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Flyash Paving Could Solve Feedlot Problems

States Impacted:
New York, Pennsylvania, California

Benefit Areas:
Environmental Quality Improved

Participants:
Federal Energy Technology Center; U.S. Department of Agriculture, Agricultural Research Service; Air Products and Chemicals; Black River Co-Gen Partners; Thomas Nickeson, Consulting Geologist

FETC Contact:

Peter Botros**

Office: (304) 285-4162
E-Mail: pbotro@fetc.doe.gov

MAIL ADDRESS:

* U.S. Department of Energy
P.O. Box 10940
626 Cochrans Mill Road
Pittsburgh, PA 15236-0940

**U.S. Department of Energy
P.O. Box 880
3610 Collins Ferry Road
Morgantown, WV 26507-0880

WEBSITE:
www.fetc.doe.gov

USDA Contact:

William Stout
Office: (814) 863-0947
E-Mail: ws1@psu.edu

MAIL ADDRESS:

USDA/ARS
University Park, PA 16182

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Description

Muddy barnyard feedlots have long been a problem for dairy farmers since the mud, together with winter thaw and spring rains, can bog down cows, draining them of energy and subjecting them to disease. However, a demonstration that involved using the flyash generated by fluidized bed combustion (FBC) power plants to pave the lots has shown a significant decrease in cases of a viral hoof infections, as well as bacterial udder diseases, for the dairy cows. In 1995-1996, FETC sponsored a research project, in cooperation with the U.S. Department of Agriculture's Agricultural Research Service, Black Rivers Co-Gen partners, and private researchers, to evaluate the environmental impacts of spreading 33 tons of flyash on a 900-square foot feedlot at an experimental dairy farm north of Harrisburg, Pennsylvania. The flyash, collected from a fluidized bed combustor, was then monitored using suction lysimeters to measure the concentrations of various elements leaching into the groundwater. The measurements, which detected only minute traces of arsenic and nickel were found in the groundwater, all below U.S. Environmental Protection Agency threshold levels for safe drinking water, were compared with data collected from an unpaved feedlot.

Goals

Originally, DOE was evaluating the use of FBC flyash as a soil amendment by spreading it on land at a power plant located in Fort Drum, NY. However, during winter months, the land was too saturated to run the spreading equipment and the concept of paving the land with FBC flyash evolved. The State of New York would only agree to issue a permit for paving the area after leaching data was obtained. As a result, paving the feedlot at the dairy farm and measuring for leachates provide the necessary data.

Tangible Benefits

National: The USDA's Natural Resource Conservation Service has since become interested in the use of flyash for paving and has even developed it as a *"best management practice"* for high-use livestock areas; several trial demonstration projects are underway. In addition, tests at the University of California-Davis Medical Veterinary School have demonstrated a sharp decrease in cases of hairy footwort and mastitis -- conditions commonly experienced by dairy cows -- based on the use of flyash for pavement. Other advantages include: cost savings, improved conditions for the cattle, and increased milk production. Paving with flyash is cheaper than paving with concrete, $6 per square yard versus $75 per square yard, respectively. Selling the flyash also enables power plants to save money on waste disposal costs. Flyash paving also enables farmers to safeguard their cattle's welfare, ensuring peak milk production and growth during the rainy season. Finally, paving the feedlot helps direct manure towards waste utilization systems, reducing the potential for nitrogen and phosphorus contamination of groundwater.

Regional: The experimental dairy farm north of Harrisburg, Pennsylvania, was able to demonstrate the technology and prove that toxic leaching of the flyash into the groundwater was not an issue. The results of the study helped the New York Department of Environmental Conservation to approve farmer use of flyash as a safe barnyard paving resource. Subsequently, flyash has been approved for paving in San Joaquin County in California, which experienced many of the heavy rains of El Nino.