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INSTALLATION OF A STOKER-COAL PREPARATION PLANT

IN

KRAKOW, POLAND

Quarterly Technical Progress Report 1

May - July, 1994

Work Performed Under Cooperative Agreement DE-FC22-94PC94114

EFH Coal Company

Mars, PA

QUARTERLY TECHNICAL PROGRESS REPORT 1

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By
Pete Rozelle, Program Manager
EFH Coal Company

Cooperative Agreement No.
DE-FC22-94PC94114

Project Officer
Thomas J. Feeley, III
U.S. Department of Energy
Pittsburgh Energy Technology Center
P.O. Box 10940
Pittsburgh; PA 15236

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EXECUTIVE SUMMARY

This report describes the progress made during the first Quarter of a two year project to demonstrate that the air pollution from a traveling grate stoker being used to heat water at a central heating plant in Krakow Poland can be reduced significantly by replacing the unwashed, unsized coal now being used with a mechanically cleaned, double sized stoker fuel and by optimizing the operating parameters of the stoker. It is anticipated that these improvements will prove to be cost effective and hence be adopted in the other central heating plants in Krakow and indeed throughout Eastern European cities where coal is the primary source of heating 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 this effort.

An evaluation of the washability characteristics of five samples of two coals (Piast and Janina) showed that "compliance-quality" stoker coals could be produced which contained less than 640 g of SO_2/KJ (1.5 lbs SO_2/MMBtu) at acceptable plant yields by washing in heavy media cyclones.

A search for long-term sources of raw coal to feed the proposed new 300 tph stoker coal preparation plant was initiated. Because of the drop in demand for Polish coals, the prospects of finding coal companies to provide a suitable raw coal at an acceptable price are good.

Meetings were held with SEPARATOR, the sole designer and builder of preparation plants throughout Poland and with Kopek, the major supplier of mining and preparation equipment in Poland to identify and obtain price quotes on such long-lead major plant equipments as washers, screens, conveyors and pumps. Most of this equipment will be manufactured in Poland.

Preliminary cost evaluations were discussed with Polish financial institutions regarding the cost of producing a quality stoker in Poland and for identifying sources of private capital to help cost share the project.

As the quantity of stoker coal that will be produced (300 tph) at the new plant will exceed the demand by MPEC, a search for other and additional potential markets was begun.

Because the final cost of the stoker coal will be influenced by such factors as the plant's proximity to both the raw coal supply and the customers, the availability and cost of utilities, and the availability of suitable refuse disposal areas, these concerns were the topic of discussions at the many meetings that were held between EFH Coal and the Polish Partners.

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, which describes the cooperation that is being undertaken by the respective governments to accomplish this program.

The DOE has selected nine U.S. companies to work with Poland to improve the country's air quality, especially 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 much of Eastern Europe. The total cost of this program is $31 million with DOE funding about half that amount.

It is estimated that the city of Krakow currently has 23 district heating plants, 3,000 small boilers, and 125,000 home stoves -- all coal fired.

PURPOSE

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

These commercial ventures are in the form of contracts, joint ventures, partnerships, and other commercially-feasible arrangements that can achieve the 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 in low stack boilers in the Krakow area of Poland.

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 the typical traveling-grate stokers commonly in use throughout this area. The low-ash, uniformly sized, quality 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 gases.

To facilitate the achievement of the stated objective, EFH Coal has executed an agreement with 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 the Pennsylvania State University to characterize two candidate Polish coals and to perform combustion tests on washed sublots of these Polish coals in their combustion simulator facility.

WORK STATEMENT

It is projected that a two year effort will be needed to accomplish the objectives of this Cooperative Agreement, consisting of two budget periods and including the following ten tasks:

Budget Period I

Task 1.0 - Polish Coal Washability and Combustion Performance Evaluation
This task consists of the following four subtasks:

Subtask 1.1 - Washability Characterization
In order to design a preparation plant, predict the range of yields and product qualities that might be produced, and estimate the capital and operating costs of a plant, it is necessary first to characterize the raw coal that will be fed to the plant. To meet this need, bulk samples (approximately ten 55-gal. drums) of two candidate Polish coals will be collected and sent to the Pennsylvania State University for evaluation.

Each of these coal samples will screened to determine their size distribution and then recombined into the following four size fractions: 1" x 3/4"; 3/4" x 1/2"; 1/2" x 1/4"; and 1/4" x 28 Mesh. Each of these size fractions will then be float-sink tested at the following specific gravities: 1.35; 1.40; 1.45; 1.50; 1.55; and 1.60. Proximate analyses (moisture, volatile matter, ash, and fixed carbon) and major/minor oxide concentrations will be determined for each of the size/specific-gravity components. The resulting size and washability data will provide the basic information needed for rational plant design.

The sized float-sink components produced during the float-sink analyses will be combined selectively to produce the array of small subsamples that will be needed for testing under Subtask 1.2.

Subtask 1.2 - Stoker Combustion Performance Evaluation
In order to predict the performance of a demonstration traveling-grate stoker in Krakow when it is being fed a double-sized washed coal, it is necessary to conduct small-scale tests in the pilot plant where the effect of various feed coal qualities over a range of stoker operating parameters can be evaluated.

Penn State has designed, constructed, and operates a test apparatus to simulate the combustion of a small section of a traveling-grate stoker; this system will be modified to meet the needs of the Polish coal-testing program. A hydrocarbon analyzer will be purchased to monitor continuously the quality of the flue gases produced during combustion. It is anticipated that about 30 separate tests will be needed to optimize the combustion parameters. Data collected during each test will include: rate of ignition travel; combustion intensity; hydrocarbon generation; influence of changing grate air distribution on combustion performance; effect of fuel sizing on bed pressure drop during ignition and combustion; and clinkering characteristics.

Subtask 1.3 - Training Program
In conjunction with the use of a clean graded fuel in the stoker, proper operation and maintenance are critical to reducing stack gas emissions. Hence Penn State will train an employee of the MPEC boiler plant and a scientist from a Polish university or technical institute for a period of about six months in the characterizing of feed coals, in combustion performance in the stoker simulator facility, and in stack gas emission technology.

The visiting Poles also will be provided with the sufficient expertise and technical details to allow their constructing a comparable simulator at MPEC or at a Polish university or technical institute.

Additionally, Penn State will coordinate further training of the two Poles at industrial and utility stoker boiler plants over a period of about six months during which time they will have the opportunity to learn how stoker-fired boilers are operated in the U.S. This practical experience will be invaluable to their operating heating boilers in Poland.

Subtask 1.4 - Technical Assistance During the Boiler Demonstration
Penn State technical personnel will visit the site of the MPEC boiler to ascertain that the boiler and its control system are in good operating condition prior to conducting the demonstration. Any deficiencies noted will be reported along with recommendations for bringing the facility up to acceptable standards; failure to correct shortcomings in either the boiler or in its control system could effect the level of carbon monoxide and hydrocarbon emissions and hence jeopardize the success of the demonstration.

EFH Coal is responsible for ensuring the facility's readiness for testing and for supplying stack gas emission monitors (e.g., oxygen, carbon monoxide, nitrogen oxides, and carbon dioxide) that are in good working condition.

Penn State will provide two persons for a period of about two weeks for the initial inspection and two persons for a period of about four weeks during the demonstration phase of the project.

Task 2.0 - Raw Coal Supply Contracts
The availability of a bankable, stable, and long-term source of raw coal to feed the new preparation plant is critical to the success of the project.

Based on the available literature and on the results of Subtask 1.1, members of the project team will search the Polish coal industry in the Greater Krakow area for suitable coal suppliers. Once one or more candidates coals are identified, negotiations will be initiated with the directors of several Krakow area mines with the goal of signing contracts with at least two firms who can guarantee the supply of coals having the stated raw coal characteristics and in the amounts required by the project; these contracts will require legal review under both United States and Polish law.

In order to minimize the cost of stoker coal to Polish customers (i,e., small boiler plants), premium/penalty arrangements will be sought wherein the price of the raw coal will be based on the yield of stoker-quality product.

Ultimately the selection of coal sources will be based on price, washability characteristics, combustion performance, and location.

Task 3.0 - Specification of Major Preparation Plant Components

As Subtask 1.1 progresses and coal supply contracts are executed under Task 2, sufficient information on the washing characteristics of the candidate coal(s) will be available to allow the development of tentative specifications for such major process units and ancillary equipment for a 300 tph preparation plant as: heavy media cyclone washers; sizing, drain-and-rinse, and dewatering screens; pumps; and conveyors. These specifications will be developed jointly by EFH Coal and Naftokrak-Naftobudowa with support from MEPC.

Task 4.0 - Preparation Flowsheet Design

This task includes all of the activities involved in designing a 300 tph preparation plant for producing a quality, double-screened stoker coal for feeding the boilers in the demonstration heating plant. Included in this task are such activities as: plant siting; raw coal storage/retrieving facilities; selecting and sizing the crushing, screening, washing, and dewatering equipment; specifying the plant instrumentation and control requirements; selecting and sizing both solid and fluid handling equipments; designing the plant's structural, mechanical, and electrical requirements; and designing disposal systems for both the solid and fluid process wastes.

It is anticipated that the plant will be essentially of U.S. design but will require input from the Polish partners regarding such specifics as electrical switchgear, transformers, and controls and drive motors for pumps, conveyors, and process units.

Task 5.0 - Cost Evaluations

While there are many similarities in the operating costs of beneficiating coals in the United States and in Poland, there are significant differences in such cost items as labor, electrical power, makeup water, permitting, insurance, reagents, magnetite, maintenance, legal fees and debt service.

A "bid package" which will include all of the plant technical specifications, drawings, and performance guarantees will be provided for construction. It is during this task that all of the operating costs (including debt service) will be estimated and the total "bottom line" cost per ton of salable stoker coal will be determined.

Task 6.0 - Securing Stoker Coal Supply Contracts
The purpose of this task is to seek sales contract for the products from the plant. This task will be carried out jointly by EFH and the Polish partners with the Poles taking the lead role.

All stoker coals produced that are in excess of MPEC's requirements will be offered first to other district heating plants in the Krakow area. Any production capacity that cannot be utilized to produce stoker-quality coal will be used to produce a low ash/sulfur coal for the Polish utility market. It is anticipated that the results of Task 5 will provide an acceptably accurate cost estimate to allow estimating a market price for these products. While there is a shortage of double screened washed stoker coal in the Krakow area, its cost must be such as to be cost effective, i.e., its marginally higher cost over raw coal fines must be justified by its superior performance in the boiler plant. Maximizing the cost/benefit ratio of burning this quality stoker coal is particularly important for this project-- the first of its type in the area.

The results of this Task will include the coal supply agreements required for the generation of a pro forma income statement needed of the final economic evaluation.

Task 7.0- Final Economic Evaluation and Risk Assessment
Using the results of the preceding Tasks 1 through 6 it will be possible to estimate both the cost of producing the products and the income derived from their sale; hence it will be possible to make a final economic evaluation of the project. Such an evaluation is prerequisite to seeking financing and for demonstrating the economic viability of an undertaking of this type in Poland.

The output from this task will be an estimate of the anticipated income and expenditure cash streams over the projected financing period.

Budget Period II

Task 8.0 - Preparation Plant Component Procurement
During this task all of the orders for long lead-time preparation process equipment to be procured from American sources will be placed; initial orders for equipment from Polish firms also will be placed.

This task will be undertaken by both EFH Coal and the Polish partners and coordinated so that the equipment will arrive according to a detailed construction schedule.

Task 9.0 - Plant Construction
This task addresses initially plant site preparation, receiving and storing equipment, permitting, and utilities connections. Once these tasks are completed actual construction of the plant will commence.

Naftokrak-Naftobudowa is responsible for the construction of the plant with support from EFH Coal and MPEC. The result of this task will be the rendering of a 300 tph stoker coal preparation plant in the vicinity of Krakow, Poland.

Task 10.0 - Plant Startup and Demonstration
Upon completion of the construction phase of the plant it will be tested, debugged, and then begin commercial production. The timing of this startup is planned for late Fall , a time of significant heating demand.

Once the plant is operating commercially a lot of stoker coal will be produced for demonstrating its efficacy as a "premium" stoker fuel. This test will be preceded immediately by a similar demonstration of boiler performance while burning the "normal" feed coal.

The following measurements will be made while the boiler is burning the "normal" coal and while burning the "premium" coal: (1) stack gas emissions to include sulfur dioxide, carbon monoxide, nitrous oxides, hydrocarbons, and particulates; and (2) boiler material and energy balances.

The results of these paired boiler tests will provide direct documentation on the reduction of undesirable stack gas emissions and the improvement in boiler performance as a direct result of burning a higher quality double sized stoker coal.

With these comparable data it will be possible to generate a total cost per ton of emissions reduction at a district heating plant achieved through the use of a premium feed coal. These achievements can be duplicated at the remaining district plants in Krakow and indeed throughout Poland and Eastern Europe.

The start/complete dates by the Quarter for the above tasks are shown on the Gantt Chart (Figure 1) for both Budget Periods I and II.

PROGRESS DURING THIS PERIOD

Task 1.0 - Polish Coal Washability and Combustion Performance Evaluation
No activity during this quarter.

Task 2.0 - Raw Coal Supply Contracts
Prior to the formation of The State Hard Coal Agency in August 1990, the polish coal industry was centrally managed and was financed by coal sales and planned subsidies from the State budget. With coal production subsidized, coal prices were stabilized as were other essential commodities and services at below their production costs. This system allowed otherwise unprofitable collieries to stay in the business of producing coal. In 1990, the industry was comprised of 70 collieries and 91 processing plants which produced 147 Mtpy (Million tons per year) of salable coal. Of this production, 55.5 percent was minus 20 mm in size and was sold uncleaned to the utility market.

One of the early problems faced by the "liberated" Polish coal industry was the fact that coal prices were fixed by the State while the costs of many of the basic goods and services were rising rapidly. This resulted in serious limitations in production -- especially in the energy-intensive industries.

In March 1993, the Polish hard coal industry was reorganized into six coal companies grouping 49 mines into 11 joint-stock companies. By 1993, coal production had dropped to a 130 Mtpy with 51.5 percent of the production sold to the utilities in the form of unwashed minus 20 mm fines.

In order to gain some insight as to the amenability of Polish coals to the production of "compliance" stoker coals containing no more than 640 g of SO_2/KJ (1.5 lbs. SO_2/MMBtu's) the washability data from five samples from two mines were evaluated. The ash content of these raw coal samples ranged from 13.11 to 29.04 percent and the sulfur content from 1.52 to 2.40 percent. These coals had an estimated moisture-ash-free (MAF) calorific value of 33,000 KJ/Kg (14,200 Btu's/lb.). On the assumption that these as-received coals would contain about 12 percent of inerts (moisture and ash), their heating value would be reduced to 29,000 KJ/Kg (12,500 Btu's/lb). Hence for these coals to meet air pollution compliance standards of less than 640 g of SO_2/KJ for stoker-fired boilers, they would have to be washed to a maximum of about 1 percent sulfur. The washability data for these five samples are shown in Tables 1 through 5.

As noted in Table 1, the 20 mm x 0.5 mm size fraction of the sample of coal from the Piast Mine contained 21 percent ash and 1.52 percent sulfur. Washing this sample at 1.80 sp. gr. would theoretically yield 80.7 percent of the raw coal as a product containing 7.32 percent ash and 1.00 percent sulfur.

As coal washers do not separate coals from their associated impurities perfectly, the actual results that would accrue from washing this coal in both a heavy media cyclone and a jig over a range of partition specific gravities were calculated. As noted in Table 6, a compliance coal containing less than 1 percent sulfur can be produced in a heavy media cyclone at 1.525 sp. gr. with a yield 76.7 percent of a product containing 6.32 percent ash, 0.94 percent sulfur and 28,000 KJ/Kg.

Washing this Piast Mine coal in a less-efficient jig at 1.375 sp. gr. would produce an equal-quality product (6.31 percent ash and 0.95 percent sulfur) but the yield would be only 44.5 percent --a decrease of 32.2 percentage points less than the more efficient heavy media cyclone.

The results of washing the two size fractions each of the two samples from the Janina Mine (Tables 2 through 5) over a range of partition specific gravities in both a heavy media cyclone and a jig are also shown in Table 6.

A summary of the actual results predicted for the five samples is shown in Table 7. These data show clearly that "compliance-quality" stoker coals can be produced from these Polish coals at yields that are economically attractive by using dense media cyclones.

Negotiations with potential raw coal suppliers were initiated at the outset of the project and were continued throughout this reporting period. Twenty one meetings have been held with the directors of Krakow-area mines. Specifically, sixteen of these meetings were the MPEC and Naftokrak-Naftobudowa, four were with ECOCOAL, and one included a representative of the DOE.

TABLE 1 - WASHABILITY DATA, PIAST MINE
(20 mm X 0.5 mm Size Fraction)

Specific Gravity	Direct Percent			Cumulative Percent		
	Weight	Ash	Sulfur	Weight	Ash	Sulfur
Fl-1.30	15.5	3.26	0.78	15.5	3.26	0.78
1.30-1.35	43.6	5.60	0.91	59.1	4.98	0.86
1.35-1.40	12.3	8.10	1.07	71.4	5.52	0.90
1.40-1.50	5.2	16.12	1.38	76.6	6.23	0.93
1.50-1.60	1.9	23.55	1.78	78.5	6.65	0.95
1.60-1.70	1.4	31.41	2.80	79.9	7.08	0.98
1.70-1.80	0.8	39.41	2.82	80.7	7.32	1.00
1.80-1.90	0.8	44.52	3.30	81.5	7.69	1.02
1.90-2.00	0.6	50.79	4.46	82.1	8.00	1.05
2.00-Sk	17.9	80.70	3.69	100.0	21.0	1.52

TABLE 2 - WASHABILITY DATA, JANINA MINE, SAMPLE 1
(20 mm x 6 mm Size Fraction)

Specific Gravity	Direct Percent			Cumulative Percent		
	Weight	Ash	Sulfur	Weight	Ash	Sulfur
Fl-1.30	55.2	6.02	0.82	55.2	6.02	0.82
1.30-1.35	0.7	8.07	0.94	55.9	6.04	0.82
1.35-1.40	2.4	18.39	2.77	58.3	6.55	0.9
1.40-1.45	0.2	14.35	0.99	58.5	6.58	0.9
1.45-1.50	2.6	22.76	5.44	61.1	7.28	1.09
1.50-1.55	0.4	24.53	6.75	61.5	7.38	1.13
1.55-1.60	1.9	30.66	7.17	63.4	8.07	1.31
1.60-1.70	5.6	35.23	7.63	69.0	10.28	1.82
1.70-1.80	2.4	44.53	3.45	71.4	11.43	1.88
1.80-Sk	28.6	73.28	3.72	100.0	29.04	2.40

TABLE 3 - WASHABILITY DATA, JANINA MINE, SAMPLE 1
(6 mm x 0.5 mm Size Fraction)

Specific Gravity	Direct Percent			Cumulative Percent		
	Weight	Ash	Sulfur	Weight	Ash	Sulfur
Fl - 1.30	79.3	6.87	0.72	79.3	6.87	0.72
1.30-1.35	1.6	7.91	0.85	80.9	6.89	0.72
1.35-1.40	1.7	10.77	1.12	82.6	6.97	0.73
1.40-1.45	0.4	11.71	1.00	83.0	6.99	0.73
1.45-1.50	0.6	21.02	2.65	83.6	7.09	0.74
1.50-1.55	0.4	24.10	2.95	84.0	7.17	0.76
1.55-1.60	0.6	23.92	3.00	84.6	7.29	0.77
1.60-1.70	0.2	34.23	5.79	84.8	7.35	0.78
1.70-1.80	0.6	39.52	4.36	85.4	7.58	0.81
1.80-Sk	14.6	66.51	7.52	100.0	16.18	1.78

TABLE 4 - WASHABILITY DATA, JANINA MINE, SAMPLE 2
(20 mm x 6 mm Size Fraction)

Specific Gravity	Direct Percent			Cumulative Percent		
	Weight	Ash	Sulfur	Weight	Ash	Sulfur
Fl-1.30	65.1	8.56	0.59	65.1	8.56	0.59
1.30-1.35	2.5	6.40	0.74	67.6	8.48	0.59
1.35-1.40	5.3	12.60	1.07	72.9	8.78	0.63
1.40-1.45	2.9	17.64	1.90	75.8	9.12	0.67
1.45-1.50	2.9	18.00	3.07	78.7	9.44	0.77
1.50-1.55	1.0	20.86	1.63	79.7	9.59	0.78
1.55-1.60	1.5	26.10	4.38	81.2	9.89	0.84
1.60-1.70	1.2	31.10	6.28	82.4	10.20	0.92
1.70-1.80	1.8	36.90	4.56	84.2	10.77	1.00
1.80-Sk	15.8	63.70	5.55	100.0	19.13	1.71

TABLE 5 - WASHABILITY DATA, JANINA MINE, SAMPLE 2
(6 mm x 0.5 mm Size Fraction)

Specific Gravity	Direct Percent			Cumulative Percent		
	Weight	Ash	Sulfur	Weight	Ash	Sulfur
Fl-130	77.8	8.73	0.92	77.8	8.73	0.92
1.30-1.35	5.6	8.00	0.76	83.4	8.68	0.91
1.35-1.40	2.7	12.38	0.99	86.1	8.80	0.91
1.40-1.45	0.7	17.93	1.18	86.8	8.87	0.91
1.45-1.50	0.9	31.55	2.51	87.7	9.10	0.93
1.50-1.55	0.5	34.90	2.18	88.2	9.25	0.94
1.55-1.60	0.9	58.35	6.21	89.1	9.74	0.99
1.60-1.70	1.4	46.40	1.88	90.5	10.31	1.11
1.70-1.80	4.4	52.81	5.15	94.9	10.61	1.14
1.80-Sk	5.1	59.95	10.88	100.0	13.11	1.63

TABLE 6 - PREDICTED WASHERY RESULTS

MINE	SIZE FRACTION	WASHER (1)	PARTITION Sp. Gr.	Percent YIELD	Percent ASH	Percent SULFUR	Cal. Val., KJ/Kg
PIAST	20 X 0.5 mm	HMC	1.525	76.7	6.32	0.94	28,000
		HMC	1.675	79.5	6.98	0.98	28,000
		JIG	1.375	44.5	6.31	0.95	28,000
		JIG	1.575	63.6	7.00	0.98	28,000
JANINA (Sample 1)	20 X 6 mm	HMC	1.35	54.2	6.18	0.84	30,000
		HMC	1.475	59.8	7.00	1.00	29,000
		HMC	1.70	68.4	10.10	1.70	29,000
		JIG	1.35	38.1	7.88	1.17	29,000
		JIG	1.55	54.6	9.87	1.46	29,000
	6 X 0.5 mm	HMC	1.35	77.8	6.90	0.72	29,000
		HMC	1.475	83.2	7.05	0.75	29,000
		HMC	1.70	84.9	7.38	0.78	29,000
		JIG	1.35	51.8	7.18	0.76	29,000
		JIG	1.55	70.5	7.61	0.81	29,000
JANINA (Sample 2)	20 X 6 mm	HMC	1.625	81.3	9.94	0.86	29,000
		JIG	1.50	62.7	10.0	0.84	29,000
	6 X 0.5 mm	HMC	1.625	89.4	9.84	0.99	29,000
		JIG	1.50	70.3	9.77	0.99	29,000

(1) Based on: dense media cyclone Imperfection = 0.019
jig Imperfection = 0.12

TABLE 7 - SUMMARY OF PREDICTED WASHERY RESULTS

	MINE					
	PIAST		JANINA, (SAMPLE 1)		JANINA, (SAMPLE 2)	
	WASHER		WASHER		WASHER	
	DMC	JIG	DMC	JIG	DMC	JIG
Calorific Value, KJ/Kg.	28,000	28,000	29,000	29,000	29,000	29,000
Ash, Percent	6.32	6.31	7.00	7.48	9.88	9.88
SO_2 Production, g/GJ	675	675	565	628	634	634
Coal Production, tpy (thousand)	880	510	824	518	983	766
Coal Production, 5-yr (thousand)	4,420	2,560	4,120	2,589	4,915	3,830
Refuse Production, 5-yr (thousand)	1,360	3,210	1,641	3,171	845	1,930
Relative Cost	1.00	1.75	1.00	1.60	1.00	1.28

The progress made to date is encouraging in that it appears that there is a bounteous supply of minus 20 mm raw coal having the proper washability characteristics for the project's requirements. And it also appears that the coal operators are willing to enter into long-term supply contracts based on performance, i.e., the value of the delivered coal is based on a premium/penalty arrangement wherein the remuneration is a function of the plant yield of specification-quality products.

The mining directors contacted to date represent about 10 percent (13 Mtpy) of the Poland's hard coal production.

Task 3.0 - Specification of Major Preparation Plant Components
Three of the four meetings held with major suppliers of preparation plant equipment were with SEPARATOR. All of the preparation plants (91 plants having a total throughput of 70,500 tph) were designed or modernized/retrofitted by the Main Study and Design Office for Coal Preparation SEPARATOR. Over 90 percent of the equipment in these installations was of Polish origin. The fourth meeting was held with Kopek, the major supplier of mining and processing equipment in Poland.

Task 5.0 - Cost Evaluations
Four meetings were held with various financial institutions preliminary to seeking sources of private funding that will be required to fund a portion of the private cost share of the project. Two of these meetings with Polinvest were encouraging.

Task 6.0 - Securing Stoker-Coal Supply Contracts
The quantity of stoker coal that will be produced by the new 300 tph preparation plant will far exceed MPEC's requirements, especially during the warmer months of the year. Hence other and additional markets are being sought to dispose of this surplus. Five meetings were convened with other potential consumers and included other steam/hot water plants and an electric utility.

Task 7.0 - Final Economic Evaluation and Risk Assessment
A major factor in the final delivered cost of the product is the siting of the plant in terms of proximity to the raw coal supply, the transportation cost of the product from the plant to the marketplace, the cost of water and power, and the ease of refuse disposal.

This concern for an optimum site for the plant was discussed at length in addition to other business arrangements at more than a dozen meetings.

The Gantt chart (Figure 1) summarizes progress to date.

DIFFICULTIES ENCOUNTERED

Attempting to conduct business in Poland is made difficult by the differences in the way the Poles were accustomed to doing business under a State controlled economy relative to our free market economy did present some formidable problems in formalizing the arrangements between EFH Coal and their Polish Partners (MPEC and Naftokrak-Naftobudowa). This delay will likely delay progress on Tasks 1.1 and 1.2 which are scheduled for next quarter.

Because of the mutual concerns of obtaining raw coal supply contracts and finding a suitable site for locating the plant, some progress was made on Task 7.0 which is not scheduled to start until the third Quarter.

FUTURE WORK

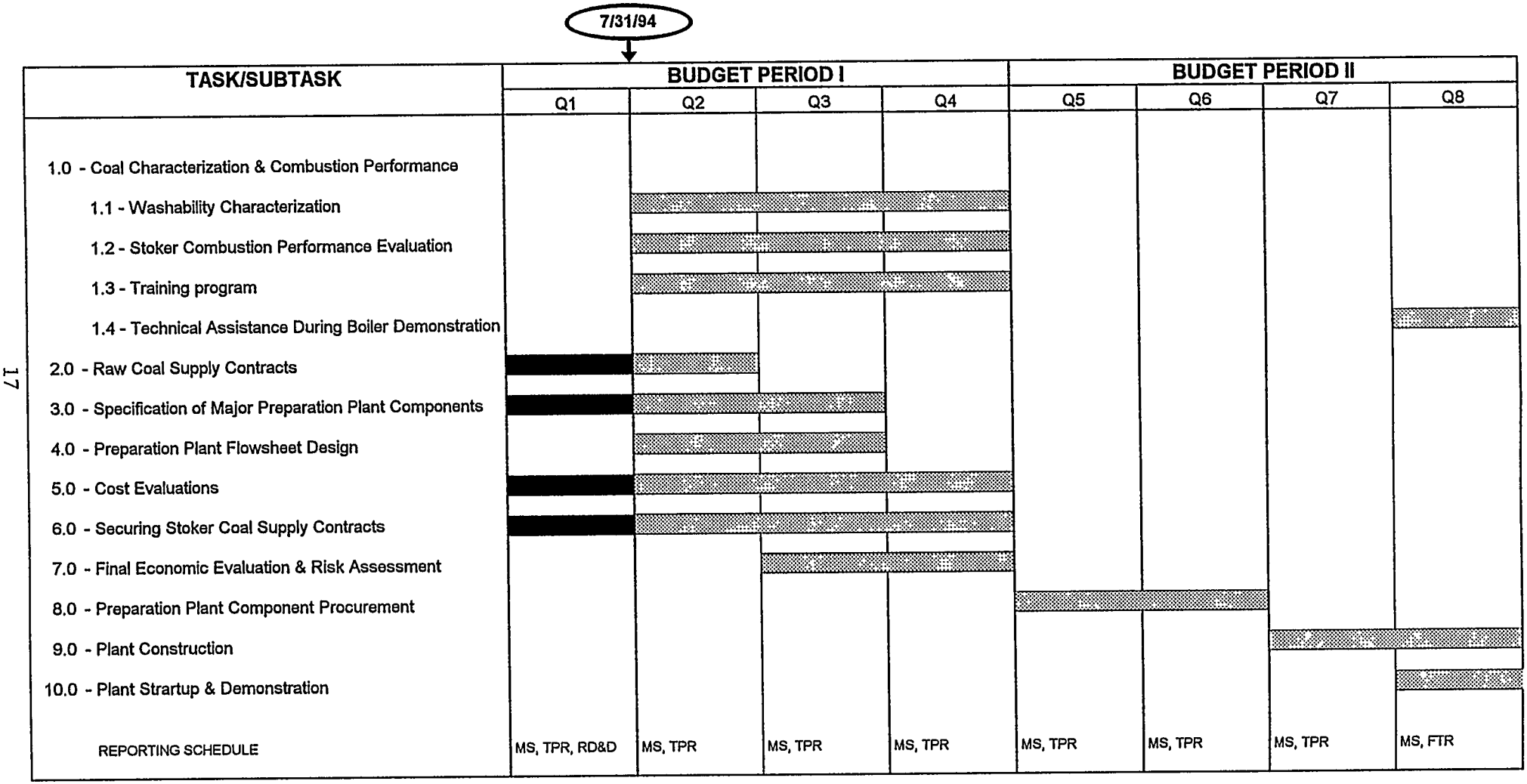
The following activities are planned for the second Quarter:

- Initiate work on Task 1.1, Coal Characterization.
- Initiate work on Task 1.2, Stoker Combustion Performance.
- Initiate work on Task 1.3, Training Program.
- Complete work on Task 2.0, Raw Coal Supply Contracts.
- Continue work on Task 3.0, Specifications of Major Preparation Plant Components.
- Initiate work on Task 4.0, Preparation Plant Flowsheet Design.
- Continue work on Task 5.0, Cost Evaluations.
- Continue work on Task 6.0, Securing Stoker-Coal Supply Contracts.

Figure 1 - GANTT CHART

KRAKOW CLEAN FOSSIL FUELS AND ENERGY EFFICIENCY PROGRAM

INSTALLATION OF A STOKER - COAL PREPARATION PLANT



Report Legend:

MS - Federal Assistance Management Summary
TPR - Technical Progress Report
RD&D - Notice of Energy RD&D Project
FTR - Final Technical Report

Performance Legend:

PLANNED

ACTUAL