# FINAL
# ENVIRONMENTAL MONITORING PLAN
Revision 1

## HEALY CLEAN COAL PROJECT
## HEALY, ALASKA

April 11, 1997

Prepared for
ALASKA INDUSTRIAL DEVELOPMENT
AND EXPORT AUTHORITY
and
GOLDEN VALLEY ELECTRIC ASSOCIATION, INC.
for Submittal to
U.S. DOE/PETC

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# SECTION 1

# EXECUTIVE SUMMARY

# 1. EXECUTIVE SUMMARY

This Environmental Monitoring Plan (EMP) provides the mechanism to evaluate the integrated coal combustion/emission control system being demonstrated by the Healy Clean Coal Project (HCCP) as part of the third solicitation of the U.S. Department of Energy (DOE) Clean Coal Technology Demonstration Program (CCT-III Program). The EMP monitoring is intended to satisfy two objectives: 1) to develop the information base necessary for identification, assessment, and mitigation of potential environmental problems arising from replication of the technology and 2) to identify and quantify project-specific and site-specific environmental impacts predicted in the National Environmental Policy Act (NEPA) documents (Environmental Impact Statement and Record of Decision).

The EMP contains a description of the background and history of development of the project technologies and defines the processes that will take place in the combustion and spray dryer absorber systems, including the formation of flash-calcined material (FCM) and its use in sulfur dioxide ($SO_2$) removal from the flue gases. It also contains a description of the existing environmental resources of the project area.

The EMP includes two types of environmental monitoring that are to be used to demonstrate the technologies of the HCCP: compliance monitoring and supplemental monitoring. Compliance activities include monitoring wastewater effluents, air emissions, visibility, and ambient air quality. Monitoring of these resources provide the data necessary to demonstrate that the power plant can operate under the required state and federal statutes, regulations, and permit requirements.

To the extent the Phase III Demonstration Test Program requires collection of environmental emissions data as part of performance testing, these additional data will be reported as EMP supplemental monitoring data.

The data generated from the compliance and supplemental monitoring activities will be reviewed for completeness and accuracy. Problem areas encountered during the reporting period; monitoring techniques/procedures; quality assurance/quality control; and actual, anticipated, or possible solutions to identified problem areas will be identified. Each EMP report will cover compliance and supplemental monitoring progress, defining whether tests have been completed or are in progress, and will contain test reports and summaries. The reports will also describe the status of permit compliance.

# SECTION 2

# INTRODUCTION

# 2. INTRODUCTION

## 2.1 PURPOSE

The DOE views the identification of environmental areas of concern and the development of an information base for the assessment and mitigation of impacts associated with the replication of Clean Coal Technology (CCT) projects to be fundamental purposes of the demonstration project. As a result, DOE requires the development of an EMP as part of each Clean Coal Technology Demonstration Program project. Monitoring is to be conducted that identifies the environmental constraints and/or advantages of potential commercialization of the demonstration technology. In addition, environmental monitoring may be necessary to quantify the project- and site-specific environmental impacts predicted in the NEPA documentation, to detect any environmental problems requiring remedial action, and to confirm the performance of environmental mitigation measures implemented as part of the project. This EMP provides the mechanism for DOE to evaluate the environmental aspects of the integrated coal combustion/emission control system being demonstrated by the HCCP as part of the third solicitation of the Clean Coal Technology Demonstration Program. It includes two types of monitoring: compliance monitoring and supplemental monitoring.

The applicable compliance monitoring activities will provide data necessary to demonstrate that the power plant can operate under the required state and federal statutes, regulations, and permit requirements. Supplemental monitoring activities will provide additional environmental data to evaluate the environmental effectiveness of the technologies integrated into the design of the HCCP.

The supplemental monitoring data will be gathered during the HCCP Phase III Demonstration Test Program. The Demonstration Test Program will include the tests necessary to ensure that equipment operates to the standards and guarantees of equipment manufacturers and the tests used to evaluate the integrated combustion/emission control technologies at various operating conditions. The waste streams to be monitored during supplemental monitoring will be identified as the HCCP Phase III Demonstration Test Program is prepared.

## 2.2 BACKGROUND AND HISTORY OF THE PROJECT TECHNOLOGIES

The background and history of the TRW Applied Technologies Division (TRW) and the Joy Technologies, Inc./Niro Atomizer (Joy) technologies are presented separately, followed by a discussion of the integrated combustion/emission control system.

### 2.2.1 TRW Combustor Technology

The research and development of the TRW Entrained Combustion System was initiated in 1975. Small-scale coal injection experiments were initially conducted to establish fluidization and flow injection parameters. Coal-fired combustion tests followed, using both swirling and tangential preheated air injection at atmospheric and pressurized conditions. Acceptable mixing and combustion conditions were achieved with slag being centrifuged to the chamber wall.

#### 2.2.1.1 Firing of Healy Coal at TRW Cleveland Test Facility

TRW conducted a test burn of two Alaskan coals at the TRW Cleveland Test Facility in support of the HCCP as part of the CCT-III Program. The tests were conducted to verify that the candidate HCCP coals could be successfully fired in the TRW coal combustor, to provide data required for scale-up to the utility size requirements, and to produce sufficient FCM for spray dryer tests to be conducted by Joy at Niro's Copenhagen, Denmark, pilot plant facility. The tests demonstrated that both Alaskan coals could be reliably burned, provided the data required for scale-up, and produced FCM material from Alaskan limestone.

During the test program, over 350 tons of Usibelli Coal Mine, Inc. (UCM) Healy coal were handled at the test facility. Coal flow rates as high as 3,800 pounds per hour (lb/hr) were demonstrated using Healy performance coal. This corresponds to a heat input of 30 million British thermal units per hour (MMBtu/hr), assuming a coal higher heating value (HHV) of 7,932 Btu/lb.

The Healy coal test burns in the TRW Cleveland Test Facility demonstrated that the Healy performance coal and the Two Bull Ridge coal can be effectively burned in the TRW Entrained Combustion System. Good to excellent combustion performance was achieved with both coal sources, as inferred by carbon losses. Slag capture was excellent with the performance coal (85 percent). Slag capture with the Two Bull Ridge coal was less (45 percent) than for the performance coal. This lower percentage is directly attributable to the higher $T_{250}$ (2,900 vs. 2,750°F) of the Two Bull Ridge coal. The larger combustor size and higher preheat temperature (650 vs. 400°F) that will be present at the HCCP are expected to accommodate the Two Bull Ridge coal. Low nitrous oxides ($NO_x$) emissions were also demonstrated. Finally, the tests demonstrated that FCM for the Joy spray dryer $SO_2$ capture system can be produced by the TRW Entrained Combustion System.

2.2.1.2 Design Verification Tests

Design verification tests (DVTs) were performed as part of the total design of the TRW Entrained Combustion System for the HCCP, primarily to mitigate the uncertainties associated with two critical subsystems, the precombustor and the direct coal feed system. The results of the DVTs verified the design and performance of the precombustor, and the concept and arrangement of the direct coal feed system were acceptable for the HCCP application (TRW 1993). The risks associated with the operation and scalability of the slagging stage and the limestone feed system were considered by TRW to be significantly less, hence DVTs on these subsystems were not performed.

### 2.2.2 Joy Spray Dryer Absorber Technology

The Joy Flue Gas Desulfurization (FGD) System consists of a spray dryer absorber (SDA), a pulse jet fabric filter, a reagent recycle system, a dry injection system, and a product transport system. These technologies have been incorporated into power plants previously. However, the FGD technology utilizing FCM in the system had not been demonstrated on a commercial scale. Testing of FCM produced during the TRW combustor tests in Cleveland was conducted in the FGD system at the Niro pilot plant facility in Copenhagen, Denmark, during September 1991.

The purpose of the tests was to investigate the ability of the FCM (collected from the TRW combustor tests of Alaskan coal) to remove $SO_2$ in the SDA system. More specifically, the purpose of the tests was to verify the projected limestone consumption and $SO_2$ removal from the HCCP emissions. Furthermore, the efficiencies of three FCM reactivation methods were evaluated. Those methods were to suspend the FCM in water followed by: 1) simple agitation, 2) heating, and 3) abrasive grinding.

The absorption tests were performed using simulated flue gas outlet conditions, determined during the test run at the TRW Cleveland Test Facility, at various operating modes for the FGD system. The findings of the tests were: 1) the FCM can be used as an absorbent in the Joy SDA system, 2) the utilization of the FCM depends on the SDA outlet temperature, with lower temperatures yielding better utilization, 3) the FCM can be activated by either grinding or heating, and 4) the efficiency with regard to $SO_2$ removal in the TRW combustor system and the Joy SDA system was found to be much better than expected.

### 2.2.3 Integrated Combustion/Emission Control System

As discussed in the preceding sections, each demonstration technology to be included in the integrated combustion/emission control system was independently tested under conditions proposed for the HCCP. The data collected from those preliminary tests indicate that the integration of these air pollution control systems will result in reduced emissions of $SO_2$, $NO_x$, and particulate matter. It is the integration of these technologies that will be demonstrated at the HCCP.

The HCCP will be an integrated system for the combustion of coal and control of all emissions. The slagging combustor, furnace, SDA, and pulse jet fabric filter (baghouse) will all play a part in reducing emissions from the plant. The slagging combustor will inhibit $NO_x$ production, generate FCM for capture of $SO_2$, and reduce the potential amount of particulate matter by up to 80 percent. The furnace will further contribute to the $NO_x$ reduction process and begin the $SO_2$ removal process. The SDA and the baghouse will complete the collection of particulate matter and $SO_2$.

Removal of any single component in the integrated system would result in ramifications on other components. For example, removal of the slagging combustor and replacement with low $NO_x$ burners would increase the ash loading out of the furnace by nearly 400 percent, and elimination of the production of FCM would require the conversion of the SDA System to a conventional lime spray dryer system and would possibly increase $NO_x$ emissions.

## 2.3 PROJECT SITE

The HCCP will be located on the southern edge of the Interior Basin of Alaska, approximately 80 miles southwest of Fairbanks and 250 miles north of Anchorage. The facility will be built adjacent to the existing 25-MW Healy Unit No. 1 conventional pulverized-coal-fired unit owned and operated by Golden Valley Electric Association, Inc. (GVEA) (Figure 2-1). The project site is in a rural setting along the east bank of the Nenana River about 2.5 miles east-southeast of the intersection of the Healy Spur Highway and the George Parks Highway at Healy. Healy Unit No. 1 has been operating as a baseload power plant since November 1967 and has an expected operating life until at least 2007. The 65-acre site is approximately 4 miles north of the nearest border of Denali National Park and Preserve (DNPP) and about 8 miles north of the entrance to that park. The Suntrana Spur of the Alaska Railroad passes at the south border of the HCCP site. Access to the site is provided by the Healy Spur Highway and the Suntrana Spur. Coal will be supplied from the UCM coal mine, located about 4 miles north of the HCCP site, using the existing haul road between the mine and Healy Unit No. 1.

The Anchorage-Healy portion of the Anchorage-Fairbanks Transmission Intertie terminates at the substation located on GVEA property. The present Healy Unit No. 1 is connected to this substation. Electricity from the HCCP will be purchased by GVEA and distributed to the Alaska Railbelt region through the existing substation and interties.

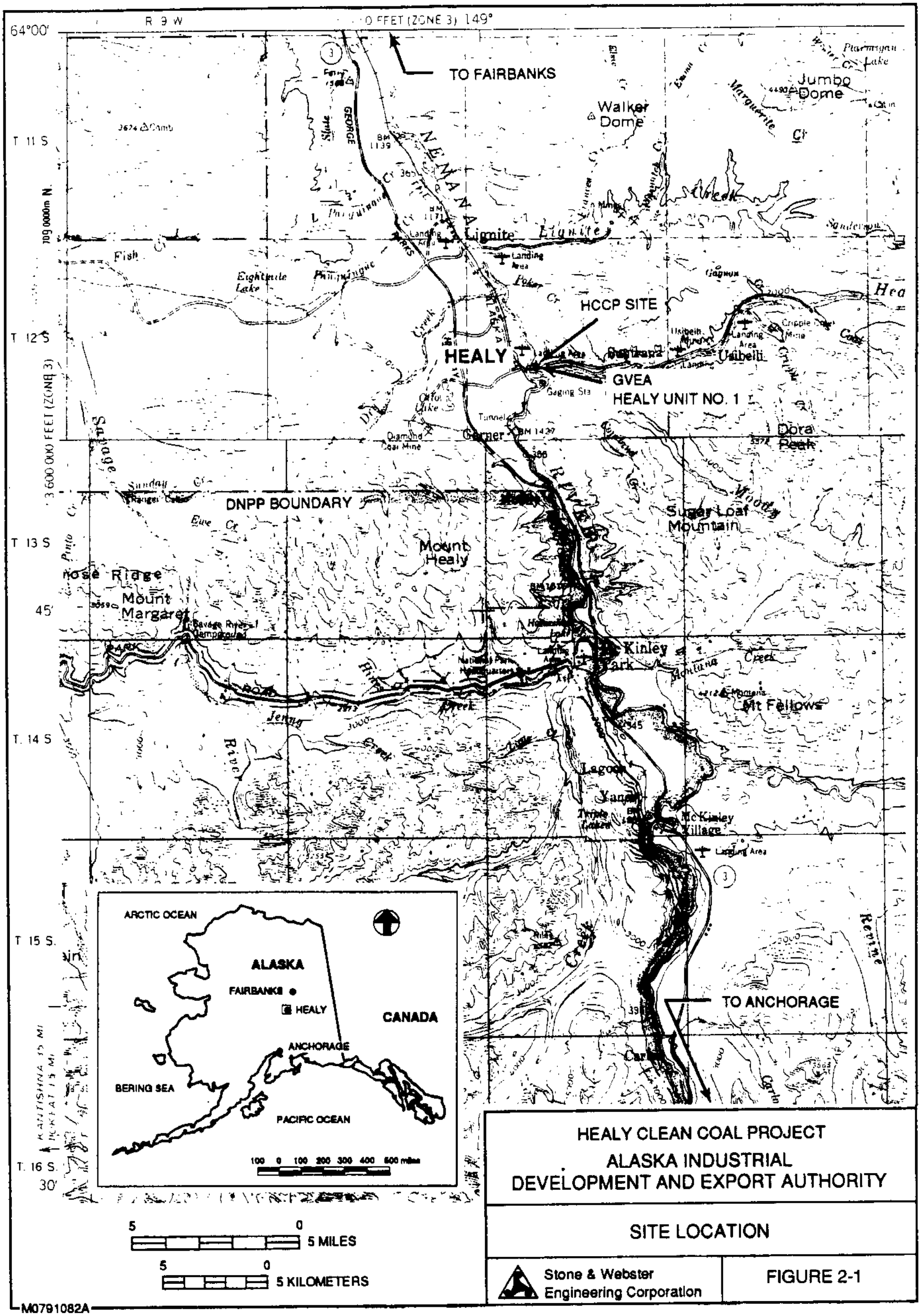
The land use classification for the HCCP site is industrial. The majority of the area immediately around the HCCP building site has sustained surface alteration in the construction and operation of the existing Healy Unit No. 1 generating plant, support buildings, coal and ash storage areas, cooling water intake/discharge structures, roads, electric substation, and transmission lines. A site plan for the HCCP is shown in Figure 2-2.

## 2.4 PROJECT SCHEDULE

The following presents the major HCCP scheduled activities. A detailed construction schedule is provided as Figure 2-3.

TABLE 2-1. Project Schedule

| PROJECT ACTIVITIES | DATE |
|---|---|
| Milestones of HCCP | |
| Began Technology Evaluation | March 1, 1989 |
| Proposal Submitted to DOE | August 24, 1989 |
| DOE Project Selection | December 27, 1989 |
| DOE Cooperative Agreement | April 21, 1990 |
| All Permits/Approvals Received | January 24, 1995 |
| Initial Operation/Commence 2-Year Demonstration Program | January 1, 1998 |
| Environmental Schedule for the HCCP | |
| DOE Proposal Support | December 31, 1989 |
| Permit & Environmental Plan | February 15, 1990 |
| Special Studies | May 10, 1993 |
| Environmental Information Volume (EIV) | |
| Draft | February 1, 1991 |
| Second Draft/Final | September 15, 1991 |
| Air Quality Permit to Operate Issued | May 6, 1994 |
| National Environmental Policy Act (NEPA) | |
| Preliminary Draft Environmental Impact Statement | May 25, 1992 |
| Draft Environmental Impact Statement (DEIS) | November 13, 1992 |
| Final Environmental Impact Statement (EIS) | December 24, 1993 |
| Environmental Monitoring Plan (EMP) | |
| Draft EMP Submitted to DOE | November 30, 1993 |
| DOE Review/Approval | February 15, 1994 |
| Final EMP Submitted to DOE | June 30, 1994 |
| Revised Final EMP Submitted to DOE | November 15, 1996 |
| Complete Phase III Demonstration Test Plan | July 1, 1997 |

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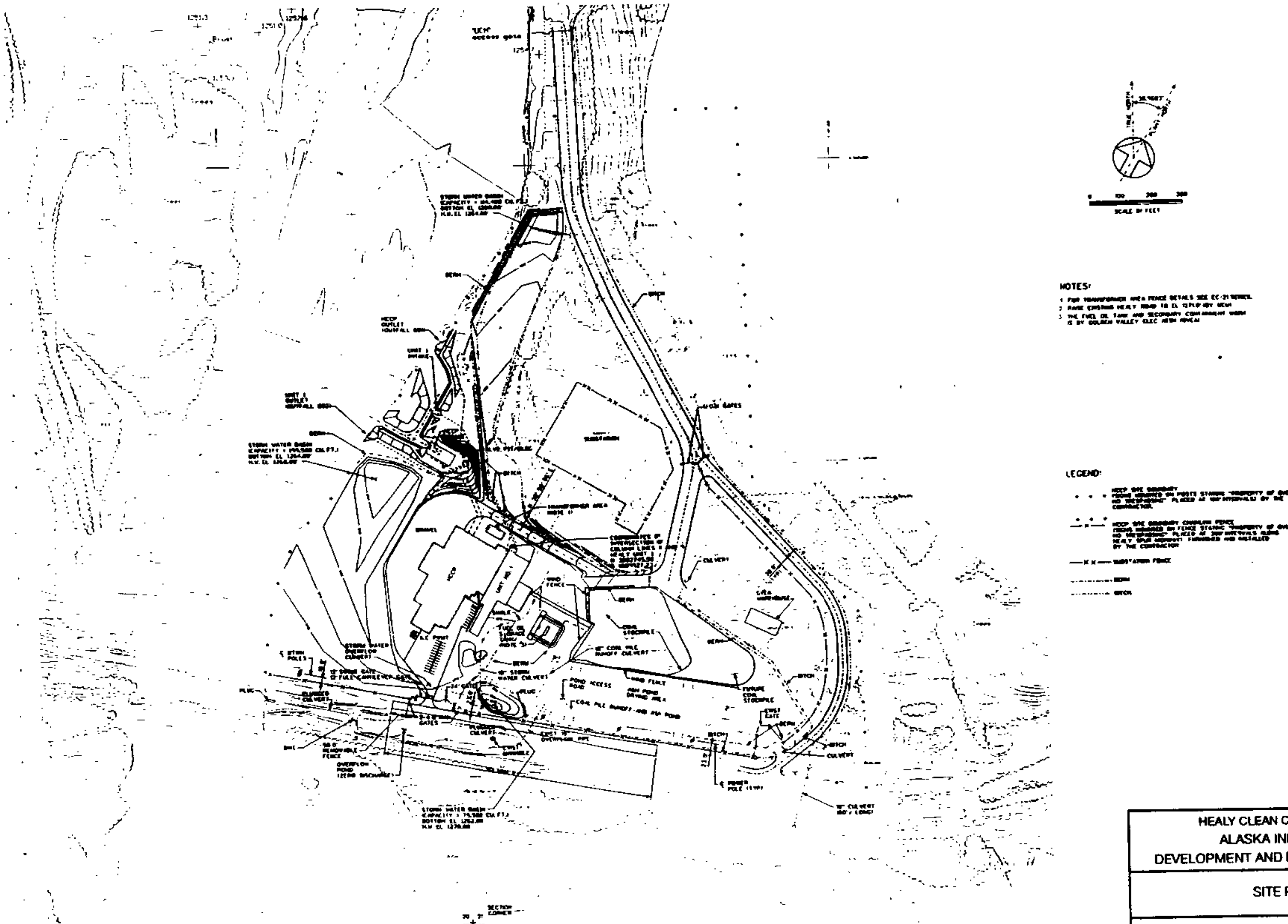
SITE LOCATION

Stone & Webster Engineering Corporation

FIGURE 2-1

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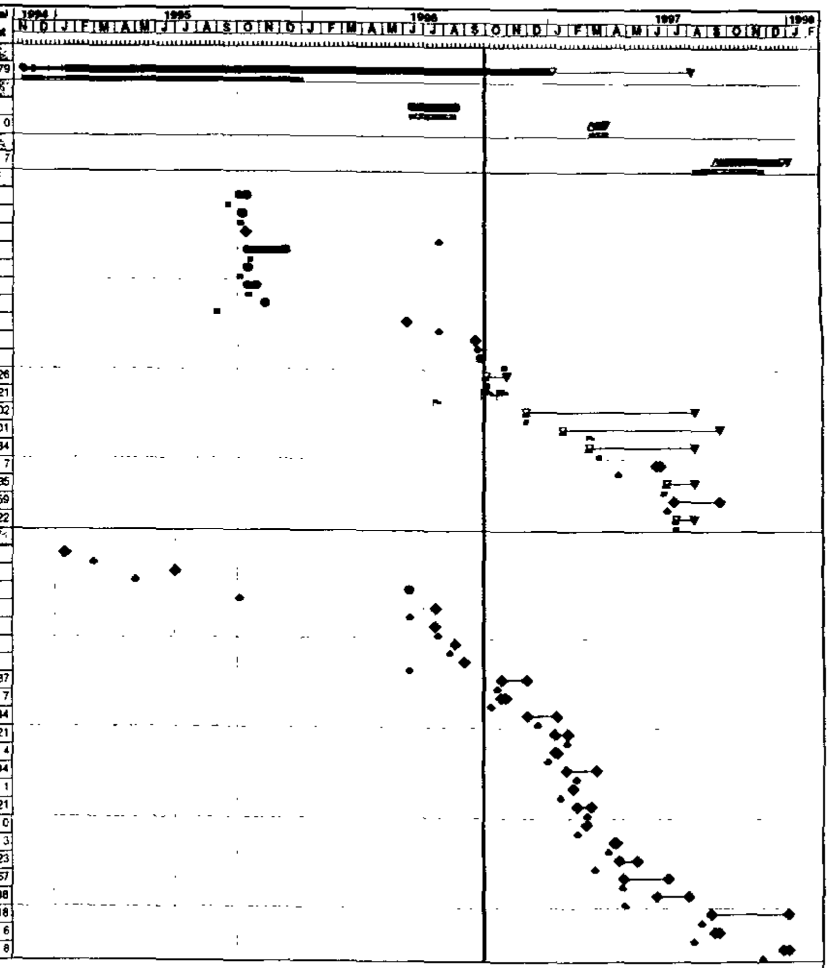
SITE PLAN

Stone & Webster Engineering Corporation

FIGURE 2-2

| Activity ID | Activity Description | Orig Dur | Rem Dur | % | Early Start | Early Finish | Late Start | Late Finish | Variance target 1 early finish | Total float |
|---|---|---|---|---|---|---|---|---|---|---|
| AWARDS & SUBMITTALS | | | | | | | | | | |
| | | 654 | 72 | 82 | 16NOV94A | 06JAN97 | 16NOV94A | 02AUG97 | -306 | 179 |
| OTHER WORK ACTIVITIES | | | | | | | | | | |
| H10005 | UNIT #1 SHUTDOWN - SUMMER 1996 | 49 | 0 | 100 | 14JUN96A | 18AUG96A | 14JUN96A | 18AUG96A | -2 | |
| H10010 | ANTICIPATED UNIT #1 SHUTDOWN - 1997 | 18 | 18 | 0 | 07MAR97* | 27MAR97 | 07MAR97 | 27MAR97* | 0 | 0 |
| OWNER WORK ACTIVITIES | | | | | | | | | | |
| U10006 | OPERATIONS TESTING | 91 | 91 | 0 | 09SEP97 | 23DEC97 | 17SEP97 | 31DEC97 | -27 | 7 |
| WORK COMPLETIONS | | | | | | | | | | |
| S99991 | 1995 STRUCT CONCRETE ACTIV COMPLETE | 1 | 0 | 100 | 02OCT95A | 12OCT95A | 02OCT95A | 12OCT95A | -23 | |
| M99991 | 1995 MECHANICAL WORK COMPLETE | 1 | 0 | 100 | 06OCT95A | 06OCT95A | 06OCT95A | 06OCT95A | -2 | |
| XS1006 | CONDENSOR FND READY FOR CONDENSOR ERECTION | 0 | 0 | 100 | | 11OCT95A | | 11OCT95A | 287 | |
| E99991 | 1995 ELECTRICAL WORK COMPLETE | 1 | 0 | 100 | 13OCT95A | 08DEC95A | 13OCT95A | 08DEC95A | -44 | |
| C99991 | 1995 CIVIL WORK COMPLETE | 1 | 0 | 100 | 14OCT95A | 14OCT95A | 14OCT95A | 14OCT95A | -11 | |
| S99993 | 1995 STRUCTURAL STEEL ACTIV COMPLETE | 1 | 0 | 100 | 14OCT95A | 26OCT95A | 14OCT95A | 26OCT95A | -9 | |
| S99993A | 1995 OTHER STRUCTURAL ACTIV COMPLETE | 1 | 0 | 100 | 09NOV95A | 09NOV95A | 09NOV95A | 09NOV95A | -61 | |
| XS1007 | TURBINE AUX EQP FND READY FOR AUX EQP ERECTION | 0 | 0 | 100 | | 05JUN96A | | 05JUN96A | 49 | |
| XS4006 | TURBINE AREA ENVIRONMENTALLY CONTROLLED | 0 | 0 | 100 | | 15SEP96A | | 15SEP96A | 3 | |
| S99992 | 1996 STRUCT CONCRETE ACTIV COMPLETE | 1 | 0 | 100 | 23SEP96A | 23SEP96A | 23SEP96A | 23SEP96A | 30 | |
| C99992 | 1996 CIVIL WORK COMPLETE | 1 | 1 | 0 | 01OCT96 | 01OCT96 | 31OCT96 | 31OCT96* | 1 | 26 |
| S99994 | 1996 MAJOR STRUC STEEL ACTIV COMPL (XCEPT LVOUT) | 0 | 0 | 0 | | 01OCT96 | | 25OCT96 | -62 | 21 |
| S99994B | 1996/97 OTHER STRUCTURAL ACTIVITIES COMPLETE | 0 | 0 | 0 | 30NOV96 | 29NOV96 | 08AUG97 | 07AUG97 | 0 | 202 |
| S99994A | 1996/97 ALL STRUCTURAL STEEL COMPLETE | 0 | 0 | 0 | 24JAN97 | 23JAN97 | 16SEP97 | 15SEP97 | 35 | 201 |
| N99991 | INSTRUM CAL/INSTALL - ALL SYSTEMS COMPLETE | 1 | 1 | 0 | 04MAR97 | 04MAR97 | 07AUG97 | 07AUG97 | 13 | 134 |
| BX99991 | BOILER READY FOR STARTUP | 0 | 0 | 0 | | 10JUN97 | | 17JUN97 | -55 | 7 |
| R99991 | 1996/97 ARCH ACTIVITIES COMPLETE | 1 | 1 | 0 | 27JUN97 | 27JUN97 | 07AUG97 | 07AUG97 | -4 | 35 |
| U10005 | ALL SYSTEM TURNOVERS COMPLETE | 0 | 0 | 0 | | 08JUL97 | | 15SEP97 | -8 | 59 |
| C99993 | 1997 CIVIL WORK COMPLETE | 1 | 1 | 0 | 12JUL97 | 12JUL97 | 07AUG97 | 07AUG97 | 0 | 22 |
| CONTRACT MILESTONES | | | | | | | | | | |
| XB0005 | MOBILIZE AT JOBSITE (3/15/95) | 0 | 0 | 100 | 15JAN95A | | 15JAN95A | | 45 | |
| XB0010 | CAMP READY FOR ALL CONTRATORS (LD - 3/01/96) | 0 | 0 | 100 | 30JUN95A | | 30JUN95A | | -61 | |
| XS2020 | SITE/MOB AREA READY FOR T/G CONT (6/15/96) | 1 | 0 | 100 | 10JUN96A | 10JUN96A | 10JUN96A | 10JUN96A | -252 | |
| XM3306 | ACCESS READY FOR GEN STATOR SETTING (8/01/96) | 0 | 0 | 100 | | 19JUL96A | | 19JUL96A | -39 | |
| XS1005 | TURB PEDESTAL READY FOR TRB ERECT (8/01/96) | 0 | 0 | 100 | | 19JUL96A | | 19JUL96A | 5 | |
| XM2205 | TURNOVER UNIT #1 COAL HANDLING (8/10/96) | 0 | 0 | 100 | | 16AUG96A | | 16AUG96A | -8 | |
| XM3305 | TURBINE BUILDING BRIDGE CRANE READY (8/01/96) | 0 | 0 | 100 | | 31AUG96A | | 31AUG96A | -81 | |
| XE2005 | TURNOVER MAIN PLANT ELECT SYS (LD - 12/01/96) | 0 | 0 | 0 | | 25OCT96 | | 01DEC96* | -6 | 37 |
| XS4005 | BOILER BUILDING ENCLOSED (LD - 11/01/96)) | 0 | 0 | 0 | | 25OCT96 | | 01NOV96* | -15 | 7 |
| XE2010 | TURNOVER PLANT CONTROL SYSTEM (LD - 1/15/97) | 0 | 0 | 0 | | 02DEC96 | | 15JAN97* | 15 | 44 |
| XM4005 | TURNOVER COOLING WATER SYSTEMS (LD - 2/01/97) | 0 | 0 | 0 | | 11JAN97 | | 01FEB97* | 19 | 21 |
| XM8005 | TURNOVER AIR SYSTEMS (LD - 1/15/97) | 0 | 0 | 0 | | 11JAN97 | | 15JAN97* | -10 | 4 |
| XM8015 | TURNOVER CONDESATE SYSTEM (LD - 3/15/97) | 0 | 0 | 0 | | 30JAN97 | | 15MAR97* | 15 | 44 |
| XB540 | BOILER/COMB READY FOR HYDRO (LD - 2/09/97) | 0 | 0 | 0 | | 08FEB97 | | 09FEB97* | -19 | 1 |
| XM8020 | TURNOVER FEEDWATER SYSTEM (LD - 3/15/97) | 0 | 0 | 0 | | 14FEB97 | | 07MAR97* | 14 | 21 |
| XM8010 | TURNOVER PIPE FOR BOILER/COMB HYDRO (LD-3/01/97) | 0 | 0 | 0 | | 01MAR97 | | 01MAR97* | -14 | 0 |
| XB590 | BOILER/COMB SYS ERECT COMPLETE (LD - 4/15/97) | 0 | 0 | 0 | | 12APR97 | | 15APR97* | -9 | 3 |
| XMZ005 | TURBINE GEN/COND ERECT COMPLETE (LD) (4/01-5/15) | 0 | 0 | 0 | | 18APR97 | | 15MAY97* | -32 | 23 |
| XM3310 | BOILER BOILOUT COMPLETE (LD - 7/01/97) | 0 | 0 | 0 | | 25APR97 | | 01JUL97* | -2 | 67 |
| XM8025 | PIPE FOR STEAM TO TURBINE COMPLETE (LD- 8/01/97) | 0 | 0 | 0 | | 14JUN97 | | 01AUG97* | -47 | 48 |
| XU1005 | CONSTRUCTION COMPLETE (LD - 12/31/97) | 0 | 0 | 0 | | 04SEP97 | | 31DEC97* | -15 | 118 |
| XU1003 | STEAM TO TURBINE/READY FOR STARTUP (OTHERS) | 0 | 0 | 0 | | 08SEP97 | | 15SEP97* | -27 | 6 |
| XU1010 | INITIAL OPERATION (OTHERS) | 0 | 0 | 0 | | 23DEC97 | | 31DEC97* | -32 | 8 |




| | | |
|---|---|---|
| Project Start | 15NOV94 | Early Bar |
| Project Finish | 14JAN98 | Float Bar |
| Data Date | 30SEP96 | Target Bar |
| Plot Date | 03OCT96 | Progress Bar |
| | | Critical Activity |

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HCPR

AIDEA - HEALY CLEAN COAL PROJECT
H C. PRICE CONSTRUCTION SCHEDULE
Dept Of Energy - September 1996

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HCCP CONSTRUCTION SCHEDULE

FIGURE 2-3

# SECTION 3

# PROJECT/PROCESS DESCRIPTION

# 3. PROJECT/PROCESS DESCRIPTION

This section of the EMP provides information about the project site and facilities, the operations processes, and the emissions and discharges.

## 3.1 PROJECT SITE AND FACILITIES DESCRIPTION

### 3.1.1 Project Site Description

The HCCP site is near the confluence of Healy Creek and the Nenana River near the northern base of the Alaska Range. The topography surrounding the HCCP site is variable. West of the Nenana River, the terrain is gently rolling, with vegetation cover consisting primarily of resin birch and immature quaking aspen communities. South of Healy Creek, shallow moraine and outwash gravel terraces supporting low shrub and herbaceous tundra back up to the lower foothills of the Alaska Range. The dominant landform near the HCCP site is the high plateau to the northeast. Steep faces of this plateau rise above the Nenana River and Healy Creek and support coniferous and deciduous forest types alternating with large gravel slides. The top of the plateau has large areas that support low shrub and herbaceous vegetation.

#### 3.1.1.1 Climatic Conditions

The climate at Healy is characterized as cold and dry, with large differences between winter and summer air temperatures. The temperature changes are conditioned by the response of the land mass to the changes in the solar heat received during the year. The sun is above the horizon at Healy for 18 to 21 hours per day during the summer months, with associated daytime temperatures occasionally reaching highs in the 70s (°F). In contrast, daylight from November to early March ranges from 10 to less than 4 hours per day. The lack of solar heating during the winter results in very cold temperatures that regularly fall below 0°F. A major contributing factor to the cold temperatures is the persistent winter snow, which reflects much of the solar energy during the sun's limited appearance. Average monthly high temperatures in the area range from 10°F in the winter to 65°F in the summer, and average monthly low temperatures range from -5°F in the winter to 45°F in the summer.

The area has low annual precipitation, most of which occurs during the warm summer months. Precipitation data, collected at the UCM Poker Flats Mine, reveal that the maximum precipitation recorded during a single month was 5.7 inches, and the maximum annual rainfall during any 1-year period was 19.3 inches. The maximum 10-year 24-hour rainfall event was 2.0 inches. Unofficial records indicate that average annual precipitation is approximately 10.5 inches and that snowfall in the Healy area is about 60 inches.

Because of the complex terrain of the Alaska Range to the south of the HCCP site, substantial differences in wind speed and direction occur between the HCCP and neighboring areas. Air masses separated by the high terrain frequently produce strong pressure gradients and consequent high wind episodes. High winds from the south-southeast frequently occur during winter; wind gusts in excess of 100 mph are known to occur in the Healy area. When the wind speed is light, local winds often flow along the drainage axes of Healy Creek and the Nenana River.

#### 3.1.1.2 Air Quality

Air quality in the vicinity of the HCCP site is classified as being very good, with ambient concentrations of all air pollutants being well below National Ambient Air Quality Standards (NAAQS). The Healy area is sparsely populated, and the only existing major industrial source of regulated atmospheric pollutants is the Healy Unit No. 1 coal-fired power plant. Monitoring of $SO_2$, $NO_x$, and $PM_{10}$ (particulate matter ≤10 mm, invaluable) by the Alaska Industrial Development and Export Authority (AIDEA) at the Park Monitoring Station indicated that all concentrations are well below the applicable NAAQS. Validated air quality data collected at the station are summarized in Table 3-1.

#### 3.1.1.3 Scenic Resources

The HCCP will be constructed in a region of abundant scenic beauty. Situated along the northern base of the Alaska Range, the region is famous for scenic resources, geological formations, plants, and wildlife that attract tourists from all over the world. The scenic quality of the landscape in DNPP, the northern border of which is 3.5 miles south of the HCCP site, is outstanding. On days when it is not cloudy, Mount McKinley and the Mount McKinley Group's peaks are visually spectacular because they rise from the relative lowlands of the Interior Basin of Alaska rather than from a range of uniformly high mountains. However, neither Mount McKinley nor the Mount McKinley Group's peaks are visible from Healy.

Another area of important scenic resources in the vicinity of the HCCP is the Nenana River Valley. The physical setting of the river, with sculptured glacial valley walls, provides distinct viewing opportunities. The Nenana River Valley itself is flat and U-shaped, with walls rising from 2,000 to 3,000 feet above the river. The river descends from 2,100 feet above mean sea level (msl) just north of Cantwell to about 1,250 feet msl at Healy. In the Nenana River Gorge, that part of the Nenana River Valley between DNPP and Healy, the river descends approximately 460 feet in about 5 miles. This descent provides some of the local area's most spectacular scenery.

### 3.1.1.4 Surface Water

#### Hydrologic Setting

The HCCP site is on a gravel terrace immediately downstream from the confluence of the Nenana River and Healy Creek. Therefore, the hydrologic characteristics that affect surface water at the HCCP site are influenced by both the Nenana River and Healy Creek and their respective drainage areas. The Nenana River originates on the southern side of the Alaska Range at the Nenana Glacier. The river flows west from the glacier, then north through the Alaska Range for approximately 115 miles before entering the Tanana River at Nenana, Alaska. A major tributary of the Nenana River is the Yanert Fork (with its source at the Yanert Glacier), which enters the Nenana River near DNPP. Healy Creek, Jack River, Windy Creek, Riley Creek, and several other smaller streams also contribute runoff to the Nenana River system. The drainage basin of the Nenana River upstream of the HCCP site is approximately 1,910 square miles.

The hydrological cycle of the Nenana River is best explained by discussing the source of the river and general climatological conditions. Maximum annual runoff from the Nenana and Yanert glaciers normally occurs during July and August. Each year, as temperatures in the mountains drop below freezing, glacial flows decrease. During October or November, the rivers generally freeze over and do not become free of ice again until late April or May. During that period of ice cover, glacial flow is at a minimum, so the primary source of water for the river is groundwater. Because the groundwater flow is nearly constant, little variation in discharge occurs during the winter. When the ice break-up occurs in the spring, flow again increases due to surface runoff and glacial melt.

#### Surface Water Quantity and Quality

The mean annual flow of the Nenana River at the HCCP site, based on the U.S. Geological Survey (USGS) sampling period of record (1951-1979), is 3,500 cubic feet per second (cfs). The minimum flow of record is 190 cfs, and the maximum flow of record is 46,800 cfs. Water temperatures in the Nenana River vary from a minimum of 32°F to a maximum of 55°F. The monthly summer mean water temperature varies from 47 to 51°F, while the winter monthly mean is approximately 32°F. Total suspended solids (TSS) measurements in the Nenana River range from a maximum value of 3,060 to 3,800 milligrams per liter (mg/l) during June and July (corresponding to the period of maximum mean glacial water discharge), to a minimum value of about 17 mg/l during September. Water quality data for the Nenana River, as determined by the USGS, are presented in Table 3-2.

### 3.1.1.5 Groundwater

#### Hydrologic Setting

The gravel terrace upon which the HCCP is sited is a depositional surface of alluvial deposits of rock and debris and outwash gravel that have filled the Nenana River Valley. The terrace is several feet above normal river level and exhibits relatively little relief, with elevations between about 1,255 and 1,265 feet. Bedrock at the HCCP site is unconsolidated sandstone, siltstone, and claystone interbedded with coal. The bedrock immediately below the building location is a gravelly sandstone. These strata dip steeply in a northerly direction.

The major difference between the alluvial gravels and the underlying formation is their relative density. The bedrock formations are noticeably more dense than the surficial deposits. The deposits forming the terrace are unconsolidated silts, sands, and gravels with some cobbles included. The terrace deposits and the bedrock are good base materials for supporting the project structures on spread footings or mats. Near-surface deposits at the HCCP site are relatively dense and mostly free-draining. As with most alluvial deposits, the mechanical properties and distribution of sands, gravels, and silts at the site are variable, both vertically and horizontally. This is also true of the underlying gravelly sandstone bedrock. As a result, there are a number of water-bearing zones. Groundwater is relatively near the ground surface and is typically at or above the elevation of the Nenana River. The general groundwater gradient is downstream.

#### Groundwater Quantity and Quality

According to recent findings of AIDEA's HCCP geotechnical investigation, the gravels of the surface alluvium constitute an extensive aquifer with generally good permeability and abundant water. The surface water, however, is less desirable for power plant operations than is the deep water or the river water. A combination of river water and deep well water will be used for HCCP and Healy Unit No. 1. Table 3-3 contains analytical data representative of the deep groundwater quality.

### 3.1.1.6 Floodplains and Wetlands

The National Wetlands Inventory has identified wetlands along the Nenana River and its tributary streams. No wetlands occur on the immediate construction site of the HCCP. The site is not within the 100-year floodplain of the Nenana River (Grey and Lehner 1983, AIDEA 1991). Fill was used during the construction of Healy Unit No. 1 to elevate the site above the floodplain, and the site no longer contains the vegetation, soil, or hydrologic characteristics of a wetland as defined in the U.S. Army Corps of Engineers Wetlands Delineation Manual (Corps 1987).

### 3.1.1.7 Terrestrial Resources

#### Vegetation

The vegetation of the Healy area occurs as a mosaic of boreal community types. These vegetative community types are related to the diverse topography, soils, geology, and microclimates of the area. The area can be divided into the following three ecological zones [based on more extensive descriptions in Woodward-Clyde (1978), Tarbox et al. (1979), and AIDEA (1991)]. The first zone is located immediately northeast of the site, where a steep escarpment rises from the floodplain of the Nenana River to a high plateau. The plateau is dominated by natural mixed resin birch, spruce, and shrub tundra communities. The south- and west-facing slopes of the escarpment support diverse plant communities, apparently because of variations in slope, aspect, and soils and the occurrence of land slides. Vegetation ranges from a mixture of grasses and pioneer trees on recent slide areas, through a variety of shrub vegetation, to open forest on the higher slopes where slopes are shallower and soils are deeper.

The second zone is high terraces of tundra located south of Healy Creek and east of the Nenana River. This zone includes low shrub and herbaceous tundra on the terrace surfaces, with alder and white spruce woodlands on the intermediate slopes. The third zone, located west of the Nenana River, is an area of rolling topography with the community of Healy, railroads, roads, and other disturbance. Because of these disturbances and fires, much of this area is currently in scrub successional vegetation. Other parts of the area contain tundra-like vegetation and forest.

The HCCP site is a highly disturbed and devegetated area adjacent to the existing Healy Unit No. 1 power plant. The site vicinity includes a mixture of disturbed areas, formerly disturbed areas with recovering vegetation, and natural vegetation.

#### Wildlife

Mammals occurring in the vicinity of the site include grizzly bears, caribou, moose, Dall sheep, wolves, red foxes, marten, lynx, wolverines, and snowshoe hares (Woodward-Clyde 1978, Tarbox et al. 1979, Elliott 1984). Little habitat exists for shorebirds or waterfowl in the vicinity of the site, but mallard, American widgeon, green-winged teal, bufflehead, spotted sandpiper, and northern phalarope have been observed to nest in the area (AIDEA 1991). Many species of upland birds and raptors also occur in the area, including a relatively high density of golden eagles (Roseneau and Springer 1991).

#### 3.1.1.8 Aquatic Resources

Five species of fish have been documented in the Nenana River near the HCCP site: round whitefish, longnose sucker, burbot, arctic grayling, and slimy sculpin. The density of aquatic macroinvertebrates (i.e., river bottom and other planktonic organisms) was found to be about 35 organisms per square meter and was the lowest of any fauna studied (Tarbox et al. 1979). No obvious effect of the existing thermal discharge from the Healy Unit No. 1 on river bottom fauna density, composition, or distribution is evident.

#### 3.1.1.9 Threatened and Endangered Species

The U.S. Fish and Wildlife Service (USFWS) was concerned that two threatened or endangered species may exist in the HCCP area: the threatened arctic peregrine falcon, which could occur as a migrant, and the endangered American peregrine falcon, which could be a resident (USFWS 1991). An investigation conducted by AIDEA found that neither of these threatened species currently nest or live in the area (Roseneau and Springer 1991). The U.S. Fish and Wildlife Service also reported that no listed or candidate threatened or endangered plant species were known to occur in the area of the HCCP site (USFWS 1991).

### 3.1.2 Coal Resource Description

The HCCP will be fueled with low-sulfur coal from the UCM coal mine. Run-of-mine UCM coal (coal that is currently used at Healy Unit No. 1) blended with waste coal will be the primary fuel. Waste coal, as defined in this EMP, will be either low-grade coal or overburden- or underburden-contaminated coal (uncovered during mining of run-of-mine coal) that is normally spoiled and not used as a fuel source. A typical blend of run-of-mine coal and waste coal is referred to as "blended performance coal" and consists of approximately equal amounts of each. Compositional analyses of typical run-of-mine coal, waste coal, and blended performance coal for the HCCP are shown in Table 3-4. The carbon content and, consequently, the heating value are greater for the run-of-mine coal, while the waste coal contains much more ash and, consequently, a lower heating value.

## 3.2 OPERATIONS PROCESS

The TRW Combustion System is designed to be installed on the boiler furnace to provide efficient combustion, maintain effective limestone calcination, and minimize the formation of $NO_x$ emissions. The main system components will include a precombustor, main combustor, slag recovery section, pulverized coal and limestone feed system, and a combustion air system. The coal-fired precombustor will be used to increase the air inlet temperature to the slagging state for optimum slagging performance. It will burn approximately 25 to 50 percent of the total coal input to the combustor. Combustion will occur in several stages to minimize $NO_x$ formation.

The slagging stage, or main slagging combustor, will consist of a water-cooled cylinder that will be sloped toward a slag opening. The remaining coal will be injected axially into the combustor, rapidly entrained by the swirling precombustor gases and additional air flow, and burned under substoichiometric (fuel-rich) conditions for $NO_x$ control. The ash contained in the burning coal will form drops of molten slag and accumulate on the water-cooled walls as a result of the centrifugal force caused by the swirling gas flow. The molten slag will be driven by aerodynamic and gravity forces through a slot into the bottom of the slag recovery section where it will fall into a water-filled tank and be removed by the slag removal system. Approximately 80 percent of the ash in the coal will be removed as molten slag.

$NO_x$ emissions will be reduced in the coal combustion process by use of the fuel and air-staged combustor system and a boiler that controls fuel and thermal-related conditions that inhibit $NO_x$ formation. The slagging combustor/boiler system will also function as a limestone calciner and first stage $SO_2$ removal device in addition to its heat recovery function. Secondary and tertiary $SO_2$ capture will be accomplished by a single SDA vessel and a baghouse, respectively. Ash collection in the process will first be achieved by the removal of molten slag in the coal combustors followed by particulate removal in the baghouse downstream of the SDA vessel. To ensure complete combustion in the furnace, additional air will be supplied to $NO_x$ control ports and, if necessary, overfire air ports located in the furnace.

For $SO_2$ control, pulverized limestone ($CaCO_3$) will be fed into the combustor. While passing into the boiler, most of the limestone will be decomposed to flash-calcined lime by the following reaction:

$$CaCO_3 + \text{Heat} \rightarrow CaO + CO_2 \qquad (1)$$

The mixture of this lime and the ash not removed by the combustors is FCM. Some sulfur capture by the entrained calcium oxide (CaO) will also occur at this time, but the primary $SO_2$ removal mechanism will be through a multiple step process of spray drying the slurried and activated FCM solids.

The FCM that is produced in the furnace via equation (1) will be removed in the baghouse. A portion of the material will be transported to disposal. Some of the material, however, will be conveyed to a mixing tank, where it will be mixed with water to form a solids slurry. By grinding the slurry in a mill, the FCM will be activated by a mechanical process whereby the overall surface area of available lime will be increased. The mill will enhance the slaking conditions of the FCM and will increase the surface area of the FCM for optimal $SO_2$ absorption. FCM slurry leaving the tower mill will be transported through the screen to the feed tank. Feed slurry will be pumped from the feed tank to the SDA, where it will be atomized via a Niro rotary atomizer (proven in lime SDA applications up to 860 MWe). After reacting with the $SO_2$ in the flue gas, the solid products and unreacted FCM will be removed in the SDA hopper or the baghouse. $SO_2$ will be further removed from the flue gas by reacting with the FCM on the baghouse filter bags.

As with any process involving the conversion of thermal energy to electrical energy, waste heat must be rejected. In the HCCP, water will be drawn from the Nenana River into the condenser. As the cool river water passes through the condenser, it will absorb heat from the turbine exhaust steam and condense the steam into water, which then will be recycled to the boiler. The warmed river water will be returned from the condenser back to the Nenana River. The estimated amount of water required for the once-through condenser will be approximately 28,000 gallons per minute (gpm), about 20 percent of the 1Q10 flow for the Nenana River during the winter and less than 1 percent of the 1Q10 flow during the summer.

Water for plant operation will be supplied both from the Nenana River and from new wells. Potable water, process water for generating steam, and other HCCP high-quality water needs will be obtained from the wells. Service water and water for bottom ash quenching and conveying will be obtained from the Nenana River.

## 3.3 EMISSIONS AND DISCHARGES

3.3.1.1 Atmospheric Emissions and Control System Atmospheric Emissions

$NO_x$ BACT

The entrained combustor operating at a maximum controlled $NO_x$ emission level of 0.35 lb/MMBtu (1010 tons per year [tpy]) has been established as Best Available Control Technology (BACT) for the HCCP.

Based on pilot-scale data, the Entrained Combustion System is expected to demonstrate an emission level equal to or less than 0.2 lb $NO_x$/MMBtu. However, an emission limit of 0.35 lb/MMBtu was permitted for this system for the following reasons:

1. Laboratory- and pilot-scale data have shown that $NO_x$ emission levels below 0.2 lb/MMBtu can be achieved by the Entrained Combustion System while burning bituminous coal. The HCCP will burn a relatively low rank subbituminous/refuse coal that may result in somewhat higher $NO_x$ emissions, ranging from 0.20 to approximately 0.35 lb/MMBtu. Actual $NO_x$ emissions at the HCCP are expected to be in the lower end of this range, but, because of uncertainties in the scale-up design process, 0.35 lb/MMBtu was used as the HCCP $NO_x$ emission limit.

2. The emission limit of 0.35 lb/MMBtu is below the current Environmental Protection Agency (EPA) New Source Performance Standards (NSPS) for subbituminous coal (0.5 lb $NO_x$/MMBtu).

3. The emission limit is below the emission level recommended for wall-fired, dry bottom utility boilers (0.5 lb $NO_x$/MMBtu) enacted by the Clean Air Act (CAA) Amendments of 1990.

4. The emission limit is also the lowest $NO_x$ emission rate at which it is believed possible to operate low $NO_x$ burners retrofitted into the HCCP boiler.

$SO_2$ BACT

An Activated Recycle SDA System with an $SO_2$ control level of 80 percent is BACT for $SO_2$ emissions.

The HCCP is permitted for $SO_2$ emissions of 248 tpy (0.086 lb/MMBtu) on an annual basis and 0.10 lb/MMBtu averaged over 3 hours. The annual emission rate is based on an 80 percent removal efficiency when firing performance coal, while the 3-hour emission rate is based on a 76 percent removal efficiency. All of the emissions are at rates that are lower than NSPS and will not violate ambient air quality standards. The 3-hour emission rate is higher than the annual emission rate because operational excursions can result in higher emission rates in the short-term, which can be compensated for over a longer term.

The Activated Recycle SDA System is expected to operate at a removal efficiency greater than 80 percent (demonstration goal is 90 percent). However, the innovative nature of the technology and the range of coal qualities to be burned during demonstration prevent the development of absolute confidence levels when estimating actual performance. The Activated Recycle SDA System will be converted to a conventional lime-based spray dryer if the TRW entrained combustor or the SDA have irreparable technical, operational, or economic problems.

Particulate Matter BACT

A fabric filter system with pulse jet cleaning, a controlled PM emission level of 0.02 lb/MMBtu annual average (demonstration goal is 0.015 lb/MMBtu), and allowable emissions of 58 tpy are BACT for PM emissions from the steam generator stack. Control efficiency is estimated at 99.95 percent. Fabric filter systems with pulse jet cleaning and a controlled emission level of 0.02 grains per dry standard cubic foot (grains/dscf) or 9 tpy allowable emission are BACT for particulate emissions from the limestone storage silo, the primary crusher, the coal handling system dust collector, and the fly ash storage silo.

Water spray dust suppression during non-freezing weather is BACT to reduce particulate emissions from the coal haul road. Estimated control level for this process is approximately 75 percent. A wind fence is BACT to reduce particulate emissions from the coal pile. Estimated control level for this process is approximately 80 percent. Total allowable fugitive emissions are 1 tpy.

Carbon Monoxide BACT

The formation of carbon monoxide (CO) from the combustion of fossil fuels is the result of incomplete combustion. Both proper burner and combustion chamber design at the HCCP, with a CO emission level of 0.20 lb/MMBtu and allowable emissions of 577 tpy, are BACT for CO emissions. A lower emission level is not technically and economically feasible with the entrained combustor that will be used for control of $NO_x$ emissions.

Beryllium BACT

BACT for this pollutant is the HCCP fabric filter with a control efficiency of 99.3

percent for beryllium and allowable emissions of 0.0005 tpy. Uncontrolled emissions of beryllium were conservatively estimated by assuming that this constituent of the coal is discharged in the solid state with the flue gas. Because beryllium compounds are emitted almost entirely as particulate, the BACT control technology for particulate matter (the fabric filter) is also BACT for beryllium.

### 3.3.1.2 Atmospheric Emissions Control System

#### Integrated System

Emissions from the HCCP will be controlled during the coal combustion process, and the flue gas will be conditioned prior to entering the stack. Monitoring of the sulfur content of "as-fired" coal fuel samples will be conducted monthly.

The HCCP will achieve the air pollution emission requirements of the Air Quality Control Permit to Operate. Control of the pollutants identified in the permit will be achieved by synergistically integrating the TRW slagging coal combustors with the specially designed bottom-fired Foster Wheeler boiler and a backend Joy SDA and fabric filter for $SO_2$ and PM removal. Control of the $NO_x$ will be achieved by substoichiometric (fuel rich) combustion of coal in the coal combustors and by air staging in the Foster Wheeler boiler. This can be achieved by a combination of operating the combustor under fuel-rich conditions and delaying the addition of combustion air in the furnace while the products of combustion are continually cooled by radiation and convection to the water-walls in the furnace. The latter is accomplished by adding combustion air through $NO_x$ ports and, if necessary, through over-fire air ports. Since the slagging combustor is operated under fuel-rich conditions, which makes oxygen atoms scarce, the formation of $NO_x$ in the slagging combustor is minimized.

The integrated process is expected to demonstrate at least 90 percent $SO_2$ removal resulting in $SO_2$ emissions of no more than 0.043 lb/MMBtu, $NO_x$ emissions of no more than 0.2 lb/MMBtu, $PM_{10}$ emissions of no more than 0.015 lb/MMBtu, and at least 99.5 percent combustion efficiency. It is anticipated that at least 20 percent of the total available $SO_2$ in the flue gas will be captured in the combustion process and at least 70 percent in the FGD System. Of the total ash generated, 60 to 90 percent will be removed from the combustors as slag and from the boiler hoppers as bottom ash. Most of the remaining ash will be removed in the baghouse. The integrated process is suitable for repowering or retrofitting existing facilities or for new facilities. If successfully demonstrated, the integrated technologies will provide an alternative technology to conventional pulverized-coal boilers with conventional FGD controls while lowering overall operating costs and reducing the volume of solid waste generated by conventional technology in current use.

Instrumentation and Controls

A computerized distributed plant control system (PCS) will be utilized to control the slagging combustor process. The system will control the fuel flow to the precombustor and the slagging combustion system to ensure that a substoichiometric condition is present in the slagging combustor to control $NO_x$ emissions. It will also be used to control all of the balance of plant systems that support the combustor operations.

Digital control of the FGD system is based on a programmable logic controller (PLC) located locally. The PLC is intertied to the PCS via a data highway for operator control and monitoring from the HCCP main control room.

Stack $SO_2$, $NO_x$, and opacity emissions will be continuously monitored by a dedicated, dilution-based continuous emission monitoring system (CEMS). The CEMS is linked to a dedicated PC computer for reporting functions and is also tied to the PCS for control and monitoring by plant operators.

### 3.3.2 Aqueous Discharges and Control System

#### 3.3.2.1 Effluent

The HCCP will generate the following wastewater streams.

- Circulating (once-through) cooling water
- Boiler blowdown water
- Demineralizer regenerants
- Floor and equipment drain water
- Metal cleaning fluids
- Fire protection runoff water
- Plant site sanitary wastewater

Wastewater discharge to the Nenana River will occur at two locations. These two outfalls will discharge the combined Healy Unit No. 1 and HCCP plant waste streams, which include both the operational wastewater and the once-through circulating cooling water. A third, internal outfall will discharge combined Healy Unit No. 1 and HCCP operational wastewater from the HCCP wastewater treatment system into the once-through circulating cooling water system. There will also be temporary discharges of effluent to the Nenana River during construction of the HCCP, including discharge of construction excavation wastewater and storm water runoff.

In addition to the discharge of wastewater effluent into the Nenana River, various wastewater streams will be disposed of to the plant septic system, to the atmosphere, or with the ash.

### 3.3.2.2 Aqueous Discharge Control System

The control systems for the wastewater streams generated at the HCCP are discussed separately in the following subsections.

#### Once-Through Circulating Cooling Water System

The cooling water system will be a once-through design that takes in cool water from the Nenana River and discharges warmed water back to the river. The function of the cooling water system in the HCCP will be to dissipate heat from the turbine cycle and component cooling water heat exchangers. River water will enter the HCCP intake structure at the existing intake pond location. The intake channel will be modified to reduce the potential for accumulation of mud and debris in the pond. A trash rack, stop logs, and intake screens in the intake structure will prevent fish and large debris from the river from entering the intake structure. The cleaned circulating water will then be pumped through an underground pipe to the HCCP condenser internal tubes, where it will absorb heat from the steam in the external compartment of the condenser.

Cold circulating water taken from the header upstream of the condenser will also be used to dissipate heat load from heat exchangers used to cool plant components and reject waste heat from the slag recovery system. The cold circulating water will flow on the tube side of these exchangers, absorbing heat from the warm component water flowing on the shell side. The warmed circulating water from these exchangers will then be discharged back into the once-through circulating cooling water header downstream from the condenser and subsequently discharged to the river.

#### Plant Operational Wastewater System

The design philosophy for the HCCP operational water/wastewater system is to maximize water reuse and minimize wastewater discharge. Therefore, operational wastewater from the plant, with the exclusion of the metal cleaning fluids subsystem and the sanitary wastewater subsystem, will be sent to the wastewater treatment system. There, the wastewater will be passed through an oil/water separator (if needed) and an equalization and pH adjustment (neutralization) tank equipped with metering pumps to input appropriate neutralizing reagents. After being processed to acceptable conditions, the effluent will be routed to the dirty water tank for precipitation of suspended impurities. The neutralized and treated effluent will be reused in the plant systems that can tolerate the wastewater quality. If there is any excess wastewater, it will be filtered and discharged to the circulating cooling water, where it will be commingled with the once-through cooling wastewater and transported to the Nenana River.

Continuous monitoring instruments will be installed upstream of the discharge at Outfall 001A to monitor the flow rate of the effluent discharged to the once-through cooling system. On a periodic basis, samples of the discharge will be collected manually at this location to evaluate effluent pH and contaminants.

Storm Water Runoff System

The HCCP is authorized to discharge storm water associated with industrial or construction activities under the terms and conditions imposed by the EPA's National Pollutant Discharge Elimination System (NPDES) Storm Water General Permit issued for use in the state of Alaska. Development of a pollution prevention plan and inspection and reporting requirements are outlined in the permit. After construction and demonstration activities are completed, storm water runoff to the Nenana River is not anticipated from the HCCP/Healy Unit No. 1 power plant site.

Coal Pile Runoff

Coal pile runoff will be directed to the existing ash pond where it will either evaporate or infiltrate.

Plant Site Sanitary Wastewater Treatment System

Wastewater from the plant sanitary waste treatment system will not be discharged directly to surface waters or groundwaters of the area. A septic system will be sized to meet the needs of all HCCP and Healy Unit No. 1 personnel. Water effluent from the septic tank will overflow by gravity into a subsurface drainage (leach) field. Accumulated sludge in the septic tank will be removed approximately every 2 to 3 years by a commercial operator authorized to transport and deliver the wastes to a waste treatment plant for disposal.

### 3.3.3 Solid Waste Discharges and Control System

3.3.3.1 Solid Wastes

The combustor will produce a vitreous slag waste, while the SDA system will produce a dry powdery waste that will solidify into a high-strength, stable waste material. These materials can easily be disposed of in a conventional landfill operation. The HCCP is expected to produce approximately 80 percent of the total ash as slag/bottom ash. The remaining ash will be collected as fly ash. All ash materials will be conveyed to storage silos. The ash will be periodically removed from these silos and hauled to the UCM coal mine for placement with mine spoils.

Other solid wastes generated during the construction, demonstration, and operational phases of the HCCP will be stored and transported to a landfill. No toxic or hazardous materials will be included in these wastes.

#### 3.3.3.2 Toxic/Hazardous Materials

A number of materials that are identified by EPA as either being toxic or hazardous will be used in the power plant. All these chemicals will be properly labeled and stored according to state and federal standards and codes.

TABLE 3-1. Existing Air Quality of the Healy Area as Measured at the Park Monitoring Station during the 12-Month Period from September 1990 through August 1991.

| POLLUTANT | AVERAGING TIME | CONCENTRATION (μg/m³) | NAAQS [a] (μg/m³) | PERCENT OF STANDARD |
|---|---|---|---|---|
| $SO_2$ | 3-hr<br>24-hr<br>Annual | 45 [b]<br>26 [b]<br>5 | 1300<br>365<br>80 | 4<br>7<br>6 |
| $NO_2$ | Annual | 6 | 100 | 6 |
| $PM_{10}$ | 24-hr<br>Annual | 86 [b,c]<br>5 | 150<br>50 | 57<br>10 |

[a] National Ambient Air Quality Standards

[b] Maximum measured concentration

[c] Concentration resulting from forest fire smoke on July 1, 1991. The maximum 24-hour value that was not influenced by an exceptional event was 31 μg/m³.

TABLE 3-2. Historical Water Quality Data for the Nenana River.

| CONSTITUENT | CONCENTRATION (mg/l) |
|---|---|
| Total Hardness (as $CaCO_3$) | 86 |
| Total Dissolved Solids (TDS) | 108 |
| Total Suspended Solids (TSS) | 948 |
| Calcium | 25 |
| Magnesium | 6 |
| Sodium | 2.4 |
| Potassium | 1.3 |
| Carbonate | 0 |
| Bicarbonate | 71 |
| Sulfate | 32 |
| Chloride | 1.4 |
| Nitrate | 0.21 |
| Silica | 5 |
| Manganese | 0 |
| Iron | 0.05-0.1 |
| pH | 7.6-7.9 |

Source: USGS (1990)

TABLE 3-3. Range of On-Site Well Water Quality, Major Constituents (Dissolved).

| PARAMETER (IN MG/L, UNLESS STATED OTHERWISE) | HEALY UNIT NO. 1 (SITE 5) OLIGOCENE-MIOCENE AQUIFER | | MW2 (SITE 7) PLEISTOCENE-HOLOCENE AQUIFER | NATIONAL DRINKING WATER STANDARDS |
|---|---|---|---|---|
| | 1967 | 9/90 - 7/91 | 11/90 - 7/91 | |
| Depth of Screen (ft) | 200 | 200 | 27 | -- |
| Total Dissolved Solids | 301 | 257-293 | 1300-2350 | 500 [c] |
| Total Hardness as $CaCO_3$ | 136 | 93-110 | 620-1100 | -- |
| Calcium | 40 | 28-33 | 210-390 | -- |
| Magnesium | 9 | 5-7 | 22-35 | -- |
| pH (pH units) | 7.9 | 8.1-8.3 | 7.1-7.9 | 6.5-8.5 [c] |
| Specific Conductance (µS/cm) | -- | 460-508 | 2940 | -- |
| Bicarbonate | -- | 162-207 | 228-322 | -- |
| Fecal Coliform (colonies/100 ml) | -- | 0 [a] | -- | 1 [b] |
| Sodium | -- | 62-68 | 190-390 | -- |
| Chloride | -- | 29-52 | 530-1400 | 250 [c] |
| Sulfate | -- | 19-24 | 3-23 | 250 [c] |
| Fluoride | -- | 0.1 [a] | -- | 2 [b] |
| Nitrogen (total) | -- | 0.4-0.6 | <0.7 | 10 [b] |

Source: AIDEA (1990-1991)

[a] Fall 1990

[b] CFR (Code of Federal Regulations) 1991. 40 CFR 265, Appendix III, "EPA Interim Primary Drinking Water Standards"

[c] CFR (Code of Federal Regulations) 1991. 40 CFR 143, "National Secondary Drinking Water Regulations"

TABLE 3-4. Typical Analysis of the Composition of Run-of-Mine Coal, Waste Coal, and Blended Performance Coal for the HCCP (as Is Expected to Be Received at the HCCP Site).

| PARAMETER | RUN-OF-MINE COAL | BLENDED PERFORMANCE COAL | WASTE COAL |
|---|---|---|---|
| Heating Value (Btu/lb) | 7815 | 6960 | 6105 |
| Analysis (percent by weight) | | | |
| Moisture | 26.35 | 25.11 | 23.87 |
| Carbon | 45.55 | 40.57 | 35.59 |
| Hydrogen | 3.45 | 3.07 | 2.70 |
| Nitrogen | 0.59 | 0.53 | 0.46 |
| Sulfur | 0.17 | 0.15 | 0.13 |
| Ash | 8.20 | 16.60 | 25.00 |
| Oxygen | 15.66 | 13.90 | 12.23 |
| Chlorine | 0.03 | 0.03 | 0.02 |
| Total | 100.00 | 100.00 | 100.00 |

Source: AIDEA (1990)

# SECTION 4

# COMPLIANCE MONITORING

# 4. COMPLIANCE MONITORING

Compliance monitoring is required to satisfy federal and state statutes, regulations, and permits, as well as the terms of project-related leases and other agreements. Wastewater effluents, air emissions, ambient air quality, and visibility are the compliance monitoring data to be reported for the EMP. Table 4-1 lists the permits and authorizations required for construction and operation of the HCCP and indicates which have monitoring requirements. Table 4-2 summarizes the compliance monitoring described in the following sections. Table 4-2 also summarizes supplemental monitoring which is discussed in Section 5 of the EMP. A process flow diagram (PFD) depicting the major components of the material and waste streams for the HCCP is provided as Figure 4-1. Figure 4-1 identifies 14 process monitoring streams. The monitoring location, data collected, and frequency of monitoring corresponding to these 14 process streams are listed in Table 4-2.

## 4.1 WASTEWATER EFFLUENTS AND OTHER WATER RESOURCES MONITORING

### 4.1.1 Purpose

The purpose of the wastewater effluent compliance monitoring program is to monitor the wastewater discharges as required to ensure that they meet all applicable federal and state wastewater discharge standards and limits.

### 4.1.2 Regulatory Authority

Wastewater discharge from the HCCP is subject to the water quality regulations promulgated by the EPA and the Alaska Department of Environmental Conservation (ADEC). The Clean Water Act provides that wastewater discharges associated with industrial activities from a point source to waters of the United States is unlawful unless authorized by an NPDES permit. The HCCP wastewater effluent discharges will be monitored for compliance under NPDES Permit No. AK-002294-2 (NPDES Permit) (EPA 1994). This NPDES permit allows discharges regulated from both Unit #1 and the HCCP.

### 4.1.3 Compliance Monitoring Objectives

The objective of the wastewater effluent monitoring program is to illustrate that the HCCP can be operated within the requirements of the NPDES Permit.

### 4.1.4 Operating Characteristics During Compliance Monitoring

Operating characteristics will be established as part of the HCCP Phase III Demonstration Test Program (Demonstration Test Program).

### 4.1.5 Wastewater Effluents Compliance Monitoring Program

Wastewater effluent compliance monitoring will include the wastewater discharge monitoring requirements set forth in the NPDES Permit.

#### 4.1.5.1 Streams to be Monitored and Parameters to be Analyzed

Prior to completion of the HCCP, Healy Unit No. 1 will continue to operate and, under the NPDES Permit, will be allowed to discharge from Outfall 002. Effluent from Healy Unit No. 1 discharged at Outfall 002 will be monitored continuously for flow and temperature and weekly for pH.

Once the HCCP is operational, the two facilities will be operated as a combined power facility, and the HCCP and Healy Unit No. 1 will discharge to common outfalls (Outfalls 001 and 002) (Figure 4-2). Commingled wastewater discharged at Outfalls 001 and 002 will comprise water from the once-through circulating cooling water and the operational wastewater systems of both units. Under combined operation of the two units, operational wastewater will be monitored prior to being commingled with the circulating cooling water at Outfall 001A, an internal outfall. Parameters that will be monitored in the operational wastewater include flow (discharge of wastewater effluent to the circulating cooling water system at Outfall 001A) (continuous); total suspended solids, oil and grease, pH, hardness as $CaCO_3$, chromium, copper, iron, lead, and zinc (monthly), and total aromatic hydrocarbons (weekly). At Outfall 001A, samples representative of combined wastewater being discharged at Outfalls 001 and 002 will be monitored for chronic and acute toxicity of the effluents. Chronic toxicity tests determine if the effluent affects the survival, reproduction, or growth of test organisms. The chronic toxicity test will also identify the no observable effect concentration, which is the effluent concentration for which survival, reproduction, or growth of the test organism is not significantly different from that of control organisms. Daily observations on mortality of test organisms will allow calculation of the 96-hour lethal concentration for 50 percent mortality (96-hour LC50). Toxicity testing will be conducted twice a year when Healy Unit No. 1 is operating by itself and quarterly when the facility commences discharging the combined wastewater from Healy Unit No. 1 and the HCCP.

After operational wastewater passes Outfall 001A, it is commingled with the circulating cooling water and eventually discharged through Outfalls 001 and 002. Flow and temperature will be monitored continuously at Outfalls 001 and 002, and pH will be monitored weekly.

The NPDES Permit also requires establishment of monitoring stations in the Nenana River upstream of the influence of facility discharges at Outfall 002 (Station 1), 650 feet downstream from Outfall 002 (Station 2), and 1,000 feet downstream from Outfall 002 (Station 3) (Figure 4-2). The ambient river condition will be monitored monthly at Station 1 will be monitored monthly for flow, temperature, pH, total suspended solids, hardness as $CaCO_3$, chromium, copper, iron, lead and zinc. Stations 2 and 3 will be monitored weekly for temperature.

#### 4.1.5.2 Sampling and Analytical Techniques

Sampling requirements are given in the NPDES Permit, and sampling and analytical methods are specified in 40 CFR 136. The Quality Assurance Plan describes the sampling methodology and analytical procedures that will be used to sample and analyze the wastewater effluent samples for the physical and chemical parameters specified for monitoring by the NPDES Permit. The laboratory will supply the sampling containers and appropriate chain-of custody forms to accompany the samples to the laboratory.

Whole effluent toxicity testing will be conducted on grab samples taken from the cross-connect sample ports representing Outfalls 001 and 002. The chronic toxicity of each wastewater discharge will be determined by direct laboratory testing with aquatic organisms, either at the power plant or at a commercial laboratory. Chronic tests will be conducted using protocols contained in "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Second Edition" (EPA/600/4-89/001). The following chronic toxicity tests will be conducted:

- *Pimephales promelas* (fathead minnow) - static renewal, larval survival, and growth tests.
- *Ceriodaphnia dubia* (daphnia) - 7-day static renewal, survival, and reproduction tests.

Samples used for toxicity testing will also be analyzed for the parameters listed in Section 4.1.5.1, above.

If chronic or acute toxicity tests identify violations of the Alaska State Water Quality Standards, additional toxicity testing, a Toxicity Identification Evaluation, treatment of the wastewater, and/or modification of the NPDES Permit will be undertaken by EPA.

#### 4.1.5.3 Quality Assurance

A quality assurance plan for wastewater effluent monitoring was developed by the laboratory contracted to conduct the sampling and analytical determinations. The plan was submitted for approval by EPA prior to operating the HCCP (within 90 days of the effective date of the NPDES Permit). The plan includes the following:

- Sampling techniques (field blanks, replicates, duplicates, control samples, etc.).
- Sample preservation methods.
- Sample shipment procedures.
- Instrument calibration procedures and preventive maintenance (frequency, standard, spare parts).
- Qualification and training of personnel.
- Analytical methods (including quality control checks, quantification and detection levels).

All quality assurance criteria used for toxicity testing will be in accordance with "Methods for Measuring Acute Toxicity of Effluent and Receiving Waters to Freshwater and Marine Organisms" (EPA/600/4-90/027); "Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (EPA/600/4-89/001); "Quality Assurance Guidelines for Biological Testing" (EPA/600/4-78/043); "Quality Assurance Bibliography" (EPA/600/4-89/001); and other EPA Region 10 approved protocols.

A copy of the quality assurance/quality control procedures used by the laboratory is kept with the NPDES permit. Copies of the results of EPA quality control samples are retained by GVEA's Environmental Officer.

The NPDES program requires development of a Best Management Practices Plan (BMP), which requires periodic inspection of all activities that may contribute to the deterioration of water quality. The plan has been developed and is currently in use.

4.1.5.4 Reporting

Monitoring results will be summarized each month on the Discharge Monitoring Report form (EPA No. 3320-1). The reports will be submitted monthly to EPA and ADEC.

### 4.1.6 Other Water Resources Monitoring

4.1.6.1 Alaska Department of Natural Resources Permits to Appropriate Water

The Alaska Department of Natural Resources has issued a Permit to Appropriate Water for power plant operation and potable water supply for the HCCP (State of Alaska Permit to Appropriate Water LAS 13550) (ADNR 1994a) and a second Permit to Appropriate Water for the HCCP once-through cooling system, other power plant operations, and potable water supply HCCP (State of Alaska Permit to Appropriate Water LAS 13551) (ADNR 1994b). The permits require metering water use and submitting monthly water use records on a quarterly basis. Established water use will be the basis for obtaining permanent water rights "Certificates of Appropriation" in the future.

4.1.6.2 Alaska Department of Environmental Conservation Wastewater General Permit

ADEC has approved disposal of wastewater from excavation dewatering during construction of the HCCP under Alaska Wastewater General Permit No. 9440 DB002. The Wastewater General Permit requires permittees with discharges estimated at less than 500,000 gallons of wastewater to monitor total flow. Permittees discharging more than 500,000 gallons of wastewater are required to monitor total flow, turbidity, total aromatic hydrocarbons, and settleable solids. The Wastewater General Permit also contains a number of other monitoring conditions that may be required depending on site-specific conditions, as well as special monitoring conditions that apply to dewatering projects within 3 miles of known contaminated sites. In approving excavation dewatering under the Wastewater General Permit, ADEC stipulated an additional specific condition that, prior to discharge, a sample of the discharge water must be analyzed for total aromatic hydrocarbons and submitted to ADEC. If the initial sample demonstrates that there is no contamination above the permit limits, sampling outlined in the Wastewater General Permit would be followed. Laboratory analysis of wastewater samples collected in August 1996 indicated that all aromatic hydrocarbons tested were at concentrations below detection limits. Monitoring results are summarized and reported to ADEC on a monthly basis.

4.1.6.3 U.S. Environmental Protection Agency Storm Water General Permit

The HCCP is authorized to discharge storm water associated with industrial or construction activity under the terms and conditions imposed by the EPA's NPDES Storm Water General Permit issued for use in the state of Alaska (NPDES HCCP Storm Water Permit No. AKR10A066) (EPA 1993). Conditions of the NPDES Storm Water General Permit require preparation of a Storm Water Pollution Prevention Plan (SWPPP) that provides compliance with approved state and/or local sediment and erosion plans or permits and/or storm water management plans or permits. As specified in the HCCP SWPPP, periodic inspections are made of erosion and sediment controls, disturbed areas of the construction site that have not been finally stabilized, material storage areas exposed to precipitation, construction entrances and exits for off-site vehicle tracking, and discharge points, if any, and inspections are also made within 24 hours after a storm event of 0.5 inches or greater. The HCCP SWPPP also specifies periodic inspection of stabilized construction sites. These inspections are completed as part of the quarterly BMP inspections.

4.1.6.4 U.S. Army Corps of Engineers Section 404 Permit

The U.S. Army Corps of Engineers has issued a Section 404 Permit to AIDEA authorizing construction of the HCCP laydown/storage area and the HCCP intake channel, intake structure, and outfall structure (Section 404 Permit No. 4-900217, Nenana River 21) (Corps 1994). Construction activities include excavation and grading and placement of some graded materials in wetlands.

The Section 404 Permit requires that, upon completion of construction activities, the permittee must ensure that these areas contain no hazardous or toxic materials and must perform certain site restoration and reclamation activities. AIDEA will comply with these requirements. The Section 404 Permit does not specify any monitoring or reporting requirements.

4.1.6.5 Alaska Department of Environmental Conservation Air Quality Control Permit to Operate

The ADEC Air Quality Control Permit to Operate contains a single condition related to water quality. Condition 32 requires that if any flame out or seal rupture occurs when Mineral Oil Di-electric Fluid (MODEF) containing more than 50 ppm polychlorinated biphenyl (PCB) is being burned in Healy Unit No. 1, the boiler seal water must be analyzed for PCB and subsequently treated.

4.1.6.6 Alaska Department of Environmental Conservation Ash Pond Wastewater Permit

During the start-up process of the HCCP, the boiler tubes will be cleaned out using a pre-boiler flush and a boilout procedure followed by an acid wash procedure. The pre-boiler flush uses an aqueous solution of soap and trisodium phosphate to remove oil and grease that were used in assembling the boiler in this initial cleaning. The boilout procedure uses an alkaline cleaning solution containing hydrous trisodium phosphate to further remove oil and grease. The acid wash procedure uses phosphoric acid to remove scaling inside the boiler. The cleaning effluents will be drained into temporary storage tanks. The alkaline boilout effluent and the acid wash will be mixed to neutralize these two solutions. The total volume of cleaning solutions will be approximately 126,000 gallons.

GVEA has requested authorization from ADEC to allow the discharge of the cleaning solutions from the temporary storage tanks into a zero-discharge ash pond. which is permitted by ADEC under Alaska Wastewater Disposal Permit No. 9231 DB013. On February 12, 1997, ADEC authorized the discharge of boiler cleaning solutions into the ash pond. The sampling plan includes one-time testing of the boiler cleaning solutions prior to discharge into the ash pond for the following: pH, conductivity, hardness as $CaCO_3$, oil and grease, arsenic, barium, cadmium, chromium, iron, lead, mercury, selenium, and silver.

## 4.2 AIR EMISSIONS MONITORING

### 4.2.1 Purpose

Air emissions from the HCCP are subject to the air quality regulations promulgated by EPA and ADEC. The State of Alaska has been delegated full authority by EPA to administer the State Implementation Plan (SIP) and to issue permits for new and modified sources, and thereby satisfy the requirements of 40 CFR 52.21 (1992), the federal Prevention of Significant Deterioration (PSD) regulations. EPA's role in permitting the HCCP emission sources includes reviewing assessment protocols for compliance with federal PSD regulations and the SIP, and guiding policy decisions as needed. The purpose of the gaseous stream compliance monitoring program is to monitor the air emissions to ensure that they meet all applicable state and federal air pollution standards (NSPS, PSD, and NAAQS).

### 4.2.2 Regulatory Authority

HCCP air emissions will be monitored for compliance with the ADEC Air Quality Control Permit to Operate No. 9431-AA001 (Air Quality Control Permit to Operate) (ADEC 1994b) and to comply with the NSPS requirements.

### 4.2.3 Compliance Monitoring Objectives

Compliance will be monitored continuously.

### 4.2.4 Operating Characteristics During Compliance Monitoring

Operating characteristics will be established as part of the Demonstration Test Program.

### 4.2.5 Air Emissions Compliance Monitoring Program

Compliance monitoring will include the HCCP Emission Monitoring Requirements of Exhibit D of the Air Quality Control Permit to Operate and other air emissions monitoring conditions of the permit.

#### 4.2.5.1 Air Emissions to Be Monitored and Parameters to Be Analyzed

Air emissions compliance monitoring will be conducted on the emissions from the HCCP and, to the extent required by the Air Quality Control Permit to Operate, on the emissions from Healy Unit No. 1.

The Air Quality Control Permit to Operate requires installation, maintenance, and operation of CEMS at both the HCCP and Healy Unit No. 1 for monitoring and recording:

- Opacity (Conditions 10 and 11).
- $SO_2$ (Conditions 13 and 51).
- $NO_x$ (Conditions 14 and 52).
- Carbon dioxide ($CO_2$) (Conditions 15 and 33 and Exhibit D of the Air Quality Control Permit to Operate).

The Air Quality Control Permit to Operate also requires installation, maintenance, and operation of a CEMS at Healy Unit No. 1 for monitoring and recording CO and

$O_2$ when burning MODEF containing 50 ppm or more PCB (Conditions 34 and 35). In addition, Unit #1 may not exceed 100 ppm CO while burning used oil; consequently CO is continuously monitored.

4.2.5.2 Sampling and Analytical Techniques

Following is a brief description of the sampling; analytical techniques; data acquisition, processing, and storage; and reporting for continuous emissions monitoring.

Sampling for the air emission chemical pollutants to be monitored will be accomplished in both Unit #1 and the HCCP stacks using an Enviroplan CEMEX probe. The probe will be mounted on a variable-length extension provided to obtain optimum probe insertion in the middle third of the stack. The probe will have two filters to remove particulate matter from the sample being drawn into the probe tip, a coarse filter at the tip of the assembly and a secondary glass wool filter to capture particulate matter. Gas sampling will be accomplished by use of instrument-grade air that draws a sample into the probe and down the umbilical for analysis. The flue gases will be transported to the Enviroplan dilution-based emission monitoring systems for analysis.

Detailed analytical techniques specific to the Enviroplan CEMEX dilution-based CEMS installed on the HCCP will be established. The basic premise of the dilution technology used to determine the chemical constituents of the air emissions is that accurate sample representatives can be measured by diluting the sample gas by a fixed ratio in order to perform the analysis using more sensitive ambient analyzers. Dilution is accomplished by drawing the sample and the dilution gas through a critical orifice. The ratio for the particular expected gas concentrations to be found at the HCCP stack will be customized. Probe dilution and support is controlled by a series of valves and flow meters. Sample sequence (sample, purge, calibration) is controlled by a programmable logic controller (CEMCON system). Sample analysis will be accomplished using a UV fluorescent $SO_2$ monitor, a chemiluminescent $NO_x$ monitor, and an infrared-based $CO_2$ monitor.

Opacity will be determined using a microprocessor-controlled opacity monitor (CEMOP 281 Optical Transmissometer). Opacity monitoring uses a two-beam alternating light sequence in accordance with the autocollimation principle. The light beam travels twice across the measuring run, and the reduction in light due to dust content of the flue gas, chemical, or metallurgical dust is measured and evaluated.

The CEMS signals are received from the monitoring devices and optional outputs are processed using a computer program (CEMDAS III). The system continually samples the monitoring instruments' output for all measured parameters, converts the samples to millivolts and engineering units, and accumulates them for period averages. Typically, CEMDAS III configurations provide 1-minute or 6-minute opacity averages and 3-hour, 24-hour, and 30-day emissions averages. CEMDAS III calculates hourly and multiperiod $SO_2$ and $NO_x$ emissions using different fuel factors, moisture, and default oxygen values.

All pertinent information will be archived on disk for historical reference and generation of quarterly reports. CEMDAS III continually checks the monitoring instrument status signals for calibration and fault conditions. Monitor calibration cycles are used to correct the calculation of engineering units for monitor drift and to provide a check on monitor performance. Zero and span values are calculated, stored, and reported.

#### 4.2.5.3 Quality Assurance

The CEMS will be installed, calibrated, operated, and maintained as specified in performance specifications set out in 40 CFR 60, Appendix B.

A Quality Assurance Plan will be developed for each CEMS (Condition 17). The Quality Assurance Plan will conform with 40 CFR 60, Appendix F, and The Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III (EPA/600/4-77-027b). The Quality Assurance Plan will be followed while operating the CEMS equipment to insure the quality of the data generated.

#### 4.2.5.4 Reporting

The system printer may print an hourly report, a summary of system activity that includes updated averages; emission standard violations; calibrations; a daily opacity averages log with all opacity averages for the previous day; and a daily emission summary. In addition, the printer can produce: a daily opacity averages log; a daily emission summary, an excess opacity summary that lists opacity violations and downtime for the current day or any previous day; and a report with excess opacity and emission incidents, and monitor and system downtime, for any period of one or more days in length. The formats of all CEMDAS III reports will be customized to GVEA specifications. The CEMDAS III provides valuable information to the control room operators, the system operator, and management personnel.

Any permit exceedances must be reported to ADEC within 24 hours.

The Air Quality Control Permit to Operate requires quarterly submittal of a Facility Operating Report to ADEC (Condition 42 and Exhibit C of the Air Quality Control Permit to Operate).

The quarterly report includes the number of hours of operation and fuel quality and consumption. For the HCCP, the average daily $SO_2$ emission rate (in lb/MMBtu and lb/hr) and the percent reduction of the potential combustion concentration of $SO_2$ will be reported for each operating date, along with the 30-day rolling averages. Monthly emissions of $SO_2$ will be reported to the nearest 0.1 ton. The date, time, duration, and average $SO_2$ concentration for any period exceeding 0.10 lb/MMBtu or 65.8 lb/hr for 3 hours or more will be reported to ADEC within 24 hours and indicated in the quarterly report. Average daily $NO_x$ emission rate and 30-day rolling averages (in lb/MMBtu) will be reported for each operating date. Monthly emissions of $NO_x$ will be reported to the nearest 0.1 ton. Continuously monitored $CO_2$ will also be reported.

For Healy Unit No. 1, the date, time, duration, and average $SO_2$ concentration for any period exceeding 143.8 lb/hr for 24 hours or more and for any period exceeding 235.6 lb/hr for 3 hours or more will be reported. These limits become enforceable after the end of the second season after startup of the HCCP (September 30, 1999). Monthly emissions of $SO_2$ will be reported to the nearest 0.1 ton. Monthly emissions of $NO_x$ will be reported to the nearest 0.1 ton.

When MODEF containing more than 50 ppm PCB is burned in Healy Unit No. 1, 60-minute average stack concentrations of $O_2$ and CO will be measured and recorded; daily average values of $O_2$ and CO during the burn will be reported to the nearest one-half percent and the nearest part per million, respectively. Continuously monitored $CO_2$ will also be reported.

The quarterly reports will also contain a listing of excess emissions incidents where equipment failures increased air contaminant emissions beyond normal levels or changes in operating conditions resulted in visible emissions from any source exceeding 20 percent opacity for more than 3 minutes in any hour or in visible emissions from the HCCP exceeding 27 percent opacity for two or more 6-minute averages in any hour (Condition 39). Any such incidents will also be reported on a monthly basis (Condition 40).

4.2.5.5 Source Testing

The Air Quality Control Permit to Operate requires source testing of the HCCP integrated system and the "Aux #2" oil-fired standby process and building heater to demonstrate compliance with NSPS and the emissions limits of the Air Quality Control Permit to Operate (Conditions 18 through 20). A source test plan will be provided to ADEC at least 30 days prior to the scheduled testing date. These tests will be conducted within 180 days following startup of each source and will be conducted while operating at the maximum design rate. Additional source tests of other project sources to ascertain compliance with applicable standards and emission limits may also be required (Condition 22). Reports on the test results will be submitted to ADEC within 45 days following completion of the tests (Condition 21).

The Air Quality Control Permit to Operate also requires source testing of the Healy Unit No. 1 coal-fired boiler with baghouse when initially burning MODEF (Condition 29). Testing will be conducted for particulate matter, $SO_2$, $NO_x$, and hydrogen chloride at the maximum anticipated PCB concentration and rate.

### 4.2.6 Other Air Emissions-Related Monitoring

#### 4.2.6.1 Alaska Department of Environmental Conservation Air Quality Control Permit to Operate

The Air Quality Control Permit to Operate contains a number of monitoring requirements that are not direct measurements of air emissions but are, rather, measurements of components of fuel sources or other factors influencing air emissions. These emissions-related monitoring conditions require monitoring and recording of:

- Sulfur content of "as-fired" coal fuel and diesel fuel (Conditions 8 and 12).
- Proximate and ultimate analysis (moisture, ash, volatile components, fixed carbon, Btu content, carbon, hydrogen, nitrogen, oxygen) of coal (Exhibit C of the Air Quality Control Permit to Operate).
- Trace component analysis of coal, including metals: arsenic, barium, cadmium, chromium, iron, lead, mercury, selenium, and silver (Exhibit C of the Air Quality Control Permit to Operate).
- Feed rates of coal and fuel oil burned in HCCP (Exhibit D of the Air Quality Control Permit to Operate).
- Steam temperature and production rate at HCCP (Exhibit D of the Air Quality Control Permit to Operate).
- Beryllium content of coal burned in HCCP (Exhibit D of the Air Quality Control Permit to Operate).
- Feed rates of coal, fuel oil, and MODEF when burning MODEF in Healy Unit No. 1 (Condition 36).

- Steam temperature and production rate when burning MODEF or RDF/used oil in Healy Unit No. 1 (Exhibit D of the Air Quality Control Permit to Operate).
- PCB concentration in MODEF burned in Healy Unit No. 1 (Exhibit D of the Air Quality Control Permit to Operate).

Monitoring results for these parameters will be included in the quarterly Facility Operating Report described in Section 4.2.5.1, above (Exhibit C of the Air Quality Control Permit to Operate).

4.2.6.2 U.S. Environmental Protection Agency New Source Performance Standards Regulatory Requirements

The NSPS for Coal Preparation Plants are contained in 40 CFR 60, Subpart Y. These regulations are applicable to "coal preparation plants" that process more than 200 tons per day (tpd) of coal. Coal preparation plants are defined as any facility that prepares coal by one or more of the following processes: breaking, crushing, screening, wet or dry cleaning, or thermal drying. Because the HCCP operates a coal crusher, and because the HCCP will process approximately 1,100 tpd of coal, the HCCP is an affected facility under NSPS Subpart Y.

The operational units that are regulated under Subpart Y include thermal dryers, pneumatic coal cleaning equipment (air tables), coal processing and conveying equipment (including breakers and crushers), coal storage systems, and coal transfer and loading systems. Out of these five types of operational units, the HCCP operates only coal processing equipment (the crusher) and the coal transfer and loading system. Therefore, only the coal crusher and coal handling systems are regulated under Subpart Y. Note that the Subpart Y definition of coal storage unit specifically exempts open storage piles; because this is the type of coal storage employed at the HCCP, its coal storage units are not regulated under Subpart Y.

The NSPS for "Electric Utility Steam Generating Units" are contained in 40 CFR 60, Subpart Da. These standards limit emissions of particulate matter, opacity, $SO_2$, and $NO_x$ from facilities combusting fossil fuels. Because the HCCP operates an electric utility steam generating unit capable of combusting more than 250 MMBtu/hr heat input of coal for which construction commenced after September 18, 1978, the HCCP is an affected facility under NSPS Subpart Da.

The NSPS for "Small Industrial-Commercial-Institutional Steam Generating Units" are contained in 40 CFR 60, Subpart Dc. These standards limit emissions of particulate matter, opacity, and $SO_2$ from steam generating units which are constructed or modified after June 9, 1989, and have heat input ranging from 10

MMBtu/hr to 100 MMBtu/hr. Because the HCCP operates the Aux #2 oil-fired standby process and building heater, which is a 23-MMBtu/hr steam generating unit, the HCCP is an affected facility under NSPS Subpart Dc.

Standards for Performance (Emission Limits)

The "Coal Preparation Plants" standard for performance (emission limit) for particulate matter under 40 CFR 60, Subpart Y for the two affected HCCP systems are described at 40 CFR 60.252(c). For coal processing equipment (the crusher) and the coal transfer systems, any gases that exhibit 20 percent opacity or greater may not be discharged into the atmosphere. This emission limit is effective on the date that the first performance test is required (see section on "Performance Testing Requirements"). The opacity standards apply at all times except startup, shutdown, and malfunction.

The "Electric Utility Steam Generating Units" standards for performance for particulate matter are described at 40 CFR 60.42a. The standards limit particulate matter to 0.03 lb/MMBtu heat input, and 1 percent of the potential combustion concentration (i.e., 99 percent removal). The facility's maximum allowable opacity of flue gas discharged to the atmosphere may not exceed 20 percent (6-minute average) except for one 6-minute period per hour of not more than 27 percent opacity.

The "Electric Utility Steam Generating Units" standards for performance for $SO_2$ are described at 40 CFR 60.43a(a)(2). The emission limit for $SO_2$ is 30 percent of the potential combustion concentration (70 percent removal) when emissions are less than 0.60 lb/MMBtu heat input, as is the case for the HCCP.

The "Electric Utility Steam Generating Units" standards for performance for $NO_x$ are described at 40 CFR 60.44a(a)(1). Facilities firing subbituminous coal are limited to $NO_x$ emissions of 0.50 lb/MMBtu heat input. However, facilities firing solid fuels containing more than 25 percent, by weight, coal refuse are exempted from NSPS $NO_x$ emission limits and $NO_x$ monitoring requirements. The HCCP performance coal contains approximately 50 percent, by weight, coal refuse. Therefore, the HCCP is not required to comply with NSPS for $NO_x$.

The "Small Industrial-Commercial-Institutional Steam Generating Units" standards for performance for $SO_2$ are described at 40 CFR 60.42c(d). Fuel sulfur in the oil supplied to the Aux #2 unit is limited to 0.5% by weight.

Performance Testing Requirements

In order to demonstrate compliance with the above emission limits, the following testing will be conducted at the HCCP. Within 60 days after achieving the maximum production rate of the HCCP, new crusher, and/or coal handling system, but not later than 180 days after initial startup, performance tests will be conducted and a written report of the results will be furnished to EPA Region 10. While the HCCP will be fired initially with oil beginning in late summer 1997, coal firing will not begin until January 1998. Therefore, "startup" will be defined as the date when coal is first fired in the HCCP. Performance testing of the HCCP would then occur within the next 180 days.

The following procedures will be used to conduct the performance tests:

- Opacity - For the crusher and the coal transfer systems, EPA Method 9 "Visual Determination of the Opacity of Emissions from Stationary Sources" (visual determination by qualified observers) will be used to determine opacity as described in 40 CFR 60.11. The minimum total time of observations will be 3 hours (30 6-minute averages) for the initial performance test. For the HCCP, continuous opacity monitoring system (COMS) data will be used in lieu of EPA Method 9 for the performance test.

- Particulate Matter - EPA Method 19 "Determination of Sulfur Dioxide Removal Efficiency and Particulate, Sulfur Dioxide, and Nitrogen Oxides Emission Rates" will be used to determine the emission rate and removal efficiency of particulate matter as described in 40 CFR 60.48a(b)(1). EPA Method 5 "Determination of Particulate Emissions from Stationary Sources" will be used to determine particulate matter concentration as described in 40 CFR 60.48a(b)(2).

- $SO_2$ - EPA Method 19 will be used to determine the emission rate and removal efficiency of $SO_2$ as described in 40 CFR 60.48a(c)(4). The continuous monitoring system will be used to determine $SO_2$ concentration as described in 40 CFR 60.48a(c)(5).

- Fuel Sulfur Content- The performance test will consist of sampling and analyzing the oil in the initial tank of oil to be fired in the Aux #2 to demonstrate that the diesel fuel contains 0.5% sulfur or less.

Monitoring of Operations

Because fabric filters are used as control devices on the crusher and coal handling system instead of venturi scrubbers, there are no continuous operational monitoring requirements for the HCCP Subpart Y affected units.

For the HCCP, NSPS regulations require continuous monitoring for opacity, particulate matter, $SO_2$. and diluent (excess oxygen or carbon dioxide). Performance evaluations and calibration checks of the continuous monitoring systems are required under 40 CFR 60.47a(i).

For the Aux #2, NSPS regulations require an analysis of the sulfur content in the fuel tank after each shipment of diesel fuel.

Notification and Record Keeping

EPA will be furnished notification as follows:

- Notification of the date construction of the affected facility (either the HCCP, the Aux #2, the new crusher, or coal handling system) is commenced, postmarked no later than 30 days after such a date.

- Notification of the anticipated date of initial startup, postmarked no more than 60 days nor less than 30 days prior to such a date.

- Notification of the actual date of initial startup, postmarked within 15 days after such a date.

- Notification of the date the CEMS performance demonstration will commence, postmarked not less than 30 days prior to such a date.

- Notification that the COMS data will be used to determine compliance with the opacity standard during performance testing, postmarked not less than 30 days prior to such a date.
- Notification of the anticipated date for conducting the opacity observations and performance tests for particulate matter and $SO_2$, postmarked not less than 30 days prior to such a date.

- Notification of any physical or operational change to an existing facility that may increase the emission rate of any air pollutant to which the NSPS standards apply, postmarked 60 days or as soon as practicable before the change is commenced. For these units at the HCCP, this notification applies to increases in particulate emissions from the crusher or coal handling system.

Records of all information required by NSPS regulations, including performance tests, CEMS measurements and evaluations, calibration checks, daily diesel fuel use, and adjustments and maintenance, are to be maintained for at least 2 years following the recording date.

In addition, records are to be maintained of the occurrence and duration of any startup, shutdown, or malfunction in the operation of the affected units or any malfunction of the air pollution control equipment (e.g., fabric filters, Entrained Combustion System, Activated Recycle SDA System) or CEMS.

Reporting

NSPS regulations described in 40 CFR 60.49a require quarterly reports to be submitted. ADEC has proposed to incorporate the NSPS program into the state operating permit (Title V) program. Until EPA fully approves the SIP, reports required by NSPS will be submitted to both EPA and ADEC. These reports must include initial performance test results, CEMS performance evaluations, daily averaged $SO_2$ emission rates (lb/MMBtu), percent reduction in $SO_2$ concentration, and 30-day average sulfur content of diesel fuel.

## 4.3 VISIBILITY MONITORING

### 4.3.1 Purpose

Early in the permitting and NEPA planning process for the HCCP, the issue of the effect of air emissions on air quality related values, including visibility, within DNPP was raised by the National Park Service (NPS). Primary concerns relate to the potential for plume visibility impacts within DNPP associated with HCCP $NO_x$ emissions and the potential for HCCP $SO_2$ emissions to form regional haze within DNPP.

The purpose of the visibility monitoring program is to monitor visibility as outlined in the Air Quality Control Permit to Operate (Exhibit F - Visibility Monitoring Plan). The Visibility Monitoring Plan (AIDEA and GVEA 1994a) was developed in response to Condition 26 of the Air Quality Control Permit to Operate and in consultation with the NPS, EPA, and ADEC.

### 4.3.2 Regulatory Authority

There are no regulatory requirements for compliance monitoring of visibility. However, there are regulatory requirements to determine the effect of any new emission source on the visibility of Class I areas. An analysis of the effect of a new emission source on the visibility of Class I areas such as DNPP is required by Condition 26 of the Air Quality Control Permit to Operate and by the visibility sections of the Code of Federal Regulations and Alaska Air Quality Control Regulations.

### 4.3.3 Compliance Monitoring Objectives

The objective of the visibility compliance monitoring program is to meet the requirements of the Visibility Monitoring Plan. The specific objectives of the HCCP post-construction Visibility Monitoring Plan are to collect sufficient visual and instrumentation data to:

- Provide reasonable assurance that $NO_x$, $SO_2$, and particulate matter emissions from the HCCP and Unit No. 1 sources are not adversely impairing visibility within the Class I area of DNPP.

- Evaluate any trained NPS observer's reports of visibility impairment for their potential attribution to $NO_x$ and $SO_2$ from operation of the HCCP and Unit No. 1 sources.

### 4.3.4 Operating Characteristics During Compliance Monitoring

Operating characteristics will vary during the 1 year of demonstration operation under the Demonstration Test Program. Operating characteristics for the commercial operation phase will be established as part of the Demonstration Test Program.

### 4.3.5 Visibility Compliance Monitoring Program

#### 4.3.5.1 Monitoring Locations and Instrumentation

The following monitoring stations and instrumentation will be established to monitor visibility:

- A high-resolution CCD video camera assembly with zoom and focus lens, camera control time-lapse programmable VCR recorder, color monitor, and controller system will be located at the DNPP Visitor Access Center facing north and down the Nenana River Valley. The objective of this camera is to record the visual characteristics of the Nenana River Gorge within the Class I area for $NO_2$ or other pollutant plumes or sulfate hazes originating from the Healy facility.

- A high-resolution CCD video camera assembly with motorized zoom and focus lens, camera control time-lapse programmable VCR recorder, color monitor, and controller system will be located at Garner Hill facing northeast.

This camera view will normally include the Healy facility, stacks, and areas north and south of the Healy facility. The camera will be remotely controllable to allow real-time viewing of camera video images and remote modification of camera viewing orientation via the motorized pan-tilt head. The objective of this camera is to record the visual characteristics and behavior of the steam/ice plumes from the Healy facility power plants, to record general weather patterns in the Healy area, and to allow viewing of the DNPP Northeast Unit and northern DNPP boundary in the Nenana River Gorge.

- An integrating nephelometer will be located at the Bison Gulch Monitoring Station (the pre-construction program "Park" Monitoring Station) at the northeastern boundary of DNPP. The integrating nephelometer will be used to monitor light scattering by fine particles. The objective of the nephelometer and collocated $SO_2$ and relative humidity measurements is to determine the contribution of pollutants from the Healy facility to the formation of sulfate particles and regional haze at the monitoring site. These data will be used to estimate the contribution of the $SO_2$ emissions from the Healy facilities to light scattering by particles within DNPP.

Figure 4-3 shows the visibility monitoring locations.

#### 4.3.5.2 Monitoring Schedule

The visibility monitoring program will be conducted for 2 years: 1 year of demonstration operation and 1 year of commercial operation. The primary focus will be on the second year, when the HCCP will be operating on a more continuous basis.

#### 4.3.5.3 Sampling and Analytical Techniques

##### Photographic Monitoring

Time-lapse video surveillance will be conducted at an exposure rate of one frame (field) every 4 seconds. Video recording will occur during approximately 7 hours of daylight/twilight per day during mid-winter, 17 hours of daylight/twilight per day during spring and fall, and 24 hours of daylight/twilight per day during mid-summer.

The visibility contractor will provide trained technicians who will closely review all original video tapes collected from the monitoring sites. The video tapes will be reviewed for general meteorological conditions and for the presence/absence of visual anomalies. The Visibility Monitoring Plan defines anomalies as visual discontinuities in the form of $NO_2$ plumes or layered surface or elevated sulfate hazes visible in the Class I area of DNPP that are reasonably attributable to $NO_x$ or $SO_2$ emissions from the HCCP and/or Healy Unit No. 1 power plants. If an anomaly is identified, the visibility contractor will review corroborating meteorological data collected as part of the Air Quality Monitoring Plan (see Section 4.4) and from the NPS Headquarters Monitoring Station and concurrent plant stack emissions data to assist in interpreting the events and meteorological conditions leading up to the anomaly. Other camera views will also be compared. Anomalies will be classified as occurring partially or entirely within the DNPP Class I area.

Integrated Nephelometer Monitoring

An integrating nephelometer with a 2.5 μm particle size selective inlet and a gas-tight scattering chamber will be used to measure light scattering by fine (sulfate) particles ($b_{sp}$) while greatly reducing the sensitivity of readings to atmospheric dust. The objective of the $b_{sp}$ and collocated $SO_2$ and relative humidity measurements is to determine whether or not conditions conducive to formation of sulfate particles occur in the Healy area, and, if so, to determine how often, when, and to what extent the emitted $SO_2$ is converted into detectable amounts of sulfate. From this information, it can be determined whether or not sulfate forms in sufficient quantities and during time periods when it could be visible to visitors within DNPP.

The integrating nephelometer will provide measured values of $b_{sp}$ in digital and analog form. Digital data will be recorded on the same data logger as the air quality data and will be transmitted via telephone to a central location for daily review (see Section 4.4). The $b_{sp}$ and $SO_2$ measurements will be made with averaging times of either 6 or 10 minutes. These short averaging times enhance the ability to quantify the contribution of $SO_2$ emissions to $b_{sp}$. $SO_2$ and $b_{sp}$ data will be plotted on a computer and reviewed to determine times when $SO_2$ was present at the Bison Gulch Monitoring Station. Times of potential interest will be marked in the data file and a regression analysis performed for the marked data to determine the contribution of the Healy facility emissions to the $b_{sp}$ measured by the nephelometer. Details of the analysis for this aspect of the visibility monitoring program are provided in the Visibility Monitoring Plan.

#### 4.3.5.4 Quality Control/Quality Assurance

Quality control is defined as those procedures that are routinely followed during the normal operation of the monitoring system to provide a quality product. For the visibility monitoring program, these procedures will include periodic zero/span checks, calibration of field and laboratory equipment, preventive maintenance, station inspections, intercomparisons of observed meteorological conditions with recorded values, and routine data screening and validation checks.

Quality assurance is defined as those procedures that are performed on a more occasional basis, usually by a person not involved with the corresponding day-to-day activities, to provide assurance that the quality control system is adequate and effective. For the visibility monitoring program, these procedures will include system and performance audits; scheduled precision checks; standard intercomparisons; cross-checking of reported data values against original raw data records, data from other similar locations, and screening criteria; and periodic evaluation of internal quality control data. Details of the visibility monitoring quality control/quality assurance procedures are provided in the Visibility Monitoring Plan.

4.3.5.5 Reporting

The date, time, duration, and a thorough written description of anomalies and associated comments on related meteorological conditions will be prepared in summary quarterly reports. The reports will also present and summarize equipment operations and data capture rates and calibration and audit results of all monitored parameters. Quarterly reports and high-quality copies of video tapes will also be distributed to ADEC, NPS, and other requesting parties. (The visibility contractor will archive original video tapes under controlled conditions for the duration of the monitoring program.) ADEC and NPS may also contact the visibility contractor at any time to obtain a verbal summary of the status of visibility monitoring and the occurrence of any anomalies during the ongoing quarter.

Data reports will include the results of analyses of elevated $b_{sp}$ episodes with respect to natural visibility impairment, background visual range, duration of elevated $b_{sp}$ readings, and perceptibility of the haze contributed by the elevated $b_{sp}$. The final report on the monitoring program will include an estimate of the frequency of occurrence and severity of haze events at other locations in DNPP based on the frequency of occurrence and severity of haze events measured at the Bison Gulch Monitoring Station.

A summary of perceptible events recorded during visibility monitoring will also be included in the quarterly Facility Operating Report to ADEC as required by Exhibit C of the Air Quality Control Permit to Operate.

**4.3.6 Procedures to Respond to Reported Visibility Impairment within Denali National Park and Preserve**

Condition 50 of the Air Quality Control Permit to Operate requires that certain procedures be implemented in the event that a pollutant plume or haze reasonably attributable to operation of the HCCP and/or Healy Unit No. 1 is observed or otherwise detected within DNPP boundaries. In response to NPS concerns, a supporting procedures document was developed to define how the visibility data to be collected as part of the Visibility Monitoring Plan (as well as certain air quality data collected as part of the Air Quality Monitoring Plan, see Section 4.4) will be used in deciding whether a reported plume or haze is credible and reasonably attributable to emissions from the Healy facility. The procedures document is included as Appendix C of the Visibility Monitoring Plan.

### 4.3.7 Other Potential Visibility Monitoring

Condition 55 of the Air Quality Control Permit to Operate requires GVEA to make $25,000 per year available to the NPS for 3 years (beginning 1 year before the startup of the HCCP) to fund NPS-selected air pollution projects, e.g., research, monitoring, or mitigation, in DNPP and/or the Healy area. Condition 55 specifically states that such funding shall not reduce funding for or otherwise affect the obligations to perform visibility monitoring as specified in the Visibility Monitoring Plan.

## 4.4 AIR QUALITY MONITORING

### 4.4.1 Purpose

The purpose of the air quality monitoring program is to monitor air quality as outlined in the Air Quality Control Permit to Operate (Exhibit G - Air QualityMonitoring Plan). The Air Quality Monitoring Plan (AIDEA and GVEA 1994b) was developed in response to Condition 27 of the Air Quality Control Permit to Operate and in consultation with NPS, EPA, and ADEC.

### 4.4.2 Regulatory Authority

PSD Monitoring Guidelines (EPA 1987) recommend that post-construction ambient air quality monitoring be performed only when there is a valid reason, such as when air quality modeling indicates that estimated concentrations will approach the NAAQS or PSD increments or when there are uncertainties in the air quality modeling results because of complex terrain, fugitive emissions, or other uncertainties in source or emission characteristics. The ADEC Final Supplemental Technical Analysis Report (TAR) (ADEC 1994), which supplemented the Air Quality Control Permit to Operate, noted that air quality monitoring estimated a high level of Class I area $SO_2$ PSD increment consumption near DNPP for both 3-hour and 24-

hour averages and high 24-hour Class II particulate PSD increment consumption near the Healy facility property boundaries. Modeling also indicated that $SO_2$ air quality impacts were near the NAAQS at a location just north of the facility. The TAR concluded that post-construction ambient air quality monitoring is warranted because of the potential for short-term NAAQS and PSD increments to be exceeded.

ADEC has regulatory discretion to require ambient air quality monitoring as part of the issuance of the Air Quality Control Permit to Operate. Condition 27 of the permit required GVEA to develop an Air Quality Monitoring Plan in consultation with NPS, EPA, and ADEC. The plan includes locations, methodology, operation, and quality assurance practices and specifies that ambient air quality monitoring will commence prior to the initial startup of the HCCP. Startup is defined as the date upon which the HCCP system begins initial operation commencing the demonstration phase. However, ADEC, EPA, and NPS have agreed that, because the HCCP will not be operating at full capacity during the demonstration year, the air quality monitoring program may be initiated as the HCCP begins its first year of full operation.

### 4.4.3 Compliance Monitoring Objectives

The specific objectives of the HCCP post-construction air quality monitoring program are to:

- Verify that the 3-hour, 24-hour, and annual $SO_2$ NAAQS are not violated in the vicinity of the Healy facility and check the accuracy of the 3-hour and 24-hour modeling results.
- Check the accuracy of the Class I 3-hour and 24-hour $SO_2$ PSD increment modeling results in DNPP.
- Check the accuracy of the Class II 24-hour particulate PSD increment modeling results in the vicinity of the Healy facility.

More details on the compliance and model verification objectives of the air quality monitoring program are provided in the Air Quality Monitoring Plan.

### 4.4.4 Operating Characteristics During Compliance Monitoring

Operating characteristics will be established as part of the Demonstration Test Program.

### 4.4.5 Air Quality Compliance Monitoring Program

4.4.5.1 Monitoring Locations and Parameters

$PM_{10}$ and DNPP $SO_2$ monitors will be sited at locations of maximum modeled increment impacts to check model accuracy at these increment "hotspots." The following monitoring stations will be established to monitor ambient air quality:

- An $SO_2$ monitor will be located at the Bison Gulch Monitoring Station (pre-construction "Park" Monitoring Station) at the northeastern boundary of DNPP to help assess the accuracy of the Class I 3-hour and 24-hour $SO_2$ PSD increment modeling results for DNPP. A 10-meter meteorological tower will also be located at this station to aid in the interpretation of air quality data, i.e., to evaluate meteorological transport and dispersion conditions during any periods of elevated $SO_2$ concentrations. Meteorological parameters will include wind speed, direction, and stability class; solar radiation; ambient temperature; and relative humidity.
  Three $PM_{10}$ monitoring stations will be located at the south, east, and north Healy facility property boundaries. The south and north stations will be equipped with continuous monitors, and the east station will be equipped with a manual monitor operated on a once-every-3-day schedule. The objective of the south monitor is to measure upwind concentrations generated by off-site sources during any exceptional events that involve southeasterly wind flows, e.g., wind-blown glacial till "dust storms." A secondary objective of the south monitor is to measure total ambient concentrations during northwesterly wind flows for comparison to NAAQS. An additional manual monitor will be operated at the north station to assess sampling precision.

- Two $SO_2$ monitors will be located at the northwest and south Healy facility property boundaries. The objective of these monitors is to verify that 3-hour, 24-hour, and annual $SO_2$ NAAQS are not violated.

- A 10-meter meteorological tower and a Doppler sodar will be located on or immediately adjacent to the Healy facility property boundary to collect site-specific meteorology. Tower measurements will include wind speed, direction, and stability class; solar radiation; ambient temperature; relative humidity; and precipitation. The sodar will measure wind speed and direction at various heights, including HCCP and Healy Unit No. 1 stack and final plume heights. The objective of the site-specific meteorological monitoring is to aid in the interpretation of air quality data.

The rationale for selecting the monitoring stations locations and descriptions of each location are provided in the Air Quality Monitoring Plan.

#### 4.4.5.2 Monitoring Schedule

The air quality monitoring program will be initiated as the HCCP begins its first year of full operation and will continue for 1 year. Near the completion of the 1-year monitoring period, a technical assessment of the data and findings of the monitoring program will be prepared and provided to ADEC to support its decision as to whether the monitoring program needs to be continued.

#### 4.4.5.3 Sampling and Analytical Techniques

Continuous air quality and meteorological data will be acquired by an electronic data logger. The data logger will be connected to a telephone modem to allow for remote interrogation. Data from all continuous air quality monitors and meteorological sensors will also be recorded on analog strip chart recorders. Data from the data logger will be retrieved and archived by computer and printed for inspection by an air quality specialist.

During the monitoring period, all data will be continuously recorded and averaged into 1-hour intervals, with the exception of the manual sampler particulate monitoring data, which will be collected on a once-every-3-day schedule for 24-hour periods. The continuous data will also be processed into 3-hour, 24-hour, and annual averages for comparison to NAAQS and PSD increments, as applicable.
All air quality instrumentation will be EPA-approved reference or equivalent instrumentation, and the meteorological equipment will meet EPA-required performance specifications.

Overall data capture rates will meet the PSD Monitoring Guidelines requirements of 80 percent data capture for air quality measurements and 90 percent data capture for meteorological measurements on an annual basis.

Additional details on the air quality monitoring equipment and data processing are provided in the Air Quality Monitoring Plan.

#### 4.4.5.4 Quality Control/Quality Assurance

Quality control is defined as those procedures that are routinely followed during the normal operation of the monitoring system to provide a quality product. For the ambient air quality monitoring program, these procedures will include periodic zero/span checks, calibration of field and laboratory equipment, preventive maintenance, station inspections, intercomparisons of observed meteorological conditions with recorded values, and routine data screening and validation checks.

Quality assurance is defined as those procedures that are performed on a more occasional basis, usually by a person not involved with the corresponding day-to-day activities, to provide assurance that the quality control system is adequate and effective. For the ambient air quality monitoring program, these procedures will include system and performance audits; scheduled precision checks; standard intercomparisons; cross-checking of reported data values against original raw data records, data from other similar locations, and screening criteria; and periodic evaluation of internal quality control data. Details of the air quality monitoring quality control/quality assurance procedures are provided in the Air Quality Monitoring Plan.

#### 4.4.5.5 Reporting

Quarterly data reports summarizing equipment operations and data capture rates, calibration and audit results, zero/span and precision test results, and validated hourly, daily, and monthly averages of all monitored parameters will be submitted to ADEC. Three- and 24-hour averages for $SO_2$ will be tabulated and ranked. The reports will compare the monitoring data to the NAAQS. Joint frequency analysis tables for wind speed and direction, wind roses, and stability class distributions will also be tabulated.

The quarterly data reports will also compare the monitoring data to the modeling data to provide a check on the accuracy of the air quality modeling. If the monitoring data exceed the modeling data by more than 15 percent, an analysis of possible reasons for the discrepancy will be submitted with the quarterly monitoring reports. If ADEC determines that additional data assessment is warranted, actual emission rates and meteorological conditions measured concurrently with the ambient air quality concentrations will be analyzed.

### 4.4.6 Other Air Quality-Related Studies

Condition 55 of the Air Quality Control Permit to Operate requires GVEA to make $25,000 per year available to the NPS for 3 years (beginning 1 year before the startup of the HCCP) to fund NPS-selected air pollution projects, e.g., research, monitoring, or mitigation, in DNPP and/or the Healy area.

In addition, by formal agreement among the Trustees for Alaska, GVEA, and AIDEA, GVEA will fund a study, at $25,000 per year for a total of 3 years, to analyze the effects of HCCP emissions on the environment surrounding the HCCP (Trustees for Alaska et al. 1994). The timing of the studies and the investigators to conduct the study will be determined by agreement among the parties.

## 4.5 SOLID WASTE MONITORING

The ADEC Air Quality Control Permit to Operate contains a single condition related to solid wastes. Condition 31 requires that if a malfunction occurs when MODEF containing more than 50 ppm PCB is being burned in Healy Unit No. 1, fly ash captured during the malfunction must be analyzed for PCB and subsequently treated.

UCM uses fly ash produced at Healy Unit No. 1 as fill at the mine. With the addition of FCM to the ash, UCM will characterize the material by analyzing for TCLP metals prior to using this material as fill. Once the FCM/ash has been characterized, no further sampling will be required unless there is a substantial change in the character of the FCM/ash material.

## 4.6 SOLID WASTE RECYCLING

Fly ash will be analyzed for potential use in making concrete products. In addition, it is anticipated that the characteristics of the slag and bottom ash will be evaluated for potential use in making building materials.

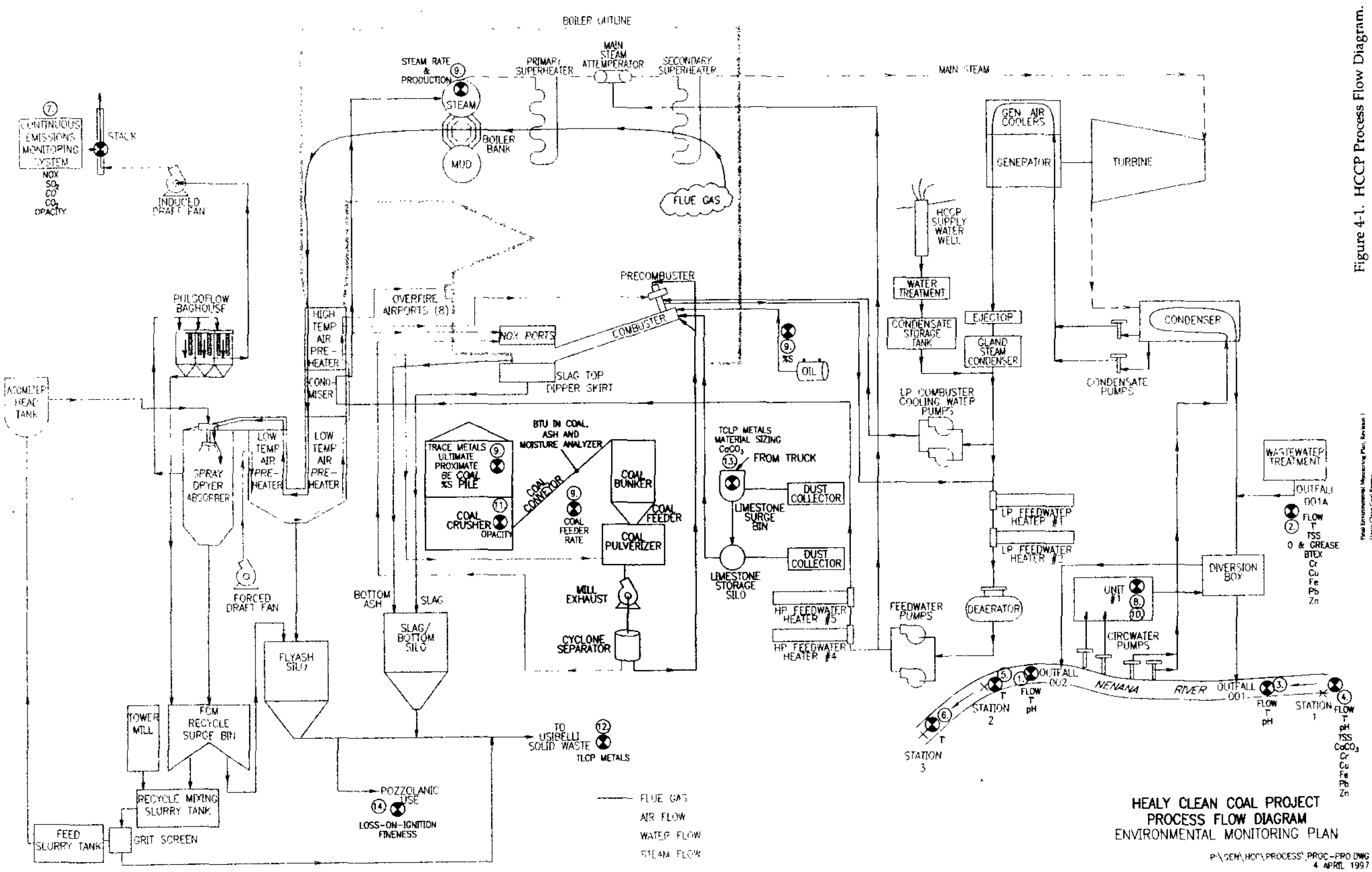
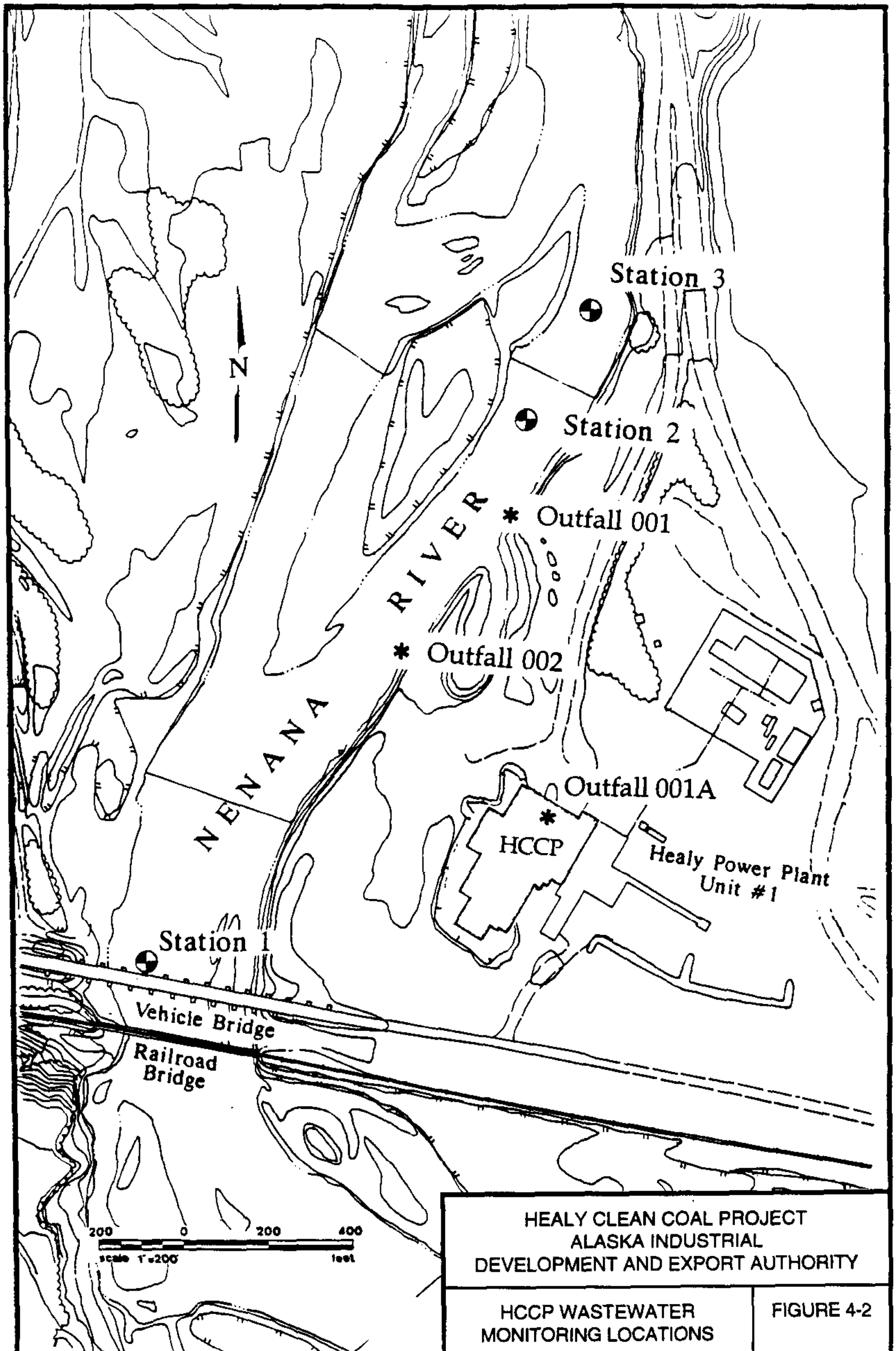





Figure 4-1. HCCP Process Flow Diagram.




HEALY CLEAN COAL PROJECT
ALASKA INDUSTRIAL DEVELOPMENT AND EXPORT AUTHORITY

HCCP WASTEWATER MONITORING LOCATIONS

FIGURE 4-2

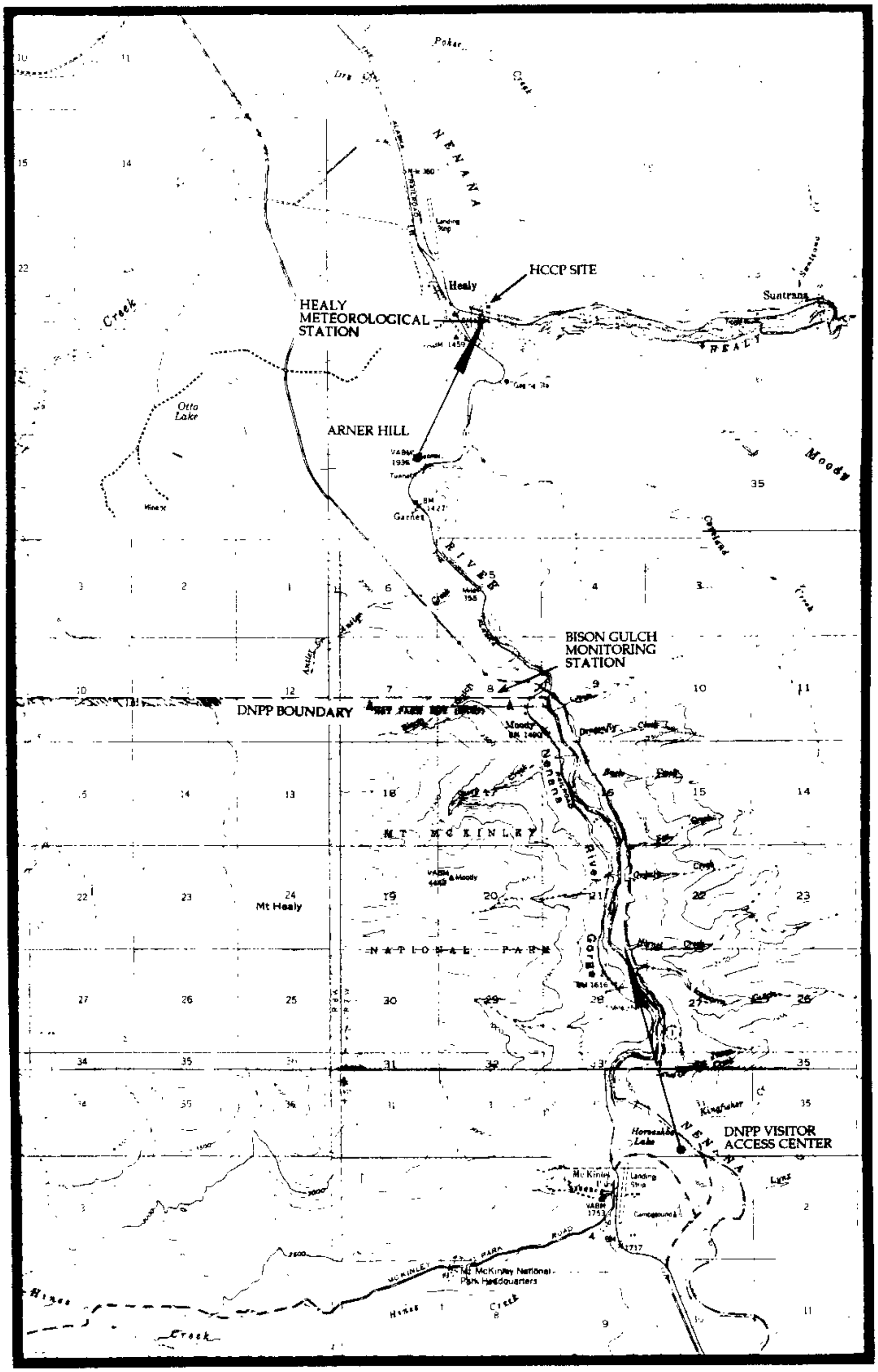
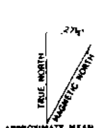
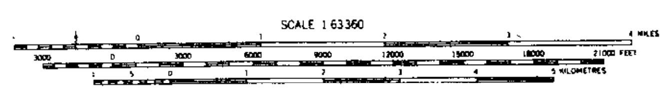



Figure 4-3. Visibility Monitoring Locations.




CONTOUR INTERVAL 100 FEET
DOTTED LINES REPRESENT 50 FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

TABLE 4-1. Permits and Authorizations Required for Construction and Operation of the HCCP.

| AGENCY | PERMIT TYPE | PURPOSE | MONITORING REQUIREMENT |
|---|---|---|---|
| U.S. Environmental Protection Agency | National Pollutant Discharge Elimination System (NPDES) Permit No AK-002294-2 | Once-through cooling and operational wastewater discharge | Yes |
| U.S. Environmental Protection Agency | National Pollutant Discharge Elimination System (NPDES) Storm Water General Permit No. AKR10A066 | Storm water runoff during HCCP construction | Yes |
| U.S. Army Corps of Engineers | Section 404 Permit No. 4-900217, Nenana River 21 | Plant intake and discharge, laydown/storage area, wetlands | Yes |
| Federal Aviation Administration | Notice of Proposed Construction - Permit No. 92-AAL-058-OE | Construction camp | Permit not used |
| Federal Aviation Administration | Notice of Proposed Construction - Permit No. 92-AAL-057-OE | HCCP stack | No |
| Alaska Department of Natural Resources | Temporary Water Use Permit No. LAS 13723 | Construction camp potable water supply | Permit not used |
| Alaska Department of Natural Resources | Permit to Appropriate Water No. LAS 13550 | Plant operation water for boiler feed, potable, and miscellaneous construction water | Yes |
| Alaska Department of Natural Resources | Permit to Appropriate Water No. LAS 13551 | Plant once-through cooling, other power plant operations, potable water | Yes |
| Alaska Department of Environmental Conservation | Wastewater General Permit No.9440-DB002 | Disposal of excavation water from HCCP construction areas | Yes |
| Alaska Department of Environmental Conservation | Section 401 Water Quality Certification | Certification for U.S. Army Corps of Engineers Section 404 Permit | No |

TABLE 4-1 (Continued). Permits and Authorizations Required for Construction and Operation of the HCCP.

| AGENCY | PERMIT TYPE | PURPOSE | MONITORING REQUIREMENT |
|---|---|---|---|
| Alaska Department of Environmental Conservation | Section 401 Water Quality Certification | Certification for Environmental Protection Agency NPDES permit for wastewater discharges during operation | No |
| Alaska Department of Environmental Conservation | Air Quality Control Permit to Operate No. 9431-AA001 (PSD Permit) | Air permit for construction of HCCP and operation of HCCP and Healy Unit No. 1 | Yes |
| Alaska Railroad Corporation | Special Land Use Permit ARRC Contract No. 6490 | Land use lease for construction camp | Permit not used |
| Alaska Railroad Corporation | Special Land Use Permit ARRC Contract No. 6491 | Land use lease for temporary laydown/storage area | No |

TABLE 4-2. Compliance and Supplemental Monitoring Summary.

| RESOURCE AND MONITORING LOCATION | PROCESS FLOW DIAGRAM NUMBER[1] | PERMIT OR RULE REQUIRING THE MONITORING | DATA TO BE COLLECTED | REQUIRED FREQUENCY OF MONITORING | AGENCY[2] REQUIRING MONITORING |
|---|---|---|---|---|---|
| **COMPLIANCE MONITORING** | | | | | |
| **Wastewater Effluents and Other Water Resources Monitoring** | | | | | |
| Outfall 002 (Healy Unit No. 1 prior to completion of HCCP) | 1 | NPDES | Flow<br>Temperature<br>pH | Continuous<br>Continuous<br>Weekly | EPA |
| Operational Wastewater Stream Upstream of Junction with HCCP Circulation Water<br><br>Outfall 001A (internal outfall) | 2 | NPDES | Flow<br>pH<br>Toxicity<br>Hardness as $CaCO_3$<br>Total suspended solids<br>Oil and grease<br>Total aromatic hydrocarbons<br>Chromium<br>Copper<br>Iron<br>Lead<br>Zinc | Continuous<br>Weekly<br>Quarterly<br>Monthly<br>Weekly<br>Weekly<br>Weekly<br>Monthly<br>Monthly<br>Monthly<br>Monthly<br>Monthly | EPA |
| Outfall 001 | 3 | NPDES | Flow<br>Temperature<br>pH | Continuous<br>Continuous<br>Weekly | EPA |

TABLE 4-2 (Continued). Compliance and Supplemental Monitoring Summary.

| RESOURCE AND MONITORING LOCATION | PROCESS FLOW DIAGRAM NUMBER[1] | PERMIT OR RULE REQUIRING THE MONITORING | DATA TO BE COLLECTED | REQUIRED FREQUENCY OF MONITORING | AGENCY[2] REQUIRING MONITORING |
|---|---|---|---|---|---|
| Monitoring Station 1 (Nenana River upstream of influence of facility discharges at Outfall 002) | 4 | NPDES | River temperature<br>Flow<br>pH<br>Total suspended solids<br>Hardness as $CaCO_3$<br>Chromium<br>Copper<br>Iron<br>Lead<br>Zinc | Weekly<br>Monthly<br>Monthly<br>Monthly<br>Monthly<br>Monthly<br>Monthly<br>Monthly<br>Monthly<br>Monthly | EPA |
| Monitoring Station 2 (Nenana River 650 feet downstream from Outfall 002) | 5 | NPDES | River temperature | Weekly | EPA |
| Monitoring Station 3 (Nenana River 1,000 feet downstream from Outfall 002) | 6 | NPDES | River temperature | Weekly | EPA |
| Outfalls 001 and/or 002 | 1, 3 | Permits to Appropriate Water | Water usage | Monthly | ADNR |

TABLE 4-2 (Continued). Compliance and Supplemental Monitoring Summary.

| RESOURCE AND MONITORING LOCATION | PROCESS FLOW DIAGRAM NUMBER[1] | PERMIT OR RULE REQUIRING THE MONITORING | DATA TO BE COLLECTED | REQUIRED FREQUENCY OF MONITORING | AGENCY[2] REQUIRING MONITORING |
|---|---|---|---|---|---|
| Effluent from Excavation Dewatering | | Wastewater General Permit and Additional Condition | Total flow<br>Total aromatic hydrocarbons<br><br>If more than 500,000 gallons:<br>Turbidity<br>Total aromatic hydrocarbons<br>Settleable solids | Daily<br>1 sample prior to discharge<br><br>Daily<br>Monthly<br>Daily | ADEC |
| Erosion and sediment controls, disturbed areas of the construction, material storage areas exposed to precipitation, construction entrances and exits, and discharge | | NPDES Storm Water General Permit | Ensure that erosion, sedimentation, and other pollution control measures are operating effectively | Weekly and within 24 hours after a storm event of 0.5 inches or greater; monthly for stabilized construction sites and under special arid conditions. | EPA |
| Excavated and Graded Areas | | Section 404 Permit | Hazardous or toxic materials<br>Site restoration/reclamation | NA | U.S. Army Corps of Engineers |
| Healy Unit No. 1 Boiler Seal Water | | Air Quality Control Permit to Operate | PCB in boiler seal water | After any flame out or seal rupture when burning MODEF with 50 ppm or more PCB | ADEC |

TABLE 4-2 (Continued). Compliance and Supplemental Monitoring Summary.

| RESOURCE AND MONITORING LOCATION | PROCESS FLOW DIAGRAM NUMBER[1] | PERMIT OR RULE REQUIRING THE MONITORING | DATA TO BE COLLECTED | REQUIRED FREQUENCY OF MONITORING | AGENCY[2] REQUIRING MONITORING |
|---|---|---|---|---|---|
| Pre-Startup Boiler Cleaning Effluent | | Healy Unit #1 Ash Pond Permit | pH<br>Conductivity<br>Hardness as $CaCO_3$<br>Oil and grease<br>Arsenic<br>Barium<br>Cadmium<br>Chromium<br>Iron<br>Lead<br>Mercury<br>Selenium<br>Silver | Prior to one-time discharge | ADEC |
| **Air Emissions Monitoring** | | | | | |
| HCCP Stack | 7 | Air Quality Control Permit to Operate, New Source Performance Standards | Particulate matter (lb/MMBtu, lb/hr)<br>Opacity (COMS)<br>$SO_2$ (lb/MMBtu, lb/hr)<br><br>Opacity (3-minute average)<br>$SO_2$ (lb/MMBtu, lb/hr, tons/month)<br>$NO_x$ (lb/hr, tons/month)<br>$CO_2$<br>CO (tons/month) | Performance test within 180 days of startup<br><br>All continuous via continuous emissions monitoring systems (40 CFR Part 60 CEMS) | ADEC,<br>EPA |

TABLE 4-2 (Continued). Compliance and Supplemental Monitoring Summary.

| RESOURCE AND MONITORING LOCATION | PROCESS FLOW DIAGRAM NUMBER[1] | PERMIT OR RULE REQUIRING THE MONITORING | DATA TO BE COLLECTED | REQUIRED FREQUENCY OF MONITORING | AGENCY[2] REQUIRING MONITORING |
|---|---|---|---|---|---|
| Healy Unit No. 1 Stack | 8 | Air Quality Control Permit to Operate | Opacity (3-minute average)<br>$SO_2$<br>$NO_x$<br>$CO_2$<br>When burning MODEF with PCB ≥ 50 ppm: $O_2$ and CO | All continuous via continuous emissions monitoring systems (40 CFR Part 60 CEMS) | ADEC |
| HCCP | 9 | Air Quality Control Permit to Operate | Sulfur content of "as-fired:"<br>Coal<br><br>Diesel fuel<br>Fuel Sampling:<br>Proximate and ultimate analysis<br>Trace components of coal, including metals (arsenic, barium, cadmium, chromium, iron, lead, mercury, selenium, silver)<br>Beryllium content of coal<br>Production Statistics:<br>Feed rates of coal and fuel oil burned<br>Steam temperature and production rate | <br>Daily, 30-day rolling average<br>Each shipment<br>Quarterly<br>Quarterly<br><br>Quarterly<br><br>Quarterly<br><br>60-minute average<br><br>Hourly | ADEC |

TABLE 4-2 (Continued). Compliance and Supplemental Monitoring Summary.

| RESOURCE AND MONITORING LOCATION | PROCESS FLOW DIAGRAM NUMBER[1] | PERMIT OR RULE REQUIRING THE MONITORING | DATA TO BE COLLECTED | REQUIRED FREQUENCY OF MONITORING | AGENCY[2] REQUIRING MONITORING |
|---|---|---|---|---|---|
| Aux #2 | 9 | New Source Performance Standards | Sulfur content of diesel fuel | Performance test within 180 days of startup and each shipment thereafter | EPA |
| | | | Diesel oil burned | Daily | |
| Healy Unit No. 1 | 10 | Air Quality Control Permit to Operate | Sulfur content of "as-fired:" | | ADEC |
| | | | Coal | Daily, 30-day rolling average | |
| | | | Diesel fuel | Each shipment | |
| | | | Proximate and ultimate analysis | Quarterly | |
| | | | Trace components of coal, including metals (arsenic, barium, cadmium, chromium, iron, lead, mercury, selenium, silver) | Quarterly | |
| | | | When burning MODEF: | | |
| | | | Feed rates of coal, fuel oil, and MODEF | 15-minute average | |
| | | | PCB concentration in MODEF | Each batch | |
| | | | When burning MODEF or RDF/used fuel: | | |
| | | | Steam temperature and production rate | 15 minutes | |
| HCCP Crusher and Coal Handling System | 11 | New Source Performance Standards | Opacity (30 6-minute averages) | Initial Performance Test within 180 days of startup | EPA |

TABLE 4-2 (Continued). Compliance and Supplemental Monitoring Summary.

| RESOURCE AND MONITORING LOCATION | PROCESS FLOW DIAGRAM NUMBER[1] | PERMIT OR RULE REQUIRING THE MONITORING | DATA TO BE COLLECTED | REQUIRED FREQUENCY OF MONITORING | AGENCY[2] REQUIRING MONITORING |
|---|---|---|---|---|---|
| **Visibility Monitoring** | | | | | |
| DNPP Visitor Access Center | | Air Quality Control Permit to Operate (Exhibit F) | Visibility | Continuous | ADEC |
| Garner Hill | | Air Quality Control Permit to Operate (Exhibit F) | Visibility | Continuous | ADEC |
| Bison Gulch Monitoring Station | | Air Quality Control Permit to Operate (Exhibit F) | Light scattering by fine particles | Continuous | ADEC |
| **Air Quality Monitoring** | | | | | |
| Bison Gulch Monitoring Station | | Air Quality Control Permit to Operate (Exhibit G) | $SO_2$<br>Meteorological data | Continuous<br>Continuous | ADEC |
| Healy Facility Property Boundaries | | Air Quality Control Permit to Operate (Exhibit G) | Particulate matter<br><br>$SO_2$<br>Meteorological data | 2 Continuous (1 @ Once-every-3-days)<br>Continuous<br>Continuous | ADEC |

TABLE 4-2 (Continued). Compliance and Supplemental Monitoring Summary.

| RESOURCE AND MONITORING LOCATION | PROCESS FLOW DIAGRAM NUMBER[1] | PERMIT OR RULE REQUIRING THE MONITORING | DATA TO BE COLLECTED | REQUIRED FREQUENCY OF MONITORING | AGENCY[2] REQUIRING MONITORING |
|---|---|---|---|---|---|
| **Solid Waste Monitoring** | | | | | |
| Healy Unit No. 1 Fly Ash | | Air Quality Control Permit to Operate | PCB in fly ash captured during malfunction | After any malfunction when burning MODEF with 50 ppm or more PCB | ADEC |
| **SUPPLEMENTAL MONITORING** | | | | | |
| Usibelli Solid Waste | 12 | | TCLP metals | Annually | |
| Limestone | 13 | | TCLP metals<br><br>Material sizing<br>$CaCO_3$ | Manufacturer's specification<br><br>Each delivery<br>Each delivery | |
| HCCP and Healy Unit No. 1 Fly Ash prior to disposal | 14 | | Unburned carbon | Periodic test performed by shipper. Each shipment being analyzed for use. | |
| **Environmental Health and Safety** | | | | | |
| Indoor Air Quality | | | Stale air ($O_2$, $CO_2$)<br>Flue gases ($SO_2$)<br>Flammability levels ($CH_4$) | Monthly<br>Weekly<br>Monthly | |

TABLE 4-2 (Continued). Compliance and Supplemental Monitoring Summary.

| RESOURCE AND MONITORING LOCATION | PROCESS FLOW DIAGRAM NUMBER[1] | PERMIT OR RULE REQUIRING THE MONITORING | DATA TO BE COLLECTED | REQUIRED FREQUENCY OF MONITORING | AGENCY[2] REQUIRING MONITORING |
|---|---|---|---|---|---|
| Ambient Particulate Matter | | | Visual inspection for fugitive dust | 4 hours | |
| Confined Spaces | | | Stale air ($O_2$, $CO_2$)<br>Flammability levels ($CH_4$)<br>Job-specific toxins | Prior to entering confined work spaces | OSHA |
| Physical Hazards in the Workplace | | | Identification job-specific hazards (mechanical, chemical, configuration, electrical, uncontrolled energy, fall, engulfment, vibration, heat, cold, noise respiratory, lighting, water, and worker use of personal protective equipment) | Job-specific | OSHA |

[1] Process Flow Diagram (PFD) identification number (see Figure 4-3).
[2] Agencies listed are in addition to reports submitted to DOE.

# SECTION 5

# SUPPLEMENTAL MONITORING

# 5. SUPPLEMENTAL MONITORING

## 5.1 HCCP DEMONSTRATION TEST PROGRAM

The HCCP Demonstration Test Program is currently being developed. Compliance monitoring as listed in Table 4.2 will run concurrently with the Demonstration Test Program. Compliance monitoring reporting requirements during the Demonstration Test Program will be as described in Section 6.

Supplemental monitoring as applicable to the demonstration tests will be defined in detail in the Demonstration Test Program. The supplementary monitoring and sampling frequency will be specific to the tests of the demonstration program. At this time, the Demonstration Test Program is perceived to include the performance and operational tests listed below. The test procedures in the Demonstration Test Program will identify from Table 4.3 of the EMP the monitoring data and monitoring frequency that will be incorporated into the test procedure specific to the test being conducted. Additionally, any special supplementary monitoring such as solid material sampling will be incorporated in the Demonstration Test Program.

Supplemental monitoring results will be included in the EMP reports. In the Demonstration Test Program, the specific test reports will include analysis of the supplementary data as applicable to the test.

### 5.1.1 Test Program

The Demonstration Test Program will include the following phases.

1. Test Procedures Development
   - 1.1 System Performance Procedures
   - 1.2 Operational Test Procedures
   - 1.3 Special Test Procedures

2. Cold Mode Shakedown Phase

3. Performance Tests
   - 3.1 Boiler and Combustor Performance
   - 3.2 Air Preheater Performance
   - 3.3 SDA Performance

4. Operational Tests

4.1 100 Percent Load
4.2 75 Percent Load
4.3 50 Percent Load
4.4 Minimum Load
4.5 Transient Load
4.6 Load Rejection
4.7 Startup, Shutdown, and Restart
4.8 Limestone Quality
4.9 Coal Quality
4.10 Commercial 90-Day Performance

It is anticipated that each performance and operational test will involve the steps listed below. Some tests may run concurrently.

- Inspection and pretest repairs and modifications as necessary (1 week).
- Establish stable operation conditions prior to test (1 to 2 weeks).
- Test (typically 1 week).
- Shutdown or modifications as necessary for next test.

### 5.1.2 Compliance Monitoring

The following general compliance monitoring will be incorporated as supplementary monitoring into the test program.

#### 5.1.2.1 Wastewater Effluent Monitoring

- Performance Tests - None
- Operational Tests - 100 percent load, coal quality, and 90-day commercial test

#### 5.1.2.2 Air Emissions Monitoring

- Performance Tests - Boiler and combustor performance, baghouse performance, and SDA performance
- Operational Tests - 100 percent load, 75 percent load, minimum load, transient load, limestone quality, coal quality, and commercial 90-day performance test

5.1.2.3 Visibility Monitoring

- Performance Tests - None
- Operational Tests - 100 percent load, limestone quality, coal quality, and commercial 90-day performance test

5.1.2.4 Air Quality Monitoring

- Performance Tests - None
- Operational Tests - 100 percent load, 75 percent load, minimum load, limestone quality, coal quality, and commercial 90-day performance test

5.1.2.5 Solid Waste Monitoring

- Performance Tests - 100 percent load
- Operational Tests - Slag/bottom ash and fly ash

Limestone that will be used to control $SO_2$ emissions will be tested for three key characteristics: metals, size, and $CaCO_3$. Limestone will be analyzed for TCLP metals by the manufacturer. Thus, the manufacturer will deliver limestone of specific metals content to HCCP. Because the TCLP metals content is representative of all shipments provided by the manufacturer and is not expected to change over time, a single TCLP metals analysis will be provided to HCCP. Material size and $CaCO_3$ are important characteristic that affect the efficiency of $SO_2$ control. Therefore, the manufacturer will provide an analysis of material size and $CaCO_3$ for each shipment of limestone to HCCP.

Fly ash of suitable quality can be recycled and used as a lime substitute in cement. Therefore, fly ash from HCCP and Healy Unit No. 1 will be tested for unburned carbon content to determine if it is suitable as pozzolanic material. Recyclable pozzolanic material will be diverted for shipment to the buyer. Effectively each shipment will be tested for unburned carbon.

The waste stream containing fly ash that does not have pozzolanic qualities will be joined with the slag/bottom ash waste stream. This combined solid waste stream will eventually be disposed at UCM. Solid waste that is shipped to UCM will be tested annually for TCLP metals.

### 5.1.3 Reporting

Intermediate topical reports and a Final Report will be issued.

## 5.2 HAZARDOUS AIR POLLUTANTS (HAPS)

Hazardous Air Pollutants (HAPs) monitoring was not included in the DOE's Program Opportunity Notice (PON). AIDEA may demonstrate HAPs control in the HCCP to the extent funding is made available and mutually agreed upon between AIDEA and DOE.

## 5.3 ENVIRONMENTAL HEALTH AND SAFETY

Environmental Health and Safety monitoring programs planned for HCCP include indoor air quality, particulate air sampling, confined space monitoring, and physical hazard surveying. This list will be expanded if evidence of additional hazards becomes evident. Many of these programs are required under the Occupational Health and Safety Administration (OSHA) safety regulations (29 CFR Part 1910.269).

Indoor air quality sampling is expected to include monthly surveys of $O_2$ and $CO_2$ concentrations (stale air) and flammability levels (methane production), weekly surveys of $SO_2$ concentrations (flue gases), and ongoing surveys for contaminants introduced due to specific activities. Random sampling techniques will be used except in the vicinity of specific activities. Process equipment will be inspected visually at least every four hours to assure proper operation. Conditions that could result in degradation of indoor air quality will be investigated.

Particulate sampling will be conducted biennially to assure adequate filtration of air emissions. Ambient air sampling will focus on the areas of coal transfer and ash disposal. In addition, random particulate sampling will be conducted. Upon worker request, particulate sampling will also be conducted. Process equipment will be inspected visually at least every four hours to assure proper operation. Improper operation resulting in dust generation will be documented.

Confined space monitoring required by OSHA regulations (29 CFR Part 1910.146) will be conducted prior to work being performed in any confined space. Testing will include measurements $O_2$ and $CO_2$ concentrations, flammability levels, and testing for any constituent which conditions indicate might be present (e.g., toxins from painting operations).

Physical hazard surveys will be conducted as a routine function of every job and specifically before entry into a confined space. Physical hazards which will be included in the survey include mechanical, chemical, configuration, electrical, uncontrolled energy, fall, engulfment, vibration, heat, cold, noise respiratory, lighting, water, and worker use of personal protective equipment.

# SECTION 6

# DATA MANAGEMENT AND REPORTING

# 6. DATA MANAGEMENT AND REPORTING

## 6.1 DATA MANAGEMENT

### 6.1.1 Introduction

The data and reporting program, including acquisition, storage, retrieval, analysis, and formal reporting of developed data, will be defined in detail in the HCCP Demonstration Test Program. The purpose of the data management section of the Test Program will be to develop a data base management system (DBMS) that 1) has long-term information storage capacity, 2) is flexible enough for the user to access any required data, 3) can perform data processing functions, and 4) can reduce the data to a useful format so that processes and/or emission control efficiency can be evaluated.

### 6.1.2 Data Entry

Wherever possible, data will be transmitted electronically to increase data entry efficiency and accuracy. AIDEA and GVEA will also rely on the DBMS to manually store process and emission data. Data transmittal forms will be designed for any manually recorded process, sampling, and analytical data and results. These forms will be compatible with the data entry format of the DBMS.

### 6.1.3 Data Verification

All data will be reviewed for completeness and accuracy as part of the data management and processing activities. Wherever applicable, data will be analyzed to determine mean, maximum, and minimum values, as well as standard deviations and other statistical parameters. Data correlations and relationships will be developed, evaluated, and/or plotted using the DBMS to provide insight and to evaluate/describe process performance.

## 6.2 REPORTING

### 6.2.1 Report Format, Content, and Frequency

Each EMP report will cover compliance and supplemental monitoring progress, defining whether tests have been completed or are in progress. These EMP reports will be submitted within 45 days of the end of the reporting period. The EMP reports will include the information outlined in the following subsections.

### 6.2.2 Monthly, Quarterly, and Annual Reports

The Monthly Environmental Monitoring Report will:

- Contain test reports.
- Contain environmental monitoring data collected during the month.
- Contain copies of all compliance reports and analyses sent to regulatory agencies during the month.
- Describe the project's permit compliance status, including a description of any significant changes to the terms of permits and notices of violations issued.
- Identify problem areas encountered during the month, i.e., problems with monitoring techniques/procedures, sampling, QA/QC, etc., and indicate actual, anticipated, or possible solutions to identified problem areas.
- Recommend modification to or deletion of supplemental monitoring tasks not yielding useful data and include the basis for the recommendation.

The Quarterly Environmental Monitoring Report will:

- Contain summaries of all environmental monitoring data collected during the quarter.
- Contain copies of all compliance reports and analyses sent to regulatory agencies during the quarter (e.g., Figure 6-1).

- Describe the HCCP's permit compliance status, including a description of any significant changes to the terms of permits and notices of violations issued from regulatory agencies.

- Identify problem areas encountered during the quarter, i.e., problems with monitoring techniques/procedures, sampling, QA/QC, etc., and indicate actual, anticipated, or possible solutions.

- Recommend modifications or deletion of supplemental monitoring tasks not yielding useful data, including the basis for the recommendation.

The Annual Environmental Report will:

- Summarize and analyze the monitoring information from all monthly and quarterly reports.

- Identify trends and patterns in the data.

- Summarize and interpret relevant environmental data and information issuing from supplemental monitoring.

- Correlate the concentration of regulated substances being monitored with the operating conditions of the project and the performance of environmental controls.

- Indicate if there are any trends of environmental concern based on the monitoring data and the reports that have been submitted.

- Indicate whether problem areas identified in previous quarterly or annual reports have been resolved and, if any, what mitigation measures should be taken.

FIGURE 6-1. Facility Operating Report.

A Facility Operating Report must be submitted to the Department of Environmental Conservation, Northern Regional Office, 1001 Noble Street, Suite 350, Fairbanks, Alaska 99701, quarterly, by the 30th day of January, April, July, and October each year. This report must include the following information:

NAME OF FIRM
NAME OF FACILITY
PERMIT NUMBER

REPORT PERIOD _____ QUARTERLY TOTAL
(When indicated, also report weekly or monthly data.)

| | | |
|---|---|---|
| 1. | Days Operated<br>Unit #1<br>Unit #2<br>Aux #1 Oil-fired boiler<br>Aux #2 Oil-fired boiler<br>Diesel #1 | Number of hours or days/quarter for each source<br>Number of hours/day that MODEF is burned |
| 2. | Fuel Consumption<br>All Sources | For each source, indicate the type of fuel and the quantity burned per quarter in the appropriate units: gallons, tons |
| 3. | Fuel Quality<br>Coal<br>Diesel fuel<br>MODEF | Coal: sulfur analysis, monthly<br>Oil: sulfur content of each shipment received<br>PCB concentration in ppm of each batch burned |

4. When MODEF containing more than 50 ppm PCB is burned in Unit #1, report the parameters (daily) as required in Exhibit D of this permit.

5. Attach a listing of the excess emissions reports required by Condition 22 of this permit.

6. Attach a summary document of perceptible events recorded during visibility monitoring.

7. Signature of authorized agent preceded by the statement:

   "I am familiar with the information contained in this report and, to the best of my knowledge and belief, such information is true, complete, and accurate."

Source: Exhibit C of Draft Air Quality Control Permit to Operate No. 9431-AA001.

# SECTION 7

# REFERENCES

## 7. REFERENCES

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# SECTION 8

# ABBREVIATIONS AND ACRONYMS

# 8. ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| ADEC | Alaska Department of Environmental Conservation |
| AIDEA | Alaska Industrial Development and Export Authority |
| | |
| BACT | Best available control technology |
| $b_{sp}$ | Light scattering by fine particles |
| Btu/lb | British thermal units per pound |
| | |
| CAA | Clean Air Act |
| $CaCO_3$ | Calcium carbonate (limestone) |
| CaO | Calcium oxide (quick lime) |
| CCT | Clean Coal Technology Program |
| CCT-III | Clean Coal Technology - Third Solicitation Program |
| CEMDAS III | Computer program for CEMS |
| CEMS | Continuous emission monitoring system |
| CFR | Code of Federal Regulations |
| cfs | Cubic feet per second |
| CO | Carbon monoxide |
| $CO_2$ | Carbon dioxide |
| Corps | U.S. Department of the Army Corp of Engineers |
| CWA | Clean Water Act |
| | |
| DBMS | Data base management system |
| DEIS | Draft Environmental Impact Statement |
| DNPP | Denali National Park and Preserve |
| DOE | U.S. Department of Energy |
| DVTs | Design verification tests |
| | |
| EIS | Environmental Impact Statement |
| EIV | Environmental Information Volume |
| EMP | Environmental Monitoring Plan |
| EPA | U.S. Environmental Protection Agency |
| | |
| FCM | Flash-calcined material |
| FGD | Flue Gas Desulfurization |
| | |
| gpm | Gallons per minute |
| GVEA | Golden Valley Electric Association, Inc. |

| | |
|---|---|
| HAPs | Hazardous air pollutants |
| HCCP | Healy Clean Coal Project |
| HHV | Higher heating value |
| Joy | Joy Technologies, Inc. |
| $LC_{50}$ | Level of concentration at which 50 percent of a lifeform will survive |
| Mg/l | Milligrams per liter |
| MMBtu/hr | Million British thermal units |
| MODEF | Mineral oil di-electric fluid |
| msl | Mean sea level |
| MWe | Megawatt (electric) |
| NAAQS | National Ambient Air Quality Standards |
| NEPA | National Environmental Policy Act |
| NPDES | National Pollutant Discharge Elimination System |
| $NO_x$ | Oxides of Nitrogen |
| NPS | National Park Service |
| NSPS | New Source Performance Standards |
| PCB | Polychlorinated biphenyl |
| PCS | Plant control system |
| PETC/PM | Pittsburgh Energy Technology Center, Office of Project Management |
| pH | Hydrogen ion concentration |
| PLC | Programmable logic controller |
| PM | Particulate matter |
| $PM_{10}$ | Particulate matter less than 10 microns in diameter |
| PON | Program Opportunity Notice |
| PSD | Prevention of Significant Deterioration |
| QA/QC | Quality assurance with quality control |
| SDA | Spray dryer absorber |
| SIP | State Implementation Plan |
| $SO_2$ | Sulfur dioxide |
| SWPPP | Storm Water Pollution Prevention Plan |
| TAR | Technical Analysis Report |
| tpd | Tons per day |
| tpy | Tons per year |

| | |
|---|---|
| TRW | TRW Applied Technologies Division |
| TSS | Total suspended solids |
| UCM | Usibelli Coal Mine, Inc. |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| $\mu g/m^3$ | Micrograms per cubic meter |