

HEALY CLEAN COAL PROJECT

QUARTERLY TECHNICAL PROGRESS REPORT  
No. 24

For the Reporting Period  
October 1, 1996 Through December 31, 1996

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 scheduled to be completed in August 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 NO<sub>x</sub>, 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
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 October 1, 1996, to December 31, 1996.

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 scheduled for early completion in August 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. 24 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 January 1, 1997, through March 31, 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 October 1, 1996, through December 31, 1996.

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 technology related to engineering, design and manufacturing; and Foster Wheeler Energy Corporation will provide combustor 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 scheduled for early completion in August 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 October 1, 1996, to December 31, 1996, 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 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 74.3% of all project work performed based on the revised cost plan for the HCCP submitted to DOE in January of 1995. Earthwork, foundations preparation and the structural concrete were completed in September of 1995. Structural steel erection began on August 16, 1995, and is currently 99% complete, including siding and roofing.
- Materials and equipment receiving is a primary activity at the site. By December 31, 1996, all thirty-four (34) vendors supplying the owner furnished equipment have made delivery. Over one hundred ninety-three (193) train loads and 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.
- 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.

#### Finance

- The construction process is within budget, with the contractor receiving \$76,925,500 through December 31, 1996, 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
	<b>TOTAL CHANGE ORDERS TO DATE</b>	<b>\$16,763,844</b>

- Through this budgeting period, \$198,400,500 of project expenditures have been made (74.3% 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 October of 1996.

#### OWNER FURNISHED EQUIPMENT

All vendors supplying owner furnished equipment have been delivered during this reporting period. 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 position.

##### 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. The retrofit includes the addition of a Continuous Emission Monitoring System (CEMS), a boiler retrofit of low-NOx 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 (January 1, 1997, to March 31, 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. Temporary heating is in progress and will extend throughout the winter months until startup of the permanent heating equipment occurs. Startup of portions of the major components of the boiler, combustor, turbine, and flue gas desulfurization system (FGD) will begin and continue over the next few months, with startup of all individual plant systems planned by April of 1997, as the checkout of each system is finalized and punch list items begin to be address.

**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.

**FIGURE 1 -- PROGRESS SCHEDULE**  
**Phase II B -- Construction**  
**(HCCP Quarterly Report 24)**

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
FGD System Supply	Field Advisory Services	Ongoing; erection part of Gen. Construction Contract	On-going	8/97
	Contract Administration	Complete	100%	3/95
	Engineering and Design Procurement	Complete	100%	3/95
Construction	Field Services	Complete; released for shipment 2/96	100%	2/96
	Engineering support to Constr.	Ongoing; erection part of Gen. Construction Contract	On-going	8/97
	Equipment Procurement	Active	90%	8/97
	General Construction	All 34 vendors have delivered	100%	12/96
	*Civil/Structural Components	Underway	98%	7/97
	*Mechanical Components	Underway	78%	6/97
	*Elec/I & C Components	Underway	48%	8/97
	*Combustors Erection	Underway	74%	4/97
	*All Other Construction	Underway	96%	6/97
	Construction Review Startup	Engineering Reviews	Complete	100%
	Operation	Incidental to systems testing	0%	1-8/97
	Startup Testing	Follows construction completion	10%	8-12/97

**SUMMARY OF MAJOR ACTIVITIES**

Design  
Construction  
Operation (Demonstration Testing)

**Completion Date (anticipated)**

November 1994  
August 1997  
July 1999

**Schedule Status**

Completed  
On Schedule (Early Completion)  
Not Started