

**Tennessee Valley Authority
Regulatory Submittal for Kingston Fossil Plant**

**Documents submitted:
Technical Memorandum KIF Rainfall Sampling Events**

**Date submitted
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**Submitted to whom
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Technical Memorandum KIF Rainfall Sampling Events November 10, 2009

Executive Summary

This technical memorandum identifies alternative rainfall sampling protocols that generate more representative samples of:

1. sheet flow events in the area of construction activity and the released ash that is on land and;
2. high flow events potentially impacting migration of the ash that remains to be recovered from the river.

The sampling plans that are primarily affected by this memorandum are:

1. Swan Pond Embayment Sampling Plan
2. Surface Water Monitoring Plan for the Emory, Clinch, and Tennessee Rivers.

Memorandum principally prepared by Robert J. Crawford

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Significant rainfall events create two additional monitoring requirements for the Kingston Ash Recovery Project. These additional monitoring requirements are currently described in the Swan Pond Embayment Sampling Plan (approved by EPA on June 22, 2009) and the Surface Water Monitoring Plan for the Emory, Clinch, and Tennessee Rivers (approved by EPA on August 25, 2009). This technical memorandum describes an automated sampling system that will provide timely sampling during rainfall-induced monitoring events as an alternate sampling approach to rainfall events in the Swan Pond embayment and elevated Emory River flow rates.

The following options for monitoring rainfall and flow to activate the auto-samplers have been identified. The automated sampling system may measure rainfall using an electronic rainfall gauge connected directly to the automated sampler or data linked from the Station 7 meteorological tower located at 199 Lakeshore Drive. Similarly, flow data may be acquired using an electronic flow meter connected directly to the automated sampler, acquired from the Emory River Mile (ERM) 0.5 velocimeter or the ERM 4.0 velocimeter; or from estimates derived from the USGS flow gage at Oakdale, TN. The activation method(s) selected may vary depending on the specific location being monitored.

The automated sampling system will use a refrigerated sampling device to chill samples to meet sample collection method requirements, but will include the capability to use ice for that purpose in case of refrigeration equipment malfunction. The US EPA Region 4 procedure for Wastewater Sampling, SESDPROC-306 R1 contains guidance on the use of automated samplers; this guidance will be used as a template with appropriate references for a site-specific procedure. US EPA field staff may collect split samples.

Embayment Sampling Event

Rainfall runoff sampling from the spilled ash and construction activities taking place on land in the Swan Pond embayment areas is required by the embayment monitoring plan. The protocol below will ensure representative samples of the first flush of ash particulates and potential constituents of concern from the embayment area are obtained prior to those constituents entering the Emory River.

- The sampling will be initiated by a ≥ 0.5 -inch rainfall event occurring within any rolling 24 hour period followed by an observed flow at the sample point in the direction of the Emory River for at least 15 minutes.
- Rainfall sampling events begin when the 0.5-inch threshold is reached and end 72 hours after the last 0.1-inch or greater rainfall occurs within a one hour period.
- Samples will be retrieved from the refrigerated, automated sampler within 72 hours of collection.
- Sampling will be initiated using automated sampling equipment.
- The equipment will take samples from approximately mid stream and approximately mid depth in the Clean Water Ditch.
- The sampling point shall be east of the east embayment inlet to the clean water ditch and more than 100 feet west of the apparent inlet to the Emory River unless otherwise justified in appropriate field log books.

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- Current plans to widen the opening of the clean water ditch to the Emory River significantly may preclude the ability to obtain a representative sample from a single sample between the Emory River and the east embayment discharge pipes. In that event, two automated samplers may be installed: one in the discharge pipes from the East Embayment, and the other in the discharge pipes to the Clean Water Ditch. These are the same sample points currently being used for routine sampling of the Swan Pond Embayment.
- The exact location of all samples collected will be documented in appropriate field log books as the landscape in this area is constantly changing due to Ash Recovery Operations.

River Sampling Event

Rainfall anywhere within the Emory River watershed can generate elevated flow conditions locally. Elevated flow conditions have historically resulted in ash migration and higher than normal values of ash constituents in the river. Previous observations indicate that it takes a local rainfall of at least one inch to produce sufficient additional flow in the Emory River to cause potential ash migration issues. The following protocol will ensure samples representative of high flow conditions in the vicinity of the ash recovery effort are collected.

- Sampling is initiated by a ≥ 1.0 -inch or greater local rainfall event within any rolling 24 hour period, or by the observed flow at the Oakdale gauging station exceeding 5,000 cubic feet per second (cfs). The sample point shall be co-located with the ERM 0.5 continuous Hydrolab monitoring station to take advantage of co-located automated field data (including flow velocity) downstream of the ash recovery effort.
- Sampling will be programmatically initiated using automated sampling equipment within approximately 2 hours of observing the rainfall or elevated flow event. The actual time may vary based on weather conditions.
- A sample will be collected approximately every 2 hours for the next 12- 24 hours. The exact timing interval may be controlled remotely and will depend on the required sample size and when the peak river flow conditions are forecast to occur locally.
- The equipment will take samples from approximately mid stream and approximately mid depth in the river.
- Sampling staff will review data loggers (or real time network resources) and select the sample(s) corresponding closest to the peak velocity in the Emory River to be submitted for analysis. The preferred velocity meter data to be used in determining the peak velocity begins with the meter at ERM 0.5; the meter at ERM 4.0; and, as a final option, engineering estimates using the Oakdale gauging data.
- Samples will be retrieved from the refrigerated, automated sampler within 72 hours of collection.
- Storm events begin when the threshold is reached and end when flow drops below 5,000 cfs. NOTE: management may implement additional automated sampling to reduce crew exposure to unsafe conditions during extended periods of inclement weather.
- Following the peak flow sampling event at ERM 0.5, daily grab samples or other additional sampling may be initiated and/or discontinued at the discretion of project management with concurrence from the US EPA On-scene Coordinator based on changing conditions in the river and the need to monitor ash migration. These decisions shall be documented in the appropriate field notebooks.