The Development of an Advanced Multi-Product Coal By-Product Processing Plant: A Clean Coal Power Initiative Project

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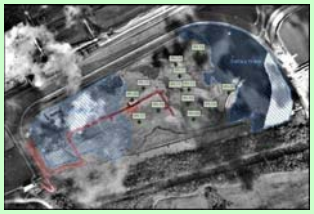
Background

An advanced coal ash beneficiation processing plant is under development by a project team consisting of CEMEX, Inc., the University of Kentucky's Center for Applied Energy Research and the LG&E Energy, Corp. within the portfolio of the U.S. DOE Clean Coal Power Initiative (CCPI). CCPI, the capstone of the National Coal RD&D Program managed by the US DOE Office of Fossil Energy, is an industry-government cost-share partnership to demonstrate clean coal technologies at sufficient scale to ensure proof-of-operation prior to commercialization. The plant will be installed at the 2,200 MW Ghent Power Plant in Carrollton, Kentucky. The Ghent Power plant is owned by Kentucky Utilities Company, a regulated subsidiary of LG&E Energy Corporation. The plant will be owned and operated by CEMEX, Inc. The plant will be at commercial scale and will be capable of producing the following:

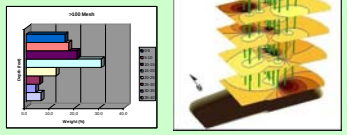
- 156,000 tons per year of pozzolan which substantially exceeds ASTM C-618 criteria for loss on ignition (LOI), fineness and strength index.
- 16,000 tons per year of ASTM C-330 and C-331 compliant high grade, lightweight aggregate.
- 16,000 tons per year graded fill sand.
- 1,500 tons per year of high quality polymeric filler.
- 8,000 tons per year of recycled carbon fuel.

Resource Analysis

The demonstration site is a filled ash storage facility at Ghent Power Plant. The site covers 110 acres and contains over 7 million tons of ash, of which approximately 1.8 million tons is less than 10 microns in diameter. To determine the amount and location of ash present, an innovative vibracoring technique was used. The technique enables the recovery of complete, intact cores so that sedimentation and stratigraphy of the in-place ash could be investigated. Layered iso-grade maps, stratigraphic columns and profiles were generated from vibracoring data.



Aerial photo of ash pond showing location of core holes.



Example of layered iso-grade map showing location and distribution of coarse (>150 micron) material.

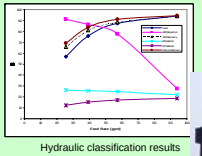
Pilot Test Work

Trailer mounted pilot test equipment has been installed on the perimeter of the ash pond and has been operated since summer 2005. The objective of the pilot test work is to evaluate several flowsheet configurations and to produce large quantities of processed ash for mortar and concrete testing. The test facility has a design feed rate of 2.5 tons/hr and includes the ancillary equipment to meet electrical and process water requirements to operate.

Transporting pilot equipment to test site.

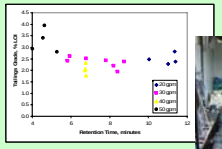
Trailer-mounted pilot test installation.

Pilot Test Results



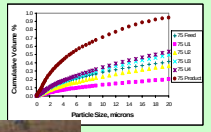
Hydraulic classification results @ 17.5% feed solids

Hydraulic classifier



Froth flotation results

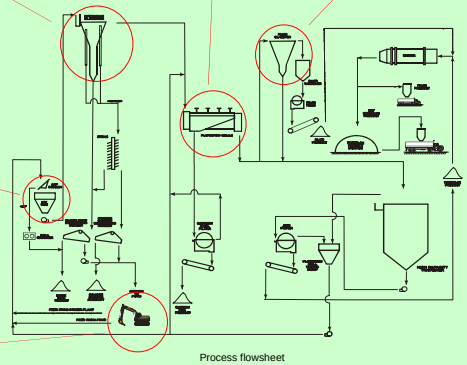
Froth flotation cells



Filler classifier

Feed slurry preparation

Feed Ash Mining



Process flowsheet

Project Status

Composite bulk quantities (i.e. 200 to 1000 lbs) of processed ash have been generated from each of the process configurations evaluated. The composite products have been characterized in terms of their grade, chemistry and processing cost and are being assessed for their use as cement replacement in mortar and concrete mix designs.

Secondary classifier testing is essentially complete with the exception of one additional geometric configuration. One additional circuit evaluation remains to be evaluated as well, that being the combination of hydraulic classification, flotation and secondary classification. The information compiled will be used for economic evaluation and design of the final process circuitry