



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4**

Science and Ecosystem Support Division
Enforcement and Investigations Branch
980 College Station Road
Athens, Georgia 30605-2720

August 2, 2011

Anda Ray, Senior Vice President & Environmental Executive
TVA Office of Environment and Research
1134 Swan Pond Rd.
Harriman, Tennessee 37748

SESD Project Number 11-0518

Dear Ms. Ray:

On June 14 and 15, 2011, Greg Noah and Tim Slagle, Environmental Protection Agency, Region 4, Science and Ecosystem Support Division, conducted performance audits, a network review, and data review of the Kingston Fossil Plant ambient air monitoring network. Performance audits were conducted on various ambient air samplers in the network that are reporting ambient data to ensure data quality. The monitoring network was assessed to determine if it continues to be sufficient to provide appropriate data to decision makers. Ambient air monitoring data was also reviewed to ensure that quality data is being collected. The performance audits and network assessment were completed in accordance with applicable quality assurance and assessment criteria included in 40 CFR Parts 50 and 58.

I appreciate the Tennessee Valley Authority's participation in this audit as well as your resolve to rapidly address the issues that were identified. Please provide a written response to all addressees outlining steps to address the recommendations included in this report. We would appreciate your response no later than September 4, 2011. If you have any questions regarding the attached audit report, please contact Greg Noah at (706) 355-8635.

Sincerely,

A handwritten signature in blue ink that reads "Laura Ackerman".

Laura Ackerman, Chief
Superfund and Air Section

cc: Doug Neeley, EPA, APTMD, w/attachment
Craig Zeller, EPA, ERRB, w/attachment
Tim Slagle, EPA, SESD w/attachment
Lloyd Generette, EPA, APTMD, w/attachment
Jackie Waynick, TDEC, w/attachment

**United States Environmental Protection Agency
Region 4**

Science and Ecosystem Support Division
980 College Station Road
Athens, Georgia 30605-2720



**Semi-Annual Performance Audits, Network Review,
and Data Review of the Ambient Air Monitoring
Network at the Kingston, Tennessee Fossil Plant Fly
Ash Removal Project**

**Kingston, Tennessee
June 14 and 15, 2011**

SESD Project Identification Number: 11-0518

Requestor: Craig Zeller
EERB
61 Forsyth St. SW
Atlanta, Georgia 30303-8960

SESD Project Leader: Gregory W. Noah
EIB, SAS
980 College Station Road
Athens, Georgia 30605-2720

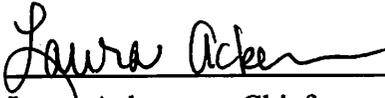
This Page Intentionally Left Blank

Title and Approval Sheet

Title: Semi-Annual Performance Audits, Network Review, and Data Review of the Ambient Air Monitoring Network at the Kingston, Tennessee Fossil Plant Fly Ash Removal Project

Final Report

Approving Official:



Laura Ackerman, Chief
Air and Superfund Section
Enforcement and Investigations Branch

08/03/11
Date

SESD Project Leader:



Gregory W. Noah, Environmental Scientist
Air and Superfund Section
Enforcement and Investigations Branch

08/03/11
Date

INTRODUCTION

On June 14 and 15, 2011, Greg Noah and Tim Slagle of EPA Region 4, Science and Ecosystem Support Division, conducted performance audits, a network review, and a data review of the Kingston, TN ambient air monitoring network. The ambient air monitoring network consists of five sites and is part of the Tennessee Valley Authority's (TVA) response to monitoring and controlling fugitive dust releases from the fly ash slide which occurred on December 22, 2008. The Tennessee Department of Environmental Conservation (TDEC) operates three samplers within the network to provide quality assurance data. The audits were conducted to provide an independent assessment of sampler performance to ensure that quality data is produced by the samplers and field operators. The network was evaluated to determine if data produced will meet monitoring objectives for the site management staff and project stakeholders.

The following table identifies the network sites and ambient parameters that were audited. A map of the locations can be found in Appendix A following the report.

Site Name	Analyzers and Parameters Audited
PS05	Met One BAM 1020 for PM2.5
PS07	BGI Inc PQ200 Sampler for PM2.5 Met One BAM 1020 for PM2.5 Tisch TE-5170 High Volume for Total Suspended Particulate Tisch TE-5170 High Volume for Total Suspended Particulate (collocated) Tisch TE-6070 High Volume for Metals in PM10 Analysis Tisch TE-6070 High Volume for Metals in PM10 Analysis (collocated)
PS08	Met One BAM 1020 for PM2.5
PS09	Met One BAM 1020 for PM2.5 Thermo TEOM 1400a for PM10
PS13	Met One BAM 1020 for PM2.5

BAM – Beta Attenuation Monitor

PM – Particulate Matter

METHODOLOGY

EPA completed three objectives during this site visit. First, performance audits were conducted for all filter based and continuous ambient air samplers at all monitoring sites. Second, the monitoring network was reviewed to determine if there were significant changes at the site that would impact the network's ability to meet the monitoring objectives and provide appropriate data to decision makers. Finally, the ambient air monitoring data, which included particulate matter and metals, were reviewed to ensure that quality data is being collected. All elements of the site visit are described below.

Performance audits were conducted on the particulate samplers to evaluate the performance of three different system parameters; flow, temperature, and barometric

pressure. A performance audit uses an EPA National Institute of Standards and Technology (NIST) traceable standard to measure a parameter (measured) and a comparison is made to the sampler measurement (indicated) to determine if acceptance criteria are met. The performance audits were completed using: the **EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II**; the **Quality Assurance Guidance Document for the PM2.5 Performance Evaluation Program, Standard Operating Procedure for Field Activities**. The performance audits were completed in accordance with applicable quality assurance criteria included in 40 CFR Parts 50 and 58.

The network review was conducted to determine if the present monitoring network provides data that will meet the monitoring objectives for protecting the health of the population in the area and assessing and controlling fugitive dust emissions. During the audit, the network and remediation site were reviewed to determine if any changes have occurred that may impact the network's ability to meet the monitoring objectives and provide appropriate data to decision makers. Several elements usually conducted in a technical systems audit were completed such as observation of sample handling procedures, sample shipping procedures, calibration standard documentation, and general recordkeeping.

The data review was conducted to determine if quality data is being collected from the ambient air monitoring network. This element includes a review of field data sheets, raw data from the contract laboratories, and an assessment on timeliness of data turn-around from collection to final quality assurance review. Data should be present that allows a reviewer to trace the path of a data point from collection through the quality assurance process demonstrating validity and quality.

AUDIT RESULTS AND RECOMMENDATIONS

The operation, maintenance, and management of the ambient air monitoring network at the removal site are conducted by the TVA Kingston staff. The TVA Kingston monitoring staff also works closely with the TVA environmental staff in Muscle Shoals, AL. TVA Kingston staff manage and validate all filter based sampling activities while the TVA Muscle Shoals staff manage and validate the continuous monitoring data. The TVA staff has been very conscientious in the operation and maintenance of the monitoring network, and have done an outstanding job overall. The TVA monitoring staff was very helpful and cooperative throughout the audit.

Data review and quality assurance responsibilities for the Kingston Fossil Plant ambient air monitoring network rest with Environmental Services. Environmental Services is a TVA contractor who specializes in data review, quality assurance, and recordkeeping. All ambient air monitoring data, both particulate matter and metals are reviewed and validated by Environmental Services. Final oversight and acceptance of the data rest with the TVA data validation and review staff. Staff from Environmental Services and TVA were present during the audit and were very responsive to questions.

Performance Audits

The auditors accompanied the TVA operator when the samplers were serviced at several ambient air monitoring sites. The auditors conducted performance audits at all sites and observed filter handling procedures when possible. All samplers and continuous monitors were functioning properly during the audit.

The results of the Kingston, TN ambient air monitoring network performance audits are tabulated below in Table 1, Performance Audits of Low Volume Samplers and Table 2, Performance Audits of High Volume Samplers. All flow checks, barometric pressure checks, and ambient temperature checks were within acceptable audit criteria; however, some differences noted during the audit exceeded the TVA action levels set for the system parameters and would require recalibration according to the Site Dust Control and Air Monitoring Plan. TVA conducts a system verification of each monitor prior to sampling, and none of these checks which were performed before the EPA audit showed differences that exceeded the action levels. The EPA and TVA verification standards were compared, and a small difference was observed between the two which accounted for the difference. As previously noted, all checks were within acceptable audit criteria.

Table 1, Performance Audits of Low Volume Samplers

Kingston Fossil Plant Ambient Air Monitoring Network

June 14, 2011

Flow audit results are reflected using percent difference

Barometric pressure and temperature audit results are reflected using indicated minus measured

Acceptance limits are based on the low volume (16.67 LPM design flow rate) requirements in the EPA Quality Assurance Handbook

Filter temperature probe was not audited on BAM monitors

Site Sampler	Q actual (LPM)	T amb (°C)	BP (mmHg)
PS05			
Met One BAM 1020 PM2.5 S/N K1250			
Indicated (Sampler)	16.70	23.4	743
Measured (EPA DeltaCal 195)	16.27	24.9	740
Audit Results	2.64 %	-1.5 °C	3 mmHg
Acceptance Limits	4% of standard	+/- 2° of standard	+/- 10 mmHg of standard
PS07			
BGI PQ200 PM2.5 S/N 0222			
Indicated (Sampler)	16.72	26.7	741
Measured (EPA DeltaCal 195)	16.50	28.2	740
Audit Results	1.33 %	-1.5 °C	1 mmHg
Acceptance Limits	4% of standard	+/- 2° of standard	+/- 10 mmHg of standard
Met One BAM 1020 PM2.5 S/N K1020			
Indicated (Sampler)	16.70	26.9	743
Measured (EPA DeltaCal 195)	16.37	27.8	740
Audit Results	2.02 %	-0.9 °C	3 mmHg
Acceptance Limits	4% of standard	+/- 2° of standard	+/- 10 mmHg of standard

Table 1 continued, Performance Audits of Low Volume Samplers

Kingston Fossil Plant Ambient Air Monitoring Network

June 14, 2011

Flow audit results were calculated using percent difference

Barometric pressure and temperature audit results were calculated using indicated minus measured

Acceptance limits are based on the low volume sampler (16.67 LPM design flow rate) requirements in the EPA Quality Assurance Handbook

Filter temperature probe was not audited on BAM monitors

Site Sampler	Q actual (LPM)	T amb (°C)	BP (mmHg)
PS08			
Met One BAM 1020 PM2.5 S/N K1254			
Indicated (Sampler)	16.70	25.0	742
Measured (EPA DeltaCal 195)	16.41	26.6	740
Audit Results	1.77 %	-1.6 °C	2 mmHg
Acceptance Limits	4% of standard	+/- 2° of standard	+/- 10 mmHg of standard
PS09			
Met One BAM 1020 PM2.5 S/N K1249			
Indicated (Sampler)	16.67	24.8	743
Measured (EPA DeltaCal 195)	16.27	26.0	740
Audit Results	2.46 %	-1.2 °C	3 mmHg
Acceptance Limits	4% of standard	+/- 2° of standard	+/- 10 mmHg of standard
TEOM 1400a PM10 S/N 25408			
Indicated (Sampler)	16.53	27.30	747.1
Measured (EPA DeltaCal 195)	16.40	27.50	741
Audit Results	0.79 %	-0.2 °C	6.1 mmHg
Acceptance Limits	4% of standard	+/- 2° of standard	+/- 10 mmHg of standard
PS13			
Met One BAM 1020 PM2.5 S/N K1258			
Indicated (Sampler)	16.70	24.9	743
Measured (EPA DeltaCal 195)	16.45	25.9	741
Audit Results	1.52 %	-1.0 °C	2 mmHg
Acceptance Limits	4% of standard	+/- 2° of standard	+/- 10 mmHg of standard

Table 2, Performance Audits of High Volume Samplers

Kingston Fossil Plant Ambient Air Monitoring Network

June 14, 2011

Flow audit results are reflected using percent difference at standard temperature and pressure

Acceptance criteria of 10%, based on the high volume requirements in the EPA Quality Assurance Handbook

Site ID Number	Sampler #S/N	Sampler Type	H2O (inches)	Sampler Flow (m3/min)	Audit Flow (m3/min)	Percent Difference
PS07	7411	Total Suspended Particulate	3.48	1.180	1.159	1.83
PS07	7410	Total Suspended Particulate	3.40	1.180	1.150	2.63
PS07	1364	High Volume PM10	3.75	1.160	1.215	-4.54
PS07	1365	High Volume PM10	3.60	1.160	1.188	-2.35

Network Review

The primary objectives for the Kingston ambient air monitoring network are to; measure exposure to ambient concentrations of target chemical compounds and compare these results against health screening levels, and monitor particulate levels to determine if action levels are exceeded so dust suppression controls can be enacted or further enhanced. With each of these audits, EPA conducts an assessment of the network to determine if there have been any significant changes at the site that would impact the network's ability to meet the monitoring objectives and provide appropriate data to decision makers. During the network review and throughout the audit, technical elements of ambient monitoring such as sample handling procedures, sample shipping procedures, calibration standard documentation, general recordkeeping, and data review are also evaluated. All monitoring sites were well maintained and met siting requirements according to 40 CFR Part 58, Appendix E. Issues and recommendations are discussed below.

Prior to the audit, TVA submitted to the EPA a proposal to eliminate a portion of the monitoring network. This proposal included eliminating the silica sampling, high volume metals sampling, continuous PM₁₀ monitoring, and the remaining low volume PM_{2.5} sampling. A review of the data shows that the silica, metals, and PM₁₀ levels measured at the TVA Kingston site are typically representative of background concentrations experienced in the region. **EPA and TDEC agree that TVA may discontinue the silica, metals, and PM₁₀ sampling.**

The remaining PM_{2.5} filter based sampler had been required by EPA to continue sampling for a period of at least six months to determine a correlation between the filter based samplers and the continuous PM_{2.5} monitors. After six months, the data would be examined by TVA, TDEC, and EPA. TVA, TDEC, and EPA have reviewed the data and agree that the methods show good correlation. However, the data shows a positive bias. The continuous methods routinely show a positive bias nationally, and the data generated at Kingston is consistent with the data collected nationally. Elevated levels of PM_{2.5} have been measured at the Kingston site; however, elevated PM_{2.5} concentrations were also measured at other nearby TDEC monitoring sites as well. These elevated concentrations are suspected to be regional events and not as a result of operations at the Kingston site. **EPA and TDEC also agree that TVA may discontinue the PM_{2.5} filter based sampling.** TVA will continue to monitor PM_{2.5} using the continuous method to meet the objectives of the Site Dust Control and Air Monitoring Plan.

No new areas of activity were observed outside of the current monitoring perimeter. At this time, the monitoring network is sufficient to meet the monitoring objectives and to provide appropriate data to decision makers.

Data Review

A review of particulate matter and metals data was conducted to determine if quality data is being collected from the ambient air monitoring network. This element of the audit included a review of electronic continuous data, field data sheets, raw data from the contract laboratories, and an assessment on timeliness of data turn-around from collection to final quality assurance review. Data should be present that allows a reviewer to trace the path of a data point from collection through the quality assurance process demonstrating validity and quality.

EPA reviewed approximately 30 data packages of particulate and metals data collected from December 2010 through May 2011. Currently, Inter-Mountain Labs (IML) is conducting both the filter weighing for the single low volume particulate sampler and the metals analysis for the high volume particulate sampling. EPA also reviewed the continuous particulate matter data from December 2010 through June 2011 collected from the continuous PM monitors.

Particulate Matter

The level 4 particulate matter data packages from IML continue to be current, acceptable, and of good quality. Pertinent information included in these data packages included bench sheets, chain of custodies, calibration certificates, and precision data summaries. All quality assurance data included in the data packages were acceptable. Data provided by Environmental Standards indicated that the particulate data was being reviewed within the 30 day validation turn-around time.

There continues to be good cooperation between TVA Kingston and TVA Muscle Shoals in handling the data review responsibilities of the continuous monitors. Data is flowing into AQS, and data is being qualified accordingly.

The BAM 1020 data continues to show good agreement across the network as illustrated in Figure 1, Kingston Ash Recovery Continuous PM_{2.5}. As a whole, all sites track closely together implying good dust control on the site.

Metals

The IML level 4 data packages for metals continue to be current, acceptable, and of good quality. Pertinent information included in these data packages included bench sheets, chain of custodies, laboratory raw data, calibration certificates, and precision data. All quality assurance data included in the data packages were acceptable. Data provided by Environmental Standards indicated that the metals data are being reviewed and validated in a timely manner. The metals data are currently being uploaded into AQS as requested by EPA.

EPA reviewed the Standard Operating Procedures (SOP) for the samplers operated in the Kingston project. While reviewing the Met One BAM 1020 PM_{2.5} monitor SOP, EPA noted two areas requiring attention. First, the field data form included in the SOP is outdated. A new form is currently being used, and this new form should be added to the SOP. Second, the operator had indicated that there are several essential cleaning steps that are performed that should be included in the SOP. The cleaning and maintenance section of the SOP should be updated to include the latest cleaning methodology. **EPA recommends that TVA update the BAM 1020 SOP to include the new form and latest cleaning procedures.**

CONCLUSION

TVA continues to operate an excellent ambient air monitoring network at the Kingston Fossil Plant. The network and monitoring data are acceptable for meeting the monitoring objectives for protecting the health of the environment and population in the area and assessing and controlling fugitive dust emissions from the remediation. The staff from both TVA Kingston and TVA Muscle Shoals continue to demonstrate good cooperation in the operation and data review of the ambient monitoring network. EPA approves the reduction in monitoring proposed by TVA, and the reduction can begin immediately. Areas for improvement and recommendations are identified in bold within the report.

Appendix A. Kingston Fly Ash Particulate Monitoring Network



END OF REPORT