AL/OE-TR-1993-0179

COMPLIANCE EMISSION TESTING OF THE CENTRAL HEATING AND POWER PLANT, EIELSON AIR FORCE BASE, ALASKA

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December 1993

Final Technical Report for Period 10 - 14 May 1993

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ARMSTRONG LABORATORY

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	December 1993	Final 10-14 May 1993

4. TITLE AND SUBTITLE
Compliance Emission Testing of the Central Heating and Power Plant, Eielson Air Force Base, Alaska

5. FUNDING NUMBERS

6. AUTHOR(S)
Robert J. O'Brien

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
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Bioenvironmental Engineering Division
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Brooks Air Force Base, TX 78235-5114

8. PERFORMING ORGANIZATION REPORT NUMBER
AL/OE-TR-1993-0179

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

Compliance emission testing for particulate matter and visible emissions was conducted on Boiler 3 at the Eielson AFB Central Heat and Power Plant. Compliance standards are found in Operating Permit No. 9331-AA001, issued by the State of Alaska on 30 April 1993. Initial testing was performed on 11 May 1993. Results from this test indicated that Boiler 3 met the standard for visible emissions but was above the standard for particulate matter emissions. Operating parameters were adjusted and Boiler 3 was retested on 13 May 93. Results from the 13 May test indicated that all emission standards were met.

14. SUBJECT TERMS
Particulate matter Visible emissions Eielson AFB
Central Heat and Power Plant Compliance emission testing

15. NUMBER OF PAGES
120

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	UL

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COMPLIANCE EMISSION TESTING OF THE CENTRAL HEATING AND POWER PLANT, EIELSON AIR FORCE BASE, ALASKA

INTRODUCTION

Background

On 10-14 May 93, compliance emission testing for particulate matter and visible emissions was conducted on coal-fired Boiler 3 at the Eielson AFB Central Heat and Power Plant (CH&PP). Testing was performed by the Air Quality Function of the Air Force Armstrong Laboratory. This survey was requested by the Eielson AFB Civil Engineering Office to satisfy State of Alaska operating permit requirements. The survey request letter is found in Appendix A. Personnel involved with on-site testing are listed in Appendix B.

Site Description

The CH&PP (Fig. 1) operates a total of 6 boilers for heat and electrical power production (Table 1). Each boiler is a spreader-stoker fired unit with a maximum design steam capacity of 120,000 pounds per hour (lb/hr). A partial view of Boiler 3 is shown in Figure 2.

Subbituminous coal is currently the only fuel used by all 6 boilers. However, each boiler is scheduled to be retrofitted to co-fire refuse derived fuel (RDF) with coal. Additionally, Boiler 4 will also be retrofitted to burn used oil in conjunction with coal. The CH&PP currently has no plans to burn hydrocarbon contaminated soil with coal, although use of this fuel is authorized in the new operating permit. A view of the coal stockpile outside the CH&PP is shown in Figure 3 while the results of a coal sample, taken from a shipment received the week before emission testing, are found in Appendix C. The CH&PP uses an average of 160,000 tons of coal per year. All coal comes from the Usibelli Coal Mines located in Healy, Alaska, approximately 120 miles south of Eielson AFB.

All boilers are equipped with forced draft and induced draft fans. The purpose of the forced draft fan is to supply air for combustion. The purpose of the induced draft fan is to maintain a negative pressure condition in the furnace part of the boiler system, to remove the combustion gases from the boiler, and to exhaust the combustion gases out the stack. Each unit is also fitted with a steam-operated soot blower to remove flyash and soot from heat exchange surfaces (1,2).

Air pollution control currently consists of a multitube cyclone separator on each boiler (Fig. 4). Each multitube cyclone separator is located in the boiler exhaust duct, upstream of the induced draft fan. The multitube cyclone separators were manufactured by the Western Precipitation Division of Joy

Figure 1. View of the Central Heat and Power Plant.

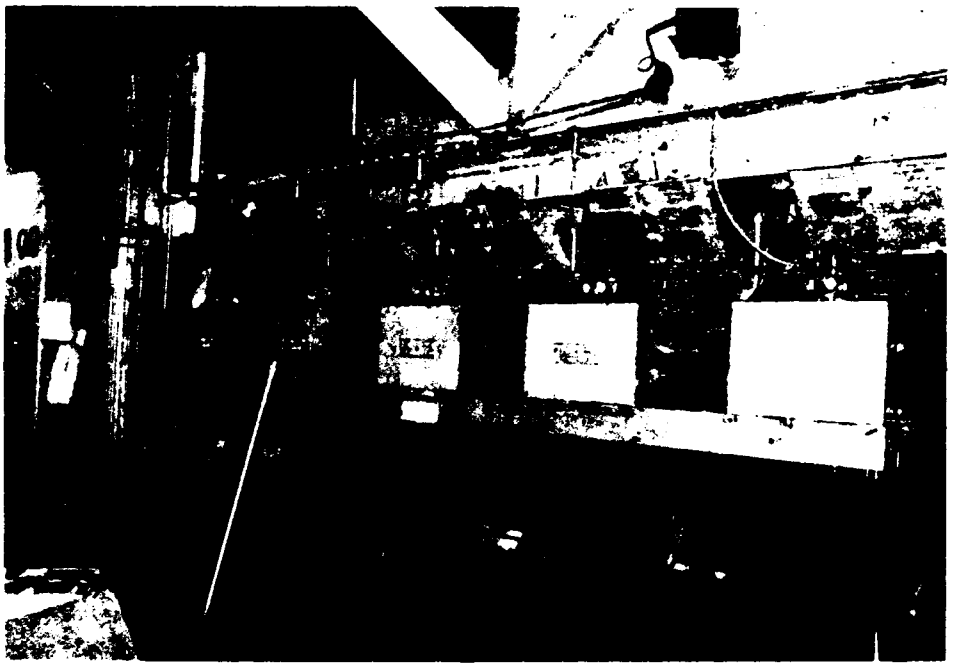

Figure 2. Partial View of Boiler 3.

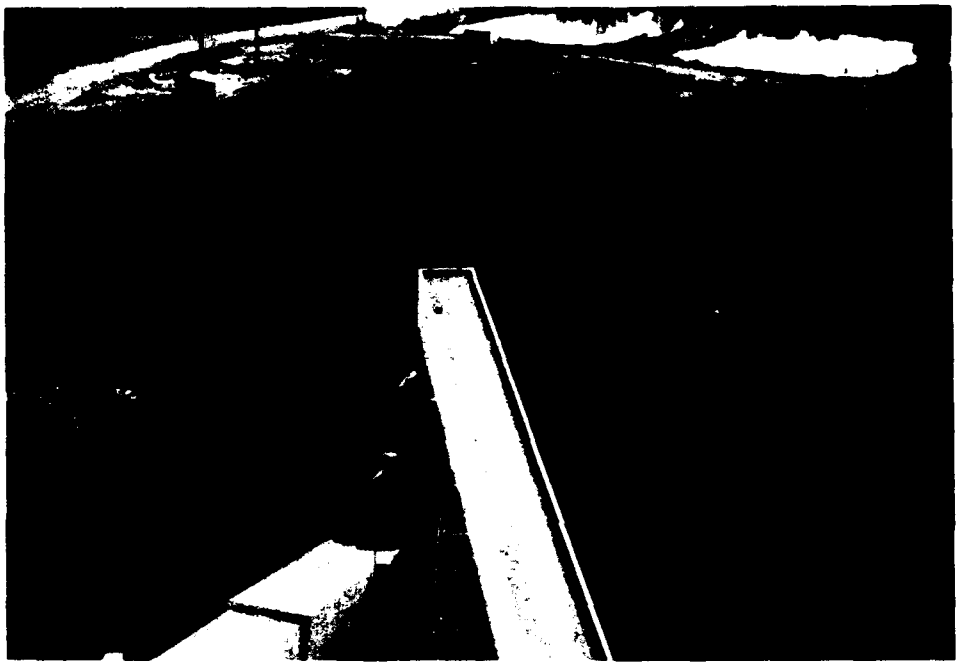

Figure 3. View of Coal Stockpile.

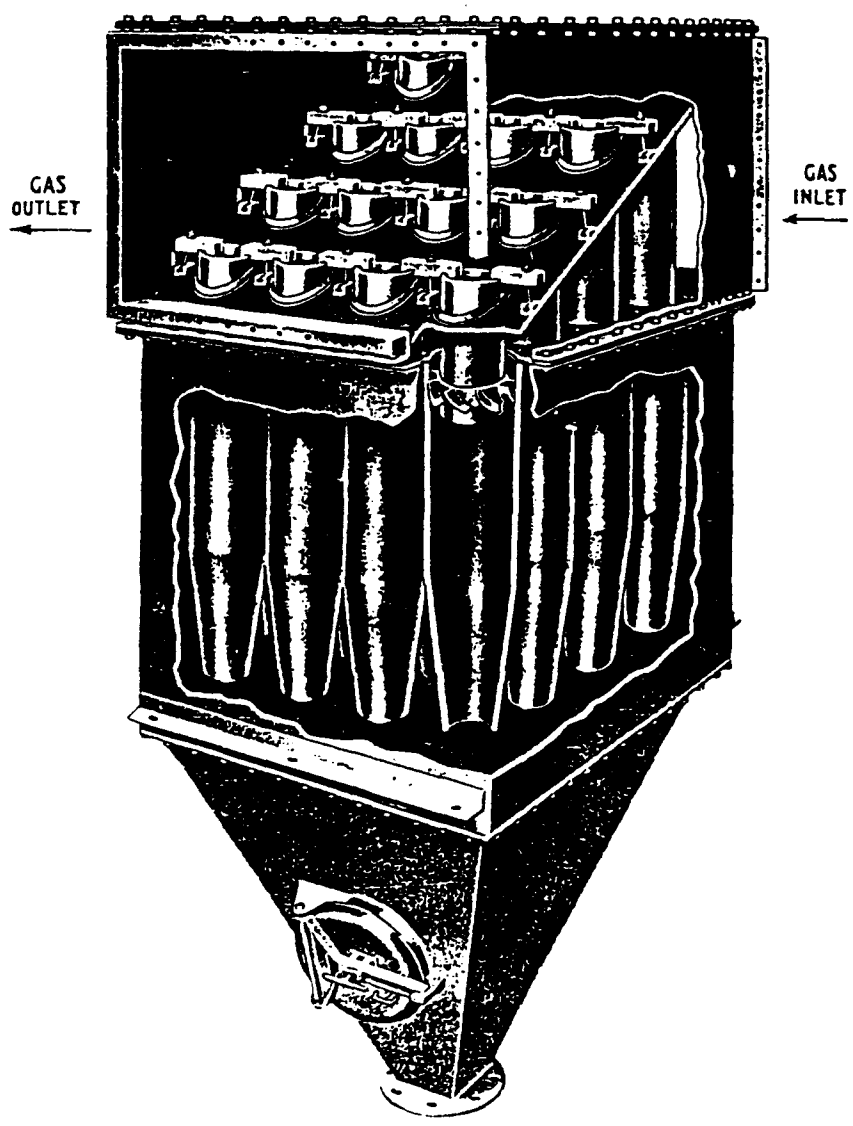

Figure 4. Multitube Cyclone Separator.

Manufacturing Company and consist of a number of individual cyclones operating in parallel (1,2). Cyclone separators are gas cleaning devices that employ a centrifugal force generated by a spinning gas stream to separate the particulate matter from the carrier gas (3). In addition to the multitube cyclone separator, each boiler is scheduled to be retrofitted with a baghouse. The first retrofit was performed on Boiler 4 in October 1993. One boiler will be retrofitted biennially until all boilers are retrofitted.

The exhaust effluent from each boiler is ducted to a separate exhaust stack located on the roof of the CH&PP. Figure 5 shows the exhaust stack for Boiler 3. All boiler exhaust stacks are similar to the one pictured in Figure 5.

The CH&PP operates 5 steam turbine generators and 1 stand-by diesel generator for electrical power production (Table 2). A steam turbine is shown in Figure 6, while the lone diesel generator is shown in Figure 7.

A flow diagram of the CH&PP's entire heat and electrical power production process is shown in Figure 8.

Applicable Standards and Guidelines

The emission standards and operating requirements for the CH&PP are stated in Operating Permit No. 9331-AA001. This permit was issued by the State of Alaska on 30 Apr 93 and has an expiration date of 31 Jan 98. The entire permit is located in Appendix D and the major provisions are summarized below:

1. The CH&PP is subject to the permitting, operating, and emission limitation requirements of Alaska Administrative Code, Title 18, Environmental Conservation, Chapter 50 - Air Quality Control (18 AAC 50). A copy of this regulation is found in Appendix E.

2. The 6 boilers are permitted to burn coal, coal with used oil, coal with refuse derived fuel, and coal with hydrocarbon contaminated soil.

3. For each type of fuel the CH&PP plans to use, source testing for particulate matter must be performed on 1 boiler not equipped with a baghouse. The source testing must be performed by the end of 1994 and be in accordance with 40 CFR Part 60, Appendix A, Methods 1 - 5.

4. Current emission limits for all 6 boilers include the following:

   a. Particulate Emissions - not to exceed 0.100 grains per dry standard cubic foot (gr/dscf).

TABLE 1. Listing of Boilers

Boiler Number	Manufacturer	Year Installed	Steam Capacity (lb/hr)*
1	Springfield	1950	120,000
2	Springfield	1950	120,000
3	Springfield	1950	120,000
4	Springfield	1950	120,000
5	Garrette and Schafer	1954	120,000
6	Garrette and Schafer	1954	120,000

* lb/hr = pounds per hour

TABLE 2. Listing of Generators

Generator Identifier	Manufacturer	Year Installed	Electrical Capacity (Megawatts)
Steam Turbine # 1	Murray	1952	2.5
Steam Turbine # 2	Murray	1952	2.5
Steam Turbine # 3	Elliot	1955	5.0
Steam Turbine # 4	Worthington	1969	5.0
Steam Turbine # 5	Trans America-Delaval	1987	10.0
Stand-by Diesel	EMD Electro-motor	1987	2.5

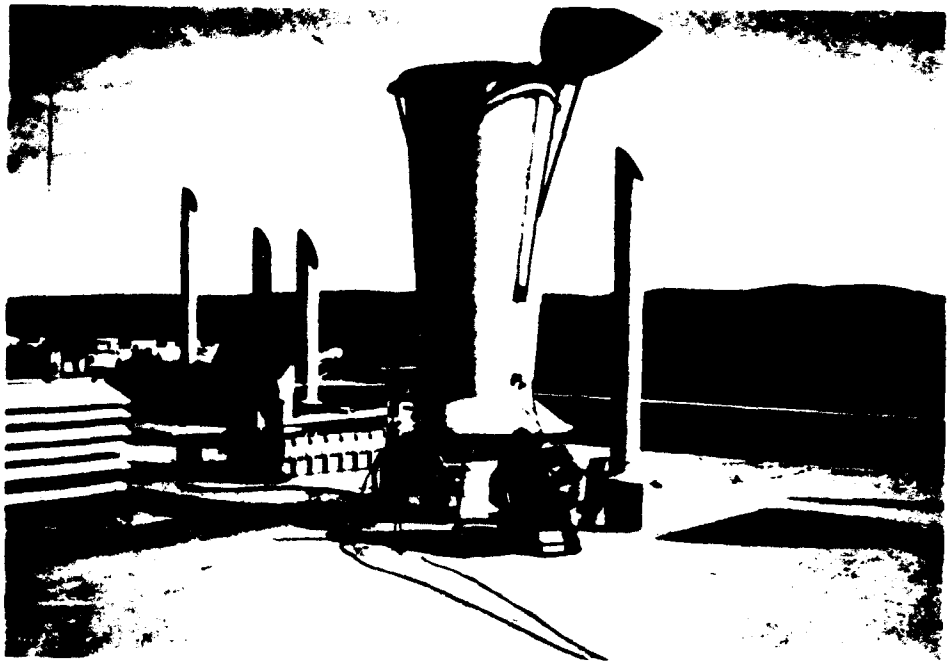

Figure 5. View of Boiler 3 Exhaust Stack.

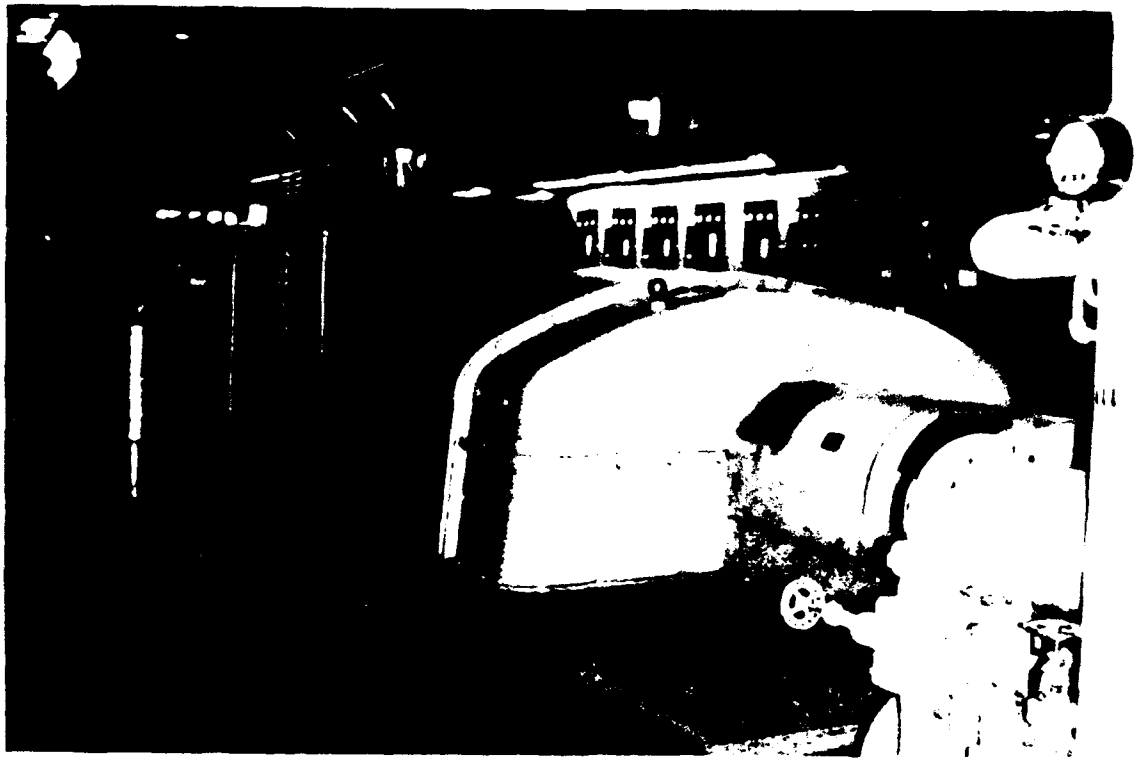

Figure 6. View of Steam Turbine Generator.

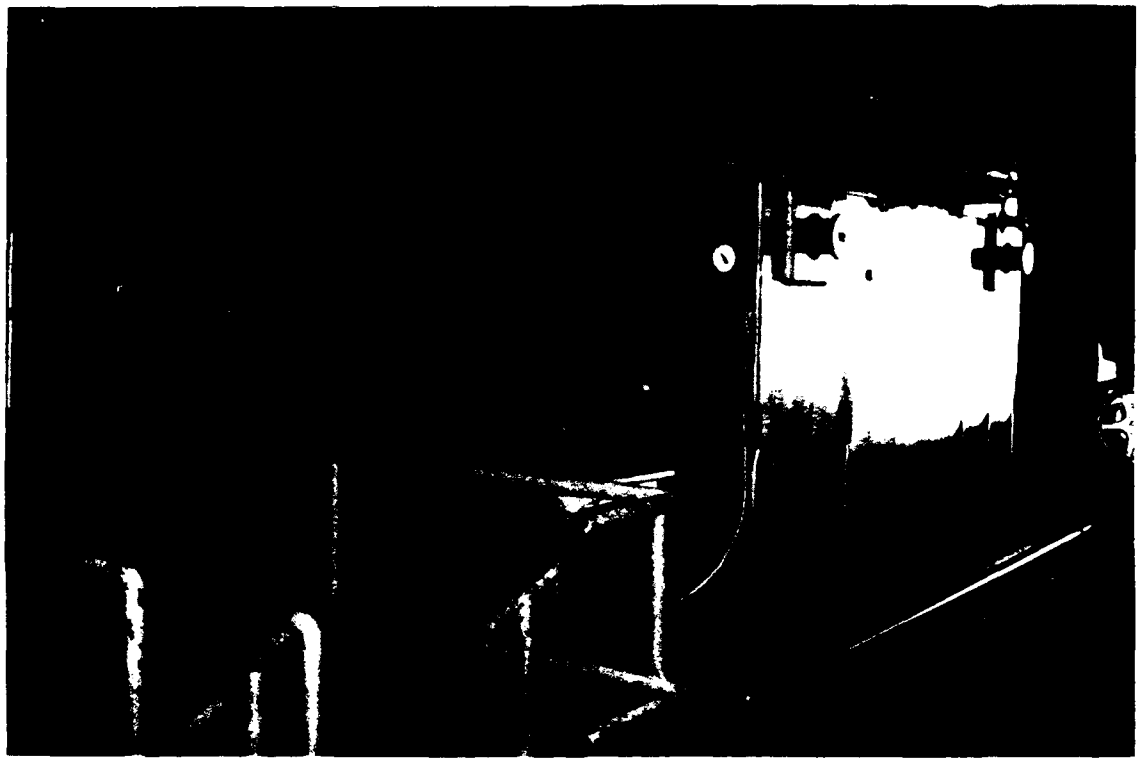

Figure 7. View of Diesel Generator.

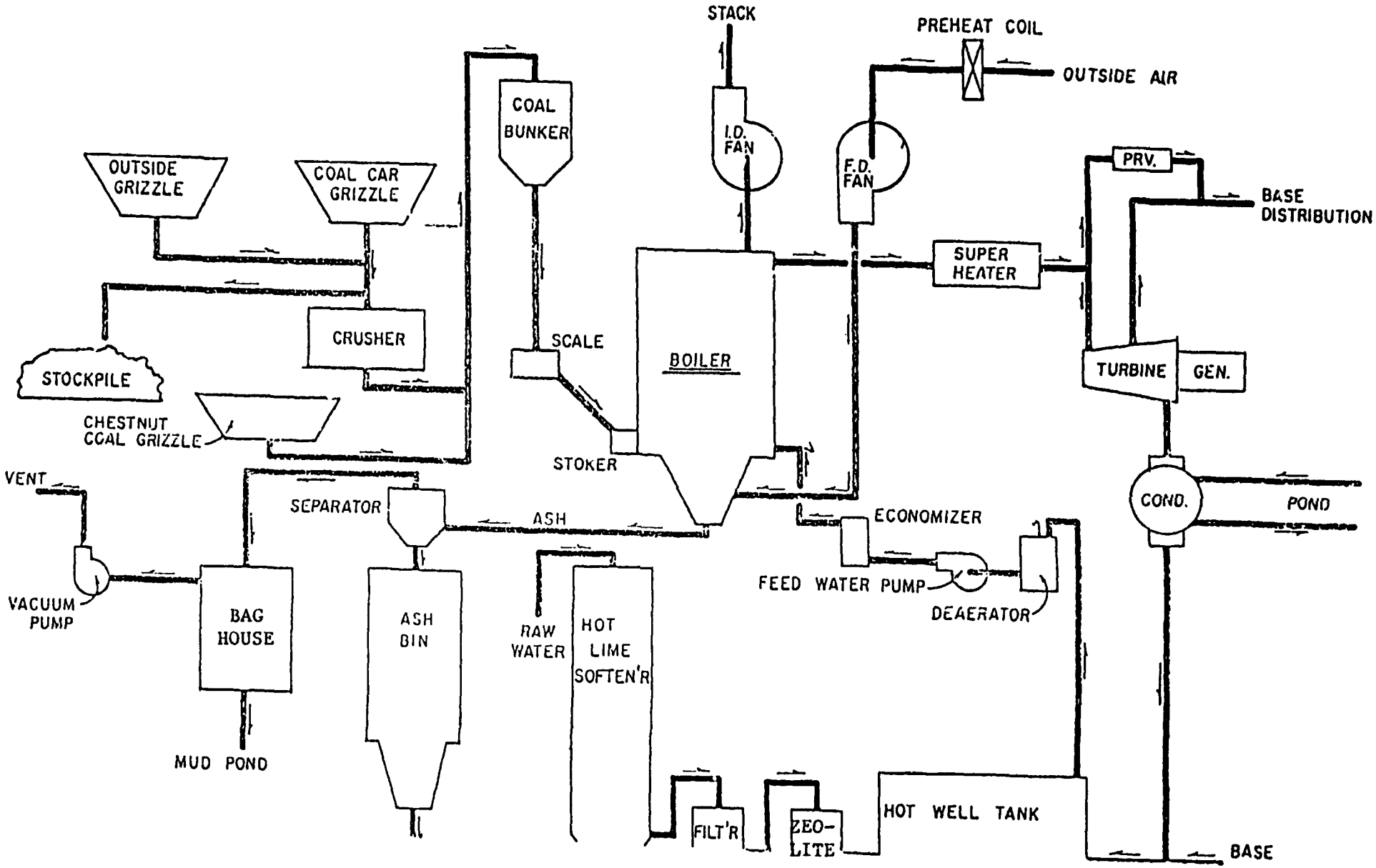

Figure 8. Flow Diagram of Heat and Power Production Process.

b. Visible Emissions - 20% opacity not to be exceeded more than 3 minutes in any 1 hour.

METHODS AND MATERIALS

Particulate sampling and analysis were conducted in accordance with Environmental Protection Agency (EPA) Methods 1 through 5. These methods are found in Appendix A to Title 40, Code of Federal Regulations, Part 60 (4).

The boiler exhaust stacks are circular and 14.2 feet (ft) high. The stacks are tapered, diverging from a 52 inch outside diameter (OD) at the roof line to a 72 inch OD at the top. The divergent angle of the stacks is approximately 7 degrees. Based on the relatively small divergent angle, the stacks are considered to be straight ducts. Prior to the stack, exhaust gases pass through the induced draft fan, rectangular ducting, and a transition to the stack located just below the roof (1,2). Figure 9 provides a schematic of the exhaust stack and associated duct work. The Boiler 3 stack has 2 sampling ports. The ports are on the same horizontal plane, 90 degrees apart. The sampling ports are located 3 ft from the nearest upstream disturbance (the roof line) and 11.1 ft from the nearest downstream disturbance (the top of the stack). With an inside stack diameter of 4.4 ft at the sampling ports, the ports are 0.7 duct diameters downstream and 2.5 duct diameters upstream from the nearest flow disturbances. EPA Method 1 requires the port holes to be located a minimum of 2 duct diameters downstream and 0.5 duct diameters upstream of the nearest flow disturbances. Although the port holes are located less than the EPA's minimum distance downstream of the nearest flow disturbance, sampling at this location was performed in Jul 88 and was once again approved by the State of Alaska (1). A total of 24 traverse points (12 for each port hole) were used to collect a representative sample. For each representative sample, 3 sampling runs were conducted and the results averaged to determine the final emission value. All sampling runs were 60 minutes in duration.

Prior to the first sampling run, the degree of cyclonic flow was determined by using a Type S pitot tube and measuring the stack gas rotational angle at each point along the center traverse. Flow conditions are considered acceptable when the arithmetic mean average of the rotational angles is 20 degrees or less. Rotational angle measurements showed the Boiler 3 stack air flow to be within the acceptable limit. A preliminary velocity pressure traverse, using the same Type S pitot tube, was also accomplished at this time.

A grab sample for Orsat analysis (measures O_2 and CO_2 for stack gas molecular weight determination) was taken during each sampling run. Orsat sampling and analysis equipment are shown in Figures 10 and 11. Stack gas moisture content, which is also

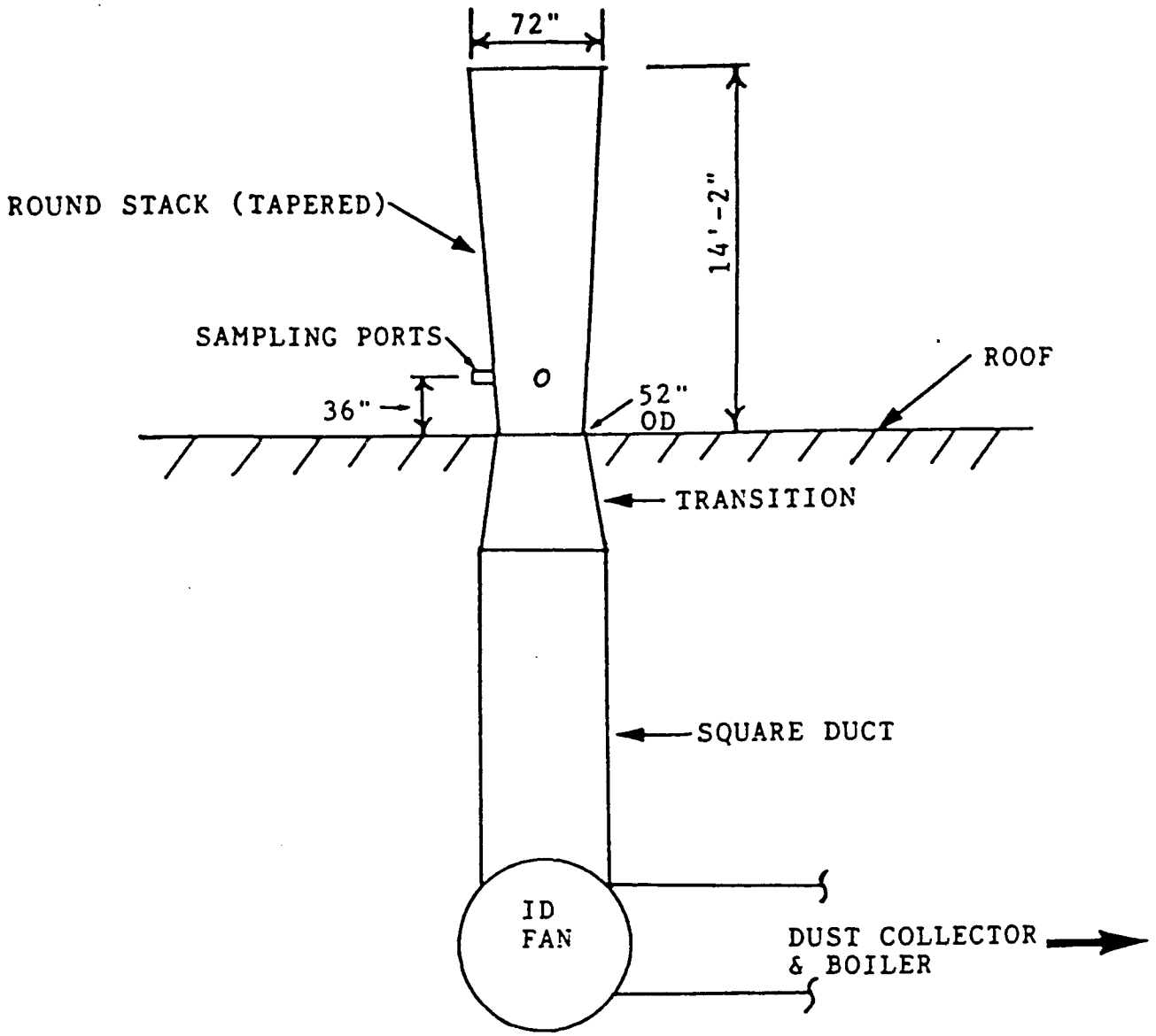

Figure 9. Schematic of Exhaust Stack and Connecting Duct Work.

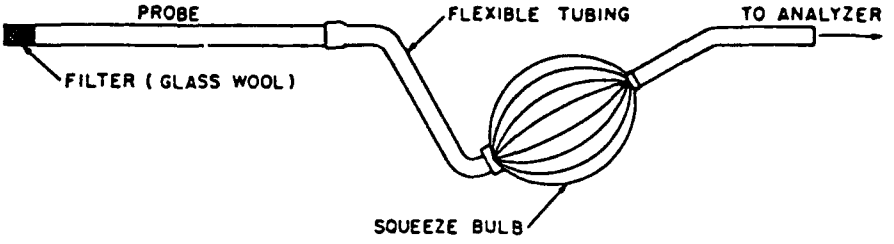

Figure 10. Orsat Grab Sampling Train.

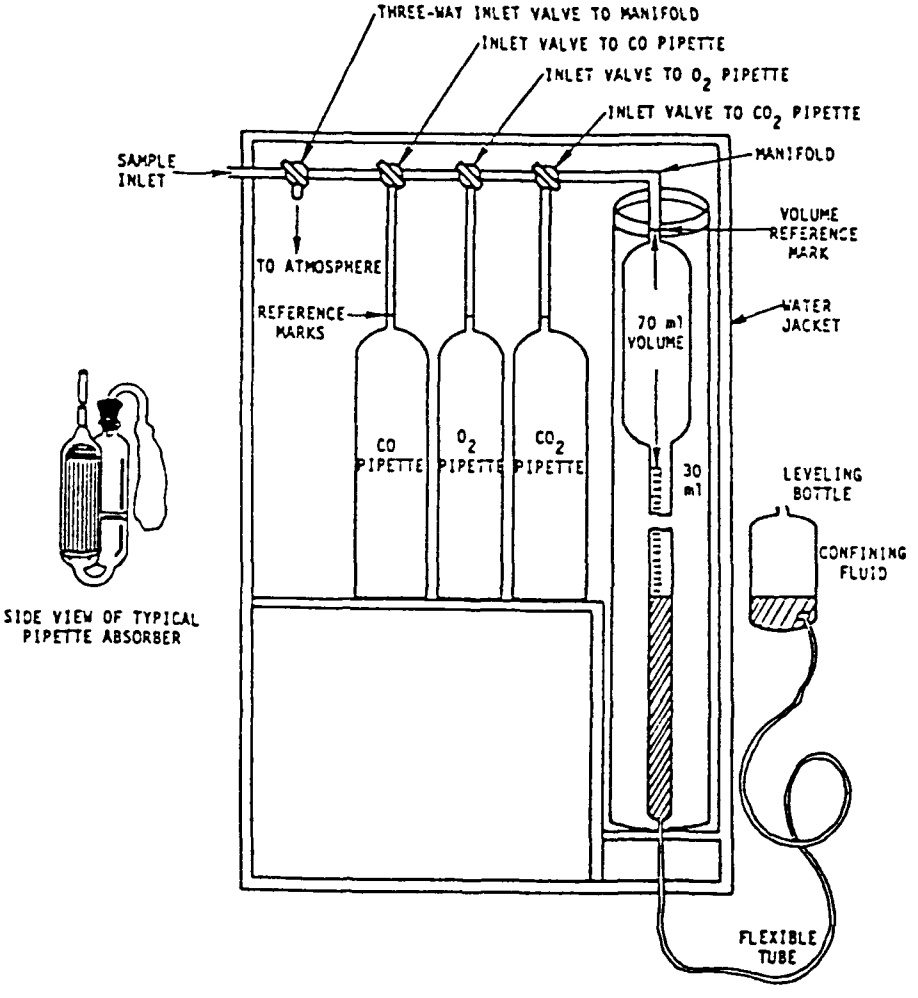

Figure 11. Orsat Analysis Apparatus.

required for determination of stack gas molecular weight, was obtained during particulate sampling.

Particulate samples were collected using the sampling train shown in Figure 12. The train consisted of a button-hook probe nozzle, heated stainless steel probe, heated glass-fiber filter, impingers, and a pumping and metering device. The probe nozzle was sized prior to the sample run so that the gas stream could be sampled isokinetically (i.e., the velocity of the gas sample entering the nozzle was adjusted to equal the stack gas velocity at each point sampled). Stack gas velocity pressure was measured at the nozzle tip using a Type S pitot tube connected to a 10-inch inclined-vertical manometer. Type K thermocouples were used to measure stack gas as well as sampling train temperatures. The probe liner was heated to minimize moisture condensation. The heated filter was used to collect particulates. The impinger train consisted of four glass impingers in series and was used as a condenser to collect stack gas moisture. The first, third, and fourth impingers were of modified Greenburg-Smith design while the second impinger was a standard Greenburg-Smith type. The first and second impingers each contained 200 milliliters (ml) of distilled water, the third impinger was empty, and the fourth impinger contained 200 grams (g) of silica gel. The pumping and metering system was used to control and monitor the sample gas flow rate. Equipment calibration data are presented in Appendix F (5).

Front half particulate matter (material collected on sampling train surfaces up to and including the filter) was determined for compliance purposes according to the procedures specified in EPA Method 5. Field data from particulate sampling are presented in Appendix G. Emission calculations were accomplished using the "Source Test Calculation and Check Programs for Hewlett-Packard 41 Calculators" developed by the EPA Office of Air Quality Planning and Standards (6). Resulting emission calculations are presented in Appendix H.

Visible emission (opacity) readings were performed in accordance with EPA Method 9. The opacity reader was certified by the Texas Air Control Board. A copy of the reader's certification card is found in Appendix I.

RESULTS

Particulate matter source testing of Boiler 3 was performed on 11 May 93. Boiler 3 was operated with a steam output of 100,000 pounds per hour (lb/hr) during all 3 sampling runs. This output is approximately 83% of the rated boiler capacity (120,000 lb/hr). A soot blow was performed during Run 1 of the test. The particulate matter emission rates were calculated as grains per dry standard cubic foot of stack gas (gr/dscf). The results from the 11 May 93 sampling are 0.095 gr/dscf, 0.118 gr/dscf, and 0.106 gr/dscf for sampling runs 1, 2, and 3,

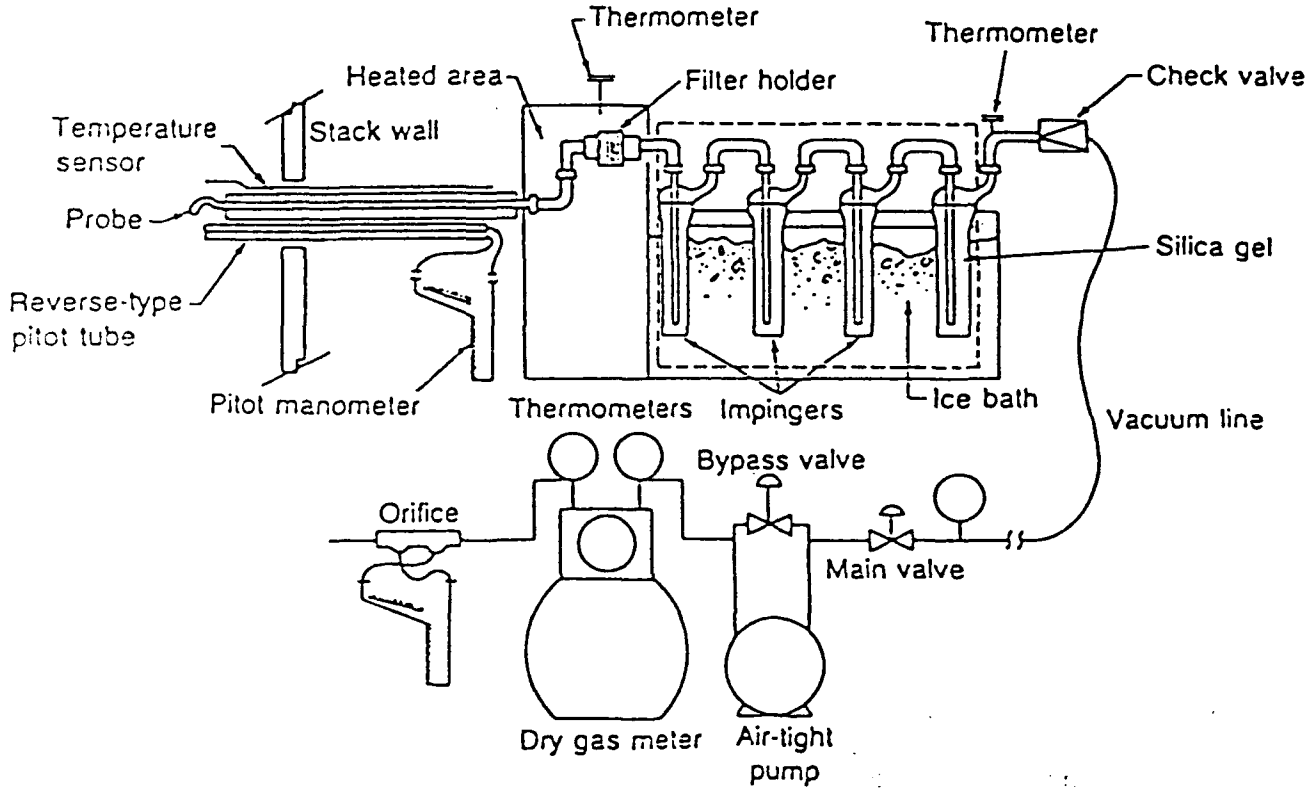

Figure 12. Particulate Sampling Train.

respectively. The average for all three runs, 0.106 gr/dscf, is above the State of Alaska standard of 0.100 gr/dscf.

CH&PP personnel were informed of the 11 May 93 sampling results and subsequently adjusted Boiler 3 operational parameters (e.g., air flow rates) to enhance combustion efficiency. Boiler 3 was then retested on 13 May 93 at the same capacity (100,000 lb steam/hr) used during the 11 May testing. A soot blow was performed during Run 3 of the 13 May test. The results from the 13 May sampling are 0.070 gr/dscf, 0.093 gr/dscf, and 0.135 gr/dscf for sampling runs 1, 2, and 3, respectively. The average for all three runs, 0.099 gr/dscf, is slightly below the 0.100 gr/dscf State standard.

Except during the 2 soot blows, visible emission readings taken during the 11 May and 13 May tests did not exceed 20% for more than 3 minutes in any one hour.

A summary of all source sampling results is provided in both Table 3 and Figure 13. Facility data, showing Boiler 3 operating parameters during source testing, are provided in Appendix J.

DISCUSSION

The initial (11 May 93) source test performed on Boiler 3 indicated that the average particulate emission rate was approximately 6% above the State of Alaska standard, with only one of the 3 sampling runs below the standard.

As a result of the high emission rate, system parameter adjustments were made by CH&PP personnel and the boiler retested on 13 May 93. Results from this second test show the new average particulate emission rate to be approximately 1% below the State of Alaska standard. Although the first 2 sampling runs were below the State standard, the third sampling run was significantly higher (approximately 35% above the standard). One probable cause for the high Run 3 value was that the soot blow was performed during this run instead of during Run 1. This means that Boiler 3 was operating at a high capacity for several hours prior to the soot blow, resulting in extra soot accumulation on the heat exchange surfaces.

Although the 13 May 93 source test shows Boiler 3 emissions are below the State of Alaska standard, the closeness to the standard indicates a potential for reducing emissions further. The following are items which may impact particulate emissions from the CH&PP boilers:

1. The survey sampling results show a direct correlation between the particulate emissions and the stack gas oxygen content. For both the 11 May and 13 May 93 sampling tests, the particulate emissions decreased with an increase in stack gas oxygen content (Fig. 14). Particulate emissions can be reduced

TABLE 3. Summary of Stack Emission Test Results, Boiler 3*

Date	Run #	Soot Blow	Oxygen Concentration (%)	Carbon Dioxide Concentration (%)	Particulate Emissions (gr/dscf)**
11 May 93	1	Yes	5.6	14.1	0.095
11 May 93	2	No	5.0	14.9	0.118
11 May 93	3	No	5.3	14.5	0.106
11 May 93	Avg	--	5.3	14.5	**0.106**
13 May 93	1	No	7.1	12.5	0.070
13 May 93	2	No	6.2	13.6	0.093
13 May 93	3	Yes	5.7	14.1	0.135
13 May 93	Avg	--	6.3	13.4	**0.099**

* Boiler 3 was operated at a capacity of 100,000 pounds steam per hour (lb steam/hr) for all sampling runs. The maximum design capacity for Boiler 3 is 120,000 lb steam/hr.

** gr/dscf = grains per dry standard cubic foot. The State of Alaska permitted standard is 0.10 gr/dscf.

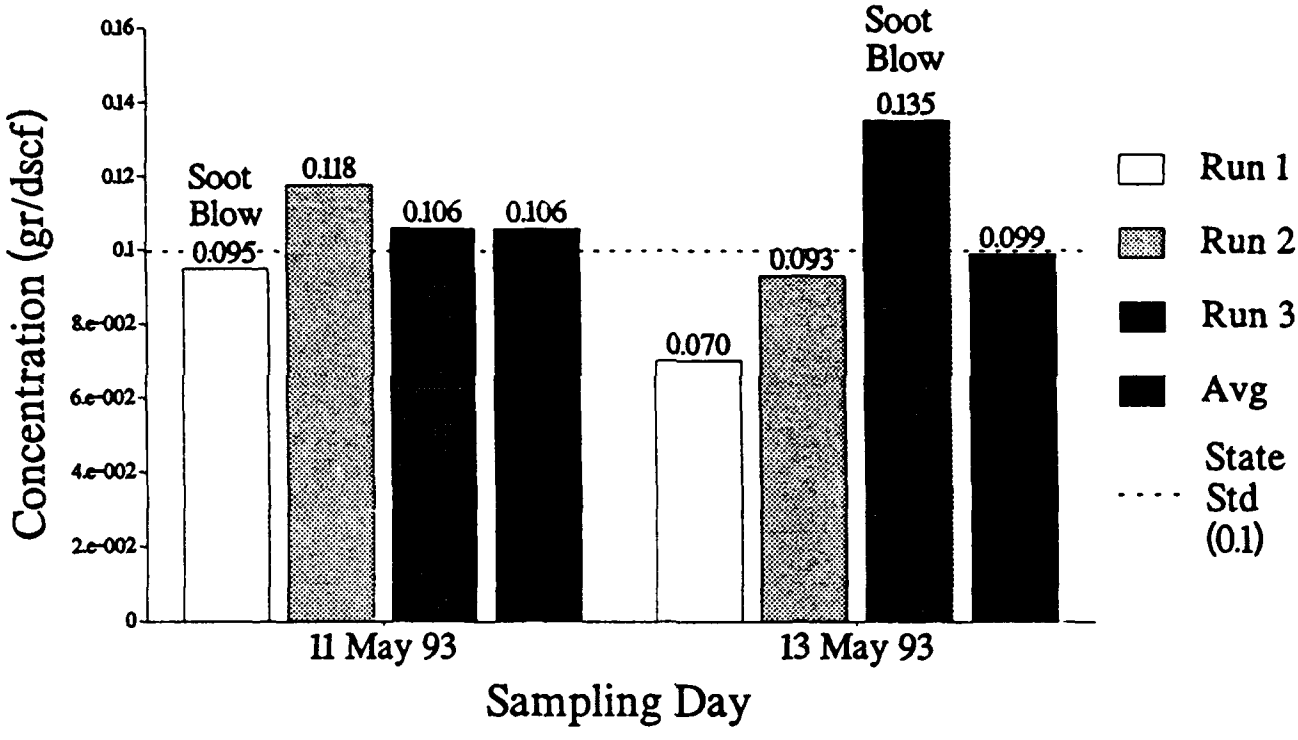

Figure 13. Chart of Sampling Results.

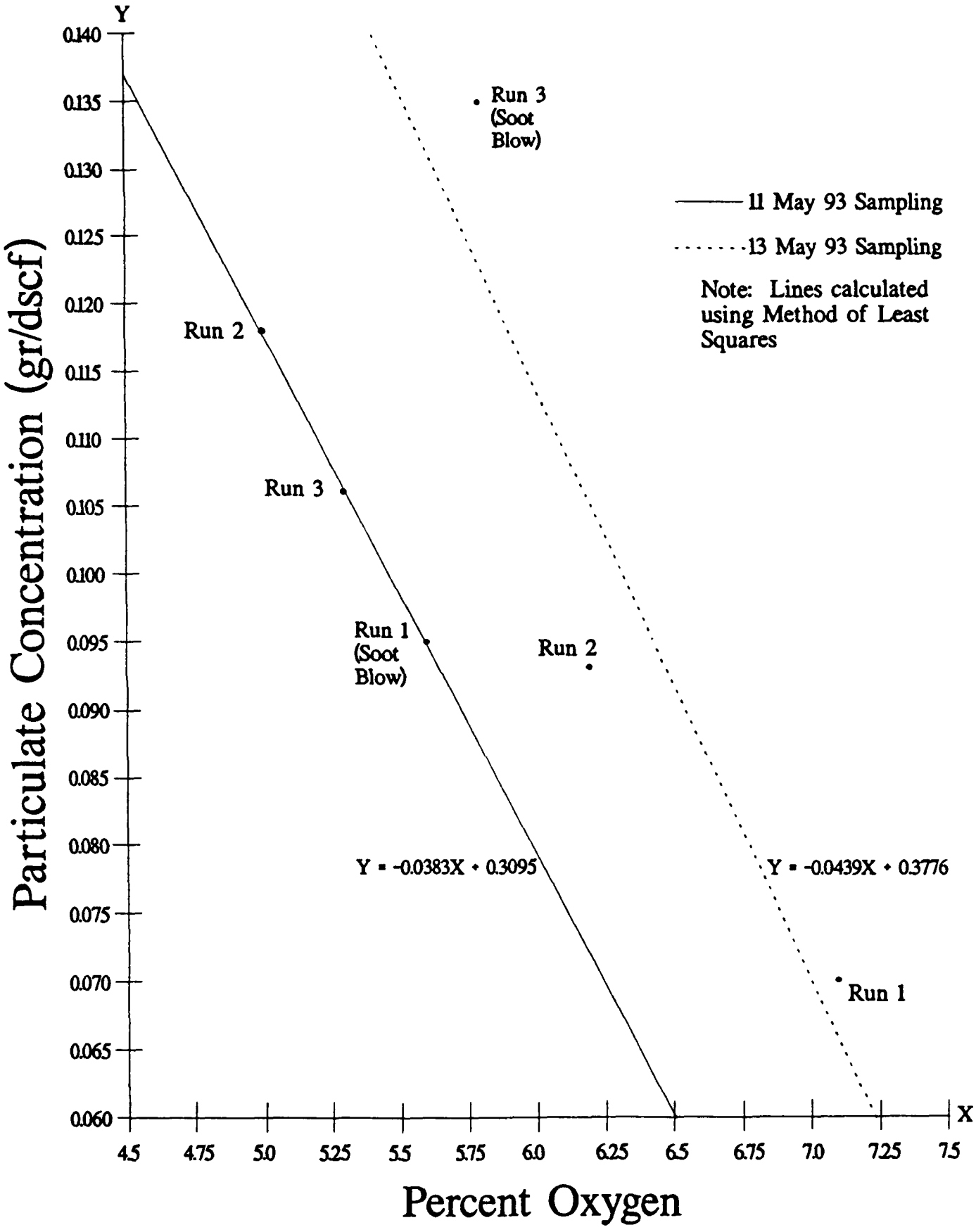

Figure 14. Correlation Between Particulate Emissions and Stack Gas Oxygen Content.

significantly when overfire air pressures are increased (7). However, increasing the amount of combustion air too much will lead to decreased combustion efficiency and excessive turbulence within the furnace (note - increasing the turbulence will increase the amount of flyash entrained in the exhaust gas stream).

2. The efficiency of cyclone separators increases with an increase in particle size (3). The 6 boilers at the CH&PP are designed to burn coal with an effective diameter of 0.75 inch. However, according to CH&PP personnel, up to 25% of the coal purchased is considered fine (i.e., less than 0.25 inch effective diameter).

3. The efficiency of cyclone separators increases with an increase in the inlet gas velocity (3). However, increasing the boiler exhaust gas flow rate may also increase the amount of flyash from the furnace which is entrained in the exhaust gas stream. Therefore, minimizing particulate emissions is highly dependent on maintaining an optimum boiler exhaust gas flow rate.

4. Particulate emissions often increase as fuel load increases (especially as full load is approached) and with sudden load changes (7).

5. Particulate emissions tend to increase as the ash content in the furnace increases (7).

RECOMMENDATIONS

The CH&PP is currently in compliance with the State of Alaska particulate emission standard. Eielson AFB personnel should thoroughly review the operating and testing requirements in Operating Permit #9331-AA001 prior to installing bag houses or using alternate fuels.

The following recommendations are provided to enhance the efficiency of your boiler systems.

1. The particulate emission rate measured during Run 1 of the 13 May 93 sampling test was approximately 30% below the Alaska standard. The boilers should be operated using conditions (e.g., oxygen levels) similar to those used during this sampling run.

2. Efforts should be made to purchase coal with a larger effective diameter.

3. The exhaust gas flow rate for each boiler should be optimized to increase the efficiency of the cyclone while decreasing the amount of flyash entrained in the exhaust gas.

4. Avoid overloading and frequent reloading of coal into the furnaces.

5. Ensure ash removal from the furnaces is performed on a frequent basis.

Armstrong Laboratory will remain active in supporting the base's present and future needs.

REFERENCES

1. USAF Occupational and Environmental Health Laboratory, Compliance Testing of Eielson AFB Central Heating and Power Plant, Coal Fired Boiler No. 3, Eielson AFB AK, USAFOEHL Report 88-149EQ0686MEF, Brooks AFB TX, December 1988.

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6. U.S. Environmental Protection Agency, Source Test Calculation and Check Programs for Hewlett-Packard 41 Calculators, EPA-340/1-85-018, Research Triangle Park NC, May 1987.

7. U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, AP-42, Research Triangle Park NC, October 1992.

APPENDIX A

Survey Request Letter

DEPARTMENT OF THE AIR FORCE
PACIFIC AIR FORCES

24 MAR 1993

FROM: 343 CES/CC
2258 Central Ave Ste 1
Eielson AFB AK 99702-2225

SUBJ: Request for Stack Test

TO: Armstrong Laboratory/OEBE
2402 E Drive
Brooks AFB TX 78235-5501

1. We request Armstrong Laboratory perform a stack test on our power plant. We are currently renewing our Air Quality Control Permit to Operate for this facility and the stack test is required as part of the permit process.

2. The previous stack test was performed in June 1989. One boiler was tested for visible emissions and particulates. We have not yet received our new permit, but do not expect any changes to the stack test requirement. Our power plant has six coal fired boilers, each with a steam capacity of 120,000 pounds per hour. Test results from the last stack test showed compliance with state regulations (opacity no greater than 20 percent and particulates no greater than 0.1 grains per cubic foot) when the boilers were operated at 100,000 pounds of steam per hour.

3. Tentatively, the time period for the stack test to be performed is the first two weeks of May. It is understood that there is no fee for this service other than TDY costs for team members. When you have selected your team, please send the names, social security numbers, and expected flight costs so that we may obtain a fund site number.

A.E. HINCHEE, GM-13
Deputy Base Civil Engineer

cc: HQ PACAF/SGPB

APPENDIX B

Personnel Information

PERSONNEL INFORMATION

1. Armstrong Laboratory Air Quality Test Team

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Capt Dennis Sylvia, Air Quality Meteorologist
MSgt Kurt Jagielski, Air Quality Technician
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Maj Randy Gross, Bioenvironmental Engineer

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Eielson AFB AK 99702-2325
Phone: DSN 377-5225
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APPENDIX C

Coal Analysis

USIBELLI COAL MINE

ANALYSIS RESULTS FOR 05/06/93

CUSTOMER.....	BTU...	% H2O	% ASH	% VOL.	% F.C.	% S..	LOCATION	BENCH	SEAM	REMARK.....	TONS
EIELSON AIR FORCE BASE	7,982	27.72	5.36	35.15	31.77	0.08	II	12B	3	50 CARS	3,659.55

APPENDIX D

Operating Permit

STATE OF ALASKA

WALTER J. HICKEL, GOVERNOR

MAY 5 RECT

DEPT. OF ENVIRONMENTAL CONSERVATION

Northern Regional Office
1001 Noble Street, Suite 350, Fairbanks, AK 99701-4980

Telephone: (907) 451-2360
Fax: (907) 451-2187

NRO File: 105.16.001

April 30, 1993

COPY

CERTIFIED MAIL - RETURN RECEIPT REQUESTED - P 077 994 258

Lt. Col. James C. Murray, Jr.
U.S. Department of the Air Force
343 CES/CC
2258 Central Avenue, Ste 1
Eielson AFB, AK 99702-2225

Dear Lt. Col. Murray:

Re: Air Quality Control Permit to Operate 9331-AA001

The Department of Environmental Conservation has received your December 11, 1992, request for renewal of Air Control Permit #8831-AA001 to operate six boilers at the Eielson AFB, Central Heating and Power Plant. Based on review of the file, the Department finds:

1. The Eielson Central Heating and Power Plant is an existing facility which consists of six boilers and one stand-by generator on base. The boilers are coal fired units. Boilers #1-4 were installed in 1950. Boilers #5 & 6 were installed in 1954. The stand-by diesel generator unit was installed in 1987 to replace existing generators from 1940.

2. The main fuel is Healy coal, but the boilers have been permitted to burn used oil, HC contaminated soil, or refuse derived fuel.

3. The facility is subject to the permitting requirements of 18 AAC 50.300(a)(1)(B).

4. The diesel generator is a stand-by unit, which will be operated in conjunction with the six boilers to ensure no emissions greater than the maximum allowed for the boilers operating alone at maximum capacity. Deviation will be allowed for in cases of extreme emergencies and for routine testing and maintenance.

5. The facility is subject to the opacity, particulate matter, sulfur dioxide, fugitive dust, and public nuisance standards in 18 AAC 50.050(a)(1), (b)(1), (b)(2), (c), (e), and (f) and 18 AAC 50.110.

Therefore, as provide by 18 AAC 50.400, the Department grants the enclosed Air Quality Control Permit to Operate 9331-AA001. Permit 9331-AA001 recinds permit 8831-AA001.

Permit 9331-AA001 will expire **January 31, 1998,** and you must have it renewed if you intend to continue to operate the boilers beyond that date. A request for renewal should be received at least 30 days prior to the expiration date if the continued operation is desired.

Please note there are 20 conditions in the permit. Failure to comply with any of these conditions will result in the suspension or revocation of your permit in accordance with 18 AAC 50.310.

You will notice that we have added several new exhibits to this permit. Exhibit B lists the emission limits and the maximum allowable annual emission of the four most common regulated air contaminants. The sulfur dioxide (SO^2) and Nitrogen oxide (NOx) emission limits were not listed on prior Air Quality Control Permit 8831-AA001.

Please note that for the coal-fired boiler, the carbon monoxide (CO) emission limit is not as restrictive as when burning refuse-derived fuel (RDF), used oil, or contaminated soil (CS).

The coal-fired boilers were last source tested June 7-15, 1989. To verify continued compliance of the boilers, the Department is requiring that a source test be conducted at least once every five operating years. As the coal-fired boilers have operated for four years after the 1989 source test, the boilers will have to be source tested at their maximum capacity with RDF, used oil and CS, before the end of 1994.

The new operating permit program mandated by the Clean Air Act Amendment of 1990 requires the collection of fees, a portion of which may be based on the actual or allowable emissions from the facility. The State is currently seeking statutory authority to implement the new operating permit program, but the program will be administered by the EPA if that effort fails. In either case, it is expected that the new operating permit program will be in place by 1995. The current permit lists the total allowable emissions from your facility in Exhibit B. 18 AAC 50.300(8) allows the owner or operator to request physical or operational limitations in order to reduce the facility's allowable emissions. If you wish to reduce the allowable emissions from your facility, please make such a request in writing, specifying the physical or operational limits to be incorporated into the permit.

Department regulations provide that if you disagree with this decision, you may request an adjudicatory hearing in accordance with 18 AAC 15.200-910. The request should be mailed to the Commissioner, Alaska Department of Environmental Conservation, 410 Willoughby Avenue, Suite 105, Juneau, AK 99801-1795, by certified mail, return receipt requested. A copy of the request shall also be sent to the Northern Regional Office, 1001 Noble Street, Suite 350, Fairbanks, AK 99701-4980. Failure to submit a request within

thirty days of service of this letter shall constitute a waiver of your right to administrative review of the decision. In addition, any other person who disagrees with this decision may request an adjudicatory hearing within thirty days of service of the enclosed permit. Any hearing granted will be limited to issues related to the issuance of this permit.

If you have any questions on this permit, please contact Jack Coutts at this office.

Sincerely,

Paul L Bateman

for William D. McGee
Regional Environmental Supervisor

SL/blt [illegible]9331001.ltr

Enclosure: Permit 9331-AA001, App. III, Sec. IV.3, SAQCP

cc: Len Verrelli, ADEC/Juneau
Doug Dasher, ADEC/Fairbanks
Sally Torok, EPA/Juneau
Max Lyon, FNSB/Fairbanks

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NORTHERN REGIONAL OFFICE
1001 NOBLE STREET, SUITE 350
FAIRBANKS, AK 99701-4980

AIR QUALITY CONTROL PERMIT TO OPERATE

Permit 9331-AA001
Rescinds 8831-AA001 Date of Issuance:

The Department of Environmental Conservation, under authority of AS 46.03, 18 AAC 15, and 18 AAC 50, issues an Air Quality Control Permit to Operate to:

U.S. Air Force
343 Civil Engineering Squadron (AAC)
Eielson Air Force Base, AK 99702

for the operation of the Eielson Air Force Base power and heating plant, consisting of six coal-fired bailers. This permit authorizes the operation of this facility only as described in the original permit and modifications as requested in documentation listed in Exhibit F, including the equipment listed in Exhibit A. Operation of the facility is subject to each condition of this permit and each requirement set forth in Exhibits C and D of this permit, and the emissions limits, standards, fuel specifications and operating limits set forth in Exhibits A and B of this permit. Where the permit differs or is more stringent than the regulations, the permit requirements apply.

LOCATION: Eielson Air Force Base, Alaska.

STANDARD CONDITIONS:

A. COMPLIANCE WITH AMBIENT STANDARDS & EMISSIONS STANDARDS, LIMITS AND SPECIFICATIONS

1. Permittee shall comply with the State Ambient Air Quality Standards and Increments established in State Air Quality Control Regulation 18 AAC 50.020.

2. Permittee shall comply with the most stringent of applicable emissions standards, limits and specifications set out in State Air Quality Control Regulation 18 AAC 50.050, 18 AAC 50.110, and Exhibit B of this permit.

B. OPERATING AND MAINTENANCE REQUIREMENTS

3. Permittee shall install, maintain, and operate, in accordance with manufacturer's procedures, fuel burning equipment, process equipment, emission control devices, testing equipment and monitoring equipment to provide optimum control of air contaminant emissions during all operating periods.

4. This permit authorizes air contaminant emissions associated only with coal, refuse derived fuel (RDF), used oil, or hydrocarbon contaminated soil in Boilers #1-6; and only with #1 oil in the stand-by diesel generator.

   a. Permittee is limited to burning up to 350,000 gallons of fuel oil per year in the stand-by diesel generator.

   b. Permittee shall offset any emissions from the stand-by generator with a corresponding reduction in emissions from the coal-fired boilers, except in extreme emergencies and routine maintenance runs not to exceed 12 hours in any three-month reporting period.

   c. Permittee may co-fire with 30% or less refuse derived fuel (RDF) in it's coal-fired boilers. The Department requires testing when co-firing with RDF, used oil or hydrocarbon contaminated soil, to ensure emissions meet the specifications of Exhibit B.

   d. The contaminated soil must not be a hazardous waste defined by 40 CFR 261.

5. Permittee shall control the following sources of fugitive dust to prevent release of particulate matter beyond the facility boundary:

   a. Material piles and roadways.
   b. Coal and ash handling and transport systems.

6. Permittee may continue to use an off-gas flare to burn gases produced during the operation of the vacuum extraction and treatability study at Site 48 on Eielson Air Force Base.

C. SOURCE TESTING REQUIREMENTS

7. Other source specific operating, testing, monitoring, or reporting requirements may be specified in the permit and exhibits, such as:

   a. Before the end of 1994, the permittee shall conduct a Source Tests on one coal boiler not equipped with a baghouse according to 40 CFR Part 60, Appendix A, Methods 1 - 5 to ascertain the concentration and mass emission rate of particulate matter for the various fuels. If RDF or contaminated soil is co-fired, the source test must be conducted with the RDF or contaminated soil in representative amounts.

   b. Permittee shall conduct tests required by Condition 7(a) of this permit at maximum design rate, or maximum anticipated operating rate. Thereafter, permittee shall operate the boilers at a rate not greater than that at which compliance was demonstrated during the required source tests. A separate source test may be performed on boiler #4 with the baghouse installed to ascertain its maximum operating rate. Until a source test demonstrates compliance at a high firing rate, each coal-fired boiler is limited to 100,000 pounds of steam/hr.

   c. Permittee shall submit for approval a complete plan for conducting the Source Test required by this permit to the Department's Northern Regional Office, 30 days prior to each test.

   d. Permittee shall submit the results of the tests required by Condition 7(a) of this permit, in the format set out in Appendix III Section IV.3 of the State Air Quality Control Plan to the Department's Northern Regional Office, within 45 days following completion of the individual tests. Additional tests may be required if deemed necessary to ascertain compliance with applicable standards and emission limits.

   e. If any continuous monitor is malfunctioning or non-operable for three or more consecutive days, permittee shall notify the Northern Regional Office by telephone and in writing on the fourth day, indicating the cause of the failure and anticipated time required to repair or replace the instrument.

D. REPORTING OF EXCESS EMISSIONS

8. Permittee shall notify the Department's Northern Regional Office by telephone or fax promptly, but not later than 24 hours, of any equipment or process failure which causes stack gas opacity to exceed 20% for more than 3-minutes in any one hour, or of any change from normal operating conditions or any other unusual circumstance which may result in emissions exceeding the limits or standards specified in this permit or regulations. The notification shall include the nature of occurrence, the expected duration, and a general description of the weather, and if applicable, the steps taken to minimize emissions and avoid recurrence. A written report for all above violations shall be submitted to the Northern Regional Office within five working days of the incident. If a fax is sent within 24 hours, no written report is required.

E. ACCESS TO FACILITY

9. Permittee shall provide access to the facility, at any reasonable time, to the Department's representative, and any other person authorized or contracted by the Department, in order to conduct an inspection or tests to determine compliance with this permit and State environmental laws and regulations. The Department representative will abide by all health and safety related rules or procedures prescribed by the permittee while within the permitted facility.

F. PERIODIC REPORTING AND RECORDS MANAGEMENT

10. Permittee shall submit a Facility Operating Report as described in Exhibit E of this permit to the Department's Northern Regional Office, by the 30th day of January and of July each year, covering the previous six months of operations. The metals and halocarbon content of used oil burned shall be reported for the parameters listed in 40 CFR 279.11, and the volume burned shall be reported in the semi-annual facility operating report.

11. Permittee shall maintain test results, monitoring instruments, recorder charts and other applicable data necessary to determine compliance with this permit in an active file for not less than one year, and have them accessible to the Department's representative, on request, for not less than three years.

12. Permittee shall maintain test results, monitoring instruments, recorder charts and other applicable data necessary to determine compliance with this permit in an active file for not less than three years, and have them accessible to the Department's representative, during an inspection.

13. Permittee shall clearly display a copy of this permit and keep a copy of the State Air Quality Control Regulations 18 AAC 50 on file at the permitted facility location.

G. CONTINUOUS MONITORING AND ROUTINE TESTING REQUIREMENTS

14. When firing only coal, the permittee shall operate Boilers #1-6 so the exhaust stack concentration of carbon monoxide does not exceed 400 parts per million, dry, corrected to 7% oxygen, based on one-hour average measurements by the Continuous Emission Monitor System required by Condition 15. When firing Coal with RDF used oil or hydrocarbon contaminated soil, the carbon monoxide concentration shall not exceed 100 parts per million, dry, corrected to 7 oxygen, based on one-hour average measurements by the Continuous Emission Monitor System required by Condition 15. The above carbon monoxide limits do not apply during startup, upsets, shutdowns, soot blowing or pulling ash.

15. Permittee shall install, calibrate, operate, and maintain a continuous emission monitoring system to measure and record the emissions of carbon monoxide through the exhaust stack of boilers co-firing RDF used oil, or hydrocarbon contaminated soil, and the concentration of oxygen stipulated in Exhibit D.

16. Permittee shall certify each continuous emission monitoring system installed as required by Condition 15 for compliance with the applicable procedures set out in 40 CFR Part 60, Appendix B, Performance Specification 3 and 4 and submit a Comparison Report as part of the source test report required by Condition 7. Any new CO or O_2 monitoring system must be certified as described by 40 CFR Part 60, Appendix B Performance Specification 3 and 4.

17. The new continuous monitor shall be installed, calibrated, certified, operated and maintained consistent with the Performance Specification 1 set out in 40 CFR Part 60, Appendix B.

18. A quality assurance plan for the opacity, CO and 0_2 monitors must be submitted for Department review before the December 31 1994. Where applicable, the plan shall conform to 40 CFR 60, Appendix F.

19. Permittee shall continuously monitor the flue gas opacity from each exhaust stack for each quarter of operation, as stipulated in Exhibit C. One, twenty minute opacity reading per boiler which operated that reporting quarter, which does not have an operating opacity meter must be taken and submitted to the Department.

20. Permittee shall continuously monitor the pressure drop across the baghouses and record representative values for each baghouse each quarter, as stipulated in Exhibit C.

This permit expires **January 31, 1998,** and may be suspended or revoked in accordance with 18 AAC 50.310.

Dated: April 30, 1993

Paul L Bateman
for William D. McGee
Regional Environmental Supervisor
Northern Regional Office

Exhibit A

Source Inventory

Permittee is authorized under this permit to operate only the following equipment. The design rating, capacity is set out in this Exhibit only for the purpose of aiding in the identification of the equipment. Permittee must notify the Department prior to installation of any new equipment of any size to determine the applicability of regulatory requirements.

Source Identification	Normal Fuel	Year Installed	Design Capacity Steam Rate	Maximum Fuel Rate
Boilers #1-4 Springfield spreader-stroker w/multiclone	Coal	1950 1987*	120 M lbs/hr	93,950 t/yr per boiler
Boilers #5 & #6 Garrette & Schafer spreader-stroker fired w/multiclone	Coal	1954 1987*	120 M lbs/hr	93,950 t/yr per boiler
Stand-by Diesel Generator #1 EMD Electro-motor	Oil	1987	2.5 MW/hr	350 M gal/yr **

* Original multiclones were installed at same time as boilers. They were replaced in 1987 with new ones.

** Based upon generator operating 20% of the year.

EXHIBIT B

AIR CONTAMINANT EMISSION LIMITS, STANDARDS, FUEL SPECIFICATIONS AND OPERATING LIMITS

Exhaust conditions shall be in accordance with the information submitted by the permittee. Permittee shall operate each source in compliance with the applicable emission standards specified by 18 AAC 50.050, and the emission limits, standards, fuel specifications and operating limits listed below, whichever is most stringent. Unless otherwise specified annual emissions are based upon the maximum fuel rate from Exhibit A.

Operations and Air Contaminants	Performance-based Emission Limits/ Operating Limit	Maximum Allowable Continuous Operation Annual Emissions Tons/Year
A. PARTICULATE MATTER	20% opacity not to be exceeded more than three minutes in any one hour	Boiler Emissions Computed from source test flue gas flow rates
Boilers #1 - #6	Not to exceed 0.10 gr/dscf	130 of TSP per boiler[5]
Stand-by Diesel Generator #1	Not to exceed 0.05 gr/dscf AP-42 Emission Factor 1.5 g/kwh	1.5 of TSP [3]
B. FUEL SPECIFICATIONS	SULFUR DIOXIDE LIMITS	
Coal 0.26% sulfur, by weight	500 ppm SO2, three hour average	490 of SO_2[4][5] per boiler
Oil 0.09% sulfur, by weight	500 ppm SO_2, three hour average	11.8 of SO_2[3][4]

EXHIBIT B (Con't)

C. PRESSURE DROP FOR BAGHOUSE		
Baghouse	Minimum pressure drop and flow rate as determined during source test, necessary to maintain air contaminant limits stipulated in this Exhibit or by manufacturer's specifications if no source test done on boilers with baghouses	
Operations and Air Contaminants	**Performance-based Emission Limits/ Operating Limit**	**Continuous Operation Max. Allowed Annual Emissions Tons/Year**
D. OXIDES OF NITROGEN		
Coal	AP-42 Emission factor 14 lb/ton[1]	660 of NO_x[2][4][5] per boiler
Oil	AP-42 Emission factor 15 g/kwh[1]	15 of NO_x[2][3][4]
E. CARBON MONOXIDE		Computed from source flue gas flow rates.
Coal	not to exceed 400 ppm, one hour average[2]	270 of CO[4][5] per boiler
Oil	AP-42 Emission factor 3.9 g/kwh	4.0 of CO[3][4]
Coal with RDF or HC Contaminated Soils	CO not greater than 100 ppm, one hour avg.	

(1) Stated as NO_2

(2) Except during startup, upsets, shutdowns, soot blowing, or pulling ash.

(3) Any emissions from stand-by diesel generators shall be offset by a corresponding reduction in coal fired boiler emissions, except in situations of extreme emergencies and routine running for maintenance and tests not to exceed 12 hours in any three month reporting period.

(4) Subject to change based on future source tests.

(5) Based upon 18 AAC 50.050, source test exhaust flow rate, and 8,760 operating hours per year at 100,000# steam/hour.

EXHIBIT B (Con't)

Note: In issuing this permit, the total emissions of each air contaminant from all existing pieces of equipment have been considered. ANY net change in emissions must be considered when determining the applicability of 18 AAC 50.300(a)(6)(C) when any future modification or series of modifications to this facility is proposed which would increase emissions of a regulated air contaminant.

Exhibit C

EMISSION TESTING REQUIREMENTS

Permittee shall conduct source tests and report the results as required by Condition 7 of this permit and as described in this exhibit. Alternative test methods may be proposed. Testing procedures must be approved by the Department prior to the test date.

Permittee shall install, calibrate, operate and maintain air contaminant emissions and process monitoring equipment on the sources as described below and in documents provided by the permittee, listed in Exhibit F. Instrument siting, operation and maintenance procedures must be approved by the Department and conform to the applicable sections of 18 AAC 50.520(a), and 40 CFR Part 60, Appendices B and F.

A Quality Assurance Plan must be developed for each monitor required by Conditions 14 and 15, conforming with 40 CFR Part 60, Appendix F, and The Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Sections 3.04, 3.07, 3.09, and 3.010 (EPA 600/4-77-027b).

An alternate emission monitoring plan may be proposed for approval by the Supervisor of the Department's Northern Regional Office if it can be shown to accurately ensure continuous compliance with the emission limits and permit conditions.

Source	Parameter and Unit of Measure	Test Method
Unit Effluent for each Boiler #1 - #6	Particulate Matter (gr/dscf and lb/hr)	Reference Method 5 specified in 40 CFR, Part 60, Appendix A.
Unit effluent for Boilers co-firing RDF used oil and/or hydrocarbon contaminated soil	Carbon monoxide, CO (ppm corrected to 7% O_2)	Reference Method 10 as specified in 40 CFR, Part 60, Appendix A
Unit effluent for each Boilers #1 - #6	Oxygen, O_2	Reference Method 3 as specified in 40 CFR, Part 60, Appendix A
Baghouse	Pressure Drop	Manometer or Electronic Gauge

Exhibit D

CONTINUOUS EMISSION AND PROCESS MONITORING REQUIREMENTS

Permittee shall monitor and report process and emission parameters as prescribed in this exhibit. Continuous monitoring equipment must be installed on the sources described below. Instrument siting, operating, and maintenance procedures must be approved by the Department and conform to 18 AAC 50.520. An alternate monitoring plan may be proposed if it can be shown to ensure continuous compliance with the emission limits specified in Exhibit B.

Parameter	Method
Fuel Consumption	Permittee shall install, operate and maintain in good working order a continuous system for recording and monitoring all fuel consumed in each boiler and diesel generator.
Fuel Sulfur Content	Permittee shall supply an analysis of each shipment of each type of fuel received.
Carbon monoxide and oxygen for Boilers #1 - #6 co-firing RDF used oil and/or hydrocarbon contaminated soil	Permittee shall maintain and operate in good working order a continuous system for recording and monitoring carbon monoxide corrected to 7% oxygen. Any new system shall be installed and calibrated according to 40 CFR Part 60, Appendix B, Performance Specification 3 and 4.
Opacity for Boiler as per schedule in letter referenced in Exhibit F, #11.	Permittee shall install, maintain, and operate in good working order a continuous system for recording and monitoring opacity. Any new system shall be installed and calibrated according to 40 CFR Part 60, Appendix B, Performance Specification 1.

Exhibit E

FACILITY OPERATING REPORT

A Facility Operating Report shall be submitted to the Department of Environmental Conservation's Northern Regional Office semi-annually by the 30th day of January and July each calendar year as required under Condition 10 of the permit. This report shall include the following information:

U.S. Air Force
343 Civil Engineering Squadron (AAC)
Eielson Air Force Base, AK 99702

1. Operations	
Coal-Fired Boilers #1 - #6	For each boiler, number of days or hours per each quarter.
Diesel Generator #1	Number of days or hours per each quarter.
2. Fuel Consumption	Gallons and type of liquid fuel burned. Tons of coal, and/or RDF, and/or contaminated soils burned per each quarter.
3. Baghouse Pressure Drop	Report daily maximum, minimum and average of the values for each quarter.
4. Fuel Quality	
Coal	Sulfur content and date of each fuel delivery.
Oil	Sulfur content and date and volume of each fuel delivery.
RDF	Source and amount of each fuel delivery.
Contaminated Soils	Water, hydrocarbon and halocarbon content. Results of TCLP tests.
Used Oil	Metals and halocarbon content listed in 40 CFR 279.11.

5. Describe any maintenance work or system modification which may have improved the air contaminant emissions from the power plant and list date(s) of operator inspections(s).

Exhibit E (con't)

6. If not already reported per Condition 8, attach a table listing opacity and duration or a copy of the opacity monitor charts when the boiler is supplying steam when opacity exceeded 20% for more than three minutes in any one hour. Provide a written explanation for the exceedance directly on the chart or table. If already reported per Condition 8, attach a list of report dates and what limit was exceeded by which boiler.

7. Attach one, twenty-minute opacity reading per boiler which does not have an operating opacity meter.

8. 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."

Exhibit F

PERMIT APPLICATION DOCUMENTATION

1. Department of the Air Force Air Quality Control Permit to Operate application dated December 17, 1977, and emissions information report OMB 158-R75 dated February 2, 1976.

2. The Alaska Department of Environmental Conservation (ADEC) report of "Particulate Matter and Sulfur Dioxide Emissions Source Test" for Eielson Air Force Base's power plant dated May 14 and 15, 1981.

3. ADEC letter to U.S. Air Force Director, Engineering Energy and Environmental Planning, Elmendorf Air Force Base, dated March 19, 1985, requesting a source test at the Eielson Air Force Base power plant.

4. U.S. Air Force letter dated March 11, 1986, to ADEC stating "a source test will be conducted..."

5. U.S. Air Force letter dated January 7, 1988, to ADEC requesting renewal of Eielson's Air Quality Control Permit to Operate.

6. Air Quality Control Permit to Operate #8831-AA001 issued January 21, 1988.

7. Source test final report dated July 1989.

8. U.S. Air Force letter dated July 6, 1992, requesting modification to Air Quality Control Permit to Operate #8831-AA001 to co-fire contaminated soils with coal.

9. Modification Air Quality Control Permit to Operate #8831-AA001 to allow test co-firing of contaminated soils with coal dated July 15, 1992.

10. Modification to Air Quality Control Permit to Operate #8831-AA001 to permit flaring at Site 48 dated August 24, 1992.

11 U.S. Air Force letter dated December 11, 1992, requesting renewal of Air Quality Control Permit to Operate #8831-AA001.

APPENDIX E

Alaska Air Quality Regulation

ALASKA AIR QUALITY CONTROL REGULATIONS

(Alaska Administrative Code, Title 18, Environmental Conservation, Chapter 50 — Air Quality Control; Effective May 26, 1972; Amended November 9, 1972; May 8, 1974; May 4, 1980; November 1, 1982; October 30, 1983; June 7, 1987; June 2, 1988)

ARTICLE 1.
PROGRAM STANDARDS AND LIMITATIONS

50.010. APPLICABILITY OF LOCAL GOVERNMENT REGULATIONS. A local air quality control agency may establish the same or more stringent regulations, but not less stringent regulations, as the applicable regulations specified in this chapter.

50.020. AMBIENT AIR QUALITY STANDARDS. (a) The concentration of contaminants in the ambient air, corrected to standard conditions, may not exceed the following:

(1) suspended particulate matter —

(A) annual geometric mean of 60 micrograms per cubic meter; or

(B) 24-hour average of 150 micrograms per cubic meter more than once each year;

(2) sulfur oxides, measured as sulfur dioxide —

(A) annual arithmetic mean of 80 micrograms per cubic meter;

(B) 24-hour average of 365 micrograms per cubic meter more than once each year; or

(C) three-hour average of 1300 micrograms per cubic meter more than once each year;

(3) carbon monoxide —

(A) eight-hour average of 10 milligrams per cubic meter more than once each year; or

(B) one-hour average of 40 milligrams per cubic meter more than once each year;

(4) ozone — one-hour average of 235 micrograms per cubic meter expected more than once per year;

(5) nitrogen dioxide — annual arithmetic mean of 100 micrograms per cubic meter;

(6) reduced sulfur compounds, expressed as sulfur dioxide — 30-minute average of 50 micrograms per cubic meter more than once each year; and

(7) lead — quarterly arithmetic mean of 1.5 micrograms per cubic meter.

(b) In areas where concentrations of contaminants in the ambient air are less than the standards set out in (a) of this section, the concentrations must be kept below those standards, and no increase above the baseline concentration may exceed

(1) for a Class I area

(A) suspended particulate matter —

(i) annual geometric mean of five micrograms per cubic meter; or

(ii) 24-hour average of 10 micrograms per cubic meter more than once each year; and

(B) sulfur dioxide —

(i) annual arithmetic mean of two micrograms per cubic meter;

(ii) 24-hour average of five micrograms per cubic meter more than once each year; or

(iii) three-hour maximum of 25 micrograms per cubic meter more than once each year;

(2) for a Class II area

(A) particulate matter —

(i) annual geometric mean of 19 micrograms per cubic meter, or

(ii) 24-hour average of 37 micrograms per cubic meter more than once each year; and

(B) sulfur dioxide —

(i) annual arithmetic mean of 20 micrograms per cubic meter;

(ii) 24-hour average of 91 micrograms per cubic meter more than once each year; or

(iii) three-hour average of 512 micrograms per cubic meter more than once each year;

(3) for a Class III area

(A) particulate matter

(i) annual geometric mean of 37 micrograms per cubic meter; or

(ii) 24-hour average of 75 micrograms per cubic meter more than once each year; and

(B) sulfur dioxide

(i) annual arithmetic mean of 40 micrograms per cubic meter;

(ii) 24-hour average of 182 micrograms per cubic meter more than once each year; or

(iii) three-hour average of 700 micrograms per cubic meter more than once each year.

50.021. STATE AIR QUALITY CLASSIFICATIONS. (a) For purposes of classifying areas according to air quality, those areas in nonattainment with the ambient air quality standards of this chapter are

(1) Anchorage urban area for carbon monoxide; and

(2) Fairbanks and North Pole urban areas for carbon monoxide.

(b) For purposes of the ambient air quality standards specified in 18 AAC 50.020(b)

(1) Class I areas in the state are

(A) Denali (Mt. McKinley) National Park;

(B) that portion of Bering Sea National Wildlife Refuge designated as a National Wilderness Area;

(C) that portion of Simeonof National Wildlife Refuge designated as a National Wilderness Area; and

(D) that portion of Tuxedni National Wildlife Refuge designated as a National Wilderness Area;

(2) those areas of the state not classified in (a) of this section, or (1) or (3) of this subsection are classified as Class II; and

(3) no areas in the state have been classified as Class III.

(c) For purposes of preventing impairment of visibility, the designated areas are

(1) Mt. Deborah and the Alaska Range East, as viewed from approximately the Savage River Campground area;

(2) Mt. McKinley, Alaska Range, and the Interior Lowlands, as viewed from the vicinity of Wonder Lake; and

(3) the Class I areas listed in (b)(1) of this section.

(d) For purposes of maintaining the ambient air quality standards set out in 18 AAC 50.020(a), the Mendenhall Valley of Juneau is a wood smoke control area.

50.030. OPEN BURNING. (a) Open burning must achieve maximum combustion efficiency throughout the burning period, and is subject to the exception in (e) of this section, the limitations in (b), (c), (d), and (f) of this section, and 18 AAC 50.110.

(b) Open burning of asphalts, rubber products, plastics, tars, oils, oily wastes, contaminated oil cleanup materials, or other materials in a way that gives off black smoke is prohibited without written approval from the department. Approved open burning is subject to the following limitations:

(1) controlled fires for training fire fighters must be advertised through news media in the general area of the activity at least three days before the activity, informing the public of the time, place, and purpose of the fire, unless waived by the department;

(2) open burning of liquid hydrocarbons produced during oil or gas well flow tests will be approved only if there are no practical means available to recycle, reuse,or dispose of the fluids in a more environmentally acceptable way; and

(3) reasonable procedures and requirements must be established by the person doing the burning to minimize adverse environment effects and limit the amount of smoke generated.

(c) Open burning or incineration of pesticides, halogenated organic compounds, cyanic compounds, or polyurethane products in a way that gives off toxic or acidic gases or particulate matter is prohibted.

(d) Open burning of putrescible garbage, animal carcasses, or petroleum-based materials is prohibited if it causes ordor or black smoke which has an adverse effect on nearby persons or residences.

(e) Controlled burning for the management of forest land, vegetative cover, fisheries, or wildlife habitat, other than burning to combat a natural wildfire, requires written approval from the department.

(f) Open burning is prohibited in an area if an air quality advisory by the department is broadcast on radio or television stating that burning is not permitted in that area for that day. This advisory will be based on a determination that there is or is likely to be inadequate air ventilation to maintain the standards set by 18 AAC 50.020.

(g) Open burning is prohibited in wood smoke control areas identified in 18 AAC 50.021(d) between November 1 and March 31.

50.040. INCINERATORS. (a) Visible emissions, excluding condensed water vapor, from an incinerator may not reduce visibility through the exhaust effluent by

(1) greater than 20 percent for a total of more than three minutes in any one hour, except as provided in (2) of this subsection; or

(2) 20 percent or greater for municipal wastewater treatment plant sludge incinerators.

(b) Emissions of particulate matter from incinerators may not exceed, per cubic foot of exhaust gas corrected to 12 percent CO_2 and standard conditions, and except as specified in (c) of this section

(1) 0.15 grains for incinerators less than 2,000 pounds, but greater than or equal to 1,000 pounds per hour rated capacity; or

(2) 0.08 grains from incinerators of 2,000 pounds per hour rated capacity or larger.

(c) Emissions of particulate matter from municipal wastewater treatment plant sludge incinerators which serve 10,000 or more persons and burn waste containing more than 10 percent wastewater treatment plant sludge by dry weight, may not exceed 0.65 grams per kilogram of dry sludge input.

50.050 INDUSTRIAL PROCESSES AND FUEL BURNING EQUIPMENT. (a) Visible emissions, excluding condensed water vapor, from an industrial process or fuel burning equipment may not reduce visibility through the exhaust effluent by

(1) greater than 20 percent for a total of more than three minutes in any one hour, except as noted in (2) — (8) of this subsection;

(2) greater than 30 percent for more than three minutes in any one hour for fuel burning equipment in operation before November 1, 1982 and using more than 20 percent woodwaste as fuel;

(3) greater than 30 percent for urea prilling towers in operation before July 1, 1972, for a total of more than three minutes in any one hour;

(4) 20 percent or greater for an asphalt plant constructed or modified after June 11, 1973;

(5) 20 percent or greater for process emissions, other than from pneumatic cleaners, at coal preparation facilities installed or modified after November 1, 1982;

(6) 10 percent or greater for pneumatic cleaners at coal preparation facilities installed or modified after November 1, 1982;

(7) 10 percent or greater for process emissions, other than from kilns, at portland cement plants installed or modified after November 1, 1982; and

(8) 20 percent or greater for kilns at portland cement plants installed or modified after November 1, 1982.

(b) Particulate matter emitted from an industrial process or fuel burning equipment may not exceed, per cubic foot of exhaust gas corrected to standard conditions

(1) 0.05 grains except as provided in (2) — (5) of this subsection, (d) of this section, and 18 AAC 50.060;

(2) 0.1 grains for a steam generating plant burning as fuel

(A) coal, and in operation before July 1, 1972;

(B) coal, and rated less than 250 million Btu per hour heat input, or

(C) municipal wastes;

(3) 0.1 grains for an industrial process in operation before July 1, 1972;

(4) 0.15 grains for fuel burning equipment in operation before November 1, 1982, and using more than 20 percent woodwaste as fuel; or

(5) 0.04 grams for an asphalt plant constructed or modified after June 11, 1973;

(c) Sulfur-compound emissions, expressed as sulfur dioxide, from an industrial process or from fuel burning equipment may not exceed 500 ppm averaged over a period of three hours, except as provided in (d) of this section, and 18 AAC 50.060.

(d) Emissions from a source installed or modified after November 1, 1982 may not exceed

(1) repealed 6-2-88;

(2) at a petroleum refinery

(A) catalytic cracking unit catalyst regenerator

(i) 1.0 kilogram of particulate matter per 1,000 kilograms of coke burnoff;

(ii) 43.0 additional grams of particulate matter per million joules supplemental heat attributable to fuels burned in a catalyst regenerator waste heat boiler; and

(iii) 500 ppm carbon monoxide by volume of exhaust gas;

(B) sulfur recovery plant rated at more than 20 long tons per day

(i) 250 ppm sulfur dioxide at zero percent oxygen on a dry basis; or

(ii) 10 ppm hydrogen sulfide and a total of 300 ppm reduced sulfur compounds, expressed as sulfur dioxide, at zero percent oxygen on a dry basis, if the air contaminants are not oxidized before release to the atmosphere; and

(C) fuel burning equipment, sulfur dioxide averaged over three hours

(i) equal to the concentration of uncontrolled emissions which would result from burning fuel gas containing 230 milligrams hydrogen sulfide per dry standard cubic meter, from equipment burning fuel gas;

(ii) a calculated concentration based on the allowable emissions in (i) and (iii) of this subparagraph, and the proportion of fuel gas and other fuels to the total fuel burned in fuel burning equipment; or

(iii) 500 ppm from all other fuel burning equipment;

(3) at a coal preparation facility

(A) thermal drying unit, 70 milligrams of particulate matter per cubic meter of exhaust gas at standard conditions; and

(B) pneumatic coal cleaning unit, 40 milligrams of particulate matter per cubic meter of exhaust gas at standard conditions; and

(4) at a portland cement plant

(A) clinker cooler, 0.050 kilograms of particulate matter per 1000 kilograms of feed on a dry basis to the kiln; and

(B) kiln, 0.15 kilograms of particulate matter per 1000 kilograms of feed on a dry basis.

(e) Release of materials other than process emissions, products of combustion, or materials introduced to control pollutant emissions from a stack at a source built or modified after November 1, 1982 is prohibited unless approved in writing by the department.

(f) No person may cause or permit bulk materials to be handled, transported, or stored, or engage in an industrial activity or construction project without taking reasonable precautions to prevent particulate matter from becoming airborne.

50.060. PULP MILLS. Average emissions per ton of pulp produced from a sulfite pulp mill may not exceed in any 24-hour period

(1) 20 pounds of sulfur oxides (expressed as sulfur dioxide) from blow pits, washer vents, storage tanks, digester relief systems, and recovery systems; and

(2) two pounds of particulate matter from blow pits, washer vents, storage tanks, digester relief systems, and recovery systems.

50.070. MOTOR VEHICLE EMISSIONS. (a) Emissions from gasoline-powered motor vehicles, excluding condensed water vapor, may not be visible for more than any five consecutive seconds.

(b) Visible emissions from diesel-powered motor vehicles, excluding condensed water vapor, may not result in a reduction of visibility of greater than 40 percent through the exhaust effluent for more than any five consecutive seconds.

50.080. [Repealed]

50.085. WOOD-FIRED HEATING DEVICES. For wood-fired heating devices,

(1) when an air quality alert is issued under 18 AAC 50.610(a)(1)(B) for particulate matter within a specific area, except areas set out in (3) of this section, visible emissions at the point of release to the atmosphere may not reduce visibility through the exhaust effluent by 50 percent or greater for more than 15 minutes in any one hour;

(2) burning in a way that creates black smoke is prohibited; and

(3) for wood smoke control areas identified in 18 AAC 50.021(d)

(A) visible emissions at the point of release to the atmosphere may not reduce visibility through the exhaust effluent by 50 percent or greater for more than 15 minutes in any one hour; and

(B) when an air emergency has been issued under 18 AAC 50.610 (a)(3)(D), no person may operate, permit, or allow the operation of a wood-fired heating device which results in the emission of smoke.

50.090. ICE FOG LIMITATIONS. The department will, in its discretion, require any person proposing to build or operate an industrial process, fuel burning equipment or incinerator in areas of potential ice fog, to obtain a permit to operate and to reduce water emissions.

50.100. MARINE VESSELS. Within three miles of the coastline of Alaska, visible emissions from any marine vessel, excluding condensed water vapor, may not result in a reduction of visibility through the exhaust effluent of greater than

(1) 40 percent for a period or periods aggregating more than three minutes in any one hour, except as provided in (2) of this section; and

(2) 40 percent for a period or periods aggregating more than six minutes in any one hour during initial startup of diesel-driven vessels.

50.110. AIR POLLUTION PROHIBITED. No person may permit any emission which is injurious to human health or welfare, animal or plant life, or property, or which would unreasonably interfere with the enjoyment of life or property.

50.120 — 50.190. [Repealed]

ARTICLE 2. PERMIT REQUIREMENTS

50.300. PERMIT TO OPERATE. (a) No person may construct, modify, reconstuct, operate, or cause the operation of the following without a permit from the department:

(1) a facility containing a source which requires an air contaminant emission control unit or system to comply with emission standards set by 18 AAC 50.040—18 AAC 50.060, and which is

(A) an industrial process with a total design rate, capacity, or throughput greater than five tons per hour and which physically or chemically treats the material; or

(B) fuel-burning equipment with a rating of 50 million Btu per hour or greater;

(2) fuel-burning equipment with a rating of 100 million Btu per hour or more;

(3) an incinerator with a rated capacity of 1,000 pounds per hour or more;

(4) a facility subject to the standards set by 18 AAC 50.040(c), 18 AAC 50.050(a)(5), 18 AAC 50.050(a)(7), or 18 AAC 50.050(d);

(5) a facility

(A) which has allowable emissions of 100 tons per year or more of an air contaminant regulated under the Clean Air Act (P.L. 91-604) as amended August 7, 1977 (P.L. 95-95), is installed after November 1, 1982, and is a

(i) fossil fuel fired steam electric plant of more than 250 million Btu's per hour heat input;

(ii) coal cleaning plant (with thermal dryers);

(iii) kraft pulp mill;

(iv) portland cement plant;

(v) primary zinc smelter;

(vi) iron and steel mill plant;

(vii) primary aluminum ore reduction plant;

(viii) primary copper smelter;

(ix) municipal incinerator capable of charging more than 250 tons of refuse per day;

(x) hydrofluoric, sulfuric, or nitric acid plant;

(xi) petroleum refinery;

(xii) lime plant;

(xiii) phosphate rock processing plant;

(xiv) coke oven battery;

(xv) sulfur recovery plant;

(xvi) carbon black plant (furnace process);

(xvii) primary lead smelter;

(xviii) fuel conversion plant;

(xix) sintering plant;

(xx) secondary metal production plant;

(xxi) chemical process plant;

(xxii) fossil fuel boiler or a combination of boilers totaling more than 250 million Btus per hour heat input;

(xxiii) petroleum storage and transfer unit with a total storage capacity exceeding 300,000 barrels;

(xxiv) taconite ore processing plant;

(xxv) glass fiber processing plant; or

(xxvi) charcoal production plant;

(B) which is listed in (A) of this paragraph, with allowable emissions of greater than 100 tons per year of a regulated air contaminant and is modified after August 7, 1977, causing an increase in allowable emissions of 100 tons per year or more; or

(C) which is listed in (A) of this paragraph with allowable emissions of greater than 100 tons per year of a regulated air contaminant and is modified after August 7, 1980, or after the date of the most recent permit issued to the facility under 18 AAC 50.400(c)(3), causing an increase in actual emissions equal to or exceeding the emissions listed in (6)(C)(i) — (xvii) of this subsection;

(6) a facility not listed in (5) of this subsection

(A) which has allowable emissions of 250 tons per year or more of an air contaminant regulated under the Clean Air Act (P.L. 91-604) as amended August 7, 1977 (P.L. 95-95), and is installed after November 1, 1982;

(B) which has allowable emissions of less than 250 tons per year of a regulated air contaminant and is modified after August 7, 1977, causing an increase in allowable emissions of 250 tons per year or more; or

(C) which has allowable emissions of more than 250 tons per year of a regulated air contaminant and which is modified after August 7, 1980, or after the date of the most recent permit issued to the facility under 18 AAC 50.400(c)(3), causing an increase in actual emissions equal to or exceeding any of the following:

(i) carbon monoxide — 100 tpy;

(ii) nitrogen oxides — 40 tpy;

(iii) sulfur dioxide — 40 tpy;

(iv) particulate matter — 25 tpy;

(v) ozone — 40 tpy of volatile organic compounds as an ozone indicator;

(vi) lead — 0.6 tpy;

(vii) asbestos — 0.007 tpy;

(viii) beryllium — 0.0004 tpy;

(ix) mercury — 0.1 tpy;

(x) vinyl chloride — one tpy;

(xi) fluorides — three tpy;

(xii) sulfuric acid mist — seven tpy;

(xiii) hydrogen sulfide (H_2S) — 10 tpy;

(xiv) total reduced sulfur including H_2S — 10 tpy;

(xv) reduced sulfur compounds including H_2S — 10 tpy;

(xvi) increased emissions of a pollutant regulated by the Clean Air Act (PL 91-604) as amended August 7, 1977 (PL 95-95) and not listed in (6)(C)(i)-(xv) of this subsection; or

(xvii) notwithstanding (i) through (xvi), if located within 10 kilometers of an area listed in 18 AAC 50.021(b)(1) with increased emissions that impact the area by 1 ug/m³ or more for a 24-hour average;

(7) a source or facility installed, reconstructed, or modified after July 1, 1979 or after the date of the most recent permit issued to the facility since November 1, 1982, under 18 AAC 50.400(c)(4), located within an area identified in 18 AAC 50.021(a), and causing an increase in actual or allowable carbon monoxide emissions, whichever is greater, from the source or facility of 100 tons per year or more; or

(8) a facility or modification to a facility for which the owner or operator has requested that the department approve limitations of emission rates or operations to reduce emissions to levels below those specified in this chapter.

(b) An application for a permit required by (a) of this section must include

(1) one set of plans and specifications clearly showing the layout of the proposed facility, location of individual equipment and points of discharge, building dimensions, and stack heights;

(2) a map or aerial photograph, on a scale at least one inch to one mile, indicating the location of the proposed facility, homes, buildings, roads, and other adjacent facilities, and the general topography within 15 kilometers of the facility;

(3) an engineering report outlining the proposed methods of operation, the

amount of material to be processed, the proposed use and distribution of the processed material, and a process flow diagram with description showing points of emission and estimated amounts and types of air contaminants to be emitted;

(4) a description of air quality control devices, including efficiency and other design criteria, and assurances that this equipment is capable of complying with applicable emission requirements specified in this chapter,

(5) if requested by the department, an evaluation of the effect of the facility's expected maximum emissions on the ambient air, including ambient air quality and meteorological data;

(6) if requested by the department, plans for emission reduction procedures to be used during an air episode; and

(7) a detailed schedule for construction or modification of the facility.

(c) A permit application for a facility subject to (a)(5) or (a)(6) of this section must include the following information, in addition to that required under (b) of this section, for each air contaminant emitted at a rate greater than an emission rate described in 18 AAC 50.300(a)(6)(C)(i)-(xvii):

(1) ambient air and meteorological data to fully describe the air quality in the vicinity of the proposed facility and any changes in air quality due to general growth which has occurred after the establishment of the baseline date in the area the facility or modification would affect; department approval of the air monitoring network is required before starting data collection;

(2) a detailed demonstration that the expected maximum emissions from the construction and operation of the facility, including emissions from associated growth, will not cause a violation, or contribute to an existing violation, of the ambient air quality standards in 18 AAC 50.020(a) or allowable increments in 18 AAC 50.020(b);

(3) an adequate demonstration that the proposed emission control system represents the best available control technology for each air contaminant and for each new or modified source; and

(4) an analysis of the impact of expected maximum emissions from the facility, including emissions from associated growth, on visibility, vegetation, and soils.

(d) A permit application for a facility subject to (a)(7) of this section must include the following information in addition to that required under (b) of this section:

(1) proof that emissions of a pollutant for which the area is declared in nonattainment will not exceed the applicable emission allowance, and will be controlled to a rate which represents the lowest achievable emission rate; and

(2) proof that other sources owned or operated by the applicant within the state are in compliance with the requirements of this chapter and the Clean Air Act (P.L. 91-604) as amended August 7, 1977 (P.L. 95-95).

(e) A permit application submitted under (a)(8) of this section need not include the information required under (b) and (c) of this section, but must specify the limitations on emission rates or operations necessary to exempt the facility from 18 AAC 50.300(a)(5) — (7) or any other requirement of this chapter.

(f) If a permit application is deficient, the department will notify the applicant by certified mail within 30 days after receipt of the application, identifying the deficiencies and the information to be submitted. When the deficiencies are corrected, the department will continue processing the application.

(g) Fugitive emissions must be included in the calculation of allowable emissions to determine if any of the following is subject to (a)(5) or (a)(6) of this section:

(1) a facility listed in (a)(5)(A) of this section; or

(2) a facility that belongs to a source category which, as of August 7, 1980, is regulated under 42 U.S.C. 7411 (new source performance standards) or 42 U.S.C. 7412 (emission standards for hazardous air pollutants) of the Clean Air Act, as amended as of August 7, 1977.

Editor's Note: A complete list of the source categories for which fugitive emissions must be included in the calculation of allowable emissions is in the State Air Quality Control Plan, which is incorporated by referencce into this chapter by 18 AAC 50.620.

50.310. REVOCATION OR SUSPENSION OF PERMIT. A permit to operate will, in the department's discretion, be revoked or suspended if the conditions of the permit or applicable laws or regulations are violated.

ARTICLE 3.
PERMIT REVIEW CRITERIA

50.400. APPLICATION REVIEW AND ISSUANCE OF PERMIT TO OPERATE. (a) Before review under (b) of this section for a facility described in 18 AAC 50.300(a)(5), (6), or (7); for a facility with a stack described in 18 AAC 50.900(23)(C); or for any other facility for which the department finds that additional public review and comment is desirable, an opportunity for public comment and hearing will be provided using the following procedures:

(1) at least 30 days before beginning review under (b) of this section a summary of the department's preliminary review and analysis of the application will be published in a newspaper of general circulation within the area where the new or modified facility is to be located. The analysis will be sent to the Environmental Protection Agency, and any federal land manager, Indian governing body on a reservation, or unit of local government which may be affected by emissions from the proposed activity; materials submitted by the applicant and a copy of the proposed permit will be available in at least one location within the area of the new or modified facility;

(2) the department, upon its own motion, or upon request, will hold a public hearing on the application following the procedures set out in 18 AAC 15.060(d)—(g); 60 days notice of a hearing will be sent to any affected federal land manager under 18 AAC 50.021(c); and

(3) public comments and testimony received on the application will be evaluated as part of the information needed to complete evaluation of the permit application, and will be made available to the public.

(b) The department will review a permit application and will, in its discretion, issue the permit within 30 days after receipt of all information needed to complete evaluation of the application, including testimony at a public hearing held under (a) of this section. For applications subject to (a) of this section, a copy of the final determination will be published and distributed as described in (a)(1) of this section.

(c) The department will issue a permit only if the applicant shows that

(1) allowable emissions from the facility and from associated growth will not prevent or interfere with the attainment or maintenance of ambient air quality standards set by 18 AAC 50.020(a);

(2) air contaminant emissions from a source in the facility will not exceed the requirements of 18 AAC 50.040 — 18 AAC 50.060 and 18 AAC 50.110 and are approvable by the Environmental Protec-

tion Agency under the federal new source performance standards or emission standards for hazardous air pollutants;

(3) for a facility subject to 18 AAC 50.300(a)(5) or (6),

(A) the best available control technology for controlling emissions of each pollutant will be installed and used for each new or modified source;

(B) in an area designated in 18 AAC 50.021(b) as in attainment with ambient air quality standards set by 18 AAC 50.020(a), allowable emissions from the facility and from associated growth will not

(i) cause or contribute to an increase in air contaminants greater than specified in 18 AAC 50.020(b); or

(ii) cause an increase of carbon monoxide more than 500 ug/m³ eight-hour average or 2000 ug/m³ one-hour average within any area specified in 18 AAC 50.021(a); and

(C) allowable emissions from the facility and from associated growth will not adversely affect air quality related values, including noise, odor, visibility, vegetation, and soils of any area within the state; and

(4) for a facility subject to 18 AAC 50.300(a)(7),

(A) emissions will not exceed the emission allowance in the applicable nonattainment area;

(B) the lowest achievable emission rate will be achieved for each new or modified source; and

(C) other sources owned or operated by the applicant within the state are in compliance with requirements of this chapter and the Clean Air Act (P.L. 91-604) as amended August 7, 1977 (P.L. 95-95).

(d) A permit to operate

(1) will be granted for no more than five years, after which the permit must be renewed for continued operation of the facility;

(2) will include a compliance schedule if the facility is emitting air contaminants in excess of applicable limitations contained in this chapter, based on the minimum time necessary to install the required control equipment; a permit which includes a compliance schedule must be renewed every year of its duration;

(3) will, in the department's discretion, require the permittee to install, use, and maintain monitoring equipment; to sample emissions according to methods prescribed by the department, at locations and intervals and by procedures specified by the department; to provide source test reports; to provide monitoring data, emission data, and information from analyses of any test samples; and to make periodic reports on process operations and emissions;

(4) will, for an application submitted under 18 AAC 50.300(a)(8), include specific limitations on emissions or operations as necessary to exempt the facility from 18 AAC 50.300(a)(5) — (7) or any other requirement of this chapter;

(5) will, in the department's discretion, require that specific emission reduction procedures be taken during an air episode; and

(6) may not be transferred without the written consent of the regional supervisor.

(e) If an application for a permit is denied, the department will notify the applicant by certified mail, stating the reasons for denial. The notification will include a statement that a person aggrieved by the department's decision may request in adjudicatory hearing within 30 days after service of the denial under 18 AAC 15.200 — 18 AAC 15.310. For applications subject to (a) of this section, a copy of the final determination will be published and distributed as described in (a)(1) of this section.

50.410. [Repealed]

ARTICLE 4. REGULATION COMPLIANCE CRITERIA

50.500. SOURCE TESTING. (a) Except as provided in (d) of this section, the department will, in its discretion, conduct or have conducted air contaminant emission tests to determine compliance with this chapter.

(b) Testing to determine compliance with this chapter must be by methods approved by the department and done at a point or points which characterize the actual discharge into the ambient air.

(c) Except as provided in (d) of this section, air contaminant emission tests must be done at maximum rated burning or operating capacity of the unit, or other rate determined by the department to characterize the actual discharge into the ambient air.

(d) Demonstration by source testing of compliance with the requirements of 18 AAC 50.040(a)(2) and (b)(2) for an incinerator greater than 4,100 pounds per hour, 18 AAC 50.050(a)(1) for a catalyst cracking unit catalyst regenerator, 18 AAC 50.040(c), 18 AAC 50.050(a)(4) — (8), 18 AAC 50.050(b)(2), or 18 AAC 50.050(d), must be done at the maximum operating or production rate within 180 days after startup of a new or modified source. Source test methods specified in 40 C.F.R. Part 60, Appendix A, as amended through July 1, 1987, or their equivalent, must be used as follows:

(1) for emissions of particulate matter, procedures specified in reference methods 1, 2, 3, 4, and 5;

(2) for emission of carbon monoxide, procedures specified in reference method 10;

(3) for emissions of sulfur dioxide, procedures specified in reference methods 1, 2, and 6;

(4) for emissions of reduced sulfur compounds, procedures specified in reference method 15;

(5) for hydrogen sulfide content of process fuel gas streams, procedures specified in reference method 11; and

(6) for visible emissions, procedures specified in reference method 9.

(e) If the provisions in (d) of this section do not apply, then compliance with emission standards must be measured by the following:

(1) for emissions of particulate matter, procedures specified in reference methods 1, 2, 3, 4, and 5 of Appendix A to 40 C.F.R. Part 60 as amended through July 1, 1987;

(2) for emissions of sulfur dioxide, procedures specified in reference methods 1, 2, and 6 of Appendix A to 40 C.F.R. Part 60, as amended through July 1, 1987; and

(3) to determine the reduction of visibility from exhaust gases, the procedures specified in the department document entitled "Alaska Air Quality Visible Emissions Evaluation Procedures" in the state Air Quality Control Plan, which is incorporated by reference into this chapter by 18 AAC 50.620.

(f) To determine compliance with this chapter, standard exhaust gas volumes

must include only the gases formed from theoretical combustion of the fuel, plus the excess gas volume normal for the specific source type, corrected to standard conditions.

50.510. AMBIENT ANALYSIS METHODS. (a) Air quality data and analyses submitted in support of a permit application must comply with procedures set out in the department document entitled "ADEC Ambient Analysis Procedures" in the State Air Quality Control Plan, which is incorporated by reference into this chapter by 18 AAC 50.620.

(b) Continuous ambient air monitoring is required in support of a permit application submitted under 18 AAC 50.300(a)(5) or (6) for each pollutant which exceeds the limitations described in 18 AAC 50.300(a)(6)(C)(i) — (xvii) unless the existing concentrations or the predicted ambient air quality impacts are less than

(1) carbon monoxide — 575 ug/m³, 8-hour average;

(2) nitrogen dioxide — 14 ug/m³, annual average;

(3) total suspended particulates - 10 ug/m³, 24-hour average;

(4) sulfur dioxide — 13 ug/m³, 24-hour average;

(5) ozone —any increase in allowable or actual volatile organic compounds emissions of 100 tons per year or more;

(6) lead — 0.1 ug/m³, quarterly average;

(7) mercury — 0.25 ug/m³, 24-hour average;

(8) beryllium — 0.001 ug/m³, 24-hour average;

(9) fluorides — 0.25 ug/m³, 24-hour average;

(10) vinyl chloride — 15 ug/m³, 24-hour average; and

(11) hydrogen sulfide — 0.2 ug/: 1-hour average.

50.520. EMISSION AND AMBIENT MONITORING. (a) Operators of facilities requiring a permit under 18 AAC 50.300 shall install, maintain, and operate continuous ambient air quality, meteorological, process, or emission monitoring and recording devices specified by the department and in accordance with 40 CFR sec. 58, Appendix B, as amended through November 1, 1983.

(b) Operators of facilities subject to 18 AAC 50.040(b)(2), 18 AAC 50.040(c), or 18 AAC 50.050(d) shall install, maintain, and operate continuous emission and process monitoring devices, keep records, and report excess emissions in accordance with procedures established in 40 CFR sec. 60 as amended through November 1, 1983.

(c) The department will, in its discretion, require the owner or operator of an air contaminant source to keep records and periodically report on the nature and amount of emissions as necessary to determine compliance with this chapter.

50.530. CIRCUMVENTION. (a) Use of air for dilution of emission contaminants without causing a total decrease in the contaminants is not permitted as a method of compliance with this chapter, except that dilution air may be used at sulfur recovery plants with a maximum production rate of 20 long tons per day or less to achieve compliance with the 500 ppm sulfur dioxide requirement in 18 AAC 50.050(c).

(b) A person owning or operating a facility emitting air contaminants subject to the limitations and provisions of this chapter shall ensure that the facility is in compliance with this chapter and any other applicable local, state, or federal law.

(c) Stack heights which exceed good engineering practice, or dispersion techniques, may not be used to affect the degree of emission limitation required for control of air contaminants.

(d) No person may construct, operate, or modify an air contaminant emission source which will result in a violation of the applicable emission standards or will interfere with the attainment or maintenance of the ambient air standards of this chapter.

ARTICLE 5. PROCEDURAL AND ADMINISTRATIVE

50.600. RECLASSIFICATION PROCEDURES AND CRITERIA. (a) The department will, in its discretion, periodically review and revise the air quality classifications within the state after notice and public hearing, except that

(1) the areas identified in 18 AAC 50.021(b)(1) of this chapter will not be reclassified; and

(2) the following areas may be reclassified only to Class I or II;

(A) an area which exceeds 10,000 acres in size and is a national monument, national primitive area, national preserve, national recreation area, national wild and scenic river, national wildlife refuge or range, or national lakeshore or seashore; and

(B) a national park or national wilderness area established after August 7, 1977 which exceeds 10,000 acres; and

(3) land within the exterior boundaries of reservations of federally recognized Indian tribes may be redesignated only by the appropriate Indian governing body.

(b) Reclassification will be initiated by the department on its own motion, or upon receipt of a petition for reclassification containing

(1) detailed reasons why reclassification is requested and is in the best interests of the public;

(2) an accurate description of the proposed boundaries of the area and the air quality within it;

(3) a detailed evaluation of emission and ambient air quality effects of any proposed new or modified facility;

(4) an evaluation of the effects of any proposed new or modified facility on air quality within other areas classified under 18 AAC 50.021;

(5) a detailed analysis of the health, environmental, economic, social, and energy effects of the proposed reclassification; and

(6) if an area proposed for reclassification includes or is part of a local government jurisdiction

(A) a resolution recommending reclassification and adopted by each affected unit of local government; and

(B) evidence that the resolution required under (A) of this paragraph was adopted after public hearing with at least 15 days' prior notice published in a newspaper of general circulation.

(c) The department will review the petition for reclassification within 30 days after receipt and will accept it for consideration if it satisfactorily describes the circumstances behind the proposed reclassification and meets the requirements of

(b) of this section. Within 10 days after acceptance under this subsection, the department will send to any affected federal land managers a draft notice of public hearings to be held on the proposed reclassification and allow 30 days for comments. Within 10 days after the comment period, the department will publish in one or more newspapers of general circulation in the area for which reclassification is sought, notice of public hearings on the proposed reclassification to be held in areas likely to be affected. The notice will include a summary of the petition, the federal land manager's comments, and the department's analysis, and will state where copies of the petition and the analysis may be obtained. The notice will be published at least 30 days before the first hearing. Copies of the notice will be sent for review and comment to state department commissioners, members of the state legislature and the Environmental Advisory Board, affected federal land managers, and to units of local government within the affected area.

(d) Public hearings on proposed reclassification will be conducted as follows:

(1) the deputy commissioner or a designee will serve as hearing officer;

(2) the hearings will be electronically recorded, and witnesses will testify under oath;

(3) the hearing officer may question a witness and will permit any reasonable, pertinent testimony to be presented; and

(4) written testimony may be introduced into the record of the hearing within 15 days following the hearing.

(e) The hearing officer will summarize the hearing record and submit a recommendation, with the basis for approval or disapproval of the reclassification, to the commissioner. The recommendation will be sent to those officials and agencies identified in (c) of this section, and to persons who submitted testimony into the public hearing record, requesting their comments within 20 days after they receive the recommendation.

(f) Within 15 days after the close of the comment period under (e) of this section, the commissioner will approve the proposed reclassification if

(1) the health, environmental, economic, social, and energy effects of the proposed reclassification are in the public interest; and

(2) reclassification will not cause or contribute to air pollutant concentrations which exceed the standards in 18 AAC 50.020.

(g) The department will annually review the air quality classifications to determine if any areas should be proposed for reclassification. The department will annually publish a summary of the classifications, any petitions for reclassification received, and air quality conditions in the state. Copies will be sent to the officials and agencies identified in (c) of this section and, upon request, to other interested persons.

(h) If an area of the state is proposed for reclassification

(1) by the department, the data specified in (b) of this section will be made available to the public at the time of public notice; the requirements of (c), (d), (e), and (f) of this section will be followed in acting on all reclassifications; or

(2) by a private individual or organization without the resources to submit a complete petition under (b) of this section, the department will provide technical and coordinative assistance to ensure reasonable opportunity for full evaluation of the proposed reclassification.

50.610. AIR EPISODES. (a) An air episode will be declared when, in the opinion of the commissioner, the concentration of air contaminants in the ambient air has reached or is predicted to reach any of the following:

(1) for an air alert

(A) sulfur dioxide — 800 micrograms per cubic meter (24-hour average);

(B) particulate matter — 375 micrograms per cubic meter (24-hour average); and

(C) carbon monoxide — 17 milligrams per cubic meter (eight-hour average); and

(D) particulate matter generated from wood-burning activities within wood smoke control areas — 150 micrograms per cubic meter (24-hour average);

(2) for an air warning

(A) sulfur dioxide — 1,600 micrograms per cubic meter (24-hour average);

(B) particulate matter — 625 micrograms per cubic meter (24-hour average); and

(C) carbon monoxide — 34 milligrams per cubic meter (eight-hour average); and

(3) for an air emergency

(A) sulfur dioxide — 2,100 micrograms per cubic meter (24-hour average);

(B) particulate matter — 875 micrograms per cubic meter (24-hour average);

(C) carbon monoxide — 46 milligrams per cubic meter (eight-hour average).

(D) particulate matter generated from wood-burning activities within wood smoke control areas — 260 micrograms per cubic meter (24-hour average).

(b) The commissioner will prescribe and publicize curtailment actions when a level of air contaminants in (a) of this section is about to be reached.

50.620 AIR QUALITY CONTROL PLAN. Volumes II and III of the Air Quality Control Plan, as amemded by the department through June 2, 1988, for implementing and enforcing this chapter, may be reviewed at the department's central or regional offices, are on file at the office of the lieutenant governor, and are incorporated by reference as part of this chapter.

ARTICLE 6. GENERAL PROVISIONS

50.900. DEFINITIONS. In this chapter

(1) "actual emissions" means the average rate, in tons per year, that the facility actually emitted during the most recent two years of normal operation; facility-specific allowable emissions may be considered actual emissions;

(2) "air contaminant" means dust, fumes, mist, smoke, fly ash and other particulate matter, vapor, gas, odorous substances, or a combination of these things;

(3) "air curtain incinerator" means a incinerator in which large amounts of combustible materials are burned in a rectangular container equipped with an overfire air system;

(4) "allowable emissions" means the calculated emission rate of a source or facility using the maximum rated capacity and enforceable limitations and conditions on emissions or operations;

(5) "ambient air" means that portion of

the atmosphere, external to buildings, to which the public has access;

(6) "asphalt plant" means a facility which manufactures asphalt concrete by heating and drying aggregate and mixing asphalt cements; the term includes any combination of dryers, systems for screening, handling, storing, and weighing dried aggregate, systems for loading, transferring, and storing mineral filler; systems for mixing, transferring, and storing asphalt concrete; and emission control systems within the facility;

(7) "baseline concentration" means the ambient concentration level for a pollutant which exists on the applicable baseline date, plus the contribution from allowable emissions of a facility described in 18 AAC 50.300(a)(5) and (6), for which construction began before January 6, 1975, but which was not in operation by the baseline date, minus the contribution from actual emissions from a facility described in 18 AAC 50.300(a)(5) and (6) constructed or modified on or after January 6, 1975;

(8) "baseline date" means, for each air contaminant and for any air quality control region in which a facility would locate or have an air quality annual impact equal to or greater than one microgram per cubic meter, the earliest date after August 7, 1977 and before November 1, 1982 on which the first permit application was found to be complete by the Environmental Protection Agency, or the date after November 1, 1982 on which information required under 18 AAC 50.300(c) for a facility subject to 18 AAC 50.300(a)(5) and (6) is submitted;

(9) "best available control technology" means the emission limitation which represents the maximum reduction achievable for each regulated air pollutant, taking into account energy, environmental and economic impacts, and other costs; the resulting emissions must comply with applicable federal emission standards; best available control technology may include, for example, design features, equipment specifications, work practices, operational standards, or combinations of these factors;

(10) "Btu" means British thermal unit;

(11) "coal preparation facility" means a facility which prepares coal by breaking, crushing, screening, wet or dry cleaning, or thermal drying, and which processes more than 200 tons per day of coal; the term includes any combination of thermal dryers, pneumatic coal cleaning equipment, coal processing and conveying equipment, breakers and crushers, coal storage systems, and coal transfer systems within the facility;

(12) "commissioner" means the commissioner of environmental conservation;

(13) "construct" means fabricate, erect, or install a source, or to make any physical change to a facility or to change in method of operation which would result in a change in actual emissions;

(14) "department" means the Department of Environmental Conservation;

(15) [Repealed]

(16) "dispersion technique" means a technique that attempts to reduce the concentration of an air contaminant in the ambient air by

(A) using that portion of a stack which exceeds good engineering practice stack height;

(B) varying the emission rate of an air contaminant according to atmospheric conditions or ambient concentrations of that air contaminant; or

(C) increasing exhaust gas plume rise by manipulating a source process parameter, exhaust gas parameter, or stack parameter, combining exhaust gases from several existing stacks into one stack, or by other selective handling of exhaust gas streams; this does not include

(i) reheating a gas stream, following use of an emission control system, to its original discharge temperature;

(ii) combining the exhaust gases from several stacks into one stack if the facility was originally designed and constructed with combined exhaust streams;

(iii) combining the exhaust gases from several stacks into one stack, if done concurrently with the installation of an emission control system accompanied by a net reduction in the allowable emissions of the controlled air contaminant; or

(iv) any technique that increases the exhaust gas plume rise if the allowable emissions of sulfur dioxide from the facility are less than 5,000 tons per year.

(17) [Repealed]

(18) "emission" means release of air contaminants into the environment;

(19) "emission allowance" means, for each nonattainment pollutant, the amount of air contaminant emissions allowed from new or modified facilities, as defined in each applicable local air quality control plan, which will not interfere with attainment of the ambient air quality standards;

(20) "excessive concentration" means, in determining good engineering practice stack height,

(A) a maximum ground-level concentration caused by emissions from the stack which is at least 40 percent in excess of the maximum concentration experienced in the absence of downwash, wakes, or eddy effects produced by any nearby structure or nearby terrain feature;

(B) for a source seeking to establish good engineering practice stack height under (23)(C) of this section, a maximum ground-level concentration as described in (A) of this paragraph caused by emissions from the individual stack which, in addition,

(i) contributes to a total concentration due to emissions from all sources which is greater than an ambient air quality standard in 18 AAC 50.020(a); or

(ii) for a source described in 18 AAC 50.300(a)(5) or (6), contributes to a total concentration due to emissions from all sources which is greater than an allowable increment in 18 AAC 50.020(b);

(C) for an existing source seeking to establish good engineering practice stack height under (23)(C) of this section, a maximum ground-level concentration as described in (B) of this paragraph if the allowable emission rate used in a modeling demonstration for determining the creditable stack height does not exceed

(i) that required by the most recent federal new source performance standard applicable to the source category; or

(ii) an alternative emission rate established by the department in consultation with the source owner or operator, after the owner or operator demonstrates to the satisfaction of the department, or the authority administering the state implementation plan, that the most recent federal new source performance standard applicable to the source category is infeasible; or

(D) for a source seeking credit for an increase in existing stack height up to the height determined under (23)(B) of this section,

(i) a maximum ground-level concentration as described in (B) of this paragraph, if the allowable emission rate used in a modeling demonstration is the emission rate specified by the State Air Quality

Control Plan, or other applicable state implementation plan, or, in the absence of such a limit, the actual emission rate; or

(ii) the actual presence of a local nuisance caused by emissions from the existing stack as determined by the department or other authority administering the state implementation plan;

(21) "facility" means pollutant-emitting sources or activities which are located on one or more contiguous or adjacent properties and which are owned or operated by the same person or by persons under common control;

(22) "fuel burning equipment" means a combustion device capable of emission, including flares but excluding mobile internal combustion engines, incinerators, marine vessels, backyard barbecues, and wood-fired heating devices;

(23) "good engineering practice" means, for stack height, the greater of

(A) 65 meters, measured from the ground level elevation at the base of the stack, or, for a source located offshore, measured from mean lower, low water;

(B) the height, measured from the ground-level elevation at the base of the stack, or for a source located offshore measured from mean lower, low water, of any nearby structure plus one and one-half times the lesser dimension (height or projected width) of the nearby structure; unless a field study or fluid model required by the department or other authority administering the state implementation plan verifies that the emissions from the stack at this height would not result in an excessive concentration of a regulated air contaminant as a result of atmospheric downwash, wakes, or eddy effects created by the source itself, any nearby structure, or any nearby terrain feature; or

(C) the height demonstrated by a fluid model or a field study approved by the department or other authority administering the state implementation plan which ensures that the emissions from a stack do not result in an excessive concentration of a regulated air contaminant as a result of atmospheric downwash, wakes, or eddy effects created by the source itself, any nearby structure, or any nearby terrain feature;

(24) "impairment of visibility" means a humanly perceptible change in visibility such as visual range, contrast, or coloration, from that which would exist under natural conditions;

(25) "incinerator" means a device used for the thermal reduction of garbage or other wastes, other than an indoor stove or fireplace, but including air curtain incinerators;

(26) "lowest achievable emission rate" means that rate of emission which reflects the most stringent emission limitation imposed in any state, or any emission control which has been achieved in practice by comparable sources;

(27) "maximum conbustion efficiency" means, for open burning, that the following are attempted: material should be kept as dry as possible through cover or dry storage; noncombustibles are separated before burn; natural or artificially induced draft is included; combustibles are separated from grass or peat layer; and combustibles are not allowed to smolder;

(28) "modify" means to make a change or a series of changes in operation, or any physical changes or additions to a source which increase the actual emissions of an air pollutant;

(29) "nearby," as used in the definition of "good engineering practice" in this section, means,

(A) for any structure in applying the formula in (23)(B) of this section, that distance up to five times the lesser of the height or the width dimension of a structure but not greater than 0.8 kilometers; the height of the structure is measured from the ground-level elevation at the base of the stack, or for sources located offshore, measured from mean lower, low water;

(B) for any structure or terrain feature in determining good engineering practice stack height with a fluid model or field study as prescribed in (23)(C) of this section, not greater than 0.8 kilometers, except that portion of a terrain feature may be considered to be nearby if it falls within a distance of up to 10 times the maximum height of the terrain feature, but not greater than 3.2 kilometers, provided that within 0.8 kilometers from the stack, the terrain feature achieves a height that is at least 40 percent of the good engineering practice stack height determined by the formula in (23)(B) of this section or 26 meters, whichever is greater, as measured from the ground-level elevation at the base of the stack or, for a source located offshore, measured from mean lower, low water; the height of the structure of terrain feature is measured from the ground-level elevation at the base of the stack, or, for a source located offshore, measured from mean lower, low water.

(30) "opacity" means the characteristic of a substance which renders it partially or wholly impervious to transmittance of light;

(31) "open burning" means the burning of a material which results in the products of combustion being emitted directly into the ambient air without passing through a stack or flare;

(32) "particulate matter" means a material except water which is, or has been, airborne and exists as a liquid or a solid at standard conditions;

(33) "petroleum refinery" means a facility engaged in the distillation of petroleum or redistillation, cracking, or reforming of unfinished petroleum derivatives;

(34) "ppm" means parts per million;

(35) "practical means available" means, when approving the open burning of liquid hydrocarbons produced during oil or gas well testing, that all alternative disposal methods will have been analyzed, and when an environmentally acceptable procedure exists, it will be required;

(36) "putrescible garbage" means a material capable of being decomposed with sufficient rapidity to cause nuisance or obnoxious odors;

(37) "reconstruct" means to make equipment or process changes for which the capital cost exceeds 50 percent of the fixed capital cost of a comparable new source or facility;

(38) "reduction of visibility" means the obscuring of an observer's vision;

(39) "regulated air pollutant" means an air pollutant regulated under Clean Air Act (P.L. 91-604) as amended August 7, 1977 (P.L. 95-95);

(40) "smolder" means to burn and smoke without flame;

(41) "source" means a structure, building, installation, or other part of a facility which emits or may emit a regulated air pollutant;

(42) "stack" means a chimney or con-

duit installed after air-pollution control equipment through which air or air contaminants are emitted into the environment;

(43) "standard conditions" means a dry gas at a temperature of 70 degrees Fahrenheit and a reference pressure of 14.7 pounds per square inch;

(44) "tpy" means tons per year; and

(45) "ug/m³" means micrograms per cubic meter of ambient air.

(46) "regional supervisor" means the supervisor of the department's regional office located at Juneau, Anchorage, or Fairbanks;

(47) "wood-fired heating device" means a device designed for wood combustion so that usable heat is derived for the interior of a building, and includes wood-fired stoves, fireplaces, wood-fired cooking stoves, and combination fuel furnaces or boilers which burn wood; and

(48) "wood smoke control area" means a geographic location within the state where wood-burning activities have resulted in a minimum of two individual 24-hour periods when ambient exposures of total suspended particulate matter solely from this activity have reached or exceeded 150 micrograms per cubic meter of air.

(49) "fugitive emissions" means those emissions of a regulated air contaminant which cannot reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.

APPENDIX F

Calibration Data

NOZZLE CALIBRATION DATA FORM

Date 11 May 93 Calibrated by Robert J. O'Brien

Nozzle identification number	Nozzle Diameter[a]			ΔD,[b] mm (in.)	D_{avg}[c]
	D_1, mm (in.)	D_2, mm (in.)	D_3, mm (in.)		
	0.250	0.251	0.250	0.001	0.250

where:

[a] $D_{1,2,3}$, = three different nozzles diameters, mm (in.); each diameter must be within (0.025 mm) 0.001 in.

[b] ΔD = maximum difference between any two diameters, mm (in.), $\Delta D \leq$ (0.10 mm) 0.004 in.

[c] D_{avg} = average of D_1, D_2, and D_3.

Calculated Diameter — 0.2596 in.

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TYPE S PITOT TUBE INSPECTION DATA FORM

1 Apr 93

Pitot tube assembly level? ✓ yes _____ no

Pitot tube openings damaged? _____ yes (explain below) ✓ no

α_1 = 1.5 ° (<10°), α_2 = 0.5 ° (<10°), β_1 = 1 ° (<5°),

β_2 = 1.0 ° (<5°)

γ = 1.5 °, θ = 0.5 °, A = 0.906 cm (in.)

z = A sin γ = (0.0237) cm (in.); <0.32 cm (<1/8 in.),

w = A sin θ = (0.0079) cm (in.); <.08 cm (<1/32 in.)

P_A (0.453) cm (in.) P_b (0.453) cm (in.)

D_t = (0.374) cm (in.)

Comments: Calibrated by O'Brien and Jagiełski

Calibration required? _____ yes ✓ no

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 2 Apr 93 Thermocouple number 6-2

Ambient temperature 22.2 °C Barometric pressure 29.280 in. Hg

Calibrator O'Brien/Jagiello Reference: mercury-in-glass ASTM 3F

other

Reference point number[a]	Source[b] (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference,[c] %
0		0.0	1.1	0.40
100		99.2	102.8	0.97
—		298.9	302.2	0.58

[a]Every 30°C (50°F) for each reference point.

[b]Type of calibration system used.

[c]$\left[\frac{(\text{ref temp, °C} + 273) - (\text{test thermom temp, °C} + 273)}{\text{ref temp, °C} + 273}\right] 100 \leq 1.5\%$.

DRY GAS METER CALIBRATION DATA (English units)

Date 22 Dec 92 Meter box number 3

Barometric pressure, P_b = 29.30 in. Hg Calibrated by JAGIELSKI / BISHOP

Vac	Orifice manometer setting (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperatures: Wet test meter (t_w), °F	Temperatures: Dry gas meter: Inlet (t_{d_i}), °F	Temperatures: Dry gas meter: Outlet (t_{d_o}), °F	Temperatures: Dry gas meter: Avg[a] (t_d), °F	Time (θ), min	Y_i	$\Delta H@_i$, in. H_2O
4.0	0.5	5	5.03	69	80	74	77	12.675	1.008	1.817
4.0	1.0	5	5.075	70	84	76	80	8.985	1.011	1.817
4.0	1.5	10	10.045	70	80	73	76.5	15.218	1.004	1.968
4.0	2.0	10	10.03	70	85	76	80.5	13.128	1.012	1.938
5.8	3.0	10	10.09	70	91	79	85	10.736	1.012	1.928
8.0	4.0	10	10.105	70	94	82	88	9.38	1.013	1.952
								Avg	1.010	1.903

ΔH, in. H_2O	$\frac{\Delta H}{13.6}$	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6})(t_w + 460)}$	$\Delta H@_i = \frac{0.0317\ \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\ \theta}{V_w}\right]^2$
0.5	0.0368	$\frac{5(29.30)(77+460)}{5.03(29.30+\frac{.5}{13.6})(69+460)}$	$\frac{0.0317(.5)}{29.30(77+460)}\left[\frac{(69+460)\,12.675}{5}\right]^2$
1.0	0.0737	$\frac{5(29.30)(80+460)}{5.025(29.30+\frac{1.0}{13.6})(70+460)}$	$\frac{0.0317(1.0)}{29.30(80+460)}\left[\frac{(70+460)\,8.985}{5}\right]^2$
1.5	0.110	$\frac{10(29.30)(76.5+460)}{10.095(29.30+\frac{1.5}{13.6})(70+460)}$	$\frac{0.0317(1.5)}{29.30(76.5+460)}\left[\frac{(70+460)\,15.218}{10}\right]^2$
2.0	0.147	$\frac{10(29.30)(80.5+460)}{10.03(29.30+\frac{2.0}{13.6})(70+460)}$	$\frac{0.0317(2.0)}{29.30(80.5+460)}\left[\frac{(70+460)\,13.128}{10}\right]^2$
3.0	0.221	$\frac{10(29.30)(85+460)}{10.09(29.30+\frac{3.0}{13.6})(70+460)}$	$\frac{0.0317(3.0)}{29.30(85+460)}\left[\frac{(70+460)\,10.736}{10}\right]^2$
4.0	0.294	$\frac{10(29.30)(88+460)}{10.105(29.30+\frac{4.0}{13.6})(70+460)}$	$\frac{0.0317(4.0)}{29.30(88+460)}\left[\frac{(70+460)\,9.38}{10}\right]^2$

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d.

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JAGIELSKI / UBAICN

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test numbers _____ Date 26 Jul 93 Meter box number 3 Plant EIELSON

Barometric pressure, P_b = 29.224 in. Hg Dry gas meter number 1 Pretest Y 1.010

Orifice manometer setting, (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: Wet test meter (t_w), °F	Temperature: Dry gas meter: Inlet (t_{d_i}), °F	Temperature: Dry gas meter: Outlet (t_{d_o}), °F	Temperature: Dry gas meter: Average[a] (t_d), °F	Time (θ), min	Vacuum setting, in. Hg	Y_i	$Y_i \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
1.9	10	9.90	74	82	74	78	13.43	9.2	1.013	$\frac{10(29.224)(78+460)}{9.9(29.224+\frac{1.9}{13.6})(74+460)}$
1.9	10	10.03	78	91	81	86	13.36	9.2	1.007	$\frac{10(29.224)(86+460)}{10.03(29.224+\frac{1.9}{13.6})(78+460)}$
1.9	10	10.07	79	93	83	88	13.29	9.2	1.005	$\frac{10(29.224)(88+460)}{10.07(29.224+\frac{1.9}{13.6})(79+460)}$
									Y = 1.008	

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d.

Acc Range : 0.960 - 1.061

V_w = Gas volume passing through the wet test meter, ft^3.

V_d = Gas volume passing through the dry gas meter, ft^3.

t_w = Temperature of the gas in the wet test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F.

t_d = Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in. H_2O.

Y_i = Ratio of accuracy of wet test meter to dry gas meter for each run.

Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest Y ±0.05Y

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

APPENDIX G

Field Data

DETERMINATION OF MINIMUM NUMBER OF TRAVERSE POINTS

Stack ID: Boiler 3 Stack diameter at ports: 4.4 (ft)

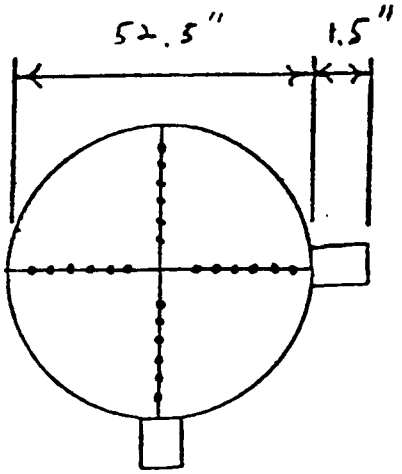
Distance A (ft) 11.1 (duct diameters) 2.5

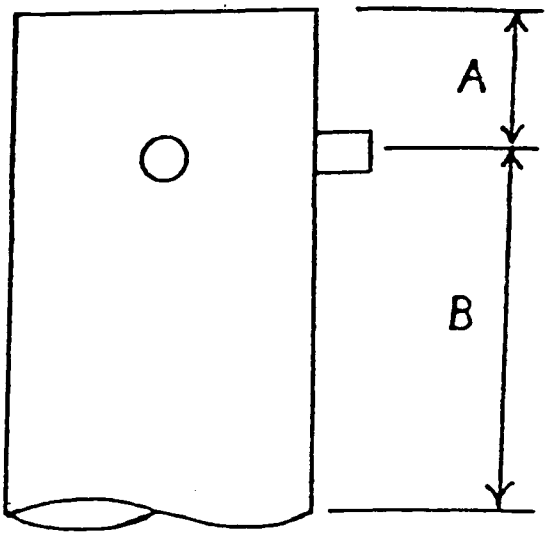
Recommended number of traverse points as determined by distance A: 12

Distance B (ft) 3 (duct diameters) 0.7

Recommended number of traverse points as determined by distance B: 24

Number of traverse points used: 24





PRELIMINARY SURVEY DATA SHEET NO. 1
(Stack Geometry)

BASE: Eielson AFB	PLANT: Central Heating & Power Plant
DATE: 10 May 93	SAMPLING TEAM: AL/OEBQ

SOURCE TYPE AND MAKE: Boiler #3, Coal Fired

SOURCE NUMBER: #3	INSIDE STACK DIAMETER: 52.5 in Inches
RELATED CAPACITY:	TYPE FUEL: Coal

DISTANCE FROM OUTSIDE OF NIPPLE TO INSIDE DIAMETER: 1.5 Inches

NUMBER OF TRAVERSES: 2	NUMBER OF POINTS/TRAVERSE: 12

LOCATION OF SAMPLING POINTS ALONG TRAVERSE

POINT	PERCENT OF DIAMETER	DISTANCE FROM INSIDE WALL (Inches)	TOTAL DISTANCE FROM OUTSIDE OF NIPPLE TO SAMPLING POINT (Inches)
1			~~2.5~~ 2.6
2			~~3.2~~ 5.0
3			~~4.4~~ 7.7
4			10.8
5			14.6
6			20.2
7			35.3
8			40.9
9			44.7
10			47.8
11			50.5
12			52.9

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PRELIMINARY SURVEY DATA SHEET NO. 2

(Velocity and Temperature Traverse)

BASE	DATE
~~ENGLAND AF~~ Eielson AFB	10 MAY 93

BOILER NUMBER: #3

INSIDE STACK DIAMETER: 53.5 Inches

STATION PRESSURE: In Hg

STACK STATIC PRESSURE: -1.06 In H20

SAMPLING TEAM: AL/OER3Q

TRAVERSE POINT NUMBER	VELOCITY HEAD, V_p IN H20	$\sqrt{V_p}$ CYCLONIC α	STACK TEMPERATURE (°F)
1	0.35	3	225
2	0.36	3	258
3	0.57	2	383
4	0.85	1	389
5	1.04	2	390
6	1.03	2	390
7	0.96	1	390
8	0.92	1	389
9	0.89	1	389
10	0.82	0	389
11	0.68	1	388
12	0.33	6	386
	FPS = 60		AVG 364
AVERAGE			

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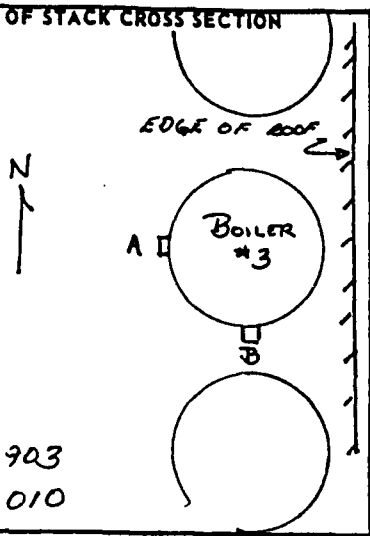
L 29.13
N COF

PARTICULATE SAMPLING DATA SHEET

1/2

RUN NUMBER: 1A
DATE: 11 MAY 93
PLANT: CHAPP BOILER #3
BASE: EIELSON AFB ~~EARLEHOOKE~~
SAMPLE BOX NUMBER: #3
METER BOX NUMBER: #3
Qw/Qm:
Co:

SCHEMATIC OF STACK CROSS SECTION



ΔH = 1.903
Yi = 1.010

EQUATIONS

$°R = °F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

ASSUMPTIONS:
MW_w 29.32
MV_D 30.58
ΔP_{STATIC} -1.06
% H2O @ 10.0
CO_2 14.9
O_2 4.8
FPS 60

PRE CHECK - GOOD 16 in Hg
POST LEAK CHECK - GOOD
START: 1208 L

AMBIENT TEMP WIND ~~CALM~~: 52 °F
STATION PRESS: 29.19 in Hg
HEATER BOX TEMP: 248 ±25 °F
PROBE HEATER SETTING: 248 ±25 °F
PROBE LENGTH: 72 in
NOZZLE AREA (A): 0.250 IN ~~sq ft~~
Cp: 0.84
DRY GAS FRACTION (Fd):

TRAVERSE POINT NUMBER	SAMPLING TIME (min) START 1208L	VAC STATIC PRESSURE (in H20)	STACK TEMP (°F) (1)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	CAL ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (6) (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (7) (°F)	SAMPLE BOX TEMP (3) (°F)	IMPINGER OUTLET TEMP (4) (°F)
1A	0	2.9	225		0.44	1.25	440.411	65		64	239	45
2	2.5	2.9	239		0.39	1.09		64		64	240	45
3	5.0	3.5	360		0.68	1.62		64		65	240	46
4	7.5	3.6	380		0.91	2.12		66		65	243	46
5	10.0	4.6	392		1.10	2.53		68		66	245	47
6	12.5	5.3	395		1.08	2.48		69		65	244	47
7	15.0	5.5	394		1.00	2.30		69		65	246	47
8	17.5	5.9	394		0.97	2.24		71		66	247	47
9	20.0	5.9	392		0.91	2.09		68		64	250	49
10	22.5	5.8	393		0.88	2.02		69		65	247	51
11	25.0	5.8	392		0.73	1.68		70		66	249	53
12	27.5	5.0	393		0.36	0.83	461.718	70		68	249	55

OEHL FORM MAY 78 18

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PARTICULATE SAMPLING DATA SHEET

2/2

RUN NUMBER: 1B

DATE: 11 MAY 93

PLANT: CH & PP BOILER #3

BASE: FIGLSON

SAMPLE BOX NUMBER:

METER BOX NUMBER: #3

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION

EQUATIONS

$^{\circ}R = {}^{\circ}F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

AMBIENT TEMP: °F

STATION PRESS: in Hg

HEATER BOX TEMP: °F

PROBE HEATER SETTING:

PROBE LENGTH: in

NOZZLE AREA (A): sq ft

Cp:

DRY GAS FRACTION (Fd):

START TIME 1258

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F) (1)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (6) (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (7) (°F)	SAMPLE BOX TEMP 3 (°F)	IMPINGER OUTLET TEMP 4 (°F)
10	0	6.5	230		0.84	2.38	461.718	64		66	245	47
2	2.5	6.5	231		0.83	2.36		66		67	248	45
3	5.0	6.7	290		1.10	2.88		68		67	247	44
4	7.5	8.2	375		1.10	2.59		70		67	250	47
5	10.0	8.0	392		1.15	2.67		073		68	249	49
6	12.5	8.7	394		1.10	2.54		74		67	249	51
7	15.0	8.6	395		1.00	2.32		75		68	250	53
8	17.5	8.7	395		1.04	2.41		75		68	249	54
9	20.0	8.7	394		1.09	2.52		74		67	249	55
10	22.5	9.7	394		1.00	2.31		73		67	248	54
11	25.0	9.0	393		0.55	1.27		72		67	248	53
12	27.5	9.0	392		0.27	0.62		70		66		
							485.709					
	$\bar{T}_{m} = 68$				$\Delta H = 2.05$							
	$\bar{T}_{s} = 359$				$(\sqrt{PSTS}) = 26.103$							
		cu ft = 45.298										

OEHL FORM MAY 78 18

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SAMPLE ANALYTICAL DATA FORM

Plant Central Heating & Power Run number 1 11 May 93

Sample location Eielson AFB

Relative humidity _____

Density of acetone (ρ_a) 0.79 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container number _____

Acetone rinse volume (V_{aw}) 310 ml

Acetone blank residue concentration (C_a) 0.006 mg/g

$W_a = C_a V_{aw} \rho_a$ = (0.006) (310) (0.79) = 1.5 mg

Date and time of wt 12 May 93 2300 hrs Gross wt 103877.0 mg

Date and time of wt 13 May 93 0830 hrs Gross wt 103877.6 mg

Average gross wt 103877.3 mg

Tare wt 103777.4 mg

Less acetone blank wt (W_a) 1.5 mg

Weight of particulate in acetone rinse (m_a) 98.4 mg

Filter(s) container number _____

Date and time of wt 12 May 93 0930 hrs Gross wt 463.6 mg

Date and time of wt 12 May 93 1615 hrs Gross wt 463.8 mg

Average gross wt 463.7 mg

Tare wt 287.0 mg

Weight of particulate on filter(s) (m_f) 176.7 mg

Weight of particulate in acetone rinse 98.4 mg

Total weight of particulate (m_n) 275.1 mg

Note: In no case should a blank residue >0.01 mg/g or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks _____

Signature of analyst Robert J. O'Brien

Signature of reviewer _____

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE	DATE	RUN NUMBER
EIELSON	11 MAY 93	1

BUILDING NUMBER	SOURCE NUMBER
CHIPP	BOILER # 3

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER Run #1	0.4637	0.2870	0.1767
ACETONE WASHINGS (Probe, Front Half Filter)	103.8773	103.7774	0.0999
~~BACK HALF (Uncooled)~~ acetone blank			- 0.0015
	Total Weight of Particulates Collected		0.2751 gm

II. WATER

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H20) ml	278	200	78
IMPINGER 2 (H20) ml	226	200	26
IMPINGER 3 (Dry) ml	1	0	1
IMPINGER 4 (Silica Gel) g	216	200 g	16
	Total Weight of Water Collected		121 gm

III. GASES (Dry)

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	14.3	14.0	14.0		14.1
VOL % O_2	5.6	5.6	5.7		5.6
VOL % CO					
VOL % N_2					

Vol % N_2 = (100% - % CO_2 - % O_2 - % CO)

OEHL FORM MAY 78 20

VISIBLE EMISSION OBSERVATION FORM

No. Run 1

COMPANY NAME: Central Heat & Power Plant

STREET ADDRESS: 354 CES/CEOF

2258 Central Ave Suite 1

CITY: Eielson AFB | STATE: AK | ZIP: 99702

PHONE (KEY CONTACT): (907) 377-3151 | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Coal Boiler #3 | OPERATING MODE: 100,000 lbs/hr

CONTROL EQUIPMENT: Cyclone Separator | OPERATING MODE: Nominal

DESCRIBE EMISSION POINT:

HEIGHT ABOVE ~~GROUND~~ ROOF LEVEL: 14' | HEIGHT RELATIVE TO OBSERVER: Start 14' End ✓

DISTANCE FROM OBSERVER: Start 90' End ✓ | DIRECTION FROM OBSERVER: Start NE End ✓

DESCRIBE EMISSIONS: Start Buoyant End ✓

EMISSION COLOR: Start Light Brown End ✓ | IF WATER DROPLET PLUME: Attached ☐ Detached ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start 2-5' above stack End ✓

DESCRIBE PLUME BACKGROUND: Start Sky End ✓

BACKGROUND COLOR: Start Blue End Grey | SKY CONDITIONS: Start mostly clear End PC

WIND SPEED: Start Calm End ✓ | WIND DIRECTION: Start End

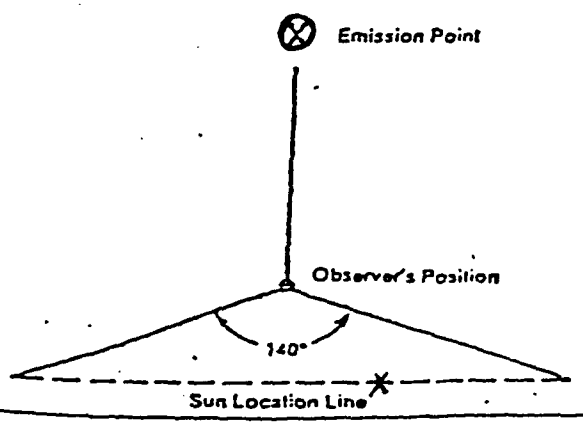
AMBIENT TEMP: Start 52 End ✓ | WET BULB TEMP | RH, percent

Stack with Plume

Sun

Wind

SOURCE LAYOUT SKETCH — Draw North Arrow



OBSERVATION DATE: 11 May 93 | START TIME: 1209 | END TIME: 1250

SEC / MIN	0	15	30	45	COMMENTS
1	5	5	5	5	
2	5	5	5	5	
3	5	5	5	5	
4	5	5	5	10	
5	5	5	5	10	
6	10	10	5	5	
7	5	5	5	5	
8	5	5	5	5	
9	10	5	5	5	
10	5	5	10	5	
11	0	0	5	5	
12	0	5	5	5	
13	5	0	5	5	
14	5	5	10	10	
15	10	10	10	10	
16	5	0	5	0	
17	5	5	5	5	
18	5	5	5	5	
19	5	5	10	10	
20	15	20	20	20	
21	15	15	15	15	
22	10	10	10	10	
23	10	5	5	5	
24	5	5	5	5	
25	10	5	5	5	
26	5	5	5	10	
27	10	45	60	55	soot Blow started
28	55	60	65	55	
29	50	40	40	30	
30	20	20	20	15	

OBSERVER'S NAME (PRINT): Robert J. O'Brien

OBSERVER'S SIGNATURE: Robert J. O'Brien | DATE: 11 May 93

ORGANIZATION: AL/OEBQ Brooks AFB TX

CERTIFIED BY: Texas Air Control Board | DATE: 12 Mar 93

ADDITIONAL INFORMATION:

VISIBLE EMISSION OBSERVATION FORM

No. Run 1 (continued)

COMPANY NAME: Central Heat & Power Plant

STREET ADDRESS:

CITY: Eielson AFB | STATE: AK | ZIP:

PHONE (KEY CONTACT): | SOURCE ID NUMBER:

PROCESS EQUIPMENT: | OPERATING MODE:

CONTROL EQUIPMENT: | OPERATING MODE:

DESCRIBE EMISSION POINT:

HEIGHT ABOVE GROUND LEVEL: | HEIGHT RELATIVE TO OBSERVER: Start End

DISTANCE FROM OBSERVER: Start End | DIRECTION FROM OBSERVER: Start End

DESCRIBE EMISSIONS: Start End

EMISSION COLOR: Start End | IF WATER DROPLET PLUME: Attached ☐ Detached ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start End

DESCRIBE PLUME BACKGROUND: Start End

BACKGROUND COLOR: Start End | SKY CONDITIONS: Start End

WIND SPEED: Start End | WIND DIRECTION: Start End

AMBIENT TEMP: Start End | WET BULB TEMP: | RH, percent:

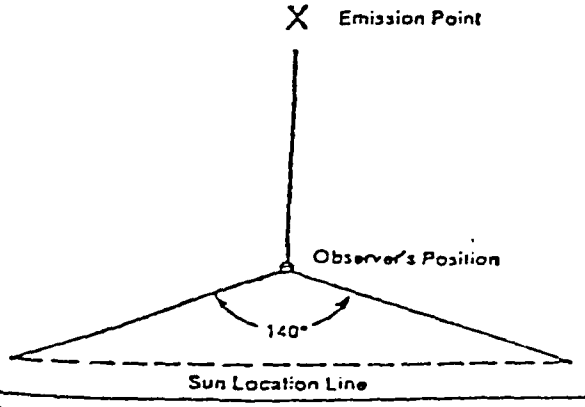
Stack with Plume

Sun

Wind

SOURCE LAYOUT SKETCH

Draw North Arrow



OBSERVATION DATE: 11 May 93 | START TIME: | END TIME:

SEC / MIN	0	15	30	45	COMMENTS
31	15	15	10	10	
32	5	5	5	10	
33	5	5	10	5	
34	5	5	5	5	
35	5	5	0	0	
36	0	5	5	5	
37	5	0	0	5	
38	5	5	5	5	
39	5	5	5	5	
40	5	5	5	5	
11					
12					
13					
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19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

OBSERVER'S NAME (PRINT): Robert J O'Brien

OBSERVER'S SIGNATURE: Robert J O'Brien | DATE: 11 May 93

ORGANIZATION: AL/OEBR Brooks AFB TX

CERTIFIED BY: Texas Air Control Board | DATE: 12 Mar 93

ADDITIONAL INFORMATION:

PARTICULATE SAMPLING DATA SHEET

1/2

RUN NUMBER: 2.A

DATE: 4 May 92

PLANT: CH & PP Boiler

BASE: Fierson

SAMPLE BOX NUMBER:

METER BOX NUMBER: #3

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION

Y: 1.010

ΔH 1.903

EQUATIONS

$°R = °F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

AMBIENT TEMP: °F

STATION PRESS: in Hg

HEATER BOX TEMP: 248 ± 25 °F

PROBE HEATER SETTING: 248 ± 25

PROBE LENGTH: 72 in

NOZZLE AREA (A): .250 sq ft

Cp: 0.84

DRY GAS FRACTION (Fd):

START 1501 L

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	VAC STATIC PRESSURE (in H20)	STACK TEMP I (°F)	STACK TEMP (Ts) (°R)	R VELOCITY HEAD (Vp)	CALC ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP 6 IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP 7 OUT (°F)	J SAMPLE BOX TEMP (°F)	4 IMPINGER OUTLET TEMP (°F)
1A	0	4.4	227		0.30	0.86		70		68	251	53
2	2.5	3.8	229		0.33	0.94		70		69	250	52
3	5.0	4.8	349		0.55	1.34		71		69	248	57
4	7.5	4.9	374		0.84	1.99		72		70	250	51
5	10.0	6.2	389		1.03	2.41		74		71	251	51
6	12.5	7.7	395		0.75	1.74		76		72	250	52
7	15.0	5.9	395		1.05	2.45		77		73	250	54
8	17.5	7.9	395		0.91	2.12		78		72	250	55
9	20.0	7.1	394		0.88	2.06		78		73	244	55
10	22.5	7.1	392		0.84	1.96		75		72	243	51
11	25.0	7.0	392		0.70	1.63		73		72	248	51
12	27.5	6.7	391		0.38	0.88		71		71	251	57
							529.535					

OEHL FORM MAY 78 18

PARTICULATE SAMPLING DATA SHEET

2/2

RUN NUMBER: 3B

DATE:

PLANT: CH4PP BOILER

BASE: EIELSON

SAMPLE BOX NUMBER:

METER BOX NUMBER: #3

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION

Y_i = 1.010

ΔH = -1.903

EQUATIONS

$^{\circ}R = {}^{\circ}F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

ASSUMPTIONS
MW_D - 30.51
MW_W - 29.26
ΔP_{STATIC} - -1.06
CO_2 - 14.8
O_2 - 5.4
% MOM = 10.0
FPS - 60

START 1426 L
STOP

AMBIENT TEMP: WIND W/OS 57 °F

STATION PRESS: 29.79 in Hg

HEATER BOX TEMP: 248 ± 25 °F

PROBE HEATER SETTING: 248 ± 25

PROBE LENGTH: 72 in

NOZZLE AREA (A): .250 IN ~~sq ft~~

Cp: .84

DRY GAS FRACTION (Fd):

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	$R_{VELOCITY HEAD}$ (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	[3] SAMPLE BOX TEMP (°F)	[4] IMPINGER OUTLET TEMP (°F)
1A	0	3.0	229		0.76	2.15	485.909	63		62	235	46
2	2.5	4.1	229		0.77	2.18		63		63	247	49
3	5.0	4.0	241		1.00	2.78		65		63	252	43
4	7.5	5.0	360		1.06	2.52		66		63	248	43
5	10.0	5.0	386		1.11	2.57		69		64	246	46
6	12.5	5.3	394		1.08	2.48		70		64	251	48
7	15.0	5.2	394		0.97	2.23		71		65	251	48
8	17.5	5.2	394		0.96	2.21		71		66	248	49
9	20.0	5.5	394		1.02	2.35		71		66	249	50
10	22.5	6.0	395		0.99	2.28		72		67	249	53
11	25.0	6.1	395		0.57	1.32		74		68	250	55
12	27.5	4.4	393		0.36	0.83		74		68	247	55
							508.839					
	$\bar{T}_M$ = 70				ΔH = 1.93							
	$\bar{T}_S$ = 355				$(\Delta P T_S)^{1/2}$ = 25.202							
		ΔH^3 = 43.626										

OEHL FORM 18 MAY 78

SAMPLE ANALYTICAL DATA FORM

Plant Central Heating & Power Run number 2 11May93

Sample location Eielson AFB

Relative humidity _____

Density of acetone (ρ_a) 0.79 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container number _____

Acetone rinse volume (V_{aw}) 300 ml

Acetone blank residue concentration (C_a) 0.006 mg/g

$W_a = C_a V_{aw} \rho_a$ = (0.006) (300) (0.79) = 1.4 mg

Date and time of wt 12 May 93 2300 hrs Gross wt 100222.2 mg

Date and time of wt 13 May 93 0830 hrs Gross wt 100223.2 mg

Average gross wt 100222.7 mg

Tare wt 100053.6 mg

Less acetone blank wt (W_a) 1.4 mg

Weight of particulate in acetone rinse (m_a) 167.7 mg

Filter(s) container number _____

Date and time of wt 12 May 93 0930 hrs Gross wt 453.5 mg

Date and time of wt 12 May 93 1615 hrs Gross wt 453.4 mg

Average gross wt 453.5 mg

Tare wt 286.5 mg

Weight of particulate on filter(s) (m_f) 167.0 mg

Weight of particulate in acetone rinse 167.7 mg

Total weight of particulate (m_n) 334.7 mg

Note: In no case should a blank residue >0.01 mg/g or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks _____

Signature of analyst Robert J. O'Brien

Signature of reviewer _____

AIR POLLUTION PARTICULATE ANALYTICAL DATA

CASE	DATE	RUN NUMBER
Edison	11 May 93	2

BUILDING NUMBER	SOURCE NUMBER
CH & PP	Boiler #3

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER #2	0.4535	0.2865	0.1670
ACETONE WASHINGS (Probe, Front Half Filter)	100.2227	100.0536	0.1691
~~BACK HALF (if needed)~~ acetone blank			-0.0014
	Total Weight of Particulates Collected		0.3347 gm

II. WATER

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H20) ml	284	200	84
IMPINGER 2 (H20) ml	222	200	22
IMPINGER 3 (Dry) ml	2	~~2~~ 0	2
IMPINGER 4 (Silica Gel) g	213.5	200g	13.5
	Total Weight of Water Collected		121.5 gm

III. GASES (Dry)

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	14.8	14.9	14.9		14.9
VOL % O_2	4.9	5.0	5.0		5.0
VOL % CO					
VOL % N_2					

Vol % N_2 = (100% - % CO_2 - % O_2 - % CO)

VISIBLE EMISSION OBSERVATION FORM

No. Run 2

COMPANY NAME	Central Heat & Power Plant
STREET ADDRESS	354 LES/CEOP
	2258 Central Ave Suite 1
CITY	Eielson AFB
STATE	AK
ZIP	99702
PHONE (KEY CONTACT)	(907) 377-3151
SOURCE ID NUMBER	

PROCESS EQUIPMENT	Coal Boiler #3
OPERATING MODE	100,000 lb/hr
CONTROL EQUIPMENT	cyclone separator
OPERATING MODE	Nominal

DESCRIBE EMISSION POINT

HEIGHT ABOVE ~~GROUND~~ ROOF LEVEL	14'
HEIGHT RELATIVE TO OBSERVER	Start 14' End ✓
DISTANCE FROM OBSERVER	Start 90' End ✓
DIRECTION FROM OBSERVER	Start NE End ✓

DESCRIBE EMISSIONS

Start Lofting End ✓

EMISSION COLOR	Start Light Brown End ✓
IF WATER DROPLET PLUME	Attached ☐ Detached ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED

Start 2-5' above stack End ✓

DESCRIBE PLUME BACKGROUND

Start sky End ✓

BACKGROUND COLOR	Start Grey End ✓
SKY CONDITIONS	Start Mostly cloudy End ✓
WIND SPEED	Start 05 End ✓
WIND DIRECTION	Start W End ✓
AMBIENT TEMP	Start 57 End ✓
WET BULB TEMP	
RH, percent	

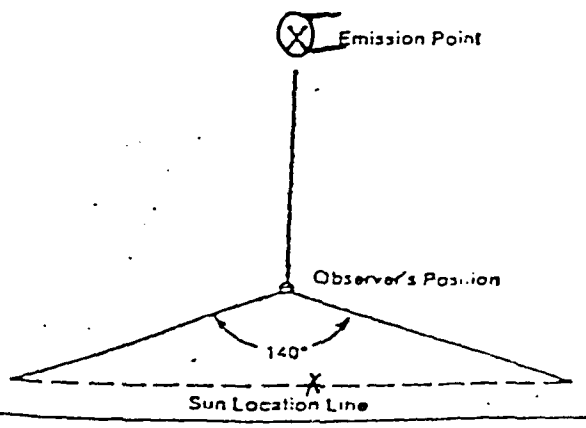
SOURCE LAYOUT SKETCH

Stack with Plume

Sun

Wind

Draw North Arrow



ADDITIONAL INFORMATION

OBSERVATION DATE	START TIME	END TIME
11 May 93.	1426	1456

SEC / MIN	0	15	30	45	COMMENTS
1	10	15	15	10	
2	10	10	5	5	
3	5	5	5	0	
4	0	5	5	0	
5	0	0	0	5	
6	0	5	5	0	
7	0	5	0	0	
8	0	0	5	0	
9	5	10	10	10	
10	10	15	10	10	
11	5	10	5	10	
12	10	5	5	5	
13	5	5	10	5	
14	5	5	5	5	
15	5	5	5	0	
16	5	0	5	5	
17	5	5	5	5	
18	5	5	0	5	
19	5	5	5	5	
20	5	5	5	5	
21	5	10	10	10	
22	5	0	5	5	
23	10	10	10	5	
24	5	5	5	5	
25	5	5	5	0	
26	0	0	0	0	
27	0	0	5	5	
28	5	5	0	0	
29	5	5	5	5	
30	0	5	5	5	

OBSERVER'S NAME (PRINT)	Robert J O'Brien
OBSERVER'S SIGNATURE	Robert J. O'Brien
DATE	11 May 93
ORGANIZATION	AL/OEBQ Brooks AFB TX
CERTIFIED BY	Texas Air Control Board
DATE	12 Mar 93

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER: 3A

DATE: 11 MAY 93

PLANT: CH & PP BOILER

BASE: EIELSON

SAMPLE BOX NUMBER:

METER BOX NUMBER: #3

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION

ΔY: 1.010

ΔH@ 1.903

EQUATIONS

$°R = °F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

Assumptions

MW_D 30.51 %H2O ~10°

MW_W 29.26 CO_2 14.3%

ΔP_{STATIC} -1.06 O_2 5.6%

FPS ~ 60

START 1642

AMBIENT TEMP 1/2 60/70 °F

STATION PRESS 29.215 in Hg

HEATER BOX TEMP 248 ±25 °F

PROBE HEATER SETTING 248 ±25

PROBE LENGTH 72 in

NOZZLE AREA (A) .250 IN ~~sq ft~~

Cp .84

DRY GAS FRACTION (Fd)

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN 6 (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT 7 (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
1A	0-2.5	3.0	228		0.35	0.99	530.648	64		64	233	46
2	2.5-5.0	3.0	239		0.32	0.89		64		64	252	44
3	5.0-7.5	3.0	346		0.53	1.20		65		64	253	41
4	7.5-10.0	3.0	387		0.82	1.89		65		64	259	41
5	10-12.5	4.8	390		1.04	2.39		66		64	259	41
6	12.5-15.0	5.6	393		1.10	2.52		67		64	254	41
7	15-17.5	6.1	393		0.98	2.24		65		63	248	43
8	17.5-20.0	6.0	394		0.93	2.13		66		63	248	44
9	20-22.5	5.6	393		0.88	2.01		65		62	248	45
10	22.5-25.0	6.0	393		0.83	1.90		66		63	251	46
11	25-27.5	6.0	394		0.70	1.61		68		64	251	46
12	27.5-30	4.0	393		0.39	0.89		68		63	251	47
							550.777					

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PARTICULATE SAMPLING DATA SHEET

2/2

RUN NUMBER: 3B

DATE: 11 May 83

PLANT: CH3. PP Boiler

BASE: Elkson

SAMPLE BOX NUMBER:

METER BOX NUMBER: #3

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION

EQUATIONS

$^{\circ}R = {}^{\circ}F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

AMBIENT TEMP: °F

STATION PRESS: in Hg

HEATER BOX TEMP: 248 ±25 °F

PROBE HEATER SETTING: 248 ±25

PROBE LENGTH: 72 in

NOZZLE AREA (A): .250 IN sq ft

Cp: .84

DRY GAS FRACTION (Fd):

START 1718L

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F) 1	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN 6 (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT 7 (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
1	0.0	3.9	235		0.77	2.16	550.777	65		64	249	48
2	2.5	6.8	235		0.77	2.17		66		64	246	44
3	5.0	6.8	365		1.08	2.56		66		64	248	44
4	7.5	8.1	375		1.05	2.46		67		64	252	45
5	10.0	8.0	386		1.10	2.55		68		64	248	44
6	12.5	8.5	393		1.10	2.53		68		64	251	46
7	15.0	8.7	394		0.94	2.16		69		65	249	46
8	17.5	8.0	394		0.94	2.16		69		65	250	47
9	20.0	8.1	394		0.98	2.25		70		65	247	47
10	22.5	8.6	394		0.92	2.12		70		66	248	48
11	25.0	8.6	393		0.65	1.50		70		66	251	48
12	27.5	7.1	393		0.55	1.27		71		67	252	48
							573.281					
	$\bar{T}_M$ = 66				ΔH = 1.94							
	$\bar{T}_S$ = 362				$(P_S T_S)^{1/2}$ = 25.723							
		P_S^2 = 42.633										

OEHL FORM MAY 78 13

SAMPLE ANALYTICAL DATA FORM

Plant Central Heating & Power Run number 3 11 May 93

Sample location Eielson AFB

Relative humidity

Density of acetone (ρ_a) 0.79 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container number

Acetone rinse volume (V_{aw}) 255 ml

Acetone blank residue concentration (C_a) 0.006 mg/g

$W_a = C_a V_{aw} \rho_a$ = (0.006) (255) (0.79) = 1.2 mg

Date and time of wt 12 May 93 2300 hrs Gross wt 99009.6 mg

Date and time of wt 13 May 93 0830 hrs Gross wt 99010.5 mg

Average gross wt 99010.1 mg

Tare wt 98869.2 mg

Less acetone blank wt (W_a) 1.2 mg

Weight of particulate in acetone rinse (m_a) 139.7 mg

Filter(s) container number

Date and time of wt 12 May 93 0930 hrs Gross wt 441.8 mg

Date and time of wt 12 May 93 1615 hrs Gross wt 441.9 mg

Average gross wt 441.9 mg

Tare wt 291.5 mg

Weight of particulate on filter(s) (m_f) 150.4 mg

Weight of particulate in acetone rinse 139.7 mg

Total weight of particulate (m_n) 290.1 mg

Note: In no case should a blank residue >0.01 mg/g or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks

Signature of analyst Robert J. O'Brien

Signature of reviewer

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE	DATE	RUN NUMBER
EIELSON	11 MAY 93	3

BUILDING NUMBER	SOURCE NUMBER
CH & PP	BOILER #3

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER RUN 3	0.4419	0.2915	0.1504
ACETONE WASHINGS (Probe, Front Half Filter)	99.0101	98.8692	0.1409
~~BACK HALF (If needed)~~ acetone blank			- 0.0012
	Total Weight of Particulates Collected		0.2901 gm

II. WATER

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H20) ml	291	200	91
IMPINGER 2 (H20) ml	217	200	17
IMPINGER 3 (Dry) ml	0	0	0
IMPINGER 4 (Silica Gel) g	222.5	200g	22.5
	Total Weight of Water Collected		130.5 gm

III. GASES (Dry)

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	14.5	14.5	14.4		14.5
VOL % O_2	5.3	5.3	5.3		5.3
VOL % CO					
VOL % N_2					

Vol % N_2 = (100% - % CO_2 - % O_2 - % CO)

VISIBLE EMISSION OBSERVATION FORM

No. Run 3.

COMPANY NAME	Central Heat & Power Plant
STREET ADDRESS	354 CES/CEOP
	2258 Central Ave Suite 1
CITY	Eielson AFB
STATE	AK
ZIP	99702
PHONE (KEY CONTACT)	(907) 377-3151
SOURCE ID NUMBER	

PROCESS EQUIPMENT	Coal Boiler #3
OPERATING MODE	100,000 lb/hr
CONTROL EQUIPMENT	cyclone separator
OPERATING MODE	Nominal

DESCRIBE EMISSION POINT

HEIGHT ABOVE ~~GROUND~~ Rock LEVEL	14'
HEIGHT RELATIVE TO OBSERVER	Start 14' End ✓
DISTANCE FROM OBSERVER	Start 90' End ✓
DIRECTION FROM OBSERVER	Start NE End ✓

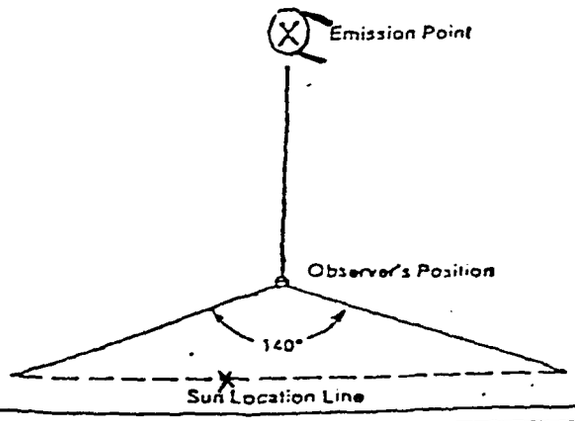
DESCRIBE EMISSIONS	Start Lifting End ✓
EMISSION COLOR	Start Light Brown End ✓
IF WATER DROPLET PLUME	Attached ☐ Detached ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	Start 2-5' above stack End ✓

DESCRIBE PLUME BACKGROUND	Start Sky End ✓
BACKGROUND COLOR	Start Blue End ✓
SKY CONDITIONS	Start clear End ✓
WIND SPEED	Start 05-10 End ✓
WIND DIRECTION	Start NW End ✓
AMBIENT TEMP	Start 70 End ✓
WET BULB TEMP	
RH, percent	

Stack with Plume
Sun
Wind

SOURCE LAYOUT SKETCH

Draw North Arrow



OBSERVATION DATE	START TIME	END TIME
11 May 93	1643	1713

SEC / MIN	0	15	30	45	COMMENTS
1	5	10	5	5	
2	0	10	10	10	
3	5	5	5	5	
4	5	10	5	0	
5	0	10	15	10	
6	5	5	10	10	
7	10	0	5	10	
8	10	10	5	10	
9	10	10	5	5	
10	10	10	10	5	
11	10	10	10	5	
12	5	5	5	5	
13	10	10	10	5	
14	10	10	10	10	
15	5	0	0	0	
16	0	0	5	5	
17	0	5	5	0	
18	5	5	5	5	
19	0	0	0	5	
20	0	0	0	5	
21	5	0	0	5	
22	5	5	0	0	
23	0	0	0	5	
24	5	5	0	0	
25	0	0	0	0	
26	5	0	0	5	
27	0	0	0	5	
28	5	5	5	5	
29	0	0	0	5	
30	5	5	5	5	

OBSERVER'S NAME (PRINT)	Robert J. O'Brien
OBSERVER'S SIGNATURE	Robert J. O'Brien
DATE	11 May 93
ORGANIZATION	AL/OEBQ Brooks AFB TX
CERTIFIED BY	Texas Air Control Board
DATE	12 Mar 93

ADDITIONAL INFORMATION

Isokinetic Determination (EPA Method 5 Program)
Boiler 3, 11 May 1993

```
                XROM "METH 5"
RUN NUMBER
ONE,  11 MAY 93
EIELSON AFB AK
                                RUN
METER BOX Y?
                    1.0100      RUN
DELTA H?
                    2.0500      RUN
BAR PRESS ?
                   29.1900      RUN
METER VOL ?
                   45.2980      RUN
MTR TEMP F?
                   68.0000      RUN
% OTHER GAS
REMOVED BEFORE
DRY GAS METER ?
                                RUN
STATIC HOH IN ?
                   -1.0600      RUN
STACK TEMP.
                  359.0000      RUN
ML. WATER ?
                  121.0000      RUN


IMP. % HOH = 11.3

% HOH=11.3

% CO2?
                   14.1000      RUN
% OXYGEN?
                    5.6000      RUN
% CO ?
                                RUN
MOL WT OTHER?
                                RUN

MWd =30.48
MW WET=29.07

SQRT PSTS ?
                   26.1030      RUN
TIME MIN ?
                   60.0000      RUN
NOZZLE DIA ?
                    0.2500      RUN
STK DIA INCH ?
                   52.5000      RUN

* VOL MTR STD = 44,865
  STK PRES ABS = 29.11
  VOL HOH GAS = 5.70
  % MOISTURE = 11.26
  MOL DRY GAS = 0.887
  % NITROGEN = 80.30
  MOL WT DRY = 30.48
  MOL WT WET = 29.07
  VELOCITY FPS = 64.43
  STACK AREA = 15.03
  STACK ACFM = 58,116.
* STACK DSCFM = 32,348.
  % ISOKINETIC =  102.00

END OF FIELD DATA
```

```
                XROM "METH 5"
RUN NUMBER
TWO,  11 MAY 93
EIELSON AFB AK
                                RUN
METER BOX Y?
                    1.0100      RUN
DELTA H?
                    1.9300      RUN
BAR PRESS ?
                   29.7900      RUN
METER VOL ?
                   43.6260      RUN
MTR TEMP F?
                   70.0000      RUN
% OTHER GAS
REMOVED BEFORE
DRY GAS METER ?
                                RUN
STATIC HOH IN ?
                   -1.0600      RUN
STACK TEMP.
                  355.0000      RUN
ML. WATER ?
                  121.5000      RUN


IMP. % HOH = 11.5

% HOH=11.5

% CO2?
                   14.9000      RUN
% OXYGEN?
                    5.0000      RUN
% CO ?
                                RUN
MOL WT OTHER?
                                RUN

MWd =30.58
MW WET=29.13

SQRT PSTS ?
                   25.2020      RUN
TIME MIN ?
                   60.0000      RUN
NOZZLE DIA ?
                    0.2500      RUN
STK DIA INCH ?
                   52.5000      RUN

* VOL MTR STD = 43.913
  STK PRES ABS = 29.71
  VOL HOH GAS = 5.72
  % MOISTURE = 11.52
  MOL DRY GAS = 0.885
  % NITROGEN = 80.10
  MOL WT DRY = 30.58
  MOL WT WET = 29.13
  VELOCITY FPS = 61.51
  STACK AREA = 15.03
  STACK ACFM = 55,483.
* STACK DSCFM = 31,582.
  % ISOKINETIC =  102.26

END OF FIELD DATA
```

```
                XROM "METH 5"
RUN NUMBER
THREE,  11 MAY 93
EIELSON AFB AK
                                RUN
METER BOX Y?
                    1.0100      RUN
DELTA H?
                    1.9400      RUN
BAR PRESS ?
                   29.2150      RUN
METER VOL ?
                   42.6330      RUN
MTR TEMP F?
                   66.0000      RUN
% OTHER GAS
REMOVED BEFORE
DRY GAS METER ?
                                RUN
STATIC HOH IN ?
                   -1.0600      RUN
STACK TEMP.
                  362.0000      RUN
ML. WATER ?
                  130.5000      RUN


IMP. % HOH = 12.7

% HOH=12.7

% CO2?
                   14.5000      RUN
% OXYGEN?
                    5.3000      RUN
% CO ?
                                RUN
MOL WT OTHER?
                                RUN

MWd =30.53
MW WET=28.95

SQRT PSTS ?
                   25.7230      RUN
TIME MIN ?
                   60.0000      RUN
NOZZLE DIA ?
                    0.2500      RUN
STK DIA INCH ?
                   52.5000      RUN

* VOL MTR STD = 42.411
  STK PRES ABS = 29.14
  VOL HOH GAS = 5.14
  % MOISTURE = 12.65
  MOL DRY GAS = 0.873
  % NITROGEN = 80.20
  MOL WT DRY = 30.53
  MOL WT WET = 28.95
  VELOCITY FPS = 63.61
  STACK AREA = 15.03
  STACK ACFM = 57,371.
* STACK DSCFM = 31,347.
  % ISOKINETIC =  99.50

END OF FIELD DATA
```

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER: 1 (SHEET 1)

DATE: 13 MAY 93

PLANT: CH 2 PP # 3

BASE: ~~ELMENDORF~~ EIELSON

SAMPLE BOX NUMBER: 3

METER BOX NUMBER: 3

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION

MW_w 29.05

MW_d 30.53

ΔP_{STATIC} -1.06

γ: 1.010 ΔH: 1.903

EQUATIONS

$^{\circ}R = {}^{\circ}F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

% MOISTURE 11.8

CO_2 14.5 %

O_2 5.3 %

FPS 63.2

PRECHECK ✓ GOOD

START 1215

AMBIENT TEMP: 63 °F

STATION PRESS: 29.66 in Hg

HEATER BOX TEMP: 248 ± 25 °F

PROBE HEATER SETTING: 248 ± 25

PROBE LENGTH: 72 in

NOZZLE AREA (A): 0.250 IN ~~sq ft~~

Cp: 0.84

DRY GAS FRACTION (Fd):

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	[k] STATIC PRESSURE (in H20)	STACK TEMP [l] (°F)	STACK TEMP (Ts) (°R)	[k] VELOCITY HEAD (Vp)	[c] ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP [6] IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP [7] OUT (°F)	[j] SAMPLE BOX TEMP (°F)	[y] IMPINGER OUTLET TEMP (°F)
1 A POS B	0.0	4.4	249		0.92	2.57	579.814	84		86	~~84~~ 243	55
2	2.5	5.2	256		1.08	2.97		87		86	252	49
3	5.0	5.9	340		1.09	2.69		89		86	262	46
4	7.5	6.0	386		1.12	2.62		93		87	263	47
5	10.0	6.1	391		1.13	2.64		94		88	262	47
6	12.5	6.6	399		1.05	2.43		85		88	265	49
7	15.0	6.7	399		0.95	2.20		95		88	260	50
8	17.5	6.3	398		0.93	2.16		96		88	251	52
9	20.0	6.6	397		0.96	2.23		97		89	246	52
10	22.5	6.9	397		0.91	2.12		97		89	247	52
11	25.0	5.4	396		0.59	1.37		97		89	248	52
12	27.5	4.3	394		0.43	0.85		95		88	248	53
							603.357					

OEHL FORM MAY 78 18

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER: 1 (GHOST 2)

DATE: 13 MAY 93

PLANT: CH & PP, #

BASE: ~~EARTHQUAKE~~ EIELSON

SAMPLE BOX NUMBER: 3

METER BOX NUMBER: 3

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION

V_s = 1,010 ΔH = 1.903

EQUATIONS

$$^{\circ}R = {}^{\circ}F + 460$$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

POST CHECK ✓ good

START 1241L

AMBIENT TEMP: °F

STATION PRESS: in Hg

HEATER BOX TEMP: 248 ± 25 °F

PROBE HEATER SETTING: 248 ± 25

PROBE LENGTH: 72 in

NOZZLE AREA (A): 0.250 IN sq ft

Cp: 0.84

DRY GAS FRACTION (Fd):

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
1B PORT A	0.0	3.0	240		0.30	0.85	603.357	88		89	245	53
2	2.5	3.1	240		0.31	0.88		89		88	246	47
3	5.0	4.6	359		0.54	1.31		91		89	247	46
4	7.5	6.7	382		0.75	1.77		93		89	248	45
5	10.0	6.8	392		0.98	2.29		95		90	248	45
6	12.5	8.1	396		1.00	2.33		96		90	249	45
7	15.0	7.6	396		0.92	1.81		97		90	249	45
8	17.5	8.1	396		0.86	2.01		98		91	249	47
9	20.0	8.2	395		0.83	1.94		99		91	251	48
10	22.5	8.2	395		0.77	1.81		100		92	251	48
11	25.0	8.2	395		0.66	1.55		101		93	251	49
12	27.5	7.7	394		0.36	0.85		101		93	251	49
							623.170					
	$\bar{T}_M$ = 92				ΔH = 1.93							
	$\bar{T}_S$ = 379				$(\Delta P T_S)^{1/2}$ = 25.673							
	ft^3 = 43.356											

OEHL FORM 18 MAY 78

SAMPLE ANALYTICAL DATA FORM

Plant Central Heating & Power Run number 1 13 May 93

Sample location Eielson AFB

Relative humidity

Density of acetone (ρ_a) 0.79 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container number

Acetone rinse volume (V_{aw}) 225 ml

Acetone blank residue concentration (C_a) 0.006 mg/g

$W_a = C_a V_{aw} \rho_a$ = (0.006) (225) (0.79) = 1.1 mg

Date and time of wt 14 May 93 1525 hrs Gross wt 103836.9 mg

Date and time of wt 14 May 93 2137 hrs Gross wt 103836.2 mg

Average gross wt 103836.6 mg

Tare wt 103768.3 mg

Less acetone blank wt (W_a) 1.1 mg

Weight of particulate in acetone rinse (m_a) 67.2 mg

Filter(s) container number

Date and time of wt 14 May 93 0900 hrs Gross wt 410.0 mg

Date and time of wt 14 May 93 1530 hrs Gross wt 410.1 mg

Average gross wt 410.1 mg

Tare wt 287.6 mg

Weight of particulate on filter(s) (m_f) 122.5 mg

Weight of particulate in acetone rinse 67.2 mg

Total weight of particulate (m_n) 189.7 mg

Note: In no case should a blank residue >0.01 mg/g or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks

Signature of analyst Robert G. O'Brien

Signature of reviewer

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE	DATE	RUN NUMBER
EIELSON	13 May 93	1

BUILDING NUMBER	SOURCE NUMBER
CH & PP	BOILER #3

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	0.4101	0.2876	0.1225
ACETONE WASHINGS (Probe, Front Half Filter)	103.8366	103.7683	0.0683
~~BACK HALF (If needed)~~ acetone blank			-0.0011
	Total Weight of Particulates Collected		0.1897 gm

II. WATER

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H20) ml	279	200	79
IMPINGER 2 (H20) ml	223	200	23
IMPINGER 3 (Dry) ml	2.5	0	2.5
IMPINGER 4 (Silica Gel) g	207	200	7
	Total Weight of Water Collected		111.5 ~~121.0~~ gm

III. GASES (Dry)

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	12.6	12.5	12.5		12.5
VOL % O_2	7.2	7.0	7.2		7.1
VOL % CO					
VOL % N_2					

Vol % N_2 = (100% - % CO_2 - % O_2 - % CO)

OEHL FORM MAY 78 20

VISIBLE EMISSION OBSERVATION FORM

No. Run 1

COMPANY NAME	Central Heat & Power Plant
STREET ADDRESS	354 CES/CEOF
	2258 Central Ave Suite 1
CITY	Eielson AFB
STATE	AK
ZIP	99702
PHONE (KEY CONTACT)	(907) 377-3151
SOURCE ID NUMBER	

PROCESS EQUIPMENT	Coal Boiler #3
OPERATING MODE	100,000 lb/hr
CONTROL EQUIPMENT	Cyclone separator
OPERATING MODE	Nominal

DESCRIBE EMISSION POINT	
HEIGHT ABOVE ~~GROUND~~ LEVEL	14' Roof
HEIGHT RELATIVE TO OBSERVER	Start 14' End ✓
DISTANCE FROM OBSERVER	Start 96' End ✓
DIRECTION FROM OBSERVER	Start NE End ✓

DESCRIBE EMISSIONS	Start Lofting End ✓
EMISSION COLOR	Start Light Brown End ✓
IF WATER DROPLET PLUME	Attached ☐ Detached ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	Start 1-5' above stack End ✓

DESCRIBE PLUME BACKGROUND	Start sky End ✓
BACKGROUND COLOR	Start Blue End ✓
SKY CONDITIONS	Start clear End ✓
WIND SPEED	Start 5-10 End ✓
WIND DIRECTION	Start NW End ✓
AMBIENT TEMP	Start 63 End ✓
WET BULB TEMP	
RH, percent	

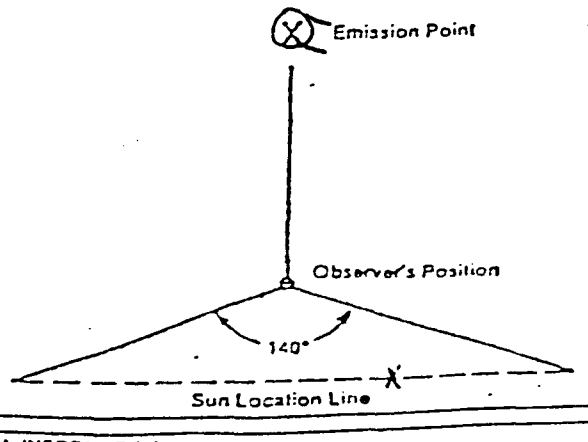
SOURCE LAYOUT SKETCH

Draw North Arrow

Stack with Plume

Sun

Wind



ADDITIONAL INFORMATION

OBSERVATION DATE	START TIME	END TIME
13 May 93	1216	1246

SEC / MIN	0	15	30	45	COMMENTS
1	5	0	5	5	
2	5	5	5	5	
3	5	5	5	5	
4	5	5	5	5	
5	5	5	5	5	
6	5	5	0	0	
7	0	0	0	5	
8	5	0	5	5	
9	5	5	5	5	
10	5	5	5	5	
11	5	10	10	10	
12	10	5	5	5	
13	5	5	5	5	
14	0	0	0	0	
15	0	0	0	5	
16	5	0	0	0	
17	5	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	5	5	0	5	
23	5	5	5	5	
24	5	5	5	0	
25	5	5	5	5	
26	5	10	10	15	
27	10	10	10	10	
28	10	5	5	5	
29	5	5	5	5	
30	5	5	5	5	

OBSERVER'S NAME (PRINT)	Robert J. O'Brien
OBSERVER'S SIGNATURE	Robert J. O'Brien
DATE	13 May 93
ORGANIZATION	AL/OEBG Brooks AFB TX
CERTIFIED BY	Texas Air Control Board
DATE	12 Mar 93

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER: 2

DATE: 8 MAY 93

PLANT: CH & PP, BOILER #3

BASE: EIELSON

SAMPLE BOX NUMBER: 3

METER BOX NUMBER: 3

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION

MW_d 30.33
MW_s 28.88
ΔP_{STATIC} -1.06
Y_i = 1.010 ΔH = 1.903

EQUATIONS

$^{\circ}R = {}^{\circ}F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

ASSUMPTIONS

% Moisture 11.8
% CO_2 12.8
% O_2 7.1
PRECHECK ✓good
START 1317L

AMBIENT TEMP: 66 °F

STATION PRESS: 29.66 in Hg

HEATER BOX TEMP: 248 ± 25 °F

PROBE HEATER SETTING: 248 ± 25

PROBE LENGTH: 72 in

NOZZLE AREA (A): 0.250 IN ~~sq ft~~

Cp: 0.89

DRY GAS FRACTION (Fd):

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
1A START	0.0	2.0	228		0.26	0.74	623.208	88		90	244	56
2	2.5	2.1	240		0.26	0.73		89		90	247	54
3	5.0	2.2	250		0.39	0.95		89		89	252	51
4	7.5	2.6	378		0.68	1.60		89		89	253	49
5	10.0	3.2	387		0.91	2.12		90		89	254	48
6	12.5	4.3	390		0.90	2.09		92		89	251	47
7	15.0	4.5	391		0.80	1.86		93		89	254	49
8	17.5	4.4	391		0.76	1.77		44		89	252	50
9	20.0	4.4	391		0.74	1.72		95		89	248	51
10	22.5	4.5	390		0.66	1.54		96		90	247	52
11	25.0	4.3	390		0.61	1.42		96		90	250	53
12	27.5	~~4.2~~ 3.2	389		0.32	0.75		96		90	251	54
							642.061					
	T_M 93				ΔH	1.65						
	T_S 359				$(\Delta P)^{1/2}$	23.4154						
	ft^3	39.94										

OEHL FORM MAY 78 18

PARTICULATE SAMPLING DATA SHEET

2/2

RUN NUMBER: 2

DATE: 13 MAY

PLANT: CH. PP BOILER #3

BASE: ERICSON

SAMPLE BOX NUMBER: 3

METER BOX NUMBER: 3

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION

EQUATIONS

$^{\circ}R = {}^{\circ}F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

POSTCHECK ✓good
START 1457L

AMBIENT TEMP: °F

STATION PRESS: in Hg

HEATER BOX TEMP: °F

PROBE HEATER SETTING:

PROBE LENGTH: in

NOZZLE AREA (A): sq ft

Cp:

DRY GAS FRACTION (Fd):

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
13	0.0	2.7	230		0.65	1.87		91		92	250	48
2	2.5	5.1	230		0.63	1.81		94		91	250	47
3	5.0	5.7	338		0.84	2.09		96		91	248	47
4	7.5	6.0	382		0.92	2.17		96		91	249	47
5	10.0	6.0	389		0.93	2.18		97		91	250	48
6	12.5	6.2	391		0.91	2.13		99		92	250	49
7	15.0	6.4	392		0.79	1.85		100		93	250	51
8	17.5	6.1	391		0.81	1.90		100		94	249	51
9	20.0	6.4	392		0.83	1.95		101		94	251	52
10	22.5	6.7	392		0.79	1.86		101		94	251	52
11	25.0	6.8	392		0.55	1.29		101		95	251	51
12	27.5	5.5	391		0.49	1.15		101		95	249	51
							463.150					

OEHL FORM MAY 78 18

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SAMPLE ANALYTICAL DATA FORM

Plant Central Heating & Power Run number 2 13 May 93

Sample location Eielson AFB

Relative humidity

Density of acetone (ρ_a) 0.79 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container number

Acetone rinse volume (V_{aw}) 200 ml

Acetone blank residue concentration (C_a) 0.006 mg/g

$W_a = C_a V_{aw} \rho_a$ = (0.006) (200) (0.79) = 0.9 mg

Date and time of wt 1525 hrs 14 May 93 Gross wt 100162.4 mg

Date and time of wt 2137 hrs 14 May 93 Gross wt 100161.5 mg

Average gross wt 100162.0 mg

Tare wt 100046.8 mg

Less acetone blank wt (W_a) 0.9 mg

Weight of particulate in acetone rinse (m_a) 114.3 mg

Filter(s) container number

Date and time of wt 14 May 93 0900 hrs Gross wt 406.7 mg

Date and time of wt 14 May 93 1530 hrs Gross wt 406.6 mg

Average gross wt 406.7 mg

Tare wt 288.9 mg

Weight of particulate on filter(s) (m_f) 117.8 mg

Weight of particulate in acetone rinse 114.3 mg

Total weight of particulate (m_n) 232.1 mg

Note: In no case should a blank residue >0.01 mg/g or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks

Signature of analyst Robert J. O'Brien

Signature of reviewer

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE	DATE	RUN NUMBER
EIELSON	13 May 93	2

BUILDING NUMBER	SOURCE NUMBER
CH & PP	BOILER # 3

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	0.4067	0.2889	0.1178
ACETONE WASHINGS (Probe, Front Half Filter)	100.1620	100.0468	0.1152
~~BACK HALF (If needed)~~ acetone blank			-0.0009
	Total Weight of Particulates Collected		0.2321 gm

II. WATER

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H20) ml	286	200	86
IMPINGER 2 (H20) ml	216	200	16
IMPINGER 3 (Dry) ml	0	0	0
IMPINGER 4 (Silica Gel) g	207.5	200	7.5
	Total Weight of Water Collected		109.5 gm

III. GASES (Dry)

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	13.6	13.6	13.5		13.6
VOL % O_2	6.2	6.2	6.2		6.2
VOL % CO					
VOL % N_2					

Vol % N_2 = (100% - % CO_2 - % O_2 - % CO)

VISIBLE EMISSION OBSERVATION FORM

No. Run 2

COMPANY NAME: Central Heat & Power Plant

STREET ADDRESS: 354 CES/CEVP

2258 Central Ave Suite 1

CITY: Eielson AFB | STATE: AK | ZIP: 99702

PHONE (KEY CONTACT): (907) 377-3151 | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Coal Boiler #3 | OPERATING MODE: 100 000 lb/hr

CONTROL EQUIPMENT: cyclone separator | OPERATING MODE: Nominal

DESCRIBE EMISSION POINT:

HEIGHT ABOVE ~~GROUND~~ Roof LEVEL: 14' | HEIGHT RELATIVE TO OBSERVER: Start 14' End ✓

DISTANCE FROM OBSERVER: Start 98' End ✓ | DIRECTION FROM OBSERVER: Start NE End ✓

DESCRIBE EMISSIONS: Start Lofting End ✓

EMISSION COLOR: Start Light Brown End | IF WATER DROPLET PLUME: Attached ☐ Detached ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start 2-5' above stack End ✓

DESCRIBE PLUME BACKGROUND: Start Sky End ✓

BACKGROUND COLOR: Start Blue End ✓ | SKY CONDITIONS: Start clear End ✓

WIND SPEED: Start 5-10 End ✓ | WIND DIRECTION: Start NW End ✓

AMBIENT TEMP: Start 66 End ✓ | WET BULB TEMP: | RH, percent:

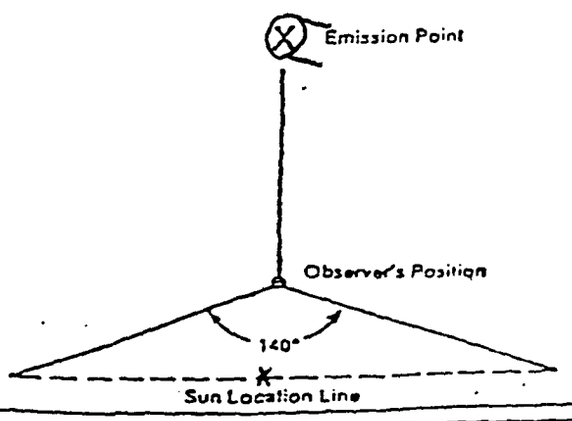
Stack with Plume

Sun

Wind

SOURCE LAYOUT SKETCH

Draw North Arrow



ADDITIONAL INFORMATION:

OBSERVATION DATE: 13 May 93 | START TIME: 1420 | END TIME: 1450

SEC / MIN	0	15	30	45	COMMENTS
1	5	5	5	5	
2	5	5	0	5	
3	0	5	5	5	
4	5	0	0	5	
5	0	0	0	0	
6	0	5	5	5	
7	5	5	5	5	
8	5	5	5	5	
9	5	5	5	0	
10	0	0	5	5	
11	0	5	5	5	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
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21	5	5	5	5	
22	5	5	5	0	
23	0	5	5	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	5	5	
27	5	5	0	0	
28	0	0	5	5	
29	5	5	5	0	
30	5	5	5	5	

OBSERVER'S NAME (PRINT): Robert J O'Brien

OBSERVER'S SIGNATURE: Robert J O'Brien | DATE: 13 May 93

ORGANIZATION: AL/OEBB Brooks AFB TX

CERTIFIED BY: Texas Air Control Board | DATE: 12 Mar 93

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER: 3A

DATE: 13 MAY 93

PLANT: CH ; PP , #3

BASE: ~~EDGEMOOR~~ EDISON

SAMPLE BOX NUMBER: 3

METER BOX NUMBER: 3

Qw/Qm:

Cs:

SCHEMATIC OF STACK CROSS SECTION

MW_w 30.33
MW_d 28.88
ΔP_{STATIC} -1.06
Y_i = 1.010 ΔH = 1.903

EQUATIONS

$^{\circ}R = {}^{\circ}F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

% Moisture 11.8
% CO_2 12.8
% O_2 7.1

PRECHECK ✓ good

START 16324

AMBIENT TEMP: 70 °F

STATION PRESS: 29.60 in Hg

HEATER BOX TEMP: 248 ± 25 °F

PROBE HEATER SETTING: 248 ± 25

PROBE LENGTH: 72 in

NOZZLE AREA (A): 0.250 IN ~~sq ft~~

Cp: 0.84

DRY GAS FRACTION (Fd):

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	~~VAC~~ STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
1A	0	3.8	220		0.65	1.90	663.257	94		93	224	57
2	2.5	3.9	252		0.67	1.87		93		93	~~234~~	50
3	5.0	3.9	360		0.85	2.06		95		94	241	49
4	7.5	4.3	378		0.91	2.16		96		94	242	49
5	10.0	5.1	384		0.97	2.29		98		94	243	50
6	12.5	5.1	391		0.91	2.14		99		94	243	51
7	15.0	5.0	391		0.81	1.90		100		94	244	51
8	17.5	5.0	391		0.79	1.86		100		94	244	52
9	20.0	5.2	391		0.82	1.93		100		94	246	52
10	22.5	5.2	391		0.77	1.81		99		94	245	52
11	25.0	4.6	390		0.53	1.25		99		94	246	52
12	27.5	1.7	390		0.45	1.06		99		94	246	52
							685.059					

OEHL FORM MAY 78 18

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER: 3

DATE: 13 MAY 93

PLANT: CH4PP, #

BASE: ~~ELMENDORF~~ EIELSON

SAMPLE BOX NUMBER: 3

METER BOX NUMBER: 3

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION

EQUATIONS

$^{\circ}R = {}^{\circ}F + 460$

$$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$$

POST CHECK
START 1602L

AMBIENT TEMP: °F

STATION PRESS: in Hg

HEATER BOX TEMP: 248 ± 25 °F

PROBE HEATER SETTING: 248 ± 25

PROBE LENGTH: 72 in

NOZZLE AREA (A): 0.250 IN ~~sq ft~~

Cp: .84

DRY GAS FRACTION (Fd):

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
1B	0.0	3.2	220		0.24	0.70	685.059	92		92	242	50
2	2.5	3.8	231		0.28	0.80		93		92	242	47
3	5.0	3.9	349		0.484	1.08		92		91	243	46
4	7.5	4.1	379		0.67	1.58		93		91	244	45
5	10.0	6.7	386		0.88	2.06		93		91	244	45
6	12.5	7.0	390		0.90	2.10		94		91	248	45
7	15.0	7.0	391		0.82	1.91		95		91	250	46
8	17.5	6.8	391		0.78	1.82		95		91	248	47
9	20.0	6.8	390		0.74	1.73		96		91	247	48
10	22.5	6.1	390		0.71	1.39		96		91	248	49
11	25.0	4.2	390		0.62	1.45		96		91	247	49
12	22.5	5.0	390		0.32	0.75		96		91	248	50
							704.323					
	T_M 95				$\overline{\Delta H}$	1.78						
	T_S 386				$(\overline{\sqrt{\Delta P}})^{1/2}$	25.3238						
	ft^3 41.066											

OEHL FORM 18 MAY 78

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SAMPLE ANALYTICAL DATA FORM

Plant Central Heating & Power Run number 3 13 May 93

Sample location Eielson AFB

Relative humidity _____

Density of acetone (ρ_a) 0.79 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container number _____

Acetone rinse volume (V_{aw}) 230 ml

Acetone blank residue concentration (C_a) 0.006 mg/g

$W_a = C_a V_{aw} \rho_a$ = (0.006) (230) (0.79) = 1.1 mg

Date and time of wt 14 May 93 1525 hrs Gross wt 99031.5 mg

Date and time of wt 14 May 93 2137 hrs Gross wt 99031.1 mg

Average gross wt 99031.3 mg

Tare wt 98862.0 mg

Less acetone blank wt (W_a) 1.1 mg

Weight of particulate in acetone rinse (m_a) 168.2 mg

Filter(s) container number _____

Date and time of wt 14 May 93 0900 hrs Gross wt 462.4 mg

Date and time of wt 14 May 93 1530 hrs Gross wt 462.3 mg

Average gross wt 462.4 mg

Tare wt 296.9 mg

Weight of particulate on filter(s) (m_f) 175.5 mg

Weight of particulate in acetone rinse 168.2 mg

Total weight of particulate (m_n) 343.7 mg

Note: In no case should a blank residue >0.01 mg/g or 0.001% of the weight of acetone used be subtracted from the sample weight.

Remarks _____

Signature of analyst Robert A. O'Brien

Signature of reviewer _____

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE	DATE	RUN NUMBER
EIELSON	13 May 93	3

BUILDING NUMBER	SOURCE NUMBER
CH & PP	BOILER #3

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	0.4624	0.2869	0.1755
ACETONE WASHINGS (Probe, Front Half Filter)	99.0313	98.8620	0.1693
~~BACK HALF (If needed)~~ acetone blank			-0.0011
	Total Weight of Particulates Collected		0.3437 gm

II. WATER

ITEM		FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H20)	ml	290	200	90
IMPINGER 2 (H20)	ml	217.5	200	17.5
IMPINGER 3 (Dry)	ml	1	0	1
IMPINGER 4 (Silica Gel)	g	205.7	200g	5.7
		Total Weight of Water Collected		~~33.2~~ 114.2 gm

III. GASES (Dry)

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	14.0	14.2	14.0		14.1
VOL % O_2	5.6	5.6	5.8		5.7
VOL % CO					
VOL % N_2					

Vol % N_2 = (100% - % CO_2 - % O_2 - % CO)

OEHL FORM 20 MAY 78

COMPANY NAME: Central Heat & Power Plant

STREET ADDRESS: 354 CES/CEOP

2258 Central Ave Suite 1

CITY: Eielson AFB | STATE: AK | ZIP: 99702

PHONE (KEY CONTACT): (907) 377-3151 | SOURCE ID NUMBER:

PROCESS EQUIPMENT: Coal Boiler # 3 | OPERATING MODE: 160,000 lb/hr

CONTROL EQUIPMENT: Cyclone Separator | OPERATING MODE: Nominal

DESCRIBE EMISSION POINT

HEIGHT ABOVE ~~GROUND~~ LEVEL: 14' Roof | HEIGHT RELATIVE TO OBSERVER: Start 14' End ✓

DISTANCE FROM OBSERVER: Start 40' End ✓ | DIRECTION FROM OBSERVER: Start NE End ✓

DESCRIBE EMISSIONS: Start Buoyant End ✓

EMISSION COLOR: Start Light Brown End ✓ | IF WATER DROPLET PLUME: Attached ☐ Detached ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start 2-5' above stack End ✓

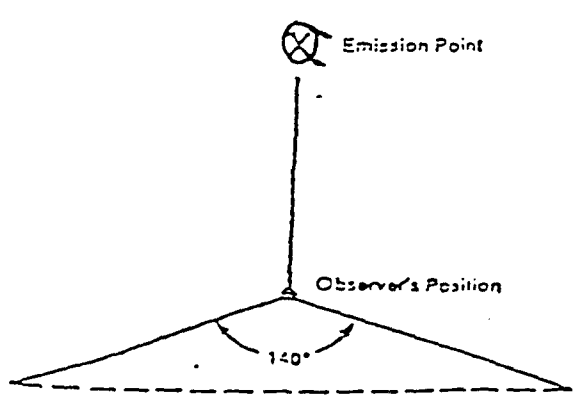
DESCRIBE PLUME BACKGROUND: Start Sky End ✓

BACKGROUND COLOR: Start Blue End ✓ | SKY CONDITIONS: Start Clear End ✓

WIND SPEED: Start 0-5 End ✓ | WIND DIRECTION: Start NW End ✓

AMBIENT TEMP: Start 61 End ✓ | WET BULB TEMP: | RH, percent:

SOURCE LAYOUT SKETCH — Draw North Arrow



ADDITIONAL INFORMATION

OBSERVATION DATE: 13 May 93 | START TIME: 1634 | END TIME: 1704

SEC / MIN	0	15	30	45	COMMENTS
1	0	5	5	5	
2	0	0	0	0	
3	0	0	0	0	
4	5	0	0	0	
5	0	0	0	1	
6	0	0	5	0	
7	5	5	0	5	
8	0	0	5	5	
9	5	5	15	15	Soot Blow
10	30	45	30	50	
11	60	35	70	60	
12	30	20	15	15	
13	10	10	5	5	
14	5	5	5	5	
15	5	5	5	5	
16	5	0	5	5	
17	5	5	5	5	
18	0	0	5	5	
19	0	5	0	0	
20	5	5	0	0	
21	5	0	0	0	
22	5	5	0	5	
23	5	0	0	0	
24	0	0	0	5	
25	0	0	0	0	
26	0	0	0	0	
27	0	5	0	0	
28	0	0	0	5	
29	5	5	5	5	
30	5	5	0	5	

OBSERVER'S NAME (PRINT): Robert J. O'Brien

OBSERVER'S SIGNATURE: Robert J. O'Brien | DATE: 13 May 93

ORGANIZATION: AL/OEBQ · Brooks AFB TX

CERTIFIED BY: Texas Air Control Board | DATE: 12 Mar 93

Isokinetic Determination (EPA Method 5 Program)
Boiler 3, 13 May 1993

```
                XROM "METH 5"
RUN NUMBER
ONE,  13 MAY 93
EIELSON AFB AK
                                RUN
METER BOX Y?
                     1.0100     RUN
DELTA H?
                     1.9300     RUN
BAR PRESS ?
                    29.6600     RUN
METER VOL ?
                    43.3560     RUN
MTR TEMP F?
                    92.0000     RUN
% OTHER GAS
REMOVED BEFORE
DRY GAS METER ?
                                RUN
STATIC H0H IN ?
                    -1.0600     RUN
STACK TEMP.
                   379.0000     RUN
ML. WATER ?
                   111.5000     RUN


IMP. % H0H = 11.2

% H0H=11.2

% C02?
                    12.5000     RUN
% OXYGEN?
                     7.1000     RUN
% CO ?
                                RUN
MOL WT OTHER?
                                RUN

MWd =30.23
MW WET=28.91

SQRT PSTS ?
                    25.6730     RUN
TIME MIN ?
                    60.0000     RUN
NOZZLE DIA ?
                     0.2500     RUN
STK DIA INCH ?
                    52.5000     RUN

* VOL MTR STD = 41.720
  STK PRES ABS = 29.53
  VOL H0H GAS = 5.25
  % MOISTURE = 11.17
  MOL DRY GAS = 0.883
  % NITROGEN = 80.40
  MOL WT DRY = 30.23
  MOL WT WET = 28.91
  VELOCITY FPS = 63.04
  STACK AREA = 15.03
  STACK ACFM = 56,862.
* STACK DSCFM = 31,427.
  % ISOKINETIC =  97.63

END OF FIELD DATA
```

```
                XROM "METH 5"
RUN NUMBER
TWO,  13 MAY 93
EIELSON AFB AK
                                RUN
METER BOX Y?
                     1.0100     RUN
DELTA H?
                     1.6500     RUN
BAR PRESS ?
                    29.6600     RUN
METER VOL ?
                    39.9400     RUN
MTR TEMP F?
                    93.0000     RUN
% OTHER GAS
REMOVED BEFORE
DRY GAS METER ?
                                RUN
STATIC H0H IN ?
                    -1.0600     RUN
STACK TEMP.
                   389.0000     RUN
ML. WATER ?
                   109.5000     RUN


IMP. % H0H = 11.9

% H0H=11.9

% C02?
                    13.6000     RUN
% OXYGEN?
                     6.2000     RUN
% CO ?
                                RUN
MOL WT OTHER?
                                RUN

MWd =30.42
MW WET=28.95

SQRT PSTS ?
                    23.4154     RUN
TIME MIN ?
                    60.0000     RUN
NOZZLE DIA ?
                     0.2500     RUN
STK DIA INCH ?
                    52.5000     RUN

* VOL MTR STD = 38.337
  STK PRES ABS = 29.53
  VOL H0H GAS = 5.15
  % MOISTURE = 11.65
  MOL DRY GAS = 0.881
  % NITROGEN = 80.20
  MOL WT DRY = 30.42
  MOL WT WET = 28.95
  VELOCITY FPS = 57.46
  STACK AREA = 15.03
  STACK ACFM = 51,825.
* STACK DSCFM = 29,119.
  % ISOKINETIC =  96.82

END OF FIELD DATA
```

```
                XROM "METH 5"
RUN NUMBER
THREE,  13 MAY 93
EIELSON AFB AK
                                RUN
METER BOX Y?
                     1.0100     RUN
DELTA H?
                     1.7800     RUN
BAR PRESS ?
                    29.6000     RUN
METER VOL ?
                    41.0660     RUN
MTR TEMP F?
                    95.0000     RUN
% OTHER GAS
REMOVED BEFORE
DRY GAS METER ?
                                RUN
STATIC H0H IN ?
                    -1.0600     RUN
STACK TEMP.
                   386.0000     RUN
ML. WATER ?
                   114.2000     RUN


IMP. % H0H = 12.1

% H0H=12.1

% C02?
                    14.1000     RUN
% OXYGEN?
                     5.7000     RUN
% CO ?
                                RUN
MOL WT OTHER?
                                RUN

MWd =30.46
MW WET=28.98

SQRT PSTS ?
                    25.3238     RUN
TIME MIN ?
                    60.0000     RUN
NOZZLE DIA ?
                     0.2500     RUN
STK DIA INCH ?
                    52.5000     RUN

* VOL MTR STD = 39.209
  STK PRES ABS = 29.52
  VOL H0H GAS = 5.00
  % MOISTURE = 12.06
  MOL DRY GAS = 0.879
  % NITROGEN = 80.03
  MOL WT DRY = 30.46
  MOL WT WET = 28.98
  VELOCITY FPS = 62.17
  STACK AREA = 15.03
  STACK ACFM = 56,080.
* STACK DSCFM = 30,371.
  % ISOKINETIC =  94.95

END OF FIELD DATA
```

BLANK ANALYTICAL DATA FORM

Plant Central Heating & Power

Sample location Eielson AFB

Relative humidity _____

Liquid level marked and container sealed ✓

Density of acetone (ρ_a) 0.79 g/ml

Blank volume (V_a) 150 ml

Date and time of wt _____ Gross wt _____ mg

Date and time of wt _____ Gross wt _____ mg

Average gross wt 97556.5 mg

Tare wt 97555.8 mg

Weight of blank (m_{ab}) 0.7 mg

$$C_a = \frac{m_{ab}}{V_a \rho_a} = \frac{(\ 0.7\ )}{(\ 150\ )\ (\ 0.79\ )} = 0.006 \text{ mg/g}$$

Note: In no case should a blank residue greater than 0.01 mg/g (or 0.001% of the blank weight) be subtracted from the sample weight.

Filters Filter number _____

Date and time of wt _____ Gross wt _____ mg

Date and time of wt _____ Gross wt _____ mg

Average gross wt _____ mg

Tare wt _____ mg

Difference wt _____ mg

Note: Average difference must be less than ±5 mg or 2% of total sample weight whichever is greater.

Remarks _____

Signature of analyst Robert J. O'Brien

Signature of reviewer _____

Quality Assurance Handbook M5-5.4

APPENDIX H

Emission Calculations

Stack Emissions Determination (EPA MASSFLO Program)
Boiler 3, 11 May 1993

```
          XROM "MASSFLO"
RUN NUMBER
ONE,  11 MAY 93
EIELSON AFB AK
                        RUN
VOL MTR STD ?
              44.865    RUN
STACK DSCFM ?
        32,348,000      RUN
FRONT 1/2 MG ?
             275.100    RUN
BACK 1/2 MG ?
                        RUN

F  GR/DSCF = 0.095
F  MG/MMM = 216.536
F  LB/HR = 26.237
F  KG/HR = 11.901
```

```
          XROM "MASSFLO"
RUN NUMBER
TWO,  11 MAY 93
EIELSON AFB AK
                        RUN
VOL MTR STD ?
              43.913    RUN
STACK DSCFM ?
        31,582,000      RUN
FRONT 1/2 MG ?
             334.700    RUN
BACK 1/2 MG ?
                        RUN

F  GR/DSCF = 0.118
F  MG/MMM = 269.159
F  LB/HR = 31.641
F  KG/HR = 14.443
```

```
          XROM "MASSFLO"
RUN NUMBER
THREE,  11 MAY 93
EIELSON AFB AK
                        RUN
VOL MTR STD ?
              43.411    RUN
STACK DSCFM ?
        31,347,000      RUN
FRONT 1/2 MG ?
             290.100    RUN
BACK 1/2 MG ?
                        RUN

F  GR/DSCF = 0.104
F  MG/MMM = 241.555
F  LB/HR = 28.362
F  KG/HR = 12.865
```

Stack Emissions Determination (EPA MASSFLO Program)
Boiler 3, 13 May 1993

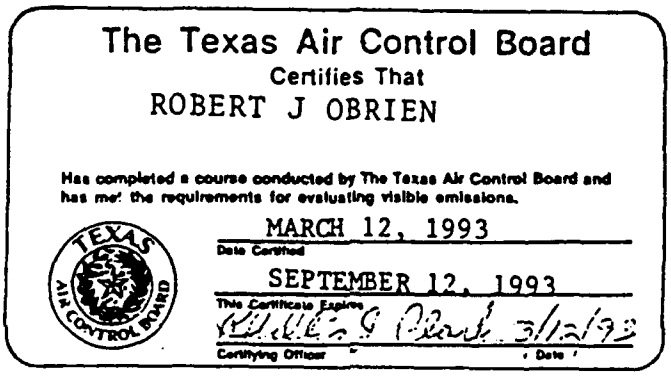
```
        XROM "MASSFLO"
RUN NUMBER
ONE,  13 MAY 93
EIELSON AFB AK
                      RUN
VOL MTR STD ?
            41.720    RUN
STACK DSCFM ?
        31,427,000    RUN
FRONT 1/2 MG ?
               189.700 RUN
BACK 1/2 MG ?
                      RUN

F  GR/DSCF = 0.070
F  MG/MMM = 160.572
F  LB/HR = 18.902
F  KG/HR = 8.574
```

```
        XROM "MASSFLO"
RUN NUMBER
TWO,  13 MAY 93
EIELSON AFB AK
                      RUN
VOL MTR STD ?
            38.337    RUN
STACK DSCFM ?
        29,119,000    RUN
FRONT 1/2 MG ?
               232.100 RUN
BACK 1/2 MG ?
                      RUN

F  GR/DSCF = 0.093
F  MG/MMM = 213.798
F  LB/HR = 23.319
F  KG/HR = 10.578
```

```
        XROM "MASSFLO"
RUN NUMBER
THREE,  13 MAY 93
EIELSON AFB AK
                      RUN
VOL MTR STD ?
            39.209    RUN
STACK DSCFM ?
        30,371,000    RUN
FRONT 1/2 MG ?
               343.700 RUN
BACK 1/2 MG ?
                      RUN

F  GR/DSCF = 0.135
F  MG/MMM = 309.557
F  LB/HR = 35.215
F  KG/HR = 15.974
```

APPENDIX I

Opacity Certification Card



The Texas Air Control Board

Certifies That

ROBERT J OBRIEN

Has completed a course conducted by The Texas Air Control Board and has met the requirements for evaluating visible emissions.

MARCH 12, 1993

Date Certified

SEPTEMBER 12, 1993

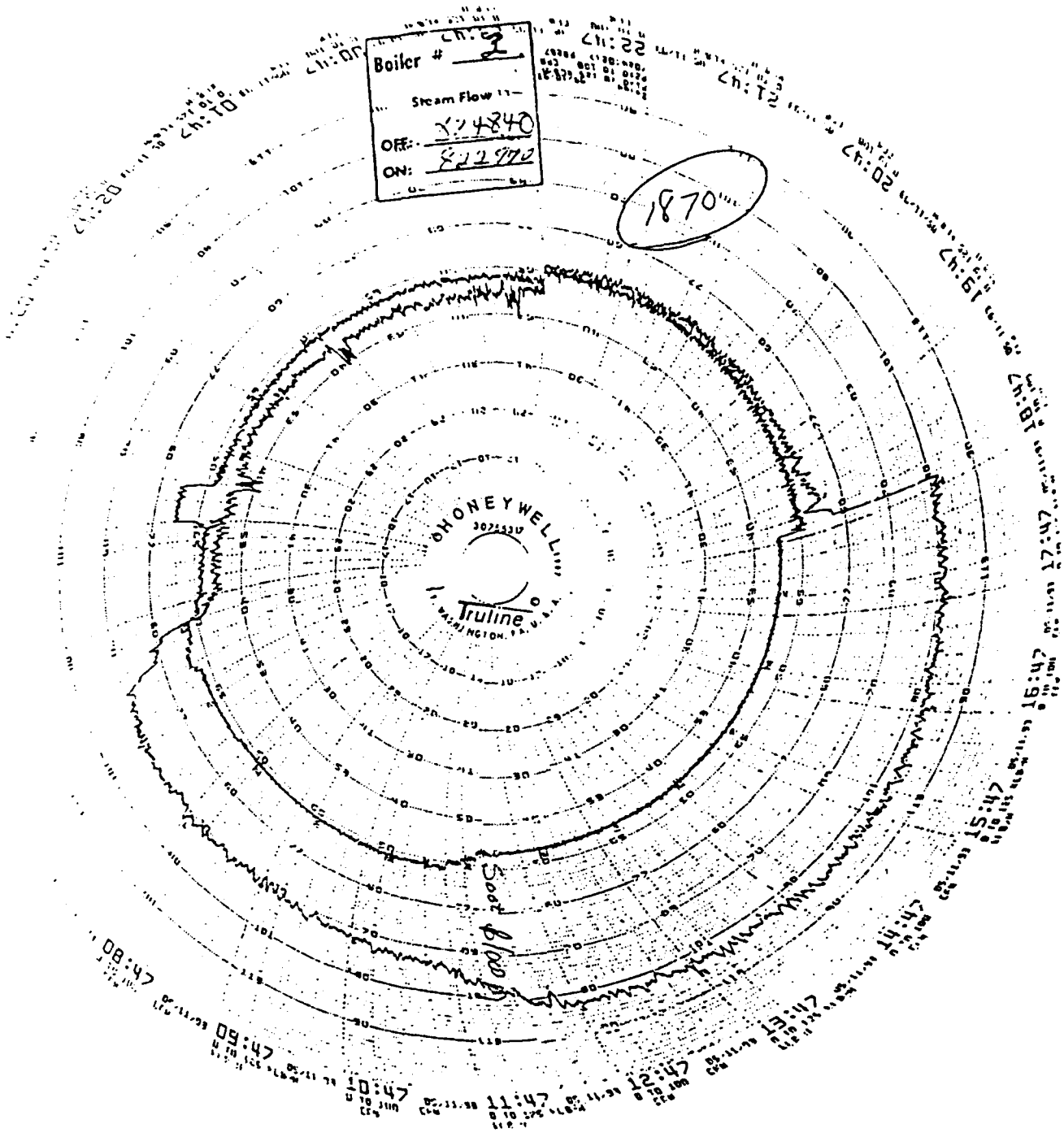
This Certificate Expires

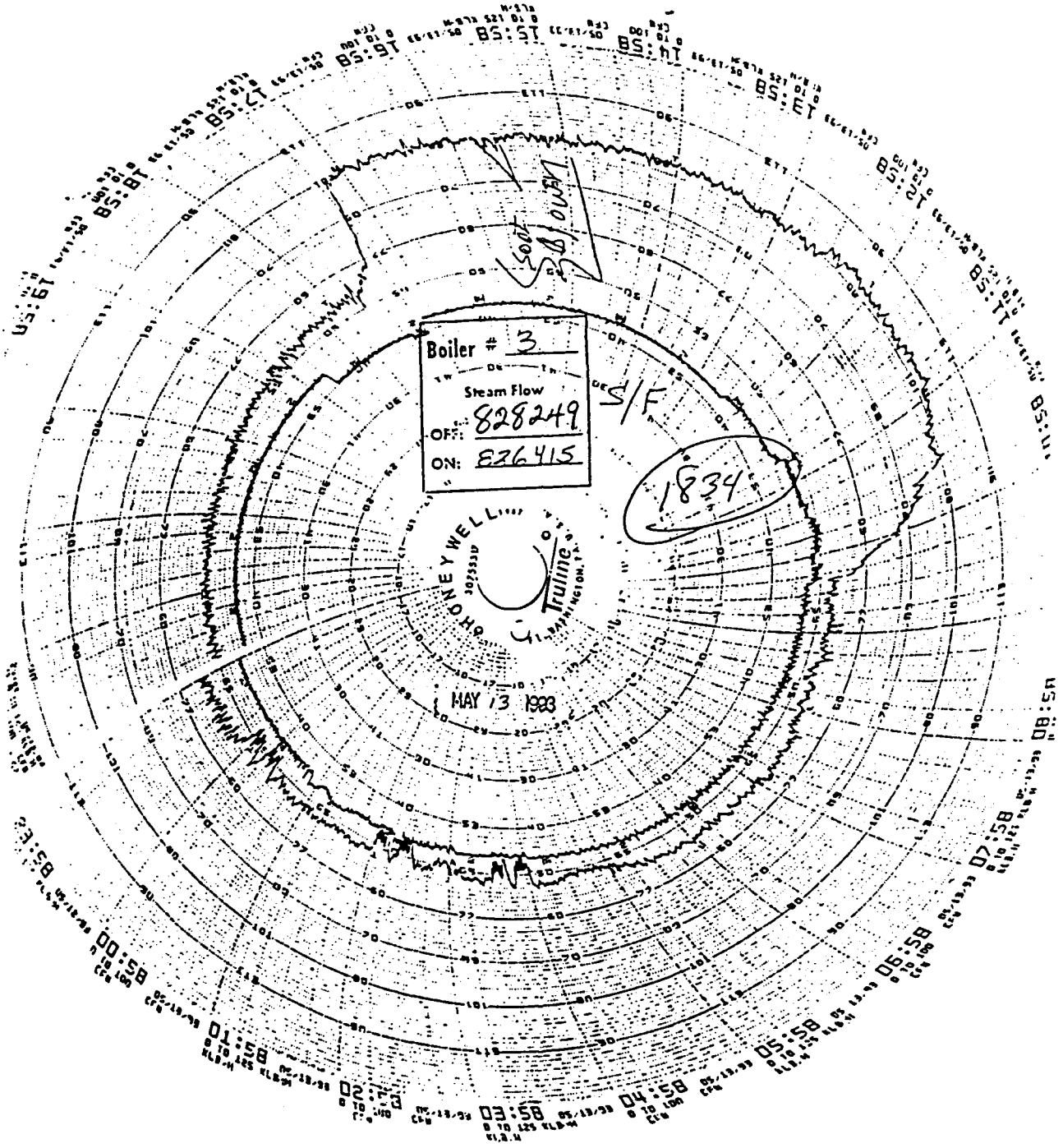
Certifying Officer

Date

APPENDIX J

Facility Data


Boiler #
Steam Flow
OFF:
ON:
1870
HONEYWELL
Truline
08:47
09:47
10:47
11:47
12:47
13:47
14:47
15:47
16:47
17:47
18:47
19:47
20:47
21:47
22:47


Boiler # 3
Steam Flow
OFF: 828249
ON: 826415
S/F
1834
HONEYWELL
Truline
MAY 13 1993