

FY97-XXVI-73
MARKET ASSESSMENT AND DEMONSTRATION OF LIGNITE FBC ASH IN
FLOWABLE FILL APPLICATIONS

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PARTICIPANTS

<u>Sponsor</u>	<u>Cost Share</u>
Montana-Dakota Utilities Co.	\$ 42,676
Western Research Institute and USDOE	72,637
ND Industrial Commission	<u>37,319</u>
Total Project Cost	\$152,632

Project Schedule – 5 Years

Contract Date – 2/17/97
Start Date – 12/1/96
Completion Date – 12/15/2001

Project Deliverables

Interim Report - 7/31/97 ✓
Interim Report - 10/31/97 ✓
Final Report – 12/15/2001 ✓

OBJECTIVE / STATEMENT OF WORK

The objective of this project is to determine through laboratory and field demonstration testing the technical and environmental potential of using fluidized bed combustion (FBC) ash from the Montana-Dakota Utilities (MDU) Heskett FBC plant in the production of 'excavatable' and 'structural' grade flowable fill materials for construction applications. Controlled Low-Strength Flowable Fill Material (CLSFFM) made from the MDU Heskett plant ash appears to be technically viable and environmentally safe. Preliminary testing has demonstrated technical viability. Further testing leading to full-scale demonstration is proposed in order to provide marketing, testing, and demonstration information essential for commercialization.

STATUS

The following tasks were completed:

- Market assessment of the Bismarck-Mandan region for the MDU flowable fill material,
- Laboratory-scale testing of the MDU flowable fill material, and
- Field-scale demonstration of “S” (structural) - grade and “E” (excavatable) grade flowable fill.

In summary, the results of the market assessment, laboratory testing and demonstration activities proved the following:

- The market assessment indicated that a market exists in the Bismarck-Mandan area for structural construction applications, such as sub-bases for residential and commercial businesses, and excavatable fill applications, such as gas line and utility trench filling.
- The cost of the MDU flowable fill product must be lower than the current \$35-\$45/cubic yard price if it is to become a common construction material. Formulations using MDU ash and lower-cost sand alternatives offer that opportunity. An estimated market of 10,000 cubic yards of MDU controlled density fill (CDF) could be realized if prices could be made competitive.
- The geotechnical properties of the MDU ash-based flowable fill can be modified to meet the needs of a range of applications from structural fill to excavatable applications, such as utility trench fill.
- Environmental assessments using standard testing indicate that the environmental properties of the fill materials are compatible with numerous construction applications and do not pose a threat to either adjacent groundwater or soils.
- WRI developed an ‘Environmental Field Simulator’ (EFS) method for assessing the impact of flowable fill materials on adjacent soils and found that the zone of impact is less than a couple of inches, thereby posing no threat to adjacent soils.
- Field-scale demonstrations of the MDU flowable fill were constructed and were successful for structural, as well as excavatable applications. Monitoring has demonstrated the geotechnical performance, environmental performance, and compatibility with common embedded materials of the MDU flowable fill products.

Technical and economic issues were identified that may hinder the commercial acceptance of MDU flowable fill materials, including: (1) the ability to produce a consistent product; (2) the ability to provide a product year round (cold weather retards strength development); and (3) the ability to evaluate and produce commercial quantities of MDU flowable fill using inexpensive materials.