CALDERON COKEMAKING
PROCESS/DEMONSTRATION PROJECT

QUARTERLY Technical Report
Period Start Date 11/26/1999 End Date 02/25/2000

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QUARTERLY TECHNICAL PROGRESS REPORT

CALDERON COKEMAKING PROCESS/DEMONSTRATION PROJECT CALDERON ENERGY COMPANY COOPERATIVE AGREEMENT NO. DE-FC22-95PC92638

Reporting Period: 11-26-99 to 2-25-00

Date of Report: 3-22-00; Award Date: 5-25-95; Anticipated Completion Date: 11-25-00

Total Project: \$ 6,332,060.00 Total DOE Share: \$3,039,389.00

Contracting Officer's Representative (COR): Carl Maronde;

Project Director: Albert Calderon

Abstract

This project deals with the demonstration of a coking process using proprietary technology of Calderon, with the following objectives geared to facilitate commercialization:

- (i) making coke of such quality as to be suitable for use in hard-driving, large blast furnaces;
- (ii) providing proof that such process is continuous and environmentally closed to prevent emissions;
- (iii) demonstrating that high-coking-pressure (non-traditional) coal blends which cannot be safely charged into conventional by-product coke ovens can be used in the Calderon process;
- (iv) conducting a blast furnace test to demonstrate the compatibility of the coke produced; and
- (v) demonstrating that coke can be produced economically, at a level competitive with coke imports.

The activities of the past quarter continued to be focused on the following:

- Concluding the Negotiation and completing Contracts among Stakeholders of the Team
- Revision of Final Report for Phase I
- Engineering Design Progress
- Selection of Systems Associates, Inc. for design of Control System
- Conclusion of Secrecy Agreement with Carborundum (St. Gobain)
- Permitting Work and Revisions

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Introduction

The commercialization path of the Calderon cokemaking process consists of the following general phases:

Phase I-- Proof of capability to produce acceptable product coke, proof of the process being environmentally closed, proof that non-conventional coal blends can be used, and proof that coke can potentially be economically produced domestically using U.S. metallurgical coals at a level competitive with low cost coke imported from foreign countries that are not subjected to U.S. environmental standards.

Phase II-- Scale-up of coking reactor to full size Commercial Demonstration Unit (CDU) in support of first commercial facility.

Phase III-- Construction and operation of first commercial facility.

Phase IV-- Worldwide commercialization of the technology aggressively by producing coke competitively and attaining a sizeable market share of the 400 million tons consumed globally per year.

Accomplishments and Discussion

During the past quarter, the discussions relating to the remaining issues (left over from the previous quarter) to enable the completion of the contracts among the stakeholders, raised several issues which included the following:

- Details of the Technology Supply Contract
- Details of the Equipment Supply Contract
- Details of the EPC Contract

- Patent Rights
- Improvements
- Infringement of the Patent Rights
- Indemnities
- Defaults

Concluding Negotiations Among Stakeholders

Following several months of intensive negotiations it was concluded that there will be a prime license contract to the Main Entity “Calderon Coke” and four sublicense contracts from the Main Entity – two to Calderon Energy, one to Bechtel and one to Bethlehem Steel.

The first contract to Calderon Energy Company to supply technology and the other to supply proprietary equipment. In the technology supply contract, Calderon will furnish the basic design package; material and energy balance, process flow diagrams and process specifications, general schematics, proprietary equipment specifications, process controls specific to proprietary equipment and process controls integrating the controls among the proprietary equipment relating to the coking reactor, the hot gas cleanup and the quenching. The second contract to Calderon Energy Company to supply the proprietary equipment which includes the complete reactor including the tiles, coal charging, and heating system; the hot gas cleanup; the quenching; the manipulator; and the upenders for relining.

The third contract to Bechtel will include detailed engineering, procurement and construction of the facilities. The fourth contract to Bethlehem will include the supply of technical support and coal. The other issues with respect to patent rights, infringement etc. were incorporated in the prime license from Calderon Energy to the Main Entity.

Revisions to Final Report

The final report for Phase I was revised consistent with the input from NETL and submitted.

Design Engineering

Engineering Design was focused on minor revisions to the coal charging machine, the final checking of this piece of equipment, and the rest of the engineering was focused on the coke quenching system.

Selection of Systems Associates, Inc.

Since Calderon Energy's Technology Contract includes the supply of controls for the proprietary equipment and the integration of the several pieces of proprietary equipment, work should start in the early part of the Demonstration Project to do work in the control system architecture in order to lay out the basic design of the facility and set the principles of the entire system philosophy. Negotiations have been initiated with Systems Associates, Inc. of Bowling Green to do the controls and develop the software with a secrecy agreement in place to protect the Intellectual Property, under the guidance from Calderon Energy.

Execution of Secrecy Agreement with Carborundum

Since Carborundum which has the most experience in making SiC is now owned by St. Gobain, a French company with facilities around the globe, the Secrecy Agreement between Carborundum and Calderon Energy had to be executed both in Worcester, Massachusetts (U.S. facility of St. Gobain) and also in Brazil. According to Carborundum the expertise and the

presses to form the tile are located in St. Gobain's facility in Brazil. It took some effort to have the parties in the United States and the parties in Brazil to come to an understanding to guard the proprietary nature of Calderon's technology in order to protect the Intellectual Property of Calderon Energy. The Secrecy Agreement among all the parties was finally executed.

Permitting Work and Revisions

The air permit which was filed with the City of Cleveland needed revisions – some were justified, others were form. This was accomplished. The permit is in the legal department of Ohio EPA in Columbus.

Conclusion

During the next quarter, the work on the Environmental Assessment and the cost estimate of the project should be concluded by NETL, Pittsburgh. Also, the cooperative agreement extending into Phase II should be concluded between NETL and Calderon Energy, and work will proceed into this second phase.

Submitted by:

Albert Calderon
Project Director