

EVENT ANALYSIS – KINGSTON FOSSIL PLANT ASH DEPOSITION INCIDENT
SEPTEMBER 18, 2009

Executive Summary

The Event

On September 18, 2009, the Tennessee Department of Environment and Conservation (TDEC) received a complaint at approximately 11 a.m. from a resident near TVA's Kingston Fossil Plant. When TDEC arrived at the residence, they found material appearing to be ash on the resident's car. Personnel at Kingston were notified and investigations began. Shortly after plant notification, personnel performed on-site inspections in and around the plant and noticed the ash-like material. However, any visible fallout of material from the stack had stopped before the inspections were started. At 6:23 p.m., Unit 4 was removed from service and at 2:41 a.m. on September 19, 2009, Unit 3 was removed from service resulting in no units generating on Stack 1. Unit 9 on Stack 2 continued to operate.

Two scrubbers are being installed at Kingston to control emissions of sulfur dioxide. One of the scrubbers will be operational this fall with the second coming into service in early summer 2010. The installation of these devices will allow Kingston to burn different coals. To evaluate plant impacts while burning these coals, Kingston was burning a higher sulfur coal prior to and during this event.

A team of TVA specialists was formed to determine the root cause of the event, the contributing factors, and how to prevent this event from occurring in the future.

TDEC collected a sample of the material and their physical analysis indicates it consists mostly of fly ash.

Analysis Results

Through data analysis, sample collection, chemical analysis of materials within the plant stack, duct and stack inspections, personnel interviews, and a review of the sequence of events, the results can be summarized as follows:

- Stack 1 has operated below the temperature at which sulfur trioxide (SO₃) condenses since about February 2009.
- During the investigation, a buildup of material was found in Stack1 which has likely been developing since February.
- The higher sulfur coal being burned prior to and during the event exacerbated the build up and initiated the event.
- An analysis of this material showed it to be primarily fly ash with a high level of sulfates.
- An inspection of Stack 2 showed only very small amounts of buildup of material.

Conclusions and Future Actions

Root Cause - After the Kingston ash spill, the power plant reduced its electricity production to reduce ash generation. Operating fewer units resulted in lower stack temperatures, allowing a buildup of ash with a high concentration of sulfates to collect on the stack liner.

Contributing Factors - Higher sulfur coal during the test burn exacerbated the buildup and initiated the event. It is likely that this event would have occurred at some future date even without the test burn.

Operation of the Selective Catalytic Reduction (SCR) systems to reduce nitrogen oxide emissions causes an increase in sulfur trioxide formation. This technology uses ammonia injection and ammonia in the flue gas contributed to the deposition.

Actions - Add procedures to ensure stack temperature and coal characteristics are reviewed prior to power generation and fuel changes at Kingston

Review and revise test burn procedure to address the introduction of different coal types and the current operating conditions at all TVA plants.

Investigate the operation of the SCR systems and minimize sulfur trioxide and/or unreacted ammonia.

If the test burns resume, TVA will notify the public before the test begins.