

PROJECT facts

Environmental & Water
Resources

07/2005

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY



SCALE UP AND DEMONSTRATION OF FLY ASH OZONATION TECHNOLOGY

Description

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PARTNERS

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Objectives

The objectives of the project are: (1) to demonstrate fly ash ozonation technology on a utility site, with minimum modification to existing plant equipment and operations and to confirm the process effectiveness through a complete battery of technology performance and concrete quality tests; (2) to develop a plan for effective implementation of the technology at the PPL Montour station; and (3) technology transfer to other U.S. coal-fired plants.

Background

One of the biggest challenges facing the fly ash utilization industry is the management of unburned carbon. Elevated carbon levels often accompany low NO_x retrofits of coal fired power stations and can disqualify ash for its largest and most lucrative utilization market— as a pozzolanic additive in concrete. Ozone treatment of fly ash reduces surfactant absorption, the cause of air entrainment problems in concrete. Efforts are underway to develop an ash beneficiation process based on this principle.

Summary

The work began with the development, testing and demonstration of the fly ash ozonation/fluidization technology at Fuller Bulk Handling (FBH) test facility, to be followed by field deployment/testing at the Montour station where the technology will be integrated with existing ash handling systems. Technical and economic analyses will then be conducted for full-scale, commercial design of the technology.



COST

Total Project Value
\$935,912

DOE/Non-DOE Share
\$594,612 / \$341,300

PERIOD OF PERFORMANCE

March 2003 to July 2005

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Accomplishments

PPL has completed the Pilot-Scale Parametric Tests at Fuller's test facility leading to the design and fabrication of a 42-inch Air Merge Blender. The deployment of the ash fluidization/ozonation system at Fuller facility was a success. Testing of ash and concrete analyses (foam index, mortar air-entraining tests, petrography, trial batches for short and extended mixing times, and ready-mix plant testing) have all shown favorable results. The design, deployment, and test system at Montour Station is in place and testing is ongoing. PPL currently is evaluating the Scale-up for Montour Station and developing generic design guidelines.

Planned Activities

Complete Task 1- Pilot-Scale Parametric Tests at Fuller's test facility

- Design and fabricate 42-inch Air Merge blender and procure ozone generator.
- Deploy ash fluidization/ozonation system at Fuller facility and conduct parametric tests
- Conduct ash and concrete analyses (foam index, mortar air-entraining tests, petrography, trial batches for short and extended mixing times, and ready-mix plant testing)

Complete Task 2 – Design/Deploy/Test system at Montour Station

- Deploy optimized fluidization/ozone generator system at Montour station
- Interface with Montour ash handling systems (storage silos, dry ash loadout dry, etc.)
- Conduct parametric tests
- Conduct ash and concrete analyses, as above.

Complete Task 3 - Design Scale-up for Montour Station and Develop Generic Design Guidelines

Complete Task 4 - Final Report