

Grant Application

For a

Pilot Scale Study of Mercury Oxidation Catalysts

At

Coal Creek Station, Underwood, North Dakota

Presented to:

Ms. Karlene Fine, Executive Director
North Dakota Industrial Commission
600 East Boulevard Avenue
Bismarck, ND 58505

Submitted by:

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September 26, 2000

Funds Requested from the North Dakota Industrial Commission: \$50,000

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APPENDICES

Appendix A. URS Group's Proposal to DOE

Appendix B Project Cost Estimate

LIST OF ACRONYMS

DOE	Department of Energy
EPRI	Electric Power Research Institute
FGD	Flue gas desulfurization
GRE	Great River Energy
NDIC	North Dakota Industrial Commission
US EPA	United States Environmental Protection Agency

1.0 Abstract

Great River Energy (GRE) requests funding from the North Dakota Industrial Commission (NDIC) for a pilot scale study of a mercury oxidation catalyst. The control technology proposed uses catalyst materials to oxidize the elemental mercury content of the flue gas from coal-fired power plants that have wet lime or limestone flue gas desulfurization (FGD) systems. The oxidized mercury is removed in the wet FGD absorbers and co-precipitates in a stable form with the byproducts from the FGD system.

The proposed project will test catalyst materials previously identified as being effective in small-scale research funded by the Department of Energy (DOE), but in a commercial form at larger scale and for longer periods. The goal of the project is to generate engineering data for future, full-scale designs. The pilot-scale tests will continue for over a year at each of the two sites.

Initiation of the project is dependent on funding by the DOE under their mercury solicitation. DOE will provide up to 80 funding for the project. URS Group (URS) will be the prime contractor for the project. The Electric Power Research Institute (EPRI) will co-fund and co-manage the project. The two host facilities – Coal Creek Station and J.K. Spruce Station in Texas – will also co-fund the project.

The total estimated cost for the project is approximately \$1.02 million. GRE is requesting \$50,000 from the North Dakota Industrial Commission's Lignite Research Development and Marketing Program.

2.0 Project Summary

Great River Energy (GRE) has committed to serving as host site for a pilot-scale study of mercury oxidation catalysts. Initiation of the project is dependent on the Department of Energy (DOE) selecting it for funding under their solicitation for promising mercury control technologies (DOE Solicitation No. DE-PS26-00NT40769). The project will be a joint effort by URS Group, the Electric Power Research Institute (EPRI), and the host sites. DOE will provide up to 80 percent of funding upon approval of the project.

The proposed project will fall under Topic 4 of the DOE's solicitation: Testing Novel and Less Mature Control Technologies on Actual Flue Gas at the Pilot Scale. The control technology proposed uses catalyst materials to oxidize the elemental mercury content of the flue gas from coal-fired power plants that have wet lime or limestone flue gas desulfurization (FGD) systems. The oxidized mercury is removed in the wet FGD absorbers, and co-precipitates in a stable form with the byproducts from the FGD system. The co-precipitated mercury does not appear to adversely affect the disposal or reuse properties of the FGD byproduct.

The proposed project will test catalyst materials previously identified as being effective in small-scale research funded by the DOE, but in a commercial form at larger scale and for longer periods. The proposed testing will provide engineering data for future, full-scale designs. The pilot-scale tests will continue for over a year at each of the two sites. Over that period, mercury oxidation percentages across each catalyst will be measured on a continual basis, to provide longer-term catalyst life data. Other measurements will be included as part of the project, including complete characterization of the host sites' flue gas.

3.0 Project Description

Appendix A contains URS Group's proposal to the DOE, which describes in detail the project background, merits, and approach. Qualifications for the project team are also discussed.

4.0 Standards of Success

The objective of the proposed project is to test previously identified, effective catalyst materials researched in the Mega-PRDA project at a larger scale and in a commercial form, so as to provide engineering data for future full-scale designs. Successful culmination of the project will be achieved by the acquisition of valid, quality data that can be used in designing full-scale oxidation systems that can compete competitively with other developing mercury control technologies.

URS Group's and EPRI's extensive work to date with the oxidizing catalysts, as described in URS's proposal, will ensure that the appropriate data is collected as part of the project. In addition, the quality assurance procedures detailed in URS's proposal will ensure that the collected data is valid and accurate.

5.0 Background

Background information for the project is included Section 1 of URS Group's proposal contained in Appendix A.

6.0 Qualifications

Qualifications for the project team are included Section 4 of URS Group's proposal contained in Appendix A.

7.0 Value to North Dakota

The lignite industry plays a significant role in North Dakota's economy. In order to maintain this role, it is important to ensure that lignite remains competitive with other fuel sources. This study will generate data that could prove useful in developing cost-effective, competitive options for reducing mercury emissions from lignite-fired utilities.

An oxidation catalyst system is probably best suited for plants with a high-efficiency particulate control upstream of a FGD system. North Dakota has approximately 1,500 megawatts of capacity, which is approximately 35% of the total in-state capacity, that is controlled in this manner. Furthermore, an additional 1,000 MW (25 percent of the state's capacity) is already equipped with high efficiency particulate controls, and future regulatory requirements might require the installation of scrubbers. In the event that scrubbers are installed on these units, an oxidation catalyst system could become a viable alternative for controlling mercury emissions.

EPRI projects that annualized costs for catalyst system would be approximately 40 percent less expensive than controlling the mercury emissions with carbon injection. Keeping control costs down will help to retain North Dakota lignite's status as a highly competitive fuel source. Details of the cost analysis are included in Section 1 of URS's proposal.

The project could also prove useful in the development of air toxic control standards if EPA were to determine in December 2000 that regulations are appropriate. Project findings could be used in assessing the feasibility and costs of controlling mercury with oxidation catalysts.

8.0 Management

Gary Blythe of URS Group will serve as Team Manager. Richard Rhudy of EPRI will participate as the co-manager. Resumes for Mr. Blythe and Rhude are included in URS's proposal.

9.0 Timetable

DOE is expected to award funding for the mercury control projects before the end 2000. Upon awarding this project, project planning will be initiated in January 2001. Testing at CCS will occur from June 2001 through August 2002. A more detailed project schedule is included on page 44 of URS's proposal contained in Appendix A.

10.0 Budget

The estimated project cost is \$1.18 million. A detailed cost estimate is contained in Appendix B.

The project budget includes only charges associated with conducting and managing the project. Time and expenses incurred during the development of contracts and this application are not charged to the project budget and will not be submitted to NDIC for reimbursement.

11.0 Matching Funds

Following is a summary of funds for the proposed project:

DOE	\$ 847,616
EPRI	\$ 227,000
Great River Energy In-kind Services	\$ 31,360
City of Public Services San Antonio	\$ 28,624
North Dakota Lignite Research, Development and Marketing Fund	<u>\$ 50,000</u>
Total Project Funding	\$ 1,184,600

12.0 Tax Liability

I, Doug Paumen, certify that Great River Energy does not have any outstanding tax liability owed to the State of North Dakota or any of its political subdivisions.

Doug Paumen
Manager, Accounting Services

Date

13.0 Confidential Information

A final report will be prepared summarizing the project and its findings. All information contained in the final report will be made available to the public without any limitations of confidentiality. The formulation of all catalysts is, and will remain, proprietary information licensed to EPRI.