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KENTUCKY JUDGE DUMPS
HNR'S UMWA OBLIGATIONS

Hobet Upgrades
Beth Station Prep Plant

Cement Plant Burns Refuse

in Commercial-Scale Demo

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Greencastle cement plant showing precalciner/preheater tower.

More than 5 million tons of refuse are generated from coal cleaning operations in Illinois each year. Over years of accumulation, these wastes now amount to several hundred million tons, and except for occasional use as mining backfill, they have not found a beneficial reuse.

Refuse typically contains residual coal that can realize significant fuel value. Supported by grants from the Illinois Department of Commerce and Economic Opportunity through the Office of Coal Development and the Illinois Clean Coal Institute, CTL Group undertook a study to learn how this intrinsic coal content could be used as a fuel supplement in the energy-intensive process of cement manufacturing, potentially leading to the multiple benefits of energy conservation, waste recycling, and reducing local environmental stress.

After samples from several different Illinois mining operations were collected and tested for fuel value, refuse from the now closed Marissa coal mine in Randolph County was used in a commercial demonstration at the Buzzi Unicem cement plant in Greencastle, Ind. Nearly 50 tons of refuse was dredged from the settling pond at the Marissa mine. The material was vigorously air-dried to make it flowable before shipment to the cement plant. About 80 tons of processed material was delivered to the cement plant for a 24-hour demonstration run.

The Greencastle plant is a semi-dry, single-stage preheater/precalciner cement plant that uses waste-derived fuels for its clinkering operation. The plant substituted the coal refuse for 15% of the coal used during a 24-hour period. During the demonstration, several parameters were observed, including precalciner fuel feed rate, ease of conveying coal refuse, fuel savings, emissions, clinker production and characterization, and cement production and properties.

During the demonstration, the plant ran smoothly, as expected, without any operational, emission, or product anomalies. The plant realized significant fuel savings in its precalciner operation. No abnormalities were noted in the precalciner or rotary kiln thermal profile, and there was no adverse impact on emissions released. The clinker was similar to that produced before and after the demonstration, the resulting cement was in compliance with ASTM C 150 Standard Specification for Portland Cement.

The study suggested that the concept of using Illinois coal refuse as a partial fuel in cement manufacturing can lead to an efficient and high-volume utilization. Buzzi Unicem has already expressed interest in longer-term demo (of 7-to-10-day duration) at its cement plants in the Midwest, including the ones at Oglesby, Ill., Cape Girardeau, Mo., and Greencastle, Ind.

A full-scale demonstration is recommended to ensure material compatibility and confirm these benefits. Additional research could clarify the following points:

- Various mine sites exhibited significant differences in the physical properties of the settling ponds. Cement plants need uniform feed to determine the potential variability in materials supplied. Compositional mapping of the waste pond areas would enable full use of the material.
- Other modes of introducing refuse into the cement kiln system should be investigated. The Greencastle commercial run required semi-dry material, which was necessary for use in the precalciner. Depending on a plant's location and kiln system, a different mode of coal refuse introduction may be necessary.
- Transportation costs are significantly higher on wet material. Moisture of the original material dug from ponds was more than 30%. Methods of drying the material prior to shipment are worth investigating.
- Two-way transport (back hauling) may reduce shipping costs.



Refuse was dredged from the Marissa mine's No. 2 settling pond and used for a test burn at a cement plant.



Prior to dredging, samples were taken. In the future, mapping the settling pond may provide a more consistent feed.

- The 24-hour demonstration showed no negative changes in the clinker or cement composition. Accurately assessing the feasibility of using large amounts of this material, however, will require a longer run such as 7 days. This would allow for stabilization of the process and would allow experimentation to maximize the use of prep waste.

In every stage of this project so far, from bench-scale to pilot plant to commercial trials, the results have shown a high degree

of promise. The use of coal refuse in cement manufacturing is likely to offer significant benefits for both coal producers and cement manufacturers.

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