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INSTALLATION OF A STOKER-COAL PREPARATION PLANT

IN

KRAKOW, POLAND

Technical Progress Report 8

January - March, 1996

Work Performed Under Cooperative Agreement DE-FC22-94PC94114

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TECHNICAL PROGRESS REPORT 8

January - March, 1996

INSTALLATION OF A STOKER-COAL PREPARATION PLANT  
IN  
KRAKOW, POLAND

By  
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Cooperative Agreement No.  
DE-FC22-94PC94114

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1. GANTT CHART

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**INSTALLATION OF A STOKER COAL PREPARATION PLANT  
IN  
KRAKOW, POLAND**

**EXECUTIVE SUMMARY**

This report describes the progress made during this reporting period of a project to demonstrate that the air pollution from a traveling-grate stoker being used to heat water at one of MPEC's central heating plants in Krakow, Poland can be reduced significantly by (1) substituting the unwashed, unsized coal currently being burned with a mechanically cleaned, double-sized stoker fuel and by (2) optimizing the operating parameters of the stoker. It is anticipated that these improvements will prove to be cost-effective and hence will be adopted by the other central heating plants in Krakow and, ideally, throughout Eastern European cities where coal continues to be the primary source of fuel.

EFH Coal Company has formed a partnership with two Polish institutions -- MPEC, a central heating company in Krakow, and Naftokrak-Naftobudowa, preparation plant designers and fabricators--for the execution of this effort.

A long-term contract for providing the raw coal required by the 300 tph stoker-coal plant described last Quarter was executed. This contract with the Katowice Coal Holding Company guarantees the providing of 300,000 tpy of raw coal, sized 20 mm x 0, and containing between 20 to 25% ash and 0.8 to 1.5% sulfur from the mine's 500- and 700-meter levels. The price of this coal delivered to the proposed plant will be in accordance with prevailing official governmental price guidelines.

The long-term lease of the land and related infrastructure (truck and rail facilities for receiving, storing and reclaiming raw coal; for storing, reclaiming and outloading the products; and for disposing of the rejects) has been executed with the Katowice Coal Holding Company for the Kazimierz-Julius mine site. The razing of the defunct preparation plant currently on site remains the responsibility of the owner. The lease, as executed, is open-ended and calls for an annual payment of \$10,000.

Negotiations continued with a number of potential customers for purchasing any stoker coal in excess of MPEC's requirements.

Bids for modular plants fabricated in the U.S. and shipped to Poland for erection was received and is being evaluated. Funding for the purchase, shipment, erection, and startup costs are estimated at \$3.0 to \$3.5 Million.

The Bilateral Steering Committee approved unanimously the request to proceed with this project into Budget Period II.

A fifth 90-day no-cost time extension was requested and approved.

## **INTRODUCTION**

The work being performed under this Cooperative Agreement between the United States Department of Energy (DOE) and EFH Coal Company (Participant) is one part of the assessment program in the Support for Eastern European Democracy (SEED) Act of 1989 (P.L. 101-179).

In October 1991, a Memorandum of Understanding (MOU) titled "Collaboration on the Krakow Clean Fossil Fuels and Energy Efficiency Program, A Project of Elimination of Low Emission Sources in Krakow" was signed by the DOE and the Ministry of Environmental Protection, Natural Resources and Forestry of the Republic of Poland, that describes the cooperation that is being undertaken by the respective governments to accomplish the goals of this program.

The DOE has selected eight U.S. companies to work with the government of Poland to improve the country's air quality, particularly around the historic city of Krakow. Although the program is focused on Krakow, it is intended to serve as a model for similar pollution control programs throughout Poland and, hopefully, much of Eastern Europe. The total cost of the SEED program is \$31 million with the DOE funding about half that amount.

The results of an air-quality study in the Krakow area during the 1984-1986 period indicated that the source of approximately 40 percent of the low level air pollutants (especially solid particulates) were attributable to an estimated 1,600 boiler houses and 200,000 tile space heating stoves--all coal-fired. A complete inventory of low level emission sources conducted during the period 1989-1990 found 1,300 boiler houses and about 130,000 tile stoves in operation (Wertz, 1995). A more detailed inventory (Cyklis, 1995) showed that about 200 mechanical stokers and 2,000 fixed-grate stokers are currently in operation in the Krakow area.

## **PURPOSE**

The purpose of the U.S./Polish Memorandum of Understanding is to encourage the formation of commercial ventures by providing project development support, resources, and services to reduce low-emission sources in the Krakow area of Poland.

These commercial ventures take the form of contracts, joint ventures, partnerships, and other commercially-feasible arrangements to achieve the intended purposes of this statute.

## **OBJECTIVE**

The specific objective of the work to be performed by EFH Coal under the terms of this Cooperative Agreement is to improve the quality of stack gas emissions from low-stack boilers in the Krakow area of Poland through the use of double-screened, washed stoker coals.

This objective will be accomplished by designing, constructing, and operating a beneficiation facility that will produce a low-ash, double-sized stoker coal for burning in a typical traveling-grate stoker used commonly throughout the Krakow area. The low-ash, uniformly sized, stoker coal, when burned properly in existing boilers, will increase combustion efficiency, reduce stoker maintenance, and reduce significantly the carbon monoxide, sulfur dioxide, and particulate levels in the stack gas emissions.

To facilitate the achievement of the stated objective EFH Coal has executed an agreement with Municipal Heat Distribution Enterprise (MPEC), a district heating company in Krakow and Naftokrak/Naftobudowa, a construction and maintenance enterprise, to design, construct and operate a 300 tph coal cleaning facility. EFH Coal has also subcontracted with the Pennsylvania State University to characterize two candidate Polish coals and to perform combustion tests on washed sublots of these Polish coals in Penn State's combustion simulator facility.

## **WORK STATEMENT**

It was projected that a two-year effort would be needed to accomplish the objectives of this Cooperative Agreement, consisting of two budget periods and including the following nine tasks:

### **Budget Period I**

- Task 1 - Polish Coal Washability and Combustion Performance Evaluation
- Task 2 - Raw Coal Supply Contracts
- Task 3 - Specification of Major Preparation Plant Components
- Task 4 - Preparation Plant Flowsheet Design
- Task 5 - Cost Evaluations
- Task 6 - Securing Stoker Coal Supply Contracts
- Task 7- Final Economic Evaluation and Risk Assessment

### **Budget Period II**

- Task 8 - Plant Construction
- Task 9 - Plant Startup and Demonstration

## **PROGRESS DURING THIS PERIOD**

### **Task 1.0 - Polish Coal Washability and Combustion Performance**

#### **Subtask 1.1 - Washability Characteristics**

No Activity

#### **Subtask 1.2 - Stoker Combustion Performance Evaluation**

No Activity

#### **Subtask 1.3 - Training Program**

No Activity

### **Task 2.0 - Raw Coal Supply Contracts**

The long-term contract for providing the raw coal required by the proposed 300 tph stoker-coal plant described last Quarter was executed. This contract with the Katowice Coal Holding Co. guarantees the provision of 300,000 tpy of raw coal sized 20 mm x 0 and containing between 20 to 25 percent ash and 0.8 to 1.50 percent sulfur. The source of this coal will be from the mine's 500- and 700-meter levels; any future additional raw coal requirements will be provided by the Co. from their other operations.

The cost of this raw coal delivered to the plant will be in accordance with the prevailing official governmental price guidelines.

### **Task 3.0 - Specification of Major Preparation Plant Components**

This task is completed.

### **Task 4.0 - Preparation Plant Flowsheet Design**

This task is completed.

## **Task 5.0 - Cost Evaluations**

The long term lease of the land and related infrastructure (truck and rail facilities and storing and reclaiming areas for both the raw coal and the products) at Katowice Holding Co.'s Kazimierz-Julius site has been executed. This site meets all of the necessary attributes to: receive raw coals by rail and truck; store, and reclaim the raw coals; pretreat and process the raw coals; store and reclaim the clean coal products; loadout the products via rail and truck; and dispose of the rejects.

The razing of the defunct preparation plant currently on the site remains the responsibility of the owner. The proposed new stoker plant will be erected in an area adjacent to this old plant.

The lease, as executed, is open-ended in terms of longevity and calls for an annual payment to the Katowice Coal Holding Company of \$10,000.

EMG completed their task of obtaining all of the permits required for the construction and operation of a coal processing facility in the Municipality of Sosnowiec and in the Voivodeship of Katowice.

## **Task 6.0 - Securing Stoker Coal Supply Contracts**

Negotiations continued with a number of potential customers for any stoker coal that might be produced in excess of that of MPEC's needs. Current efforts continue to be focused on two potential consumers; Nova Huta and Skawina. Contracts have been signed with MPEC and LEG.

## **Task 7.0 - Final Economic Evaluation and Risk Analysis**

Progress continued under this task during the reporting period.

The bids for modular plants built in the U.S. and shipped to Poland for erection received from Taywood Mining in Lexington, KY and from Fairmont Equipment Company are being evaluated.

## **DIFFICULTIES ENCOUNTERED**

The extended delay in negotiating raw coal supply contracts has precluded the washability testing of the raw coal and the simulations of the combustion performance of burning the washed stoker coal in traveling-grate boilers.

Much of this Quarters efforts were devoted to obtaining approval for the project to proceed to Budget Period II. Justification for continuing this project was requested in the "Contractor's Application for Additional Funding" which was submitted on September 9, 1995. This request was approved unanimously by the Bilateral Steering Committee (DOE, AID, Polish Academy of Sciences, and the City of Krakow Voivodeship Environmental Office).

## **FUTURE WORK**

- Collect a representative sample of raw coal from the Kazimierz-Julius mine, ship this sample to Penn State, and initiate the washability testing of raw coal and the boiler performance simulations on samples of the coal washed at a number of specific gravities.
- Continue to negotiate with Nova Huta Steel and Skawina for coal sales agreements, as well as boiler plants other than MPEC.
- Continue to collect and compile additional income and outlay, information so that the "proforma" for the project can be finalized.

Because of the inordinately long length of time it has taken to negotiate long-term raw-coal supply contracts with Polish coal producers, a fifth 90-day no-cost time extension was requested from the Department of Energy for Budget Period I.

The revised Gantt Chart shown in Figure 1 illustrates the status of the project at the end of this reporting period (March 1996).

## REFERENCES

Wertz, Jerzy, Needs and Perspectives of Air Quality Improvement in Crakow, Proceedings, Krakow Conference on Low Emission Sources, Krakow, Poland, Oct. 10 - 12, 1995, pp. I-4 - I-5.

Cyklis, Piotr, and T.A. Butcher, Coal-Fired Boiler Houses in Crakow: Present State and Possibilities to Improve Their Efficiency, Proceedings, Krakow Conference on Low Emission Sources, Krakow, Poland, Oct. 10 - 12, 1995, pp. III-1 - III-8.

