SELECTIVE FLOTATION OF FOSSIL RESIN FROM WESTERN COAL

DOE Contract DE-AC22-90PC90178

Quarterly Report for August 31, 1991 to November 30, 1991

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March 30, 1992

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Technical activities for the fifth quarter of DOE contract DE-AC22-90PC90178, "Selective Flotation of Fossil Resin from Western Coal," mainly involved efforts on economic analysis conducted by both the University of Utah and Advanced Processing Technologies, Inc.

Economic analysis of this fossil resin project mainly focused on the flotation plant which is intended to be designed with data obtained from the current proof-of-concept flotation test program. It is believed that the analysis of this step is fairly accurate. The other two economic aspects of fossil resin recovery/utilization are refining and marketing. Cost data used for refining were from an estimated base and are believed to have a relatively large variance. Marketing data used were obtained from two independent marketing studies which were made available on confidentiality basis. Nevertheless, the data used are believed to be fairly accurate with respect to the market potential.

The scenario involved in this economic analysis is that an existing coal preparation plant is available and is retro-fitted to establish the fossil resin flotation plant. The refining plant will have to be constructed almost as a greenfield site. The flotation plant is engineered for the production of 20 million pounds of fossil resin per year (referred to as Phase I) while the refining plant has a capacity to process 48 million pounds of fossil resin per year. In this way, future expansion can easily be accomplished by adding another flotation plant at the location of another coal mine (referred as phase II).

I. TOTAL CAPITAL COST

A) Flotation Plant Capital Cost (Phase I)

The principle assumption for the flotation plant capital costs involved in the Phase I period is that an existing, decommissioned coal processing plant is available and is retro-fitted with the fossil resin flotation plant.

Capital Cost

1. Utilities Conversion	\$350,000	
2. Plant Feed Systems	\$47,000	
3. Flotation Preparation	\$62,000	
4. Coarse Coal Handling	\$50,000	
5. Mid Size Coal Handling	\$50,000	
6. Fine Size Coal Handling	\$120,000	
7. Processed Coal Shipping	\$50,000	
8. Water Systems	\$20,000	
9. Resin Flotation	\$140,000	
10. Fine Coal Processing	\$390,000	
11. Resin Filtration	\$80,000	
12. Lime Circuit	\$50,000	
	Subtotal	\$1,409,000

Construction Cost

1. Engineering	\$150,000	
2. Construction -- General	\$150,000	
3. Misc and Contingency	\$300,000	
	Subtotal	\$600,000

Other Cost

Purchase Old Plant Land & Access	\$800,000	
	Subtotal	\$800,000
	TOTAL	<u>\$2,809,000</u>

B) Resin Refining Plant Cost

The principle assumption for THE resin refining plant capital costs is that the land is already available from foregoing purchase of an old coal processing plant. The entire plant has yet to be constructed and will be constructed adjacent to the resin flotation plant. Preliminary analysis as well as the information obtained from independent sources indicate that there is little difference in capital cost between constructing a 20 million pound per annum refining plant and a 48 million pound per annum refining plant since this is a very small refining plant. In this way, a 48 million pound capacity was chosen for the purpose of future expansion (installation of resin flotation plant at other sites. For a 48 million pounds resin refining plant (about 22,000 metric tons per year). The estimated capital cost is about \$3,000,000 with a variance of plus and minus \$500,000.

C) Operating Capital

The estimated yearly operating capital for both flotation and refining plant is about \$3,551,000 as demonstrated in the total yearly operating capital cost balance sheet. The first year's operating capital has to be funded as a capital investment. It is assumed that the operating capital for the second year can be generated from the first years sales.

D) Summary of Capital Cost

Details for the capital cost estimates will be provided in the final report. Consideration of all capital outlay shows that the grand total for capital cost should be \$9,359,000

II TOTAL PHASE I YEARLY OPERATION COST

A) Flotation Plant

Labor	Base (\$/year)	Total
Foreman (1)	55,000	\$55,000
Lead Operators (4)	32,000	\$120,000
Operators (4)	28,000	\$112,000
Labor Subtotal		\$287,000

Reagent \$34,000

Power and Other Utilities \$200,000

Transportation \$400,000

TOTAL YEARLY OPERATING COST \$921,000 (Equivalent to \$0.0460/lb
resin Produced)

B) Refining Plant

Again, unlike the flotation plant, the costs for refining (both capital and operating) are rough estimates. In this regard, it is believed that the operating cost will be about \$750,000/annum, which is equivalent to \$0.0375/lb of resin produced, since the refining plant is on such a small scale.

C) Total Yearly Operating Cost and Income

<u>Source</u>	<u>Amount</u>	<u>\$/lb</u>
U of U Patent Royalty	\$80,000	0.0040
Resource Payments	\$400,000	0.0200
Flotation Plant	\$921,000	0.0460
Refining Plant	\$750,000	0.0375
Administration/Overhead	\$400,000	0.0200
Sales Cost	\$600,000	0.0300
Management	\$400,000	0.0200
Subtotal	\$3,551,000	0.1778
Sinking Fund Payment	\$1,484,317	0.0742
Total Expense Before Tax	\$5,035,317	0.2518
Income (Sales)	\$10,000,000	0.5000
Net Income Before Tax	\$4,964,683	0.2482

The general assumption in this balance sheet is that the sinking fund (total capital, \$9,359,000) invested in the first year will be paid back to investors over a 10 year period with a yearly interest rate of 10%. The tax schedule is not included in this calculation since it will have to involve many other related aspects. Further, the sales price of the fossil resin was established in conversations with broker/marketing organizations. The price quoted here actually is the low-end of the price range (\$0.5-0.7/lb).

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