Tennessee Valley Authority
Regulatory Submittal for Kingston Fossil Plant

Documents submitted:
Site Dust Control and Air Monitoring Plan (revised to incorporate TDEC comments)

Date submitted
8/ / 2009

Submitted to whom
Leo Francendese, EPA

Concurrence

Received	Not Applicable	TVA
☒	☐	Anda Ray
☒	☐	Mike Scott
☐	☒	Kathryn Nash
☐	☒	Cynthia Anderson
☒	☐	Dennis Yankee
☐	☒	David Stephenson
☐	☐	_____
☐	☐	_____
☐	☐	_____

Received	Not Applicable	Jacobs
☐	☒	John Moebes
☒	☐	Julie Pfeffer
☐	☒	Jack Howard
☐	☒	Donna Cueroni
☒	☐	Paul Clay
☐	☐	_____

Approvals

TVA Anda Ray Date 8-13-09

EPA Leo Fran Date 8.14.09

Consulted w/ TDEC B. Scott

cc:

- ☒ Anda Ray, TVA
- ☒ Barbara Scott, TDEC
- ☒ Leo Francendese, EPA
- ☒ Mike Scott, TVA
- ☒ Dennis Yankee, TVA
- ☒ Kathryn Nash, TVA
- ☒ Cynthia Anderson, TVA
- ☐ John Moebes, Jacobs
- ☒ EDM
- ☒ Julie Pfeffer, Jacobs
- ☒ David Stephenson, TVA
- ☒ Michelle Cagley, TVA
- ☒ Greg Signer, TVA
- ☒ KIF Incident Document Control
- ☒ Katie Kline, TVA
- ☒ Gretchen Wahl, Jacobs
- ☒ Dannena Bowman, EPA
- ☒ Jeff Gary, Jacobs

Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902-1401

Anda A. Ray
Senior Vice President
Office of Environment and Research

August 13, 2009

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

Dear Mr. Francendese:

Please find enclosed the Site Dust Control and Air Monitoring Plan which has been revised to address comments from the Tennessee Department of Environment and Conservation. The enclosed plan fulfills the requirements of Section IX, paragraph 28, item b. of the Administrative Order and Agreement on Consent. Please contact me if you have any questions.

Sincerely,

Anda A. Ray

Enclosure

TVA Kingston Fossil Plant
Ash Recovery Project, Time-Critical Action
Site Dust Control and Air Monitoring Plan

Control of fugitive dust and comprehensive air quality monitoring are two key elements of the overall response for the TVA Kingston Ash Recovery Project. This document outlines procedures that are in place now, and additional plans to establish and maintain a strong, effective onsite dust control program. It also includes a perimeter and offsite Ambient Air Monitoring Plan as an attachment, since site perimeter and offsite air quality data is a basic measure of the effectiveness of the dust control effort at the site. Onsite monitoring is conducted through the industrial hygiene program that is outlined in the Site Safety and Health Plan.

Problem Statement

Fly ash can produce persistent air-borne dust once it dries on the surface of above-ground placements. As a result of the ash slide that occurred on December 22, 2008, there are large areas of fly ash at the Kingston site exposed to weathering and wind. Since the incident, TVA has been and continues to work to develop effective measures to control fugitive dust.

Initial Efforts

Ash Deposits

Within one month after the incident, TVA spread grass seed, fertilizer and straw over centralized areas of the displaced ash. A liquid vinyl acrylic emulsion was also sprayed in some areas in an attempt to seal the surface and prevent dusting. Both of these efforts had limited success. The cold temperatures kept the grass seed from germinating. Cold weather also reduced the adhesion of the acrylic emulsion to the ash surface so that it loosened and flaked off during windy conditions.

After trying several other materials and application methods, TVA found a material that is an adequate short term solution for controlling fugitive dust. The material is manufactured by Profile Products LLC, and is trade-named Flexterra Flexible Growth Medium. It is a combination of a cellulosic fibrous material and a non-toxic polymeric binder. Standard hydroseeding equipment is used to apply the Flexterra at rates of 1,200 to 3,500 lbs per acre. Flexterra has three advantages: it adheres to the surface of the ash very well; it forms a matrix structure on the surface of the ash that reduces dusting; and it allows grass seed to germinate and grow up through it.

TVA has applied Flexterra to approximately 300 acres through May 15, 2009. Some of this acreage has required more than one application because the ash was being worked or the ash surface under the Flexterra sloughed off.

TVA has contracted with a local hydroseeding company to apply Flexterra to control fugitive dust on the ash deposits. This company is available seven days per week as needed.

Roads

Since shortly after the incident, the on-site haul roads and portions of the public roads that are used by construction equipment have been sprayed with water multiple times per day. In addition, the paved plant and public roads are cleaned by a wet sweeper/vacuum truck.

Dust Suppression on Roads at the Facility

The normal travel areas of the facility (public roads, paved in-plant roads) will continue to be sprayed by water trucks (see photo at the end of the plan) and cleaned by sweeper vacuum trucks. The unpaved gravel haul roads will continue to be sprayed with water trucks. These dust suppression methods work well except during extreme cold weather. A figure has been placed at the end of the plan illustrating the roads that will likely be routinely watered or swept in the future.

To control fugitive dusting on unpaved haul roads, TVA has engaged a contractor to spray a calcium chloride solution on the gravel roads at the site. Calcium chloride attracts moisture, which will help keep the road surface slightly damp, which reduces dusting. Additional dust suppression agents capable of being applied in sub-freezing temperatures are being investigated for use if needed during the winter months.

The site has been reconfigured to accommodate HAZWOPER protocols. Exclusion zones and contamination reduction zones have been established. Vehicle traffic out of the exclusion zones triggers a cleaning procedure that reduces ash transfer, and reduces fugitive dusting on roads throughout the facility.

Wheel wash stations are located strategically around the plant where trucks enter and leave the site. Vehicles that have traveled through the ash containing areas are routed through the wheel washes before traveling on public roads. If ash is present on the truck other than the wheel area, it will be further cleaned at this point. A figure at the end of the plan illustrates the locations of the likely wheel wash locations at the vehicle exit points of the site. As activities change on the site, the locations may change.

As in the past, adding mulch to roads built on ash is a technique that will be used in the future to minimize dust and the need for using water on the ash.

Although not at the facility, local roads are often used by trucks bringing in rock from a nearby quarry. If notable dusting of the roads is noticed, or if a community concern is raised, TVA will contact the quarry and ensure that mitigation actions are taken.

Dust Suppression and Control around the Ash Processing Area

To date, there has been no data that indicates dusting is causing exposure to personnel that would be above established action limits. However, it is anticipated that the ash processing and rail loading operation may generate higher levels of dusting during the summer months. To control this potential problem, a system is being designed that will utilize large fans equipped with water misters. These misters can be installed around the ash processing area as needed to knock down any dust before it leaves the exclusion zone. Additional misters will be designed to be mobile to travel to an area that is a dusting problem. This system will be ready to implement if there are visible dust clouds that are not controlled by other means, or if air sampling data shows either that personnel

exposure is above health and safety action limits (25 ug/m3), or that there is the potential for fugitive dust to travel beyond the site boundaries.

Dust Suppression during Construction

All contractors are responsible for controlling their operations to minimize dust generation. This includes limiting or stopping operations during heavy dusting conditions, various management or training procedures that limit employee exposure, and engineered measures that protect equipment operators working in the ash area.

Dust suppression activities in the active construction areas are task-specific. The equipment that operates in the ash containing areas (excavators, dump trucks, dozers, etc) is equipped with enclosed cabs that are air conditioned, heated and filtered. An ongoing program is in place to inspect door gaskets, A/C units, filters and other devices that seal the cabs to make sure they are properly maintained including keeping the inside cab area clean from ash buildup. Management and training procedures are in place to protect other personnel that work in the area (those that are not in equipment cabs).

Water trucks are used for dust control wherever access allows because they are cost effective and do a satisfactory job of controlling the dust short-term. Where access to the work area is provided by cutting a road through the ash itself, water alone does not work well; too much added water creates a boggy area. In these areas, mulch from ground-up tree stumps has been spread on the road surface and are wet-down and compacted with good results.

Applying Flexterra in an active construction site during ongoing excavation activities is generally ineffective because it will only survive a few days before it is destroyed by excavation or construction traffic.

In some construction areas it is possible to apply Flexterra adjacent to the work area to control dust around the site without interfering with ongoing work. This is the preferred method for fugitive dust suppression (see photo at the end of this plan). To this end, weekly planning and coordination sessions are held between the hydroseeding contractor and the primary construction contractor to allow Flexterra application wherever practical.

The extent of use of these methods will depend on comparing offsite or perimeter air monitoring results to offsite action levels specified in the air monitoring plan, comparing personnel monitoring to onsite action levels as specified in the site-wide health and safety plan, as well as visible presence of dust or community concerns.

Dust Suppression on Ash Deposits

Flexterra application alone has been the primary method of dust suppression on the stable ash deposits until recently. As the weather has warmed up in April and May, some of the seed applied to the ash back in January has germinated and started growing on the ash. This has prompted a significant increase in the application of grass seed as an additional method of dust suppression. Several trial plots of various seed mixes and fertilizer combinations have been planted and more are planned.

Flexterra has been proven to be the most effective dust control method to date. However, adding grass seed to the Flexterra mixture can significantly improve overall dust control. The grass seed and fertilizer are mixed with the Flexterra solution and applied with the same hydroseeding equipment. The Flexterra matrix holds the seed in place while it germinates and develops a root structure. Once the root structure is established it is anticipated the grass will grow into the ash and stabilize the entire ash surface.

The goal of the grass seeding trials is to develop seed mix and fertilizer combinations that will survive on the ash in both warm and cold seasons. At the least this will improve the dust control, make the Flexterra last longer, and improve the appearance of the site. At best, it could develop a ground cover robust enough to replace periodic Flexterra applications at some future date.

As construction activities are completed, the remaining ash deposits will be contoured to reduce the slopes and allow grassing. Once the major interim construction is completed, most of the ash deposits will be grassed until final decisions are made concerning ash disposition.

Alternative materials and methods for dust suppression, as well as alternative grassing approaches, will continue to be analyzed to find ways to improve dust control. It is anticipated that this effort will continue for the life of the project.

Monitoring

Airborne dust monitoring is ongoing, and has been since the initial incident occurred. Data collected to date, both for ambient air and personnel, consistently show that ambient air standards have not been exceeded and personnel exposure to trace elements in the ash has been far below any established action limits.

Appendix A to this document, “Ambient Air Monitoring Plan For the TVA Kingston Fossil Plant Fly Ash Release Remediation”, establishes action levels (Table 4), including visible dust at site boundaries and quantitative values referenced to 75% of the National Ambient Air Quality Standards for airborne particulates. Exceedences of any of these action levels that are potentially caused by ash recovery operations requires immediate notification to the site construction manager responsible for dust control. The operation that caused the emission will be ceased until a re-evaluation of dust control measures is completed and additional control measures implemented if needed. On-site EPA and TDEC personnel will be notified concurrently of any exceedence.

Before starting new site activities such as moving quantities of ash from one point to another on-site, an assessment of potential dust generation will be completed. Appropriate modifications to dust control measures or personnel monitoring are made based on that assessment. A representative from the on-site environmental or safety group will observe any new activity as it starts up to provide feedback to field personnel and adjust dust control measures as necessary.

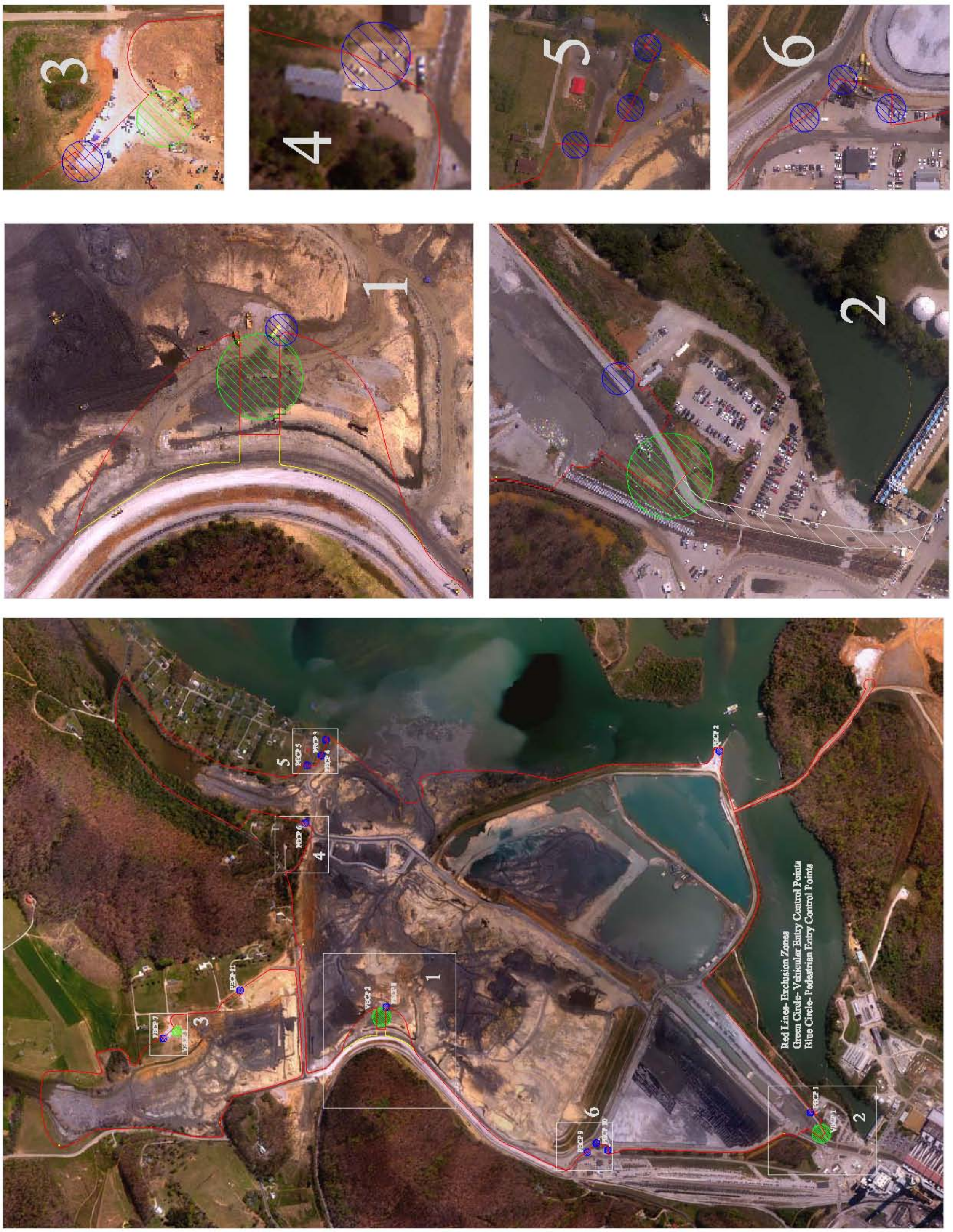
Additional information on personnel monitoring is contained in the KIF Site Wide Safety and Health Plan. Selected personnel are periodically monitored for potential silica exposure. To date, a variety of job responsibilities have been monitored (e.g., equipment operators, laborers, and drivers).

Ambient air monitoring at the KIF site has the following components:

- Continuous monitoring is performed at established fixed locations at the perimeter of the site and at selected locations in the community.
- Continuous meteorological data is collected to assist in interpreting air sample results.
- Continuous real-time hand held particulate monitoring is performed at the perimeter of the site and in the local community. This allows the flexibility to respond to abnormal or unanticipated events. This monitoring technique is used to respond to public inquiries or complaints.

Additional detailed information on air monitoring is contained in Appendix A.


Blue- Water Truck Route
Yellow- Sweeper Truck Route


Red Lines- Exclusion Zones
Green Circle- Vehicular Entry Control Points
Blue Circle- Pedestrian Entry Control Points
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Appendix A

Ambient Air Monitoring Plan

Ambient Air Monitoring Plan For the TVA Kingston Fossil Plant Fly Ash Release Remediation

August 2009

1. Introduction

The purpose of this document, the Ambient Air Monitoring Plan (hereafter referred to as the "AAMP"), is to provide a plan for air monitoring on and around the Kingston Fossil Plant during remediation efforts related to the Kingston Fossil Plant Fly Ash Release. This AAMP summarizes the efforts of the Tennessee Valley Authority (TVA) and the designated air monitoring contractor to conduct air monitoring for respirable (≤2.5 micron) and inhalable (≤10-micron) particulate matter (PM2.5 and PM10) and additional constituents of fly ash. The objective of the monitoring outlined in this AAMP is to measure airborne particulates in the adjacent community and to provide operational information for site dust control measures during the remediation efforts. **Note**: Federal Reference Methods (FRM), and the National Ambient Air Quality Standards (NAAQS), alluded to throughout this AAMP are used in the sense that they are Applicable, Relevant, and Appropriate Requirements (ARAR) for this project. These methods, standards, and regulations are used as an ARAR for this source-specific site remediation project only and are not relevant for other regulatory purposes (e.g., to determine attainment status). The activities outlined in the Preliminary AAMP discussed below have been implemented, with the exception of the operation of the continuous monitoring of PM2.5 at fixed monitoring site PS07, currently scheduled to begin in mid-August, 2009. This AAMP documents activities that are adequate to determine the air quality impacts of the Kingston Fossil Plant Fly Ash Release. The discussion of air monitoring activities that appear in earlier draft submittals of the AAMP, the Quality Assurance Project Plan, and the Field Sampling Plan are incidental to this document.

The United States Environmental Protection Agency (EPA) Region 4, in collaboration with the Tennessee Department of Environment and Conservation (TDEC) conducted an audit of the current TVA ambient air monitoring program the week of June 29, 2009. At the exit meeting, EPA commented that TVA's air monitoring program generally was sound; and they noted several strong areas, e.g., recordkeeping and performance audits. EPA also made several recommendations for improvements. Although the audit report has not been received, TVA is proceeding to implement the suggested improvements. The following is a summary of the status of TVA's response to the EPA findings:

- EPA requested that the field blank filter be placed back inside the PQ200 instrument housing to better replicate sample conditions for the actual samples during the sampling period. Status: A change was implemented on July 3, 2009 to the PQ200 standard operating procedure (SOP) to include the practice of leaving the field blank filter inside the instrument housing during the sampling run.
- The Delta Cal certification is one week past due. Status: An additional Delta Cal has been obtained. Its use has been incorporated into routine quality assurance activities.
- Field data is recorded on paper and transcribed to electronic format, increasing the risk of transcription errors. Status: Efforts are underway to adapt the collection of field data to the overall site electronic data format. This is expected to be implemented by August 31, 2009.

- There are a limited number of spare parts onsite. Status: A critical spare parts list has been developed and parts ordered. They will be onsite by September 15, 2009.
- Quality assurance (QA) data are being analyzed, but not evaluated. Status: Review of QA data has been implemented. Automated QA steps will also be incorporated as the collection of field data is migrated to the electronic format; expected to be in place by August 31, 2009. TVA's QA contractor will perform surveillance to ensure implementation.
- EPA expressed concern regarding the location of site infrastructure and vehicle traffic in close proximity to fixed site PS07. Status: TVA has implemented physical and administrative controls to re-route vehicles to preserve the integrity of the PS07 location. Data from PS07 continues to be monitored for effects from the micro-scale environment surrounding the monitoring equipment.

In addition to the above findings, the following commitments were made by TVA:

- As agreed, TVA has installed a tapered element oscillating microbalance (TEOM) PM2.5 at fixed site PS07. The unit began operation on July 28, 2009. Instrument shakedown continues.
- TVA prepared and furnished to EPA on July 6, 2009, a clarified summary report of metals detects in air samples from December 28, 2008 until the installation of the federal reference method (FRM) monitors.
- TVA implemented an analysis protocol for matching TDEC's analysis of total suspended particulates. The first sample for this protocol was collected on July 15, 2009.
- EPA requested that proposed action levels are tied to 75% of the NAAQS. That change is reflected in Section 9.0 of this plan.
- EPA requested industrial hygiene (IH) monitoring data showing metals detects. The data were sent to EPA on July 6, 2009.
- TVA committed to releasing verified air sample analyses data within two weeks of receipt.

1.1. Preliminary Ambient Air Monitoring

A draft air monitoring plan entitled "Preliminary Ambient Air Monitoring Program for the TVA Kingston Fossil Plant Fly Ash Release" (preliminary AAMP) is attached as Appendix A. The preliminary AAMP, prepared by the Center for Toxicology and Environmental Health, L.L.C. (CTEH) and TVA, was submitted on January 2, 2009, for review by local, state, and federal agencies. The purpose of that plan was to outline CTEH air monitoring activities during the initial response phase of the project.

The preliminary AAMP was accepted and implemented by the Incident Command Center for the fly ash release. Air monitoring began on December 28, 2008, for fly ash and its constituents. The stated objective of these activities was to "monitor the

impact of the fly ash release on air quality." Standard methods commonly employed by TVA and CTEH were implemented during the early phase of the project.

In addition to air monitoring begun by CTEH on December 28, 2008, TVA deployed its Mobile Air Quality Monitoring Laboratory (MAQML) on the KIF plant property northeast of the powerhouse to determine ambient air quality on site. Coordinates of this location are 35 degrees, 54.294 minutes north latitude, and 84 degrees, 31.019 minutes west longitude. This Laboratory was used to measure atmospheric levels of PM2.5 and PM10 mass along with basic meteorological data (wind speed and direction, temperature, relative humidity and precipitation). Daily airborne particle sampling began on December 31, 2008, by the TVA MAQML. PM10 filter sampling commenced at 1200 hr along with semi-continuous PM2.5 mass sampling using a TEOM system. PM2.5 filter sampling began later on December 31, 2008, after the necessary equipment arrived on-site. Elemental analysis of both the on-site PM10 and PM2.5 filters was conducted using XRF. Beginning December 31, 2008, daily particle sampling was conducted following a noon-to-noon schedule. The TVA MAQML was demobilized on February 4, 2009, to allow for preparation of the area designated by site operations as the temporary ash processing site. The results of this monitoring can be provided in a separate report.

2. **Ambient Air Monitoring Plan Purpose and Objectives**

The primary purpose of this AAMP is to describe the rationale and methodology for monitoring to be performed during the remediation of the fly ash release at or near the Kingston (KIF) plant. During the remediation, fly ash may become airborne under certain conditions. The re-suspension of inhalable and respirable fly ash particles by strong winds is the greatest concern. The Environmental Protection Agency (EPA) has established NAAQS that define levels of air quality which the Administrator judges are necessary, with an adequate margin of safety, to protect the public health. The air monitoring tasks outlined in this AAMP will document the ambient air quality in the vicinity of the release with respect to these NAAQS, and identify any airborne releases of fly ash on-and-off site so that any on-site activities or measures (i.e., dust suppression for ash that will remain in place for a longer period of time) potentially associated with a release can be modified to prevent a recurrence.

Principal objectives of the plan are as follows:

- Monitor air quality in the vicinity of fly ash release remediation in real time using fixed air monitoring stations and mobile air monitoring instruments.
- Identify immediate notification steps in the event that real-time particulate levels exceed predetermined action levels so that mitigation can be initiated.
- Monitor PM2.5 and PM10 on a time-weighted or 24-hour average basis to provide air sampling data relevant to the NAAQS for particulate matter.
- Document the ambient air sampling protocols, and the frequency and types of analyses that are conducted on the collected samples.
- Specify the target chemical compounds that will be compared to established levels of concern.

3. Scope

3.1. Real-time Monitoring

TVA will obtain data from instrumentation that provides an immediate indication of the presence of airborne PM10 and PM2.5 outside of the perimeter of the site at a location in the direction of the prevailing winds from the site. TDEC continues to operate a TEOM PM10 instrument at fixed site PS07 and TVA will install a TEOM PM2.5 instrument at this location by mid-August 2009.

3.2. Real-time Mobile Monitoring

TVA will continue to implement real-time mobile monitoring at the site perimeter and in the community 24 hours/7 days per week using portable instruments. Based on TVA's commitment to install TEOM PM 2.5 instrument at fixed site PS07, the current real-time mobile monitoring schedule (24 hours/7 days per week) may be modified in the future based on site and weather conditions and further evaluation of fixed-site data.

In addition to real-time mobile monitoring of the site perimeter and in the community, the mobile instruments will be used as an investigative tool if visible dust is identified at the exclusion zone boundary that exceeds TDEC fugitive emission limits, or the average of the real-time PM10 or PM2.5 values in the previous 24 hours exceed 75% of the NAAQS of either particulate species.

3.3. Fixed-site Monitoring

PM10 and PM2.5 will be monitored at five fixed monitoring sites at the perimeter of the KIF site using filter-based sampling systems. The data is collected for comparison with the applicable NAAQS, but is not considered for compliance with the NAAQS. Prior to the event, TDEC established a monitoring station approximately 2.5 miles northwest of the Kingston plant at Harriman High School. TVA has augmented the equipment at that site. Data from the Harriman High School monitoring station will be used as an indicator of background levels.

3.4. Constituents of Potential Concern (COPCs)

COPCs in the airborne dust are arsenic and quartz. The rationale for the selection of these COPCs and associated action levels is discussed in Section 9. These constituents are identified by laboratory analyses of the sample filters collected from the fixed monitoring sites. High volume samplers are appropriate for lowering the detection limit sufficiently to measure the COPCs in airborne dust and are used at one site (PS07) for this purpose. If other sample filters accumulate sufficient quantities of dust such that COPCs may be detectable, they will be analyzed for COPCs as well. COPCs may be changed as more data becomes available or upon the request of EPA, TDEC, or other participating agencies.

3.5. Data Evaluation

Data are made available to regulatory agencies and the public as they become available and undergo quality assurance review. Trends of PM10 and PM2.5 are routinely posted on the TVA website, as are results for analyses for COPCs.

4. Sampling Sites

Both mobile and fixed sampling strategies are employed in documenting the ambient air quality.

4.1. Fixed Site Monitoring Locations

Of the ten fixed locations identified in the preliminary AAMP, six were selected for ongoing monitoring. The selection of these six locations follows USEPA siting criteria for ambient particulate monitors to the extent possible. Factors such as proximity to roads, proximity to tree obstructions and vertical distance from nearby horizontal structures were considered. Fixed locations were selected to represent areas closely associated with and proximal to the released fly ash. These areas were selected to characterize ambient concentrations of particles and target compounds potentially associated with fly ash in community-based locations near the fly ash. Included in this category is the one (1) background sampling location selected to best represent typical upwind air quality conditions nearby, but not impacted by the ash release. Prevailing wind direction near the plant is strongly influenced by ridge and valley topography oriented along the southwest to northeast axis of the Tennessee River Valley. Two monitoring locations have been established to the northeast of the plant (PS06 and PS07) and one to the southwest (PS09) roughly along this axis so that “upwind” and “downwind” air sampling will exist for most days. In addition, on a line roughly perpendicular to this orientation (northwest-southeast) a second pair of sampling sites (PS05 and PS08) are located. A high ridge located just west of KIF will occasionally induce down-slope airflows under stable atmospheric conditions. The sampling sites discussed in this section are listed below in Table 1. The sites are illustrated in Figure 1.

Table 1

Locations of Fixed-Site Air Monitoring

Fixed-Site	Street Address	Location Coordinates
PS05	1025 Swan Pond Road, Kingston, Tennessee	Lon: -84.523842, Lat: 35.902641
PS06	130 Birkshire, Harriman, Tennessee	Lon: -84.511230, Lat: 35.918091)
PS07	199 Lakeshore Drive, Harriman, Tennessee	Lon: -84.504196, Lat: 35.91666
PS08	540 Emory River Road, Harriman, Tennessee	Lon: -84.497139, Lat: 35.907097)
PS09	304 Windswept Lane, Kingston, Tennessee	Lon: -84.51680, Lat:35.889576
PS10	Harriman High School, 1002 North Roane Street, Harriman, Tennessee	Lon: -84.54372, Lat: 35.938695

Site PS10 is located a considerable distance northwest of the KIF plan at Harriman High School. This location will provide air monitoring results for background air quality. All six locations are at grade or street-level.

4.2. Mobile Real-Time Monitoring Locations

These monitoring locations are selected by air monitoring consultant field sampling personnel, in real-time, to assess the potential presence of PM10 particulates within the adjacent community. These locations focus on the community areas in proximity to the fly ash release area as well as the outlying community areas partially removed from the immediate area of impact. This generally encompasses a four-mile radius around the site. When used in support of investigations of ambient air quality excursions, meteorological conditions will influence monitoring location selection.

5. Monitoring Equipment

5.1. Fixed-site Monitoring Equipment

Fixed-site monitoring equipment was selected to measure levels of ash and ash constituents that could become airborne during response and remediation activities. The primary selection criteria were structured such that the data collected by the instruments would be valid when compared with the applicable NAAQS. Additionally, criteria were evaluated that would allow or provide for ease of use, reliability of operation, the ability to collect analytical data of target chemical compounds, and collection of additional relevant data. Factors such

as sampler inlet height, proximity to co-located reference method samplers, and proximity to high-volume particulate samplers have been addressed to the extent possible for the sampling locations selected. USEPA and TDEC personnel have conducted a preliminary investigation of these sites and have indicated that the monitors are appropriately positioned. The equipment being used and the measurement objectives are listed in Table 2.

Table 2

Fixed-Site Air Monitoring Instrument Summary

Site	Instrument	Measurement Objective
PS05	BGI PQ200	PM2.5
PS06	BGI PQ200	PM2.5
PS07	BGI PQ200 BGI PQ200 BGI PQ200 BGI PQ200 Tisch Hi-Vol Tisch Hi-Vol Tisch Hi-Vol Tisch Hi-Vol ThermoElectron TEOM SKC 224-PCXR8	PM2.5 PM2.5 (Audit) PM10 PM10 (Audit) Total Suspended Particulate (TSP) TSP (Audit) PM10 PM10 (Audit) PM2.5 (August, 2009) Crystalline Silica Quartz
PS08	BGI PQ200	PM2.5
PS09	BGI PQ200 BGI PQ200	PM2.5 PM10
PS10	BGI PQ200	PM2.5

Site PS07 is considered to be at the location of the greatest potential to detect ash spill related particulates. Accordingly, it is the location with the most comprehensive array of monitoring equipment. As noted in Table 2, duplicate instruments are co-located at PS07 for quality assurance purposes. TDEC operates a continuous PM10 monitor at PS07 that is used by the project for real-time assessment of the effectiveness of dust suppression activities at the spill site. TVA will begin operation of a continuous PM2.5 monitor in August, 2009 to complement data from the TDEC monitor. The data from these instruments will be used for notification as discussed in Section 10 below.

The TDEC operates a monitoring site in Harriman, Tennessee, about two and a half miles northwest (4.5 km) from KIF. The site is on the other side of one of the ridges that align northeast-southwest within the geographic region of the Tennessee and Clinch River valleys and bound the KIF plant site. It is an appropriate location for a background monitoring site. TVA has incorporated this site in its network as PS10, and has added one (1) BGI PQ200 PM2.5 FRM sampler here. The instrument samples on a 1-in-6 day schedule

discussed in Section 6 below. Meteorological measurements (including wind speed and direction) are also monitored at this location by TVA.

The Tisch High Volume instruments sample at a rate that is approximately 50 times that of the BGI instruments. The high volume samplers are employed primarily to lower the minimum detection level for constituents of concern.

5.2. Mobile Monitoring Equipment

Instantaneous measurements of PM10 will be taken using TSI AM510 (or equivalent) portable aerosol monitors. These measure airborne PM10 concentrations in mg/m^3. Data from these instruments is used to investigate the source of visible dust or elevated values as measured at the fixed stations.

5.3. Operation, Maintenance, and Quality Assurance

Operation, maintenance, data collection and quality assurance procedures for all monitoring equipment are maintained onsite.

6. Monitoring Schedules

6.1. Sampling of Filter-based Instruments

Filter based instrument monitoring schedules are the same as the 1-in-3 day or 1-in-6 day Year 2009 EPA Ambient Particulate Monitoring Sample-Day Schedule, depending on station location relative to the fly ash and prevailing winds. Due to their proximity to the fly ash and their orientation along the prevailing wind direction, Station PS06, PS07, and PS09 will be sampled on a 1-in-3 day schedule. Stations PS05, PS08, and PS10 will be sampled on a 1-in-6 day schedule with provision to increase the sampling frequency to 1-in-3 days based on particulate monitoring results. The additional TEOM PM2.5 unit to be located at Station 7, as well as TEOM units operated by TDEC at Stations 7 and 10 will be operated continuously.

6.2. Fixed-site Real-time Monitors

With the exception of down time for equipment maintenance, PM10 monitoring will be conducted continuously in real time at Station 7. PM2.5 monitoring will likewise occur continuously beginning in August 2009, as the instrument comes online.

6.3. Real-time Mobile Monitoring

Real-time mobile monitoring with portable instruments at the site perimeter and in the community will continue on a 24-hour, 7 day per week basis through the balance of the summer months of 2009. Pending evaluation of data from this effort and from the fixed-site monitoring, adjustments may be made to the mobile monitoring schedule (i.e., reduced hours and/or frequency). Real-time mobile monitoring may also be used to characterize any off-normal operational or weather-related events that result in the potential for off-site dust transport.

USEPA and TDEC will be notified in writing in advance of any proposed changes to the mobile monitoring schedule.

7. Performance Evaluation

This monitoring network will participate in the EPA Performance Evaluation Program (PEP). Frequency and type of the EPA PEP audit will be determined by USEPA. Fixed monitoring stations are available for audit by TDEC and EPA. TVA insists that its air monitoring contractor maintain a program of continuous improvement. In addition, TVA maintains a contract with a firm that provides third party quality assurance services. The air monitoring program is routinely reviewed under; to include sampling, laboratory analytical, and quality assurance activities. A problem resolution and tracking procedure is used to ensure that issues identified during these reviews are promptly addressed. The issues are analyzed for root cause, solutions are identified and implemented, and measures are taken to prevent recurrence. The status of open items is reviewed weekly. Findings identified during audits by regulatory agencies are treated in the same fashion.

8. Target Analytical Measurements

The preliminary AAMP identified a large number of constituents for analysis in addition to particulate air concentrations (PM2.5 and PM10). TVA performed bulk sampling of the ash containment area on December 31, 2008. These samples were analyzed for metals (Aluminum, Calcium, Lithium, Selenium, Vanadium, Antimony, Chromium, Magnesium, Silver, Zinc, Arsenic, Cobalt, Manganese, Strontium, Barium, Copper, Mercury, Thallium, Beryllium, Iron, Molybdenum, Tin, Cadmium, Lead, Nickel, and Titanium) and BTEX. BTEX were not detected in ash samples. An evaluation and recommendation of the appropriate analytes for this AAMP was performed by CTEH. CTEH used the rationale that any metal in ash below a typical background concentration for soil or which is below a USEPA residential soil regional screening level (RSL) would not pose an airborne concern. Only the 95% UCL for arsenic exceeded both the arithmetic mean concentration for background soils and the USEPA soil RSL. Although the quartz concentrations of the ash are lower than those of natural soils, material safety data sheets (MSDS) of fly ash products nearly always include crystalline silica as a potential hazard. For this reason, TVA monitors for airborne quartz during remediation of the site.

TVA encourages other agencies participating in the ash recovery to share sampling plans. In most cases, TVA will sample for the same analytes using the same methods in order to provide independent confirmation of the results. As other agencies make changes to their sampling plans, changes may be warranted to the TVA plan. For example, TDEC has begun to analyze a TSP sample collected at Station 7 for Aluminum, Arsenic, Barium, Beryllium, Cadmium, Chromium, Lead, Manganese, Selenium, Thallium, Vanadium and Mercury. The sample is collected on the 1/6 day cycle. These metals constitute a broader list of analytes than selected by TVA as discussed above. Even so, TVA will supplement and confirm the TDEC data by using the similar sample and analysis methods on an alternate (offset 3 days)

1/6 day cycle. The data from the analysis for the extended list of metals will be evaluated to determine the continuing validity of the COPCs of the core monitoring plan.

8.1. Constituents of Potential Concern (COPCs)

Samples collected at fixed sites are analyzed according to Table 3.

Table 3

Summary of Sampling and Analyses Methods

Sample Collection Method	Analyte	Regulatory Guidance	Analysis Method
FRM	$PM_{2.5}$	40 CFR50 Appendix L	Gravimetric
FRM	PM_{10}	40CFR 50 Appendix K	Gravimetric
FRM	$PM_{2.5}$ Arsenic	EPA Method I.O.- 3.5	ICP-MS
FRM	PM_{10} Arsenic,	EPA Method I.O.- 3.5	ICP-MS
High volume sampler	PM_{10} Arsenic	EPA Method I.O.- 3.5	ICP-MS
High volume sampler	TSP Aluminum, Arsenic, Barium Beryllium Cadmium, Chromium Lead, Manganese, Selenium, Thallium Vanadium Mercury	EPA Method I.O.- 3.5	ICP-MS
Low Volume sampler	PM_{10} Crystalline Silica (Quartz)	NIOSH 7500	SKC Aluminum Cyclone
Real Time instantaneous TSI AM510	PM_{10}		Laser Photometer

* Conditional analyses: if NAAQs for $PM_{2.5}$ or PM_{10} is exceeded, that sample will be analyzed for COPCs.

8.2. Laboratory Analyses

Samples collected by fixed instruments are sent offsite for analysis. Procedures for the collection, handling, labeling, shipping, Chain of Custody, and QC samples are maintained onsite.

Laboratory procedures are found in the "TENNESSEE VALLEY AUTHORITY KINGSTON FOSSIL PLANT ASH RECOVERY PROJECT QUALITY ASSURANCE PROJECT PLAN (TVA-KIF-QAPP)", Appendix E.

9. Action Levels

Action levels for the site were determined using existing standards where possible, or were calculated from risk-based screening levels or other appropriate guidelines. The action levels selected or derived are summarized in the sections below. Table 4 shows the action levels which have been selected for this site. These results will be communicated according to the procedures in Section 10.

Table 4

Action Levels

Analyte	Off-Site-Specific Action Levels	Source
Airborne Dust	Visible Dust	TDEC Chapter 1200-3-8
Particulate PM2.5 (24-hour average)	26 µg/m^3 (24 hour)	NAAQS
Particulate PM10 (24-hour average)	112 µg/m^3	NAAQS
Arsenic (24-hour average)	20 ng/m^3	ATSDR, 2007
Crystalline Silica (24-hour average)	10 µg/m^3	ACGIH TLV Divided by 420

9.1. Action Level Rationale: Airborne Dust

Action levels for PM2.5 and PM10 reflect 75% of the 24-hour concentration standards as set forth by the 40 CFR part 50 NAAQS criteria. Action levels for visible dust are also established to remain in compliance with the regulatory limit for visible dust emissions at the boundaries of the site.

9.2. Action Level Rationale: Arsenic

A site-specific action level for arsenic was established using background concentrations reported by the Agency for Toxic Substances and Disease Registry (ATSDR, 2007). As reported by Schroeder et al. (1987; as cited in ATSDR, 2007), the range of background arsenic air concentrations in rural areas was 1 to 28 ng/m^3. USEPA has also estimated arsenic concentrations in the U.S. as part of its Assessment System for Population Exposure Nationwide (ASPEN) (Rosenbaum et al. 1999 as cited in ATSDR, 2007). Using 1990 data to estimate total emissions of arsenic in the conterminous 48 states, excluding road dust or windblown dust from construction or agricultural tilling, the 25th percentile, median, and 75th percentile arsenic concentration were estimated by USEPA to be 9, 20, and 30 ng/m3, respectively. These estimated levels are close to the range reported for rural areas by Schroeder et al. The median estimate for background air concentrations for arsenic (20 ng/m^3) is used as the action level for arsenic.

9.3. Action Level Rationale: Crystalline Silica Quartz

A value of 10 µg/m^3 was established for quartz based on the USEPA-developed air quality target level derived for the deconstruction of the 130 Liberty Street Deutsche Bank building in Manhattan (http://www.renewnyc.com/plan_des_dev/130liberty/air_monitoring_reference.asp; accessed February 24, 2009). The USEPA value is based on respirable crystalline silica. Quartz is the most common form of respirable crystalline silica.

10. Exceedence Notification

Real-time or filter based measurements equal to or above the action levels will indicate the need for an evaluation of the data generated by the network and other data sources to determine the cause of the elevated values. The TVA KIF environmental staff, in coordination with on-site EPA and TDEC personnel, will determine if there is a reasonable potential that fugitive emissions from ash recovery operations are impacting air quality beyond the perimeter of the exclusion zone. The TVA Air Lead may direct the collection of additional data using mobile PM10 monitoring instruments and an increase in fixed based sampling schedules. If it is determined that fugitive emissions from the ash recovery operations are a probable cause of the action level exceedence(s), the Construction Manager for Dust and Erosion Control will be immediately notified and will implement prompt measures to mitigate the source.

The TVA Project Manager, USEPA On-scene Coordinator, and TDEC On-site Representative will be contacted in person, by phone or email when data indicates an exceedence of action levels for PM2.5, PM10, arsenic or quartz. Further notifications to TVA and regulatory agency personnel will be made as directed by these individuals. Every effort will be made to make these notifications within one work day of verification of the analytical results. An event that triggers immediate further investigation will result in immediate notification to USEPA and TDEC on-site personnel.

11. Meteorological Monitoring

Meteorology monitoring will be conducted at PS07 and PS10. Wind speed, direction and temperature will be measured; additional meteorological parameters may be measured as well. Calibration and maintenance of meteorological monitoring equipment will be performed in accordance with procedures maintained onsite.

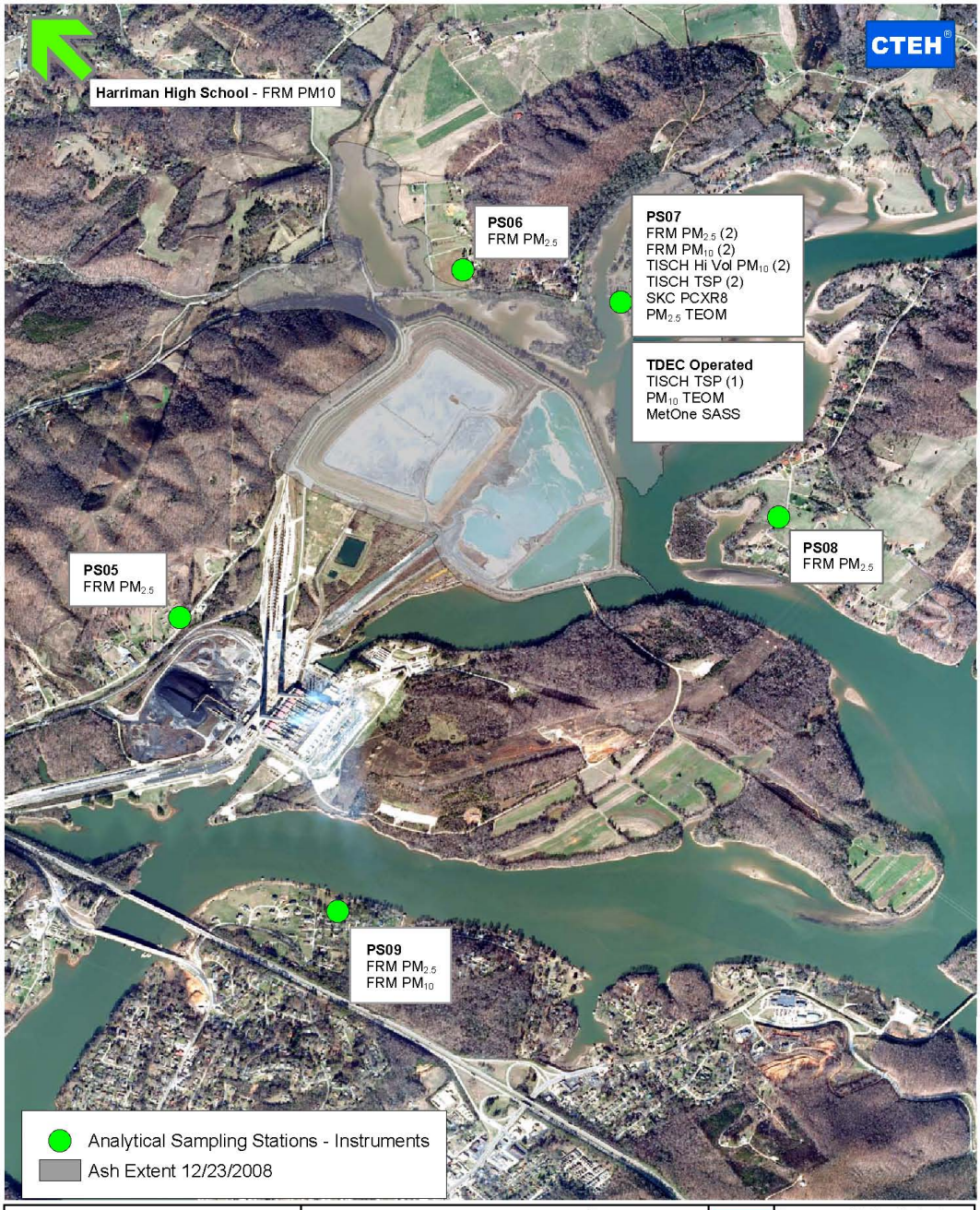
12. Quality Assurance / Quality Control

Air monitoring activities will conform to the TENNESSEE VALLEY AUTHORITY KINGSTON FOSSIL PLANT ASH RECOVERY PROJECT QUALITY ASSURANCE PROJECT PLAN (TVA-KIF-QAPP)

13. Electronic Data Management and Reporting

All data will be managed according to the Kingston Ash Recovery Project Data Management Plan. All air monitoring data collected will be provided to the appropriate database administrator, for inclusion as identified in the Data Management Plan. As relevant QA/QC activities are completed, TVA is committed to provide data to EPA's data system. TVA understands that the data is non-regulatory, and not intended for use in determining compliance with the NAAQS.

Particulate Monitoring Stations



Stationary Particulate Monitoring Stations	FIGURE 1	CTEH	Tennessee Valley Authority
		Project No. 4735	Kingston, TN
			Roane County
			Date Printed: 07/28/2008