FY94-XV-52
ENGINEERING FEASIBILITY STUDY OF COAL REBURN APPLICATION TO THE CYCLONE FURNACES IN NORTH DAKOTA LIGNITE CYCLONE USERS GROUP

CONTRACTOR: North Dakota Lignite Cyclone Users Group

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PARTICIPANTS

Sponsor	Cost Share
ND Cyclone Users Group (Coyote Generating Station, Leland Olds Generating Station, Milton R. Young Generating Station)	$170,985
ND Industrial Commission	170,985
Total	$341,970

Project Schedule - 9 Months
Contract Date - 1/28/94
Start Date - 1/28/94
Completion Date - 4/1/95

Project Deliverables
Status Report - 3/31/94 ✓
Status Report - 9/2/94 ✓
Final Report - 4/30/95 ✓

OBJECTIVES / STATEMENT OF WORK

The objective of study FY94-XV-52, is to show that the B&W low-NOx burner technology system retrofit is physically, economically, and technically feasible on a North Dakota Lignite Cyclone Users Group boiler. Cyclone equipped boilers have unique configurations which prevents application of standard low-NO_x burner technology. The use of standard low-NO_x burner technology, such as, selected catalytic reduction or selected non-catalytic reduction (SCR/SNCR) offers promise of controlling NO_x from cyclone units, but at high capital and/or operating costs. Reburning involves the injection of a supplemental fuel into the main furnace to produce locally reducing stoichiometric conditions which convert NO_x to molecular nitrogen, thereby reducing NO_x emissions. In the two studies funded by the North Dakota Industrial Commission, North Dakota lignite was used as the supplemental fuel. The North Dakota Lignite Cyclone Users Group, in conjunction with the Commission, completed an initial study (LRC-IX-36), evaluating the use of North Dakota lignite at the B & W Alliance Research Facility. The second study (FY94-XV-52), an engineering feasibility evaluation, is the next step leading to first-of-a-kind commercialization of the low-NO_x burner technology with North Dakota lignite.

STATUS

The engineering study revealed that the Babcock & Wilcox coal reburning technology is technically and physically feasible as retrofits to the following lignite-fired cyclone boilers:

Basin Electric's Leland Olds #2
Minnkota Power's MR Young #2
Montana-Dakota Utilities's Coyote #1.

Coal reburning operation at these facilities would result in a predicted 53% NO_x emission reduction at maximum continuous rating. Coal reburn system design operation percentage heat input at full load is 30%. At low load operation, reburn heat input is 30-35% and the resultant predicted NO_x emissions reduction is 46%.

The following table summarizes the predicted particulate loading and % UBCL for the three units:

Parameter	Basin Electric Leland Olds #2	Minnkota Power MR Young #2	Montana-Dakota Utilities Coyote #1
Base Flyash Loading	40%	45%	50%
Reburn Flyash Loading	52%	55.5%	59%
Baseline %UBCL[1]	0.15	0.09	0.13
Reburn %UBCL	0.21	0.12	0.16

Budgetary cost estimates were provided. Cost estimates assumed installation of reburn equipment by B&W, and balance of plant costs by Sargent & Lundy. Depending on existing infrastructure, estimated costs range from $22 - $30 million.

[1] %UBCL is defined as percent unburned carbon.