. Trends in the Concentrations of Arsenic and Selenium in Settling Basin and Clean Water Ditch Surface Water Samples.

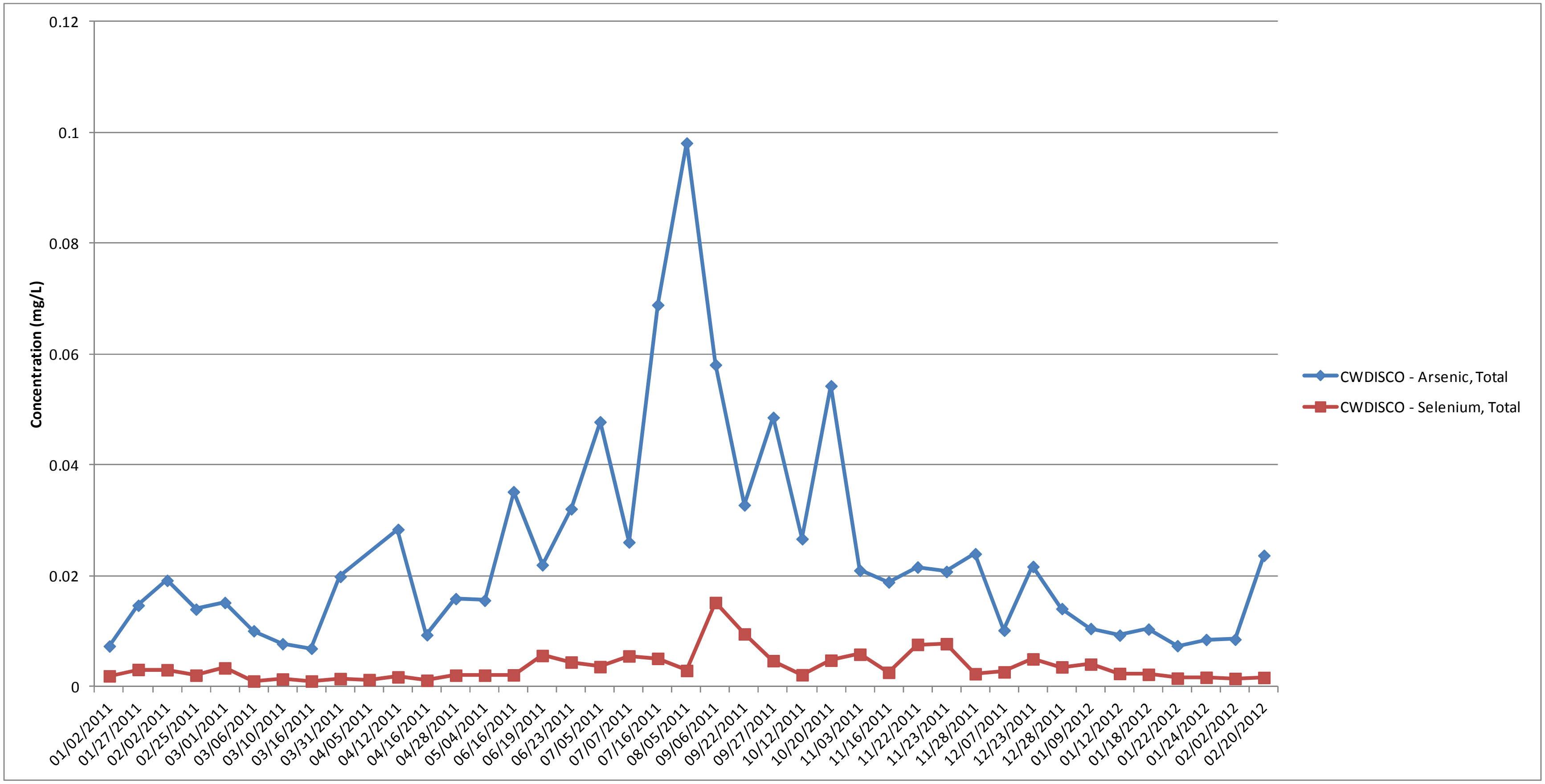

Figure 4. Trends in the Concentrations of Arsenic and Selenium in Clean Water Ditch Rain-Event Surface Water Samples.

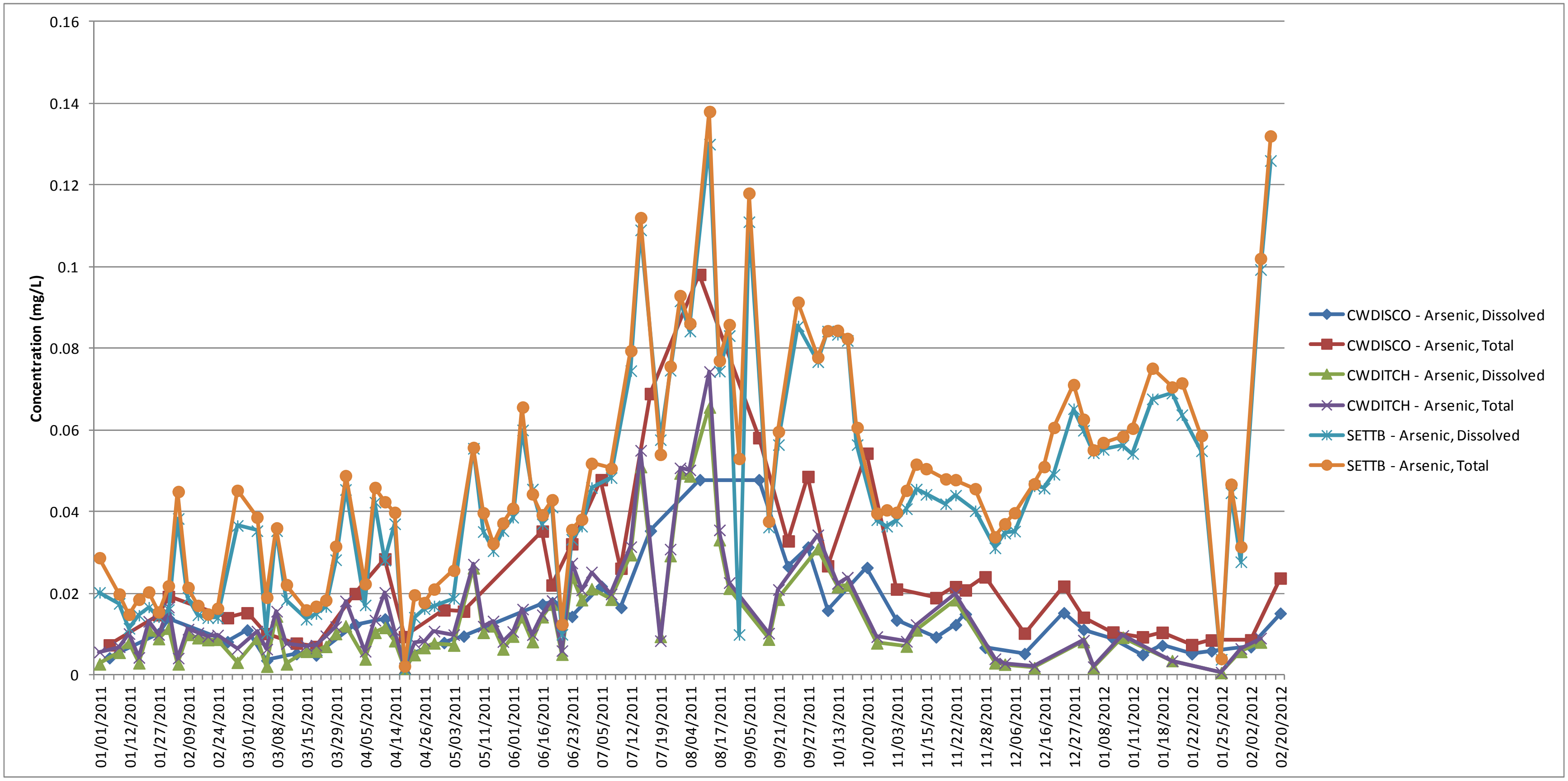

Figure 5. Comparison of Total and Dissolved Arsenic Concentration in Swan Pond Embayment Surface Water Samples.

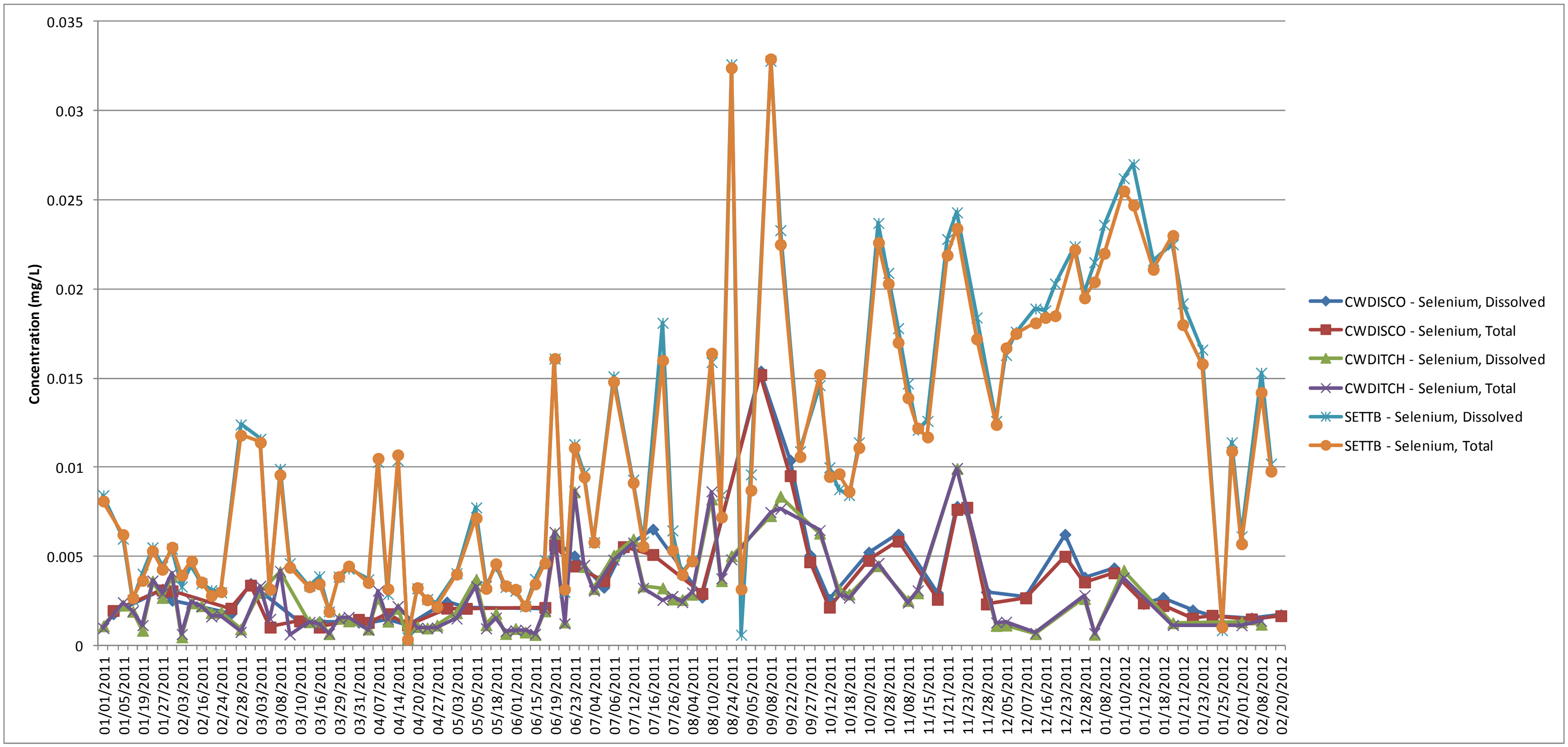

Figure 6. Comparison of Total and Dissolved Selenium Concentration in Swan Pond Embayment Surface Water Samples.

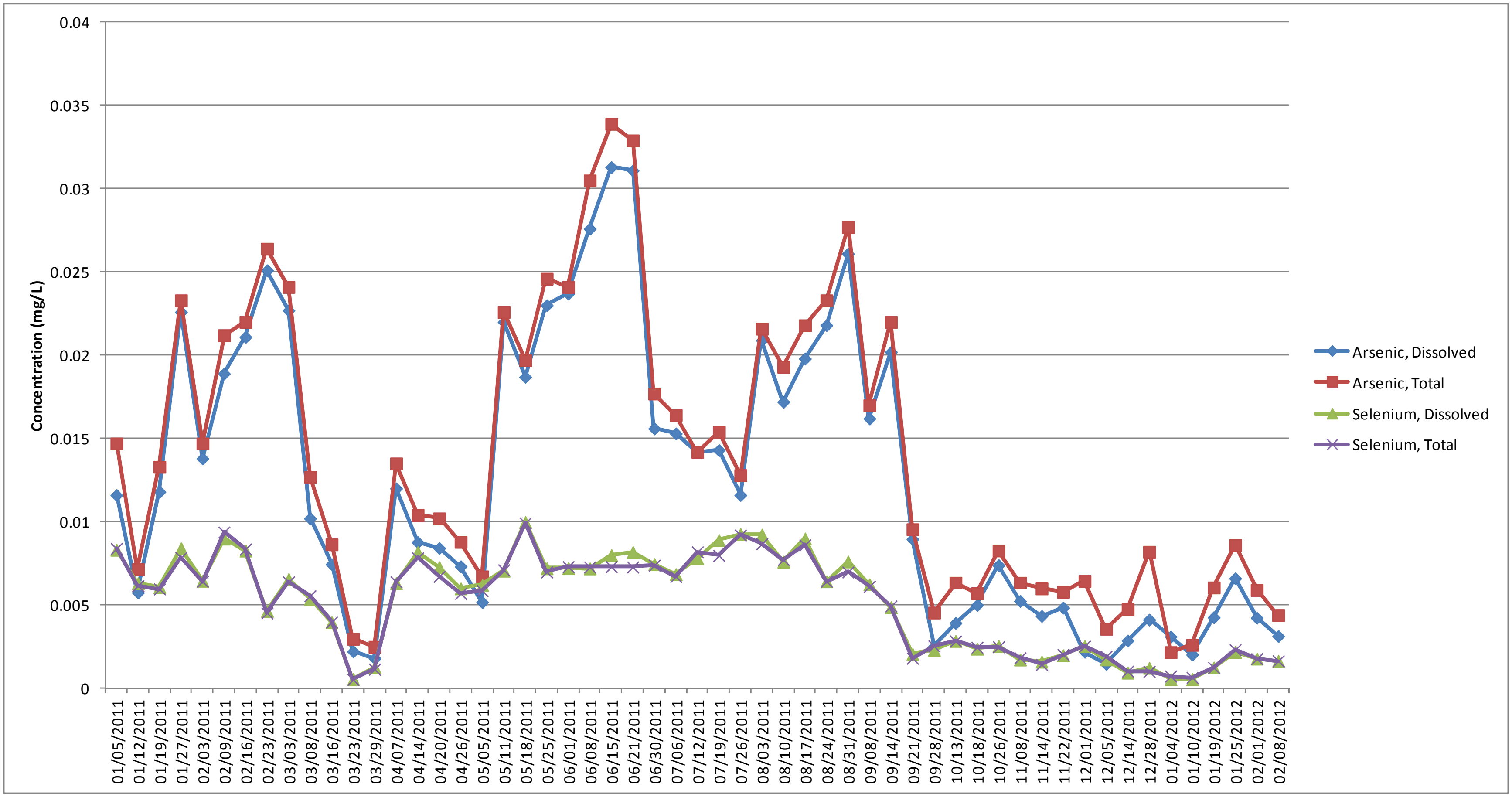

Figure 7. Comparison of Total and Dissolved Arsenic and Selenium Concentration in Stilling Pond Surface Water Samples.