

HEALY CLEAN COAL PROJECT

QUARTERLY TECHNICAL PROGRESS REPORT  
No. 25

For the Reporting Period  
January 1, 1997 Through March 31, 1997

U.S. DEPARTMENT OF ENERGY COOPERATIVE AGREEMENT  
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ALASKA INDUSTRIAL DEVELOPMENT AND EXPORT AUTHORITY  
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## ABSTRACT

The Healy Clean Coal Project, selected by the U.S. Department of Energy under Round III of the Clean Coal Technology Program is currently in construction. The project is owned and financed by the Alaska Industrial Development and Export Authority (AIDEA), and is cofunded by the U.S. Department of Energy. Construction is eighty-five percent (85%) complete and scheduled for completion in September of 1997, with startup activity concluding in December of 1997. Demonstration testing and reporting of the results will take place in 1998, followed by commercial operation of the facility. The emission levels of nitrogen oxides (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>) and particulates from this 50 megawatt plant are expected to be significantly lower than current standards.

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### Acronyms and Abbreviations

AIDEA	Alaska Industrial Development and Export Authority
AK	Alaska
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
EMP	Environmental Monitoring Plan
FWEC	Foster Wheeler Energy Corporation
GVEA	Golden Valley Electric Association, Inc.
HC Price	H.C. Price Company
HCCP	Healy Clean Coal Project
NEPA	National Environmental Policy Act
NPDES	National Pollution Discharge Elimination System
No.	Number
NO <sub>x</sub>	Nitrogen Oxides
OCIP	Owner Controlled Insurance Program
SCA	Sumitomo Corporation of America
SO <sub>2</sub>	Sulfur dioxide
SWEC	Stone and Webster Engineering Corporation
TRW	TRW, Inc.
UCM	Usibelli Coal Mine, Inc.

## **SECTION 1 - SUMMARY**

Please refer to Quarterly Technical Progress Report No. 1, January 1, 1991, to June 30, 1991, for the project background and objectives for the Healy Clean Coal Project (HCCP). The report presented in the following text covers the period January 1, 1997, to March 31, 1997.

The plant design is finalized and all federal and state permits have been obtained for construction of the project. Construction of the project began in May of 1995 and is on schedule and within the budget established following the award of the general construction contract. Off-site manufacturing of equipment, including combustor supply and flue gas desulfurization system supply, is complete. Construction is eighty-five percent (85%) complete and is scheduled for early completion in September of 1997. Startup testing will be complete by January of 1998, at which time the demonstration testing period will begin.

Quarterly Technical Progress Report No. 25 summarizes the significant project development steps taken during the reporting period. The information is derived from the monthly reports, which are a more detailed chronology of events. The report concludes with a forecast of activities for the period of April 1, 1997, through June 30, 1997.

## **SECTION 2 - INTRODUCTION**

This Quarterly Technical Progress Report is required under U.S. Department of Energy (DOE) Cooperative Agreement, Section XV, "Reporting Requirements" and Attachment C, "Federal Assistance Reporting Checklist". It covers the period of January 1, 1997, through March 31, 1997.

The primary objective of the HCCP is to conduct a cost-shared project that will demonstrate a new power plant design which features the innovative integration of an advanced combustor and heat recovery system coupled with both high- and low-temperature emission control processes. The parties anticipate that if the demonstration project is successful, the technology could become commercialized in the near term and will be capable of (1) achieving significant reductions in the emissions of sulfur dioxide (SO<sub>2</sub>) and the oxides of nitrogen (NO<sub>x</sub>) from existing facilities to minimize environmental impacts such as transboundary and interstate pollution and/or (2) providing for future energy needs in an environmentally acceptable manner.

The primary equipment elements comprising this new power plant design includes entrained combustion (slagging) systems coupled with a boiler which will produce low-NO<sub>x</sub> levels, and function as a limestone calciner and first-stage SO<sub>2</sub> remover in addition to its heat recovery function; a single spray dryer absorber vessel for second-stage SO<sub>2</sub> removal; a baghouse for third-stage SO<sub>2</sub> and particulate removal; and a lime activation system which recovers unused reagent from particulate collected in the baghouse. The emission levels of SO<sub>2</sub>, NO<sub>x</sub>, and particulate to be demonstrated are expected to be less than the Federal New Source Performance Standards (NSPS).

The HCCP is a 50-megawatt, coal-fired power plant that is being built adjacent to the existing 25-megawatt Healy Unit No. 1 that is owned and operated by Golden Valley Electric Association (GVEA). The scope of the project consists of a power plant utilizing an entrained combustion (slagging) system that burns coal in stages.

The Alaska Industrial Development and Export Authority (AIDEA) is administering state funds, performing under the Cooperative Agreement, and financing and owning the project through advance funding and the sale of bonds. DOE is providing cost-shared funding under the Cooperative Agreement to demonstrate advanced coal utilization technologies. AIDEA has assembled a team to design, build, supply coal, and operate the HCCP generating facility: GVEA, a member-owned cooperative electric utility that provides generation, transmission and distribution service to the Fairbanks area, will operate the facility under an agreement with AIDEA and will pay for power generated; Usibelli Coal Mine will furnish coal to GVEA; Stone and Webster Engineering Corporation will provide overall project engineering and management services; TRW and Babcock and Wilcox will provide SO<sub>2</sub> and NO<sub>x</sub> removal technology related to engineering, design and manufacturing; and Foster Wheeler Energy Corporation will provide boiler expertise.

Construction of the project began in May of 1995. During the summer and fall of 1995, earthwork, foundation, and structural steel work were performed. No on-site construction was performed after the winter shutdown which began in November of 1995. Construction began again in March of 1996. Equipment manufacture continued through the winter to be ready for installation throughout the balance of the construction process. Construction is eighty-five percent (85%) complete and is scheduled for early completion in September of 1997. Startup testing will be complete by January of 1998, at which time the demonstration testing period will begin. Additional schedule details are provided on Figure 1 - Progress Schedule.

### **SECTION 3 - PROJECT STATUS**

The following status is for Phase II (construction) work performed during the period January 1, 1997, to March 31, 1997, and is presented in bullet format listed by major activities.

## PROJECT MANAGEMENT

### Project Team

The Healy Clean Coal Project (HCCP) team participants and their primary roles include:

- Alaska Industrial Development and Export Authority (AIDEA) - Ownership, overall project management, and financing.
- Golden Valley Electric Association, Inc. (GVEA) - Design input and review, operator, and purchaser of the HCCP electrical output.
- Usibelli Coal Mine, Inc. (UCM) - Design input and review, coal supplier, and ash disposal.
- TRW, Inc. (TRW) - Entrained combustion (slagging) system technology supplier.
- Babcock & Wilcox - Spray dryer, fabric filter, and ash recycle system technology supplier (formally Joy Environmental Technologies, Inc.).
- Stone and Webster Engineering Corporation (SWEC) - Architect/Engineer.

In addition, Foster Wheeler Energy Corporation (FWEC) has been contracted for design and supply of the boiler. Sumitomo Corporation of America (SCA) has been contracted for design and supply of the turbine/generator. H.C. Price Company (H.C. Price) has been contracted for general construction of the facility.

The required monthly reporting under the terms of the Cooperative Agreement, Article XV - Reporting Requirements, was fulfilled during this reporting period.

### Construction Management

AIDEA is leading the construction management effort with staff located in Anchorage and a project team located at the project site in Healy to manage the construction effort; administer all field services, supplier contracts, and material purchase orders; and provide direct construction coordination with the general contractor. AIDEA has retained an experienced manager, who has extensive international experience in power plant construction. The manager is assisted by staff from AIDEA and technical specialists from SWEC having backgrounds suited for work in progress. In addition, support is provided as required from the SWEC office in Denver, Colorado, and off-site fabricators of equipment components.



- Construction progress is on schedule with eighty-five percent (85%) of construction work completed. Earthwork, foundations preparation, and the structural concrete were completed in September of 1995. Structural steel erection began on August 16, 1995, and is now complete, including siding and roofing.
- All thirty-four (34) vendors supplying the owner furnished equipment have made delivery. Over one hundred and ninety-three (193) train loads and five hundred and fifteen (515) truck loads of permanent materials and equipment were received at the site through October of 1996, at which time activity slowed dramatically. Materials and equipment receiving is now nearly complete, with only minor materials receiving remaining.
- On-site fabrication and erection of tanks and silos are complete. The tanks and silos were sandblasted and painted as installation occurred. Installation work has begun on all plant systems. On-site fabrication and installation of the Spray Dryer Absorber (SDA) is complete; on-site fabrication and erection of the stack was finished ahead of schedule; and substantial portions of the ducting have been set in place.
- Piping systems supporting the boiler hydrostatic tests were finished in March of 1997 and the boiler/combustor hydrostatic testing was completed successfully. The turbine lube oil piping and electrohydraulic control system flushing was started. Air compression and portions of the combined Unit No. 1 and HCCP coal system were started up. Water treatment startup is in progress.
- Construction meetings are held weekly with H.C. Price to review the construction schedule and progress, interface owner furnished equipment fabrication schedules, and to coordinate with Babcock and Wilcox, TRW, SCA, and FWEC, respectively, for the flue gas desulfurization system, combustors, turbine, and boiler deliveries and erection with general construction activities. Change orders, when necessary, continue to be negotiated with the General Contractor and the suppliers.
- The final Environmental Monitoring Plan (EMP) was issued by AIDEA to DOE in October of 1996. Based on the DOE comments, a revised final EMP will be issued next quarter.
- Work on the Demonstration Test Plan is underway. AIDEA has received input from Babcock and Wilcox and TRW.

#### Finance

- The construction process is within budget, with the contractor receiving \$87,453,500 through March 31, 1997, in progress payments towards the contract total of \$100,010,035. This figure includes two large change orders (Numbers 3 and 7 in the chart below) which merged erection of the boiler and turbine systems into the General Construction contract. Savings from deletion of these responsibilities from

the supplier contracts resulted in a no net change in the overall project budget. Other changes are allocated to reserves for such purposes. Therefore, the project remains on budget. A summary of change orders to date is noted in Table 1.

**Table 1 – Summary of Change Orders to General Construction Contract**

<b>Change Order No.</b>	<b>Purpose</b>	<b>Cost</b>
1	Alaska State Fire Marshall changes	\$825,000
2	Construction Camp insurance adjustment	\$400,000
3	Boiler Erection - Moved from supplier contract	\$14,576,611
4	Fencing - Deletion	(\$49,854)
5	Touch-up Painting - Deletion	(\$148,961)
6	Borough Bed Tax - Added after bid date	\$70,000
7	Turbine Erection - Moved from supplier contract	\$1,812,796
8	Boiler Clean - Deletion	(\$786,864)
9	Ash and Disposal Credit - Net	(\$167,538)
10	Miscellaneous small changes	\$52,654
11	Camp Extension - Interim capacity	\$180,000
12	Engineering claim	\$500,000
	<b><i>TOTAL CHANGE ORDERS TO DATE</i></b>	<b><i>\$21,763,844</i></b>

- Through this budgeting period, \$213,750,500 of project expenditures have been made (80.0% of the project budget of \$267,190,000). The project remains on schedule and within budget.

**PERMITTING/NEPA COMPLIANCE**

The plant design is finalized and all federal and state permit related activities have been completed, and all permits necessary for the construction of the HCCP have been obtained. AIDEA is current in compliance with the permits, and representations made during the project's review under the provisions of the National Environmental Policy Act (NEPA). This review resulted in the issuance of a Final Environmental Impact Statement and Record of Decision that authorized construction of the Project. A Mitigation Action Plan Annual Report was submitted to DOE in September of 1996.

**OWNER FURNISHED EQUIPMENT**

All vendors supplying owner furnished equipment have been delivered. The FWEC and SCA related erection work has been consolidated under the scope of work of H.C. Price by a change order, providing a no net change in the project budget.

### Combustor Supply

All major components of the TRW combustion system and the FWEC boiler components have been set in place.

### FGD System Supply

The Flue Gas Desulfurization (FGD) baghouse modules have been set in place. On-site fabrication and installation of the Spray Dryer Absorber (SDA) system is complete.

### SCA

All components of the turbine, turbine auxiliary and piping, generator, embedded materials, electrical equipment, and instrumentation have been placed inside the plant in their final positions.

### Other Systems

On-site fabrication and erection of the stack is finished and substantial portions of the ducting have been set in place. Waterwall form-up is complete and welding and boiler erection are on-going, slightly behind schedule. Placement of structural concrete is complete including floor slabs and foundations for the substation and coal handling system. Block construction throughout the plant, including the walls that adjoin Unit No. 1 and for the walls which form room partitions throughout the plant. Installation of the water treatment system equipment is finished and work on the substation 138 kv line (electrical tie-ins to Unit No. 1) is complete. Healy Unit No. 1 is on line, with the jointly shared coal handling systems installed.

### Healy Unit No. 1 Retrofit

Healy Unit No. 1 retrofit is complete and on line. The operational and performance testing is anticipated to take place during the summer of 1997. The retrofit includes the addition of a Continuous Emission Monitoring System (CEMS), a boiler retrofit of low-NO<sub>x</sub> burners including necessary new pulverizers and air system modifications, and a sorbent injection system for SO<sub>2</sub> control. The modifications are required by the HCCP and Healy Unit No. 1 air quality permits and associated agreements.

## **SECTION 4: SUMMARY AND PLANS FOR NEXT QUARTER (April 1, 1997, to June 30, 1997)**

**SUMMARY:** Construction work is on-going at the HCCP site and will continue throughout the remainder of Phase II. Weatherization and insulation of the plant will be

finished. All of the major components of the boiler, combustor, turbine and FGD systems have been placed inside the plant in their final positions and related erection work is nearing completion. The startup of portions of these systems will continue over the next few months, and startup of all individual plant systems is planned to occur by the end of May of 1997, as the checkout of each system is finalized and punch list items begin to be addressed. Vender representatives for both the Owner Furnished Equipment and the General Contractor Furnished Equipment will continue to be scheduled for job site visits to witness and assist with equipment startup.

**PLANS:** Specific activities planned for next quarter include:

**AIDEA**

- Continued oversight of project construction and project management.
- Environmental Monitoring Plan is being finalized and Demonstration Test Plan is in preparation.

**Environmental**

- All state and federal permits have been acquired and AIDEA remains in compliance.

**TRW**

- Combustor systems will be installed as part of the boiler erection during this period and continue through the 1997 construction season.

**FWEC**

- Engineering and design of the boiler system are complete. The boiler system was delivered in June of 1996 and will be installed during the remaining 1997 construction season.

**Babcock & Wilcox**

- Engineering, design, and fabrication of the spray dryer absorber and ash recycle system are complete. Installation will occur during the remaining 1997 construction season.

**SCA**

- Installation of the turbine, turbine auxiliary and piping, generator, embedded materials, and electrical equipment will continue.

## **SWEC**

- Construction phase service activities will continue, and include reviewing vendor submittals, responding to requests for information from the general contractor, and construction inspection.

## **Healy Unit No. 1 Retrofit**

- Healy Unit No. 1 retrofit is complete and on line. The operational and performance testing is anticipated to take place during the summer of 1997.

**FIGURE 1 -- PROGRESS SCHEDULE -- (HCCP Quarterly Report 25)  
Phase II B -- Construction**

Primary Activity (WBS)	Tasks	Status	Percent Complete	Completion Date (actual/anticipated)	
Owner Activities	Project Management	Active, in support of construction	On-going	12/97	
	Construction Management	Active, in support of construction	On-going	12/97	
	Finance	Funds are available to complete the project	100%	4/91	
Combustor Supply	Fabrication	Complete; released for shipment 1/96 - 2/96	100%	2/96	
	Field Advisory Services	Ongoing; erection part of Gen. Construction Contract	On-going	8/97	
FGD System Supply	Contract Administration	Complete	100%	3/95	
	Engineering and Design	Complete	100%	3/95	
	Procurement	Complete; released for shipment 2/96	100%	2/96	
	Field Services	Ongoing; erection part of Gen. Construction Contract	On-going	8/97	
Construction	Engineering support to Constr. Equipment Procurement	Active	91%	9/97	
	General Construction	All 34 vendors have delivered	100%	12/96	
	*Civil/Structural Components	Underway	98%	7/97	
	*Mechanical Components	Underway	89%	6/97	
	*Elec/I & C Components	Underway	62%	8/97	
	*Combustors Erection	Underway	87%	4/97	
	*All Other Construction	Underway	97%	6/97	
Construction Review Startup	Engineering Reviews	Complete	100%	11/94	
	Operation Startup Testing	Incidental to systems testing Follows construction completion	0% 25%	1/97-9/97 9/97-12/97	

<u>SUMMARY OF MAJOR ACTIVITIES</u>		<u>Completion Date (anticipated)</u>	<u>Schedule Status</u>
Design		November 1994	Completed
Construction		September 1997	On Schedule (Early Completion)
Operation (Demonstration Testing)		July 1999	Not Started