

CARLSON, JEFFREY L.* and PARKER THILMONY, Minn-Dak Farmers Cooperative, 7525 Red River Road, Wahpeton, ND 58075. **Experiences with Briquetting and Burning Boiler Fly Ash in a Coal-Fired Beet Pulp Dryer.**

ABSTRACT

Minn-Dak Farmers Cooperative has two coal fired Babcock and Wilcox boilers that are each capable of generating 175,000 pounds of steam per hour. The boilers produce between 4,000 and 8,000 tons of fly and bottom ash annually, 50-to-70 percent of which is fly ash.

Analysis of the fly ash showed it to contain 29 percent fixed carbon, 6 percent volatile matter and 5,200 BTU per pound. This compares to 38 percent fixed carbon, 31 percent volatile matter and 9,200 BTU per pound in sub bituminous coal.

An economic evaluation done on burning 3,000 tons fly ash considered the recovered energy (31,000 MM BTU), and avoided fly ash disposal cost (\$35-to-\$50 per ton). One additional benefit considered was the conversion of fly ash to bottom ash with a corresponding reduction in environmental liability. The evaluation showed that further testing was warranted

Komerich Briquetting Research, Inc., of Anniston, Alabama made test briquettes using Minn-Dak fly ash, molasses and hydrated lime at 10, 13 and 15 percent and 3.5, 5.0 and 5.5 percent molasses and lime respectively. All three briquette types had good strength, with the best performance (222 pounds crushing force and 9 foot drop height at failure) for the briquette with the highest concentration of molasses and lime.

LWR Enterprises of Waterford, Ohio made 55 tons of two-inch by two-inch by one-inch briquettes from the above best performing mixture. When tested by MTVL Laboratories of New Ulm, Minnesota, they were found to have 3,397 BTU per pound, 23 percent moisture, 18 percent fixed carbon, 13 percent volatile matter and 46 percent ash

These briquettes were mixed with sub bituminous coal to give 88 tons of a fuel with about 6,5000 BTU per pound. A test burn was conducted on March 14 and 15, 2006 in Minn-Dak's coal fired pulp dryer. The dryer is equipped with a Detroit Stoker moving grate firebox. The stoker throws the fuel to the back of the firebox and the grate moves slowly forward. The grate speed and stoking amount are set to create an ash bed sufficient to protect the grate as well as allow for complete combustion of the fuel.

The test showed that these briquettes had sufficient strength to make it through Minn-Dak's coal handling system without breaking. The stokers had difficulty in throwing the briquettes to the back of the firebox, making a variable ash bed. The briquettes burned well once some adjustments were made to the stokers.

Pellets produced from the dried pulp were similar in strength and ash content to pellets produced using sub bituminous coal as fuel. Twenty percent of the ash was unaccounted for in a mass balance of the ash content in the fuel, the wet pulp, the pellets and the bottom ash.

Based on the test results; briquetting fly ash has a simple payback of between four and five years. Further testing considered includes 1) using concentrated separator byproduct as a binder instead of molasses, 2) using smaller briquettes, and 3) doing a more thorough ash balance including emissions testing.