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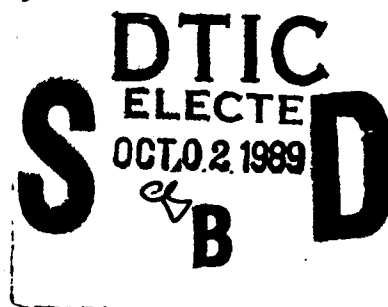
¹⁵AFOEHL-REPORT 89-068EQ0686GEF



**Compliance Testing of Eielson AFB Central Heating
and Power Plant, Coal-Fired Boiler No. 4,
Eielson AFB AK**

JAMES A. GARRISON, Maj, USAF, BSC

JULY 1989



Final Report

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**AF Occupational and Environmental Health Laboratory (AFSC)
Human Systems Division
Brooks Air Force Base, Texas 78235-5501**

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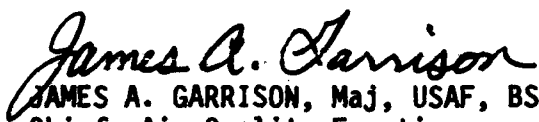
NOTICES

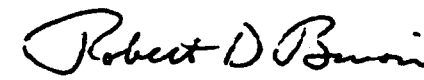
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This report has been reviewed and is approved for publication.


JAMES A. GARRISON, Maj, USAF, BSC
Chief, Air Quality Function


ROBERT D. BINOVI, Lt Col, USAF, BSC
Chief, Environmental Quality Division

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JAMES C. ROCK, Colonel, USAF, BSC
Commander

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE				Form Approved OMB No 0704-0188	
1a. REPORT SECURITY CLASSIFICATION Unclassified			1b. RESTRICTIVE MARKINGS N/A		
2a. SECURITY CLASSIFICATION AUTHORITY N/A			3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release. Distribution is unlimited.		
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE N/A					
4. PERFORMING ORGANIZATION REPORT NUMBER(S) AFOEHL Report 89-068EQ0686GEF			5. MONITORING ORGANIZATION REPORT NUMBER(S)		
6a. NAME OF PERFORMING ORGANIZATION AF Occupational and Environmental Health Laboratory.		6b. OFFICE SYMBOL (If applicable) ECE	7a. NAME OF MONITORING ORGANIZATION		
6c. ADDRESS (City, State, and ZIP Code) Brooks AFB TX 78235-5501			7b. ADDRESS (City, State, and ZIP Code)		
8a. NAME OF FUNDING/SPONSORING ORGANIZATION Same as 6a		8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER		
8c. ADDRESS (City, State, and ZIP Code) Same as 6c			10. SOURCE OF FUNDING NUMBERS		
PROGRAM ELEMENT NO	PROJECT NO	TASK NO	WORK UNIT ACCESSION NO		
11. TITLE (Include Security Classification) Compliance Testing of Eielson AFB Central Heating and Power Plant, Coal-Fired Boiler 4, Eielson AFB AK					
12. PERSONAL AUTHOR(S) Maj James A. Garrison					
13a. TYPE OF REPORT Final		13b. TIME COVERED FROM 890607 TO 890615		14. DATE OF REPORT (Year, Month, Day) July 1989	
15. PAGE COUNT 107					
16. SUPPLEMENTARY NOTATION					
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP	Compliance Testing, Eielson Source Emission Testing, Stack Sampling, Particulates, Opacity, Stack Emissions, Garrison Air Pollution. (J)		
19. ABSTRACT (Continue on reverse if necessary and identify by block number)					
At the request of HQ 343 CSG/DEEV and HQ AAC/SGPB, source compliance testing (particulate and visible emissions) of Boiler No. 4 in the Eielson AFB Central Heating and Power Plant was conducted on 7-15 June 1989. Testing was performed to determine compliance with regards to the renewal of Alaska Department of Environmental Conservation Air Quality Control Permit to Operate #8331-AA001. Boiler No. 4 was tested on 12 and 14 Jun 89. On 12 June results indicated that visible emissions standards were met; however, particulate emissions standards were not met. The boiler was retested on 14 June and all emissions standards were met. All emission requirements for permit renewal have now been met.					
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION Unclassified		
22a. NAME OF RESPONSIBLE INDIVIDUAL James A. Garrison. Maj, USAF, BSC			22b. TELEPHONE (Include Area Code) (512) 536-3305 AV 240		22c. OFFICE SYMBOL AFOEHL/ECQ

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I. INTRODUCTION

On 7-15 June 1989, compliance emission testing for particulate and visible emissions was conducted on coal-fired boiler 4 at the Eielson AFB Central Heat and Power Plant (CH&PP), by personnel of the Air Quality Function, Consultant Services Division, Air Force Occupational and Environmental Health Laboratory (AFOEHL). This survey was requested by HQ 343 CSG/DEEV and HQ AAC/SGPB to determine visible and particulate emission compliance status with regards to the renewal of Alaska Department of Environmental Conservation (ADEC) Air Quality Control Permit to Operate #8331-AA001. Personnel involved with on-site testing are listed in Appendix A.

II. DISCUSSION

A. Background

On 7 January 88 Eielson AFB requested that ADEC renew Air Quality Control Permit to Operate #8331-AA001 (Appendix B) for the CH&PP (Figures 1 and 2). As a condition of the permit renewal process and prior to issue of the new Air Quality Control Permit to Operate #8831-AA001, ADEC required source testing of a representative boiler in accordance with Title 40 Code of Federal Regulation Part 60 (40 CFR 60) Appendix A, Methods 1 through 5 (determination of particulate emissions) and 9 (visual determination of the opacity of emissions) to determine the maximum steam load at which the boilers will meet the applicable emission standards. Permit #8831-AA001 limits the operation of the boilers to the maximum steam load at which the associated visible and particulate emissions meet the applicable standards.

To demonstrate and maintain compliance with Alaska Administrative Code, Title 18, Environmental Conservation, Chapter 50 - Air Quality Control (18 AAC 50) and other rules set forth by ADEC, Eielson AFB requested that AFOEHL conduct stationary source emissions testing on a representative boiler to: (1) determine particulate emissions as specified in 40 CFR 60, Appendix A, Reference Methods 1-5, and (2) determine the opacity of visible emissions from the same boiler during Method 5 testing as specified in 40 CFR 60, Appendix A, Reference Method 9.

Source testing was accomplished during July 1988 on boiler 3. The boiler was tested twice at each of two operating capacities; 100,000 and 90,000 pounds of steam per hour. Boiler 3 failed to meet particulate standards; however, it did meet visible emissions standards. Boilers at the power plant were subsequently down-rated to 80% operating capacity by ADEC until further testing indicated standards could be met at a higher operating capacity.



Figure 1. Eielson AFB Central Heat and Power Plant



Figure 2. Eielson AFB Central Heat and Power Plant

B. Site Description

The CH&PP operates a total of six boilers for electrical power and steam production:

<u>Boiler No./ Manufacturer</u>	<u>Steam Capacity (lb/hr)</u>	<u>Year Installed</u>	<u>Fuel</u>
1/Springfield Boiler Co.	120,000	1950	coal
2/Springfield Boiler Co.	120,000	1950	coal
3/Springfield Boiler Co.	120,000	1950	coal
4/Springfield Boiler Co.	120,000	1950	coal
5/Garrette and Schafer	120,000	1954	coal
6/Garrette and Schafer	120,000	1954	coal

The CH&PP also operates five steam turbine generators for electrical power production. The turbines range in size from 2,500 to 10,000 kilowatts. A typical turbine is shown in Figure 3.

All boilers are spreader-stoker fired units with mechanical fly-ash collection systems. Each unit is fitted with a steam-operated soot blower to remove fly-ash and soot from heat exchanger tubing.

Air pollution control consists of individual multiclone dust collectors (see Figure 4) on each boiler. The multiclone dust collectors were manufactured by Western Precipitation Division - Joy Manufacturing Co. and consist of a number of cyclonic collectors operating in parallel. Each unit is located in the boiler exhaust duct upstream of the induced-draft fan.

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 4 during testing. All boiler exhaust stacks are similar to the one pictured in Figure 5.

C. Applicable Standards

The opacity, particulate and source testing regulations are defined under 18 AAC 50.050(a), 50.050(b) and 50.500, respectively (Appendix C). Paragraph 50.050(a) states that visible emissions, excluding condensed water



Figure 3. Steam Turbine Generator

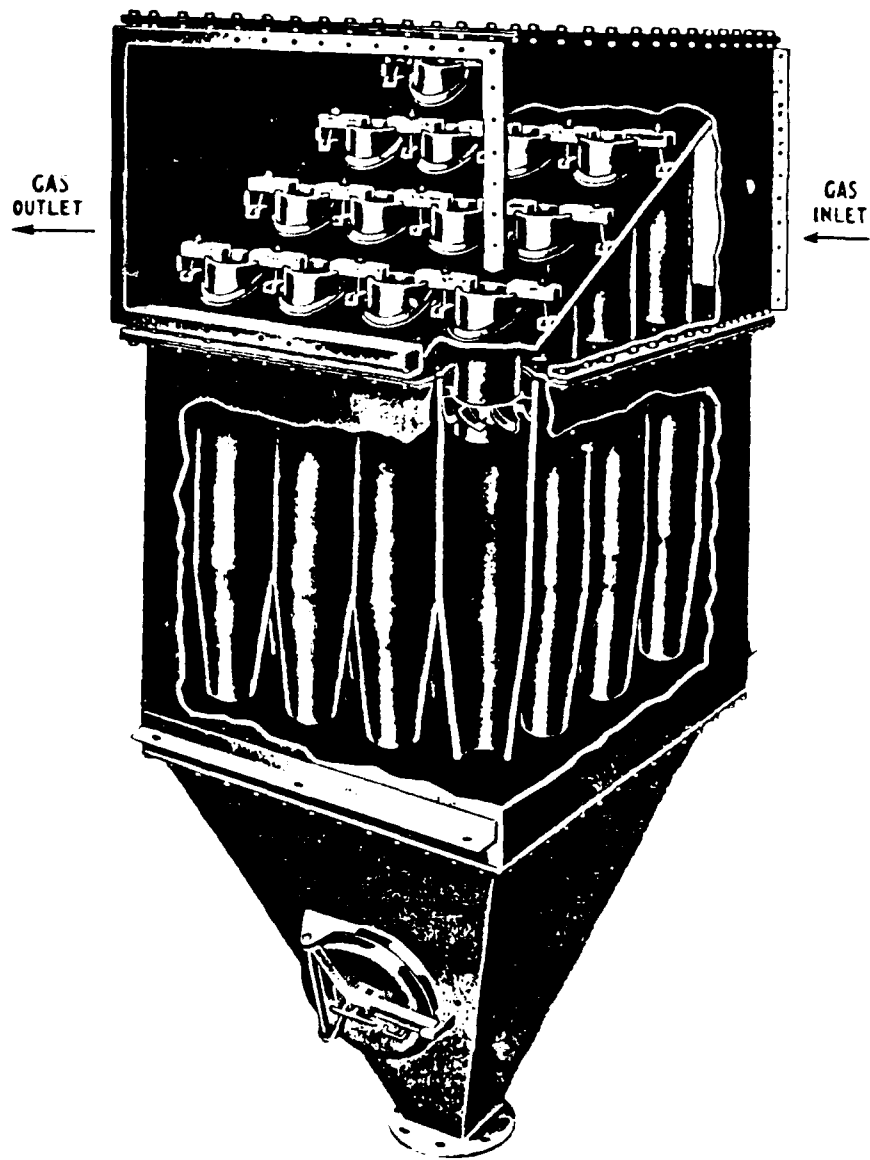


Figure 4. Multiclone Dust Collector



Figure 5. Boiler 4 Exhaust Stack During Testing

vapor from an industrial process or fuel burning equipment, may not reduce visibility through the exhaust effluent by greater than 20% for a total c^f more than three minutes in any one hour.

Under 18 AAC 50.050(b), particulate matter emitted from industrial processes or fuel burning equipment may not exceed, per cubic foot of exhaust gas corrected to standard conditions, 0.1 grains per dry standard cubic foot (gr/dscf) for steam generating plants burning as fuel: (1) coal, and in operation before July 1, 1972 or (2) coal, and rated less than 250 million Btu per hour heat input.

Permit to Operate No. 8831-AA001, Exhibit B, reiterates the visible and particulate emissions standards imposed by 18 ACC 50.050(a) and (b).

D. Sampling Methods and Procedures

The permit to operate for the CH&PP limits the operation of the boilers to the maximum steam load at which the associated visible and particulate emissions meet standards. We analyzed particulate emissions data on site to determine the operating capacity which would meet emissions standards.

18 AAC 500 and Permit No. 8831-AA001 require that all emissions tests be conducted in accordance with the procedures and analysis methods specified in 40 CFR 60, Appendix A, Methods 1-5 and 9. Therefore, test methods, equipment, sample train preparation, sampling and recovery, calibration requirements, and quality assurance were done in accordance with the methods and procedures outlined in 40 CFR 60, Appendix A.

The boiler exhaust stacks are tapered and diverge from a 52 inch (in) outside diameter (OD) at the roof line to a 72 in OD at the top. The stack height is 14.2 feet (ft). The included divergent angle of the stack is approximately 7 degrees. Based on the relative small divergent angle, we considered the stacks to be straight ducts. Sampling ports were already in place and located 36 inches above the roof. 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. Figure 6 provides a schematic of the exhaust stack and associated duct work. Even though the sampling port location did not meet Method 1 criteria, the test team made the decision to use the existing sample ports since a similar configuration had been previously approved by ADEC personnel during source testing conducted in July 1988. Based on the port location, stack diameter at the sample port location and type of sample (particulate), a maximum number of 24 traverse points were used for emission evaluation.

Particulate samples were collected using the sampling train shown in Figure 7. The train consisted of a button-hook probe nozzle, heated stainless steel probe, heated glass filter, impingers and pumping and metering device. The nozzle was sized prior to each sample run so that the gas stream could be sampled isokinetically; in other words, the velocity at the nozzle tip was the same as the stack gas velocity at each point sampled. Flue gas velocity pressure was measured at the nozzle tip using a Type-S pitot tube connected to

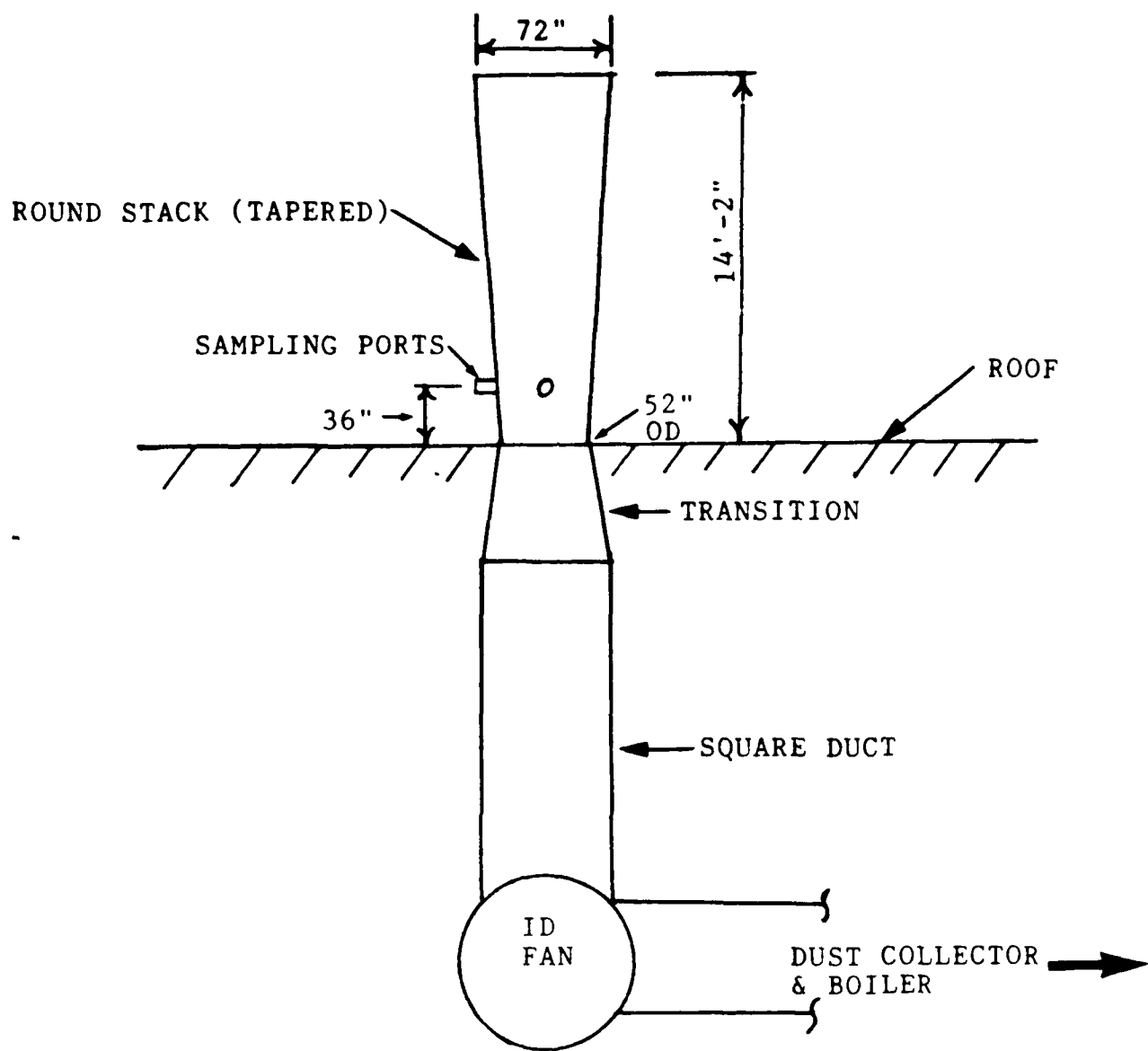


Figure 6. Exhaust Duct Transition

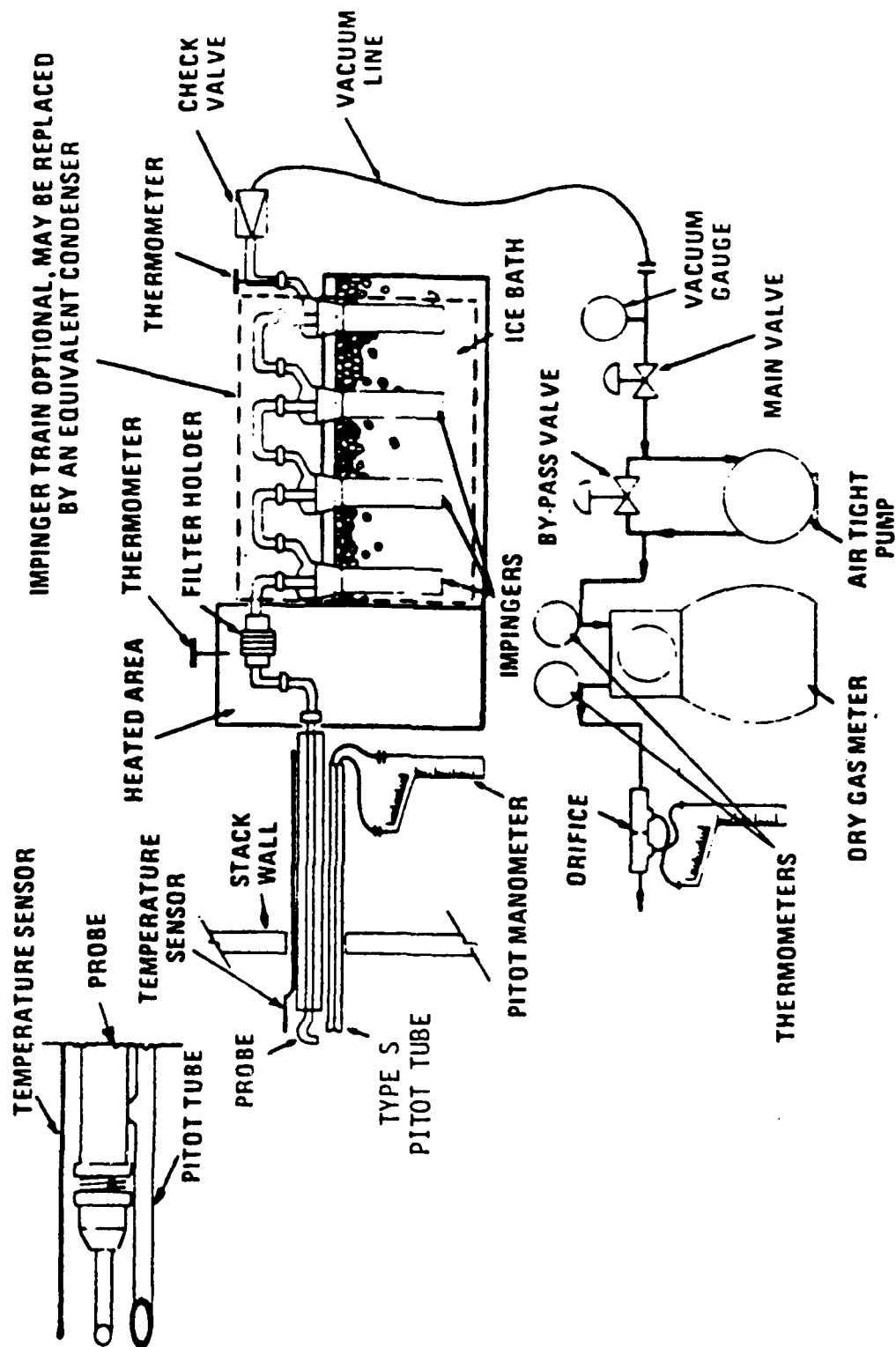


Figure 7. Particulate Sampling Train

a ten-inch inclined-vertical manometer. Type K thermocouples were used to measure flue gas as well as sampling train temperatures. The probe was heated to minimize moisture condensation. The heated filter was used to collect particulate materials. The impinger train (first, third and fourth impingers: modified Greenburg-Smith type, second impinger: standard Greenburg-Smith design) was used as a condenser to collect stack gas moisture. The pumping and metering system was used to control and monitor the sample gas flow rate. Calibration data are presented in Appendix D.

The time for each sampling run was 60 minutes (three sample runs make up a complete test); therefore, the sampling time per traverse point was 2.5 minutes. These sample times were applicable for all runs.

Prior to each test, a preliminary velocity pressure traverse was accomplished and cyclonic flow was determined. For acceptable flow conditions to exist in a stack, the average of the absolute value of the flow angle taken at each traverse point must be less than or equal to 20 degrees. The flow angle for the boiler 4 stack averaged 8 degrees.

During each sample run, a flue gas grab sample for ORSAT analysis (measures oxygen, and carbon dioxide for stack gas molecular weight determination and emissions correction) was taken. ORSAT sampling and analysis equipment are shown in Figures 8 and 9. Flue gas moisture content, also needed for determination of gas molecular weight, was obtained during particulate sampling.

During testing, boiler 4 was operated at an output capacity of 100,000 pounds of steam per hour. Boiler operating logs for 12 June and 14 June are provided in Appendix D. These logs indicate hourly steam output and other operating parameters. One of the three runs which comprised a complete test included a soot blow; this is indicated on the field test data sheets provided in Appendixes E-F. Acetone (used for washing the probe liner and nozzle after collecting a sample) blank sample results are provided in Appendix G. Equipment calibration data are found in Appendix H.

Emission calculations were done using "Source Test Calculation and Check Programs for Hewlett-Packard 41 Calculators" (EPA-340/1-85-018) developed by the EPA Office of Air Quality Planning and Standards, Research Triangle Park NC. This is our standard method for calculating emissions data. Emissions calculations are found in Appendix I.

Method 9 determinations for opacity were accomplished during each sample run by a certified test team member. Method 9 field observation forms are provided in Appendixes F and G. EPA Method 9 certification documentation is provided in Appendix J.

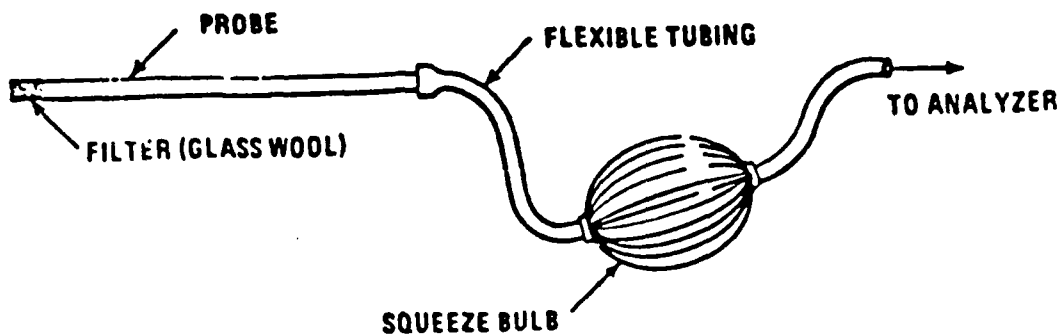


Figure 8. ORSAT Sampling Train

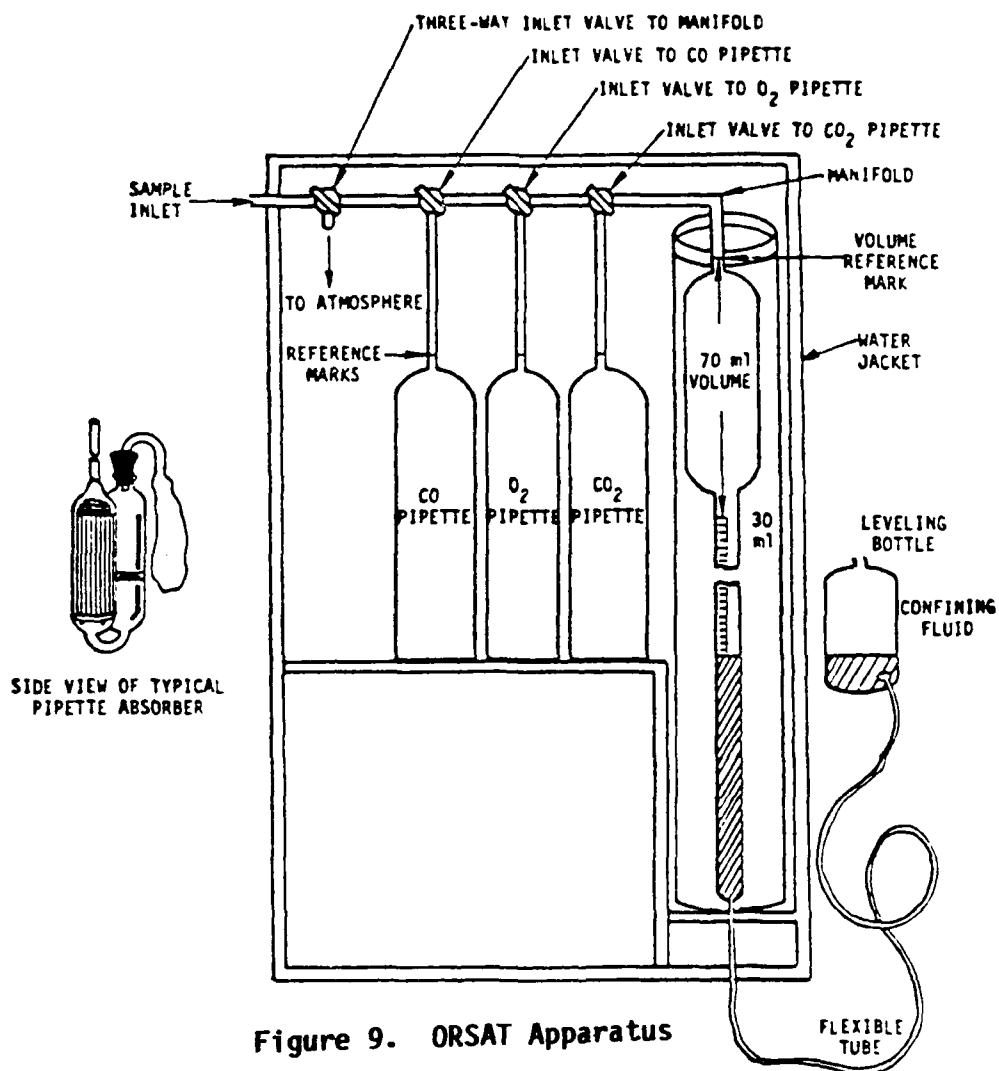


Figure 9. ORSAT Apparatus

III. CONCLUSIONS

Source testing of boiler 4 was conducted on 12 and 14 June 89. Test results for 12 June 89 indicated:

1. Visible emissions averaged less than 10% for all runs except for time periods where soot blows occurred. Soot blows did cause opacity to exceed an average of 20% but not for more than a three-minute period.

2. Particulate emissions were above the emissions standard of 0.1 grains per dry standard cubic foot (gdscf) with an average value of 0.11 gdscf.

Operational parameters of boiler 4 were adjusted and the unit retested on 14 June. Test results indicated:

1. Visible emissions averaged less than 10% for all runs except for time periods where soot blows occurred. Soot blows did cause opacity to exceed an average of 20% but not for more than a three-minute period.

2. Particulate emissions were in compliance with applicable standards with an average value of 0.09 gdscf.

The following table provides operating parameters and resultant particulate emission rates determined for each sample run for boiler 4:

STACK EMISSION TEST RESULTS

<u>Date</u>	<u>Boiler No.</u>	<u>Run No.</u>	<u>Boiler Operating Capacity (1000 lbs steam/hr)</u>	<u>Soot Blow</u>	<u>Particulate Emissions (gr/dscf)*</u>
12 Jun 89	4	1	100		0.15
12 Jun 89	4	2	100	X	0.09
12 Jun 89	4	3	100		<u>0.09</u>
				Average	0.11
14 Jun 89	4	1	100	X	0.11
14 Jun 89	4	2	100		0.08
14 Jun 89	4	3	100		<u>0.09</u>
				Average	0.09

* gr/dscf = grains per dry standard cubic foot

Test results indicate that the Eielson AFB Central Heat and Power Plant is now in compliance with applicable ADEC visible and particulate emissions regulations while operating the boilers at an output capacity of 100,000 pounds of steam per hour.

IV. RECOMMENDATION

AFOEHL will remain active in providing Eielson AFB with consultative and field support with regards to the Central Heat and Power Plant.

REFERENCES

1. "Standards of Performance for New Stationary Sources", Title 40, Part 60, Code of Federal Regulations, July 1, 1987.
2. Quality Assurance Handbook for Air Pollution Measurement Systems - Volume III, Stationary Source Specific Methods, U.S. Environmental Protection Agency, EPA-600/4-77-027-b, Research Triangle Park, North Carolina, December 1984.
3. Source Test Calculation and Check Programs for Hewlett-Packard 41 Calculators. U.S. Environmental Protection Agency, EPA-340/1-85-018, Research Triangle Park, North Carolina, May 1987.

APPENDIX A
Personnel Information

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1. AFOEHL Test Team

Maj James Garrison, Chief, Air Quality Function
Capt Paul Scott, Consultant, Air Resources Meteorologist
Capt Ronald Vaughn, Consultant, Air Quality Engineer
1LT Charles Attebery, Consultant, Air Quality Engineer
SGT Robert Davis, Environmental Engineering Technician

AFOEHL/ECQ
Brooks AFB TX 78235-5501

Phone: AUTOVON 240-2891
Commercial (512) 536-2891

2. Eielson AFB on-site representatives

1Lt Clinton Stuart, 343 Medical Group/SGPB
SSgt John Willey, 343 Medical Group/SGPB

Ted W. Tisdale	343 CES/DEMP Utilities Operations General Foreman, Central Heat and Power Plant
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George Pousche	343 CES/DEMP Assistant, Utilities Operations General Foreman, Central Heat and Power Plant
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Brent Koenen	343 CES/DEEV
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Larry Bright	343 CES/DEEV
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Jack Coutts	Regional Air Coordinator/Dept of Environmental Conservation, State of Alaska (phone contact)
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APPENDIX B
Permit No. 8831-AA001

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STATE OF ALASKA

DEPT. OF ENVIRONMENTAL CONSERVATION

January 21, 1988

STEVE COWPER, GOVERNOR

(907) 452-1714

Northern Regional Office
1001 Noble Street
Suite 350
Fairbanks, Alaska 99701

CERTIFIED MAIL
RETURN RECEIPT
REQUESTED

Captain George A. Heiner
Chief, Environmental/Contract Planning
U.S. Department of the Air Force
343D Civil Engineer Squad (AAC)
Eielson AFB, Alaska 99702

Dear Capt. Heiner:

Re: Air Quality Control Permit to Operate 8831-AA001

We have received your letter dated January 7, 1988, requesting renewal of Air Quality Control Permit to Operate 8331-AA001. In our review of the permit file, we find a letter dated March 11, 1986 from Capt. Blackshear in which he states "a source test will be conducted after repair. . ." Your letter indicated that the repairs were completed last summer. Since the source test has not been completed, we are requiring it as condition 4 of the new Air Quality Control Permit to Operate # 8831-AA001. Please note that the source test report must be submitted to the department by December 31, 1989. The source test will determine at which maximum load the boiler can be fired.

The new permit expires on January 30, 1993, and you must have it renewed if you intend to continue to operate the facility beyond that date. Please note that there are 11 conditions to be met on this 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.

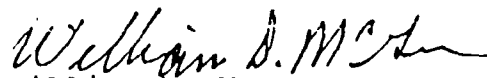
Captain Heiner

-2-

January 21, 1988

Any person who disagrees with this decision may appeal the decision by requesting an adjudicatory hearing, using the procedures contained in 18 AAC 15.200-310. Hearing requests must be delivered to the Commissioner of the Department of Environmental Conservation, 3220 Hospital Drive, P.O. Box 0, Juneau, Alaska 99811-1800, within 30 days of receipt of this letter. If a hearing is not requested within 30 days, the right to appeal is waived and the decision becomes final.

Sincerely,



William D. McGee
Regional Environmental Supervisor

jc/wdm/tss

Enclosure

cc: A. Ewing, EPA/Anchorage
R. Joy, FNSB/Fairbanks
L. Verrelli, ADEC/Juneau

100.16.002

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NORTHERN REGION OFFICE
1001 NOBLE STREET, SUITE 350
FAIRBANKS, ALASKA 99701

AIR QUALITY CONTROL PERMIT TO OPERATE

Permit No. 8831-AA001
Renews Permit No. 8331-AA001;

Date of Issue January 21, 1988

The Department of Environmental Conservation, under the authority of AS 46.03 and 18 AAC 50.400, issues an Air Quality Control Permit to Operate to:

U.S. Department of the Air Force
343D Civil Engineering Squadron (AAC)
Eielson A.F.B., Alaska 99702

FOR THE OPERATION OF the Eielson Air Force Base power and heating plant, consisting of six coal-fired boilers, as described in Exhibit A in accordance with the conditions of this permit and Exhibits A and B and as described in permit application documents listed in Exhibit C.

LOCATED near Fairbanks, Alaska on Eielson Air Force Base.

THE FOLLOWING CONDITIONS SHALL APPLY TO THIS PERMIT:

01. The permittee shall comply with the State Ambient Air Quality Standards established in Section 020 and the applicable emission limitation specified in Section 040 of the State Air Quality Control Regulations 18 AAC 50 and Exhibit B.
02. An Air Contaminant Emission Source Operating Report as described in Exhibit A shall be submitted semiannually to the department's Northern Regional Office, 1001 Noble Street, Suite 350, Fairbanks, Alaska 99701, by the 30th of January and July of each year.
03. The permittee shall maintain and operate all fuel burning equipment, emission control devices, testing equipment, and monitoring equipment to provide optimum fuel burning efficiency during all operating periods. The permittee shall establish and have in the control room written standard operating procedures for use by the operators of the boilers.
04. The permittee shall conduct a source test of one representative boiler in accordance with Title 40 Code of Federal Regulation Part 60 Appendix A, Methods 1 through 5 to determine the maximum steam load at which the boilers will meet the emission standards in Exhibit B. The source

test report must be in the format specified by Appendix IV-3 of the State Air Quality Control Plan and be submitted to the Department's Northern Regional Office by December 31, 1989.

05. Until the source test in Condition 4 is conducted, permittee shall operate the coal fired boilers at a firing rate, which at no time shall exceed 100,000 lbs/hr steam, (5/6) rated capacity, based on one-hour average steam production. The source test shall thereafter determine the maximum load.
06. Additional testing or monitoring, as deemed necessary, shall be conducted, installed, maintained, and operated in accordance with 18 AAC 50.500 and 50.520 to measure air contaminant emission concentrations. If any continuous monitor is malfunctioning or non-operable for three or more consecutive days, permittee shall notify the Northern Regional Office of the department on the fourth day indicating the cause of failure and anticipated time required to repair the instrument.
07. The permittee shall maintain test results, monitoring instrument recording charts, and other applicable data in an active file for not less than one year, and have them accessible, upon request, to the department for not less than three years.
08. Permittee shall notify the department's Northern Regional Office by telephone (452-1714) when equipment failures or operation conditions occur which increase air contaminant emissions. Opacity violations totaling less than one-half hour per day do not need to be reported. The permittee shall report the expected duration, nature of occurrence, amount and type of material burned, and steps taken to minimize emissions and avoid recurrence.
09. Permittee shall submit a written report by the 15th day of each month to the department's Northern Regional Office which summarizes the date, time, and other information requested in Condition 8 for each incident reported in accordance with that permit condition and in violation of performance limitations listed in Exhibit B.
10. The department's representative is allowed access to permittee's facilities to conduct inspections or tests to determine compliance with this permit and state environmental laws and regulations.

11. A copy of this permit shall be clearly displayed, and the State Air Quality Control Regulations 18 AAC 50 kept on file, at the permitted facility location.

This permit expires 30 January 1993 and may be suspended or revoked in accordance with 18 AAC 50.310.



William D. McGee
Regional Environmental Supervisor

EXHIBIT A
AIR QUALITY CONTROL PERMIT TO OPERATE 8831-AA001
AIR EMISSION SOURCE OPERATING REPORT

An Air Source Operating Emission Report shall be submitted to the Alaska Department of Environmental Conservation, Northern Regional Office, 1001 Noble Street, Suite 350, Fairbanks, Alaska 99701 semiannually by January 30 and July 30 each year. The report shall include, but not be limited to, the following information:

1. Facility identification and reporting period. Include the firm name, facility name and location, permit number and the period of time covered by the report.
2. Operating time and fuel consumption logged on permitted equipment tabulated by quarter. Include the number of days or hours of operation and quantity of fuel consumed by each boiler.
3. Report a change in type of fuel and tests or analyses performed.
4. A brief discussion of any change in monitoring equipment or failure which may affect reported results or yield incomplete data for any given day.
5. Signature of authorized agent preceded by the statement, "I am familiar with the information contained in this report and that to the best of my knowledge and belief such information is true, complete, and accurate."

EXHIBIT B
AIR QUALITY CONTROL PERMIT TO OPERATE 8831-AA001
AIR CONTAMINANT EMISSION LIMITATIONS

Exhaust conditions shall be in accordance with the information submitted.

<u>Pollutant</u>	<u>Performance Limitation</u>	<u>Annual Limit TPY</u>
Particulate matter	0.1 grains per dry standard cubic foot, 100,000 lbs steam/hour for each of the 134 MMBTU/HR boilers	150 per each of the six boilers
	20 percent opacity not to be exceeded for more than 3 minutes in any one hour, except during upsets, startups, and shutdowns	

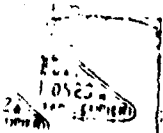


EXHIBIT C
AIR QUALITY CONTROL PERMIT TO OPERATE 8831-AA001
PERMITTEE'S DOCUMENTATION

1. Department of the Air Force Air Quality Control Permit to Operate application dated December 19, 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 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 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.

APPENDIX C
State Regulations

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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)

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 micro-

grams 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 prohibited.

(d) Open burning of putrescible garbage, animal carcasses, or petroleum-based materials is prohibited if it causes odor 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 CO₂ 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 asphalt plants installed or modified after November 1, 1982;

(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 industrial processes 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) — (4) of this subsection, (d) of this section, and 18 AAC 50.060;

(2) 0.1 grains for steam generating plants 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; or

(4) 0.15 grains from fuel burning equipment in operation before November 1, 1982, and using more than 20 percent woodwastes as fuel.

(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) at asphalt plants, 90 milligrams of particulate matter per cubic meter of exhaust gas at standard conditions;

(2) at petroleum refineries

(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 coal preparation facilities

(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 portland cement plants

(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, reconstruct, 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 Btu's 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 less 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 for the affected area 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 is modified after August 7, 1980, or after the date of the most recent permit issued for the affected area under 18 AAC 50.400(c)(3), causing an increase in actual emissions equal to 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 — 1 tpy;

(xi) fluorides — 3 tpy;

(xii) sulfuric acid mist — 7 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 $1 \mu g/m^3$ 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 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:

(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.

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 rate 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 incinerators greater than 4,100 pounds per hour, 18 AAC 50.050(a)(1) for catalyst cracking unit catalyst regenerators, 18 AAC 50.040(c), 18 AAC 50.050(a)(4) — (8) and (d) must be done at maximum operating or production rates within 180 days after startup of a new or modified source. Source test methods specified in 40 CFR 60, Appendix A, as amended through November 1, 1982 or their equivalent are to 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. sec. 60 as amended through November 1, 1983;

(2) for emissions of sulfur dioxide, procedures specified in reference methods 1, 2, and 6 of Appendix A to 40 C.F.R. sec. 60 as amended through November 1, 1983; and

(3) to determine the reduction of visibility and opacity of exhaust gases, the procedures specified in the department document entitled "Alaska Air Quality Visible Emissions Evaluation Procedures" (dated August 1983).

(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 under 18 AAC 50.300(a)(5) or (6) must comply with procedures set out in the department document entitled "ADEC Ambient Analysis Procedures" (dated July 1987).

(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/m³, 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

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APPENDIX D
Plant Operating Data

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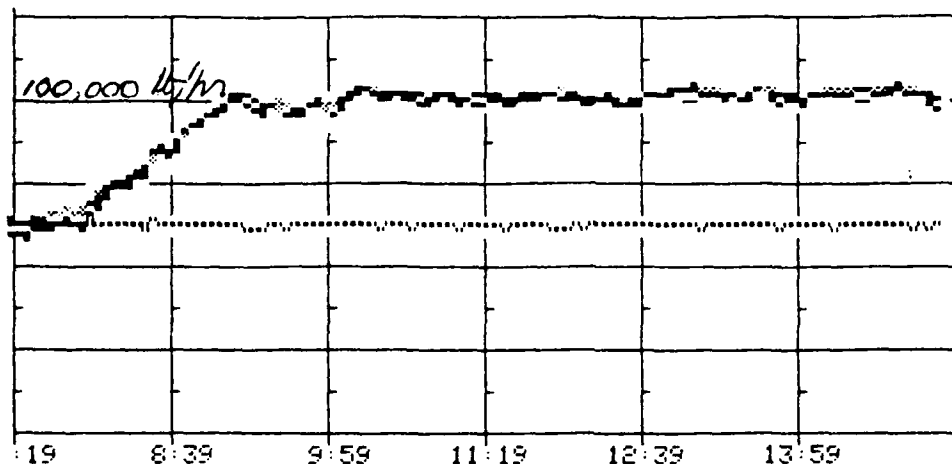
12JUN89 MONDAY

6G

BLR NO. 4 TRENDS

S1234567

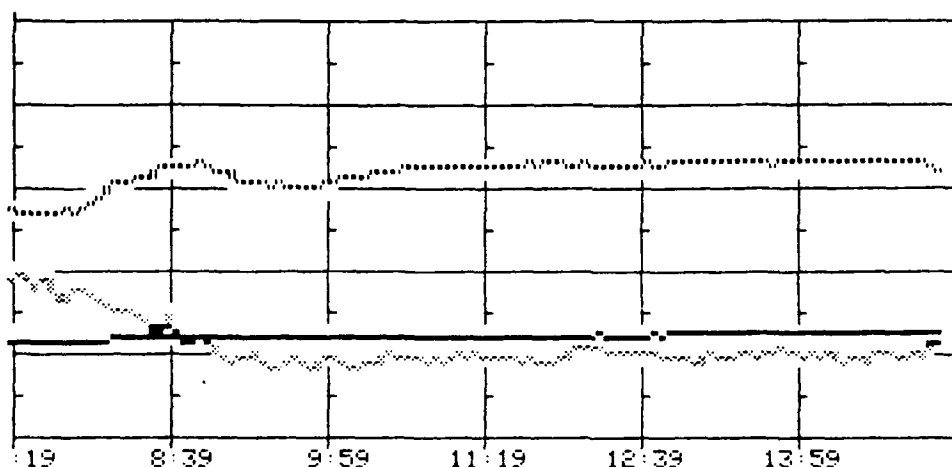
15:12:46



FI-204 BLR 4
%FEEDWATER 125.00
99.25 KLB/HR
SMP 0.00

LI-146 BLR 4
MSTEAM DRUM 100.00
49.31 %
SMP 0.00

FI-104 BLR 4
MSTEAM FLOW 125.00
96.60 KLB/HR
SMP 0.00



AI-847 BLR 4
%OXYGEN PERCENT 25.00
5.54 %
SMP 0.00

FI-155 BLR 4
MCOMB. AIR 100.00
63.66 KLB/HR
SMP 0.00

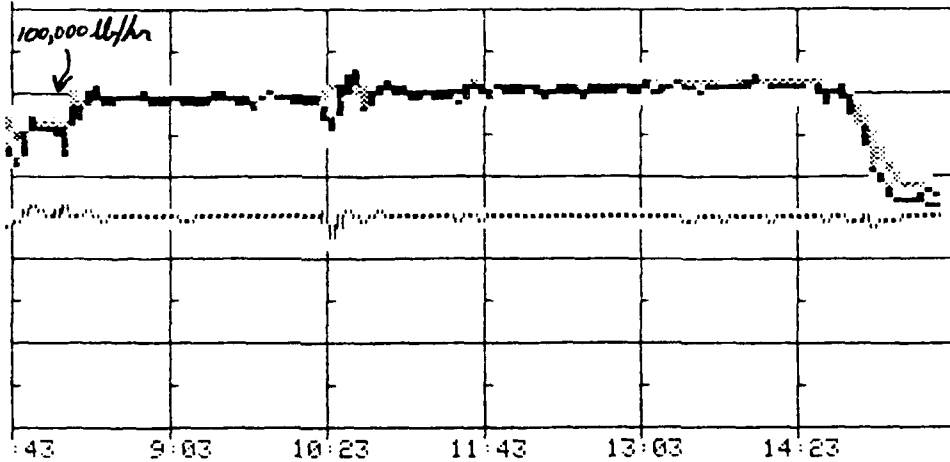
TI-625 BLR 4
FLUE GAS OUTLET 1600.0
390.98 DEG F
SMP 0.00

14 JUN 89 WEDNESDAY 6G

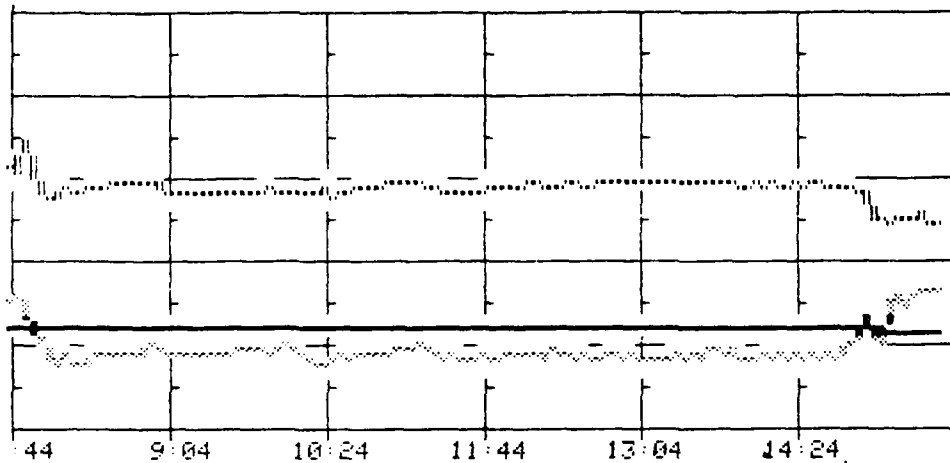
BLR NO. 4 TRENDS

S1234567

15:39:24



FI-204	BLR 4
FEEDWATER	125.00
68.49 KLB/HR	0.00
SMP	
LI-146	BLR 4
STEAM DRUM	100.00
49.54 %	0.00
SMP	
FI-104	BLR 4
STEAM FLOW	125.00
64.22 KLB/HR	0.00
SMP	



AI-847	BLR 4
OXYGEN PERCENT	25.00
4.36 %	0.00
SMP	
FI-155	BLR 4
COMB. AIR	100.00
57.50 KLB/HR	0.00
SMP	
TI-675	BLR 4
FLUE GAS OUTLET	1600.0
381.00 DEG F	0.00
SMP	

TIME = 14:48:00

APPENDIX E
Boiler #4, Field Data, 12 July 89

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DETERMINATION OF MINIMUM NUMBER OF TRAVERSE POINTS

Stack ID: BOILER #4 Stack diameter at ports: 52

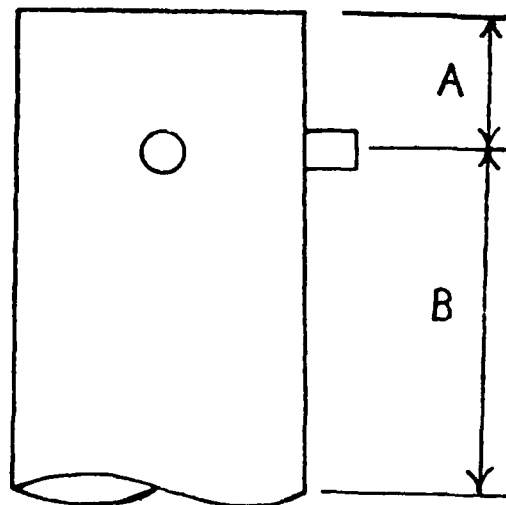
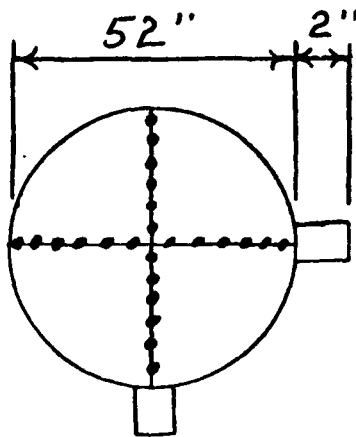
Distance A (ft) 11' 2" (duct diameters) 2.6

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

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	PLANT POWER PLANT BLDG 6302
DATE 12 JUNE 89	SAMPLING TEAM AFCEHL
SOURCE TYPE AND MAKE BOILER #4, COAL FIRED	
SOURCE NUMBER #4	INSIDE STACK DIAMETER 52" Inches
RELATED CAPACITY 120 x 10³ LB STEAM/hr	TYPE FUEL COAL
DISTANCE FROM OUTSIDE OF NIPPLE TO INSIDE DIAMETER 2" 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			3.1
2			5.5
3			8.1
4			11.2
5			15.0
6			20.5
7			35.5
8			41.0
9			44.8
10			47.9
11			50.5
12			52.9

PRELIMINARY SURVEY DATA SHEET NO. 2
(Velocity and Temperature Traverse)

BASE EIELSON AFB	DATE 12 JUNE 89
BOILER NUMBER #4	
INSIDE STACK DIAMETER 52 Inches	
STATION PRESSURE 29.256 In Hg	
STACK STATIC PRESSURE (-) 1.3 In H2O 38.9*	
SAMPLING TEAM AFOEHL	

TRAVERSE POINT NUMBER	VELOCITY HEAD, V_p IN H2O	CYCLONIC (A) 3 (B) 16	STACK TEMPERATURE (°F)
1	0.95	3 16	350
2	1.30	8 16	404
3	1.30	8 14	405
4	1.26	0 2	407
5	1.20	2 0	407
6	1.15	0 3	406
7	1.00	3 10	407
8	1.05	3 12	407
9	0.98	5 13	407
10	0.93	12 10	407
11	0.95	15 12	406
12	0.90	10 10	406
		AVG = 8°	
	$\overline{PPS} = 69$		
	$\overline{\Delta H} = 1.68$		
	$\overline{T_s} = 402$		
		Nozzle = .2417	
		<u>actual = .2508</u>	
AVERAGE			

EQUATIONS

RUN NUMBER # 1 2/2	SCHEMATIC OF STACK CROSS SECTION	EQUATIONS $^{\circ}R = ^{\circ}F + 460$ $H = \left[\frac{5130 \cdot F_d \cdot C_p \cdot A}{C_o} \right]^2 \cdot \frac{T_m}{T_s} \cdot V_p$	AMBIENT TEMP	oF
DATE 12 JUNE 89			STATION PRESS	in Hg
PLANT			HEATER BOX TEMP	oF
BASE			PROBE HEATER SETTING	
SAMPLE BOX NUMBER			PROBE LENGTH	in
METER BOX NUMBER			NOZZLE AREA (A)	sq ft
Q_w/Q_m			Cp	
C _o			DRY GAS FRACTION (F _d)	

[illegible]

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE EIELSON	DATE 12 JUNE 89	RUN NUMBER #1
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BUILDING NUMBER BLDG 6203 POWER PLANT	SOURCE NUMBER BOILER #4
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I. PARTICULATES			
ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	0.5587	0.2874	0.2713
ACETONE WASHINGS (Probe, Front Half Filter)	98.8981	98.6688 ~~102.7352~~	0.2293
BACK HALF (If needed)			
Total Weight of Particulates Collected			0.5006 gm

II. WATER			
ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H2O)	144	100	44
IMPINGER 2 (H2O)	142	100	42
IMPINGER 3 (Dry)	10.6	0	10.6
IMPINGER 4 (Silica Gel)	225.1	200	25.1
Total Weight of Water Collected			122 gm

III. GASES (Dry)					
ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO ₂	10.4	10.6	10.6		10.5
VOL % O ₂	8.3	8.3	8.2		8.3
VOL % CO					
VOL % N ₂					

$$\text{Vol \% N}_2 = (100\% - \% \text{CO}_2 - \% \text{O}_2 - \% \text{CO})$$

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER #2	DATE 1/2	PLANT POWER PLANT, BOX 6223	BASE EIELSON AF13	SAMPLE BOX NUMBER	METER BOX NUMBER #2	Qw/Qm	Co
SCHEMATIC OF STACK CROSS SECTION							
EQUATIONS $OR \approx OF + 460$ $H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co} \right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$ ambient temp 70 OF station press 29.25 in Hg heater box temp 250 OF probe heater setting 250 probe length 72 in nozzle area 1.25 sq ft Cp .84 dry gas fraction (Fd)							

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in Hg)	STACK TEMP		VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP		3 SAMPLE BOX TEMP (OF)	4 IMPINGER OUTLET TEMP (OF)
			(OF)	(Ts) (OF)				IN (OF)	AVG (Tm) (OF)		
1	0	3.5	200		1.07	3.14	80.557	88	5	240	85
2	2.5	4.0	404		1.40	3.64		89		241	63
3	5.0	4.5	412		1.45	3.76		92		241	67
4	7.5	4.5	412		1.50	3.86		95		244	78
5	10.0	5.0	413		1.45	3.73		96		244	83
6	12.5	5.0	412		1.40	3.61		97		245	91
7	15.0	4.5	412		1.30	3.36		97		246	96
8	17.5	4.0	412		1.25	3.23		97		248	100
9	20.0	4.0	412		1.20	3.10		97		246	104
10	22.5	4.0	412		1.20	3.11		100		245	103
11	25.0	4.0	412		1.20	3.12		101		253	104
12	27.5	3.5	411		1.18	2.55		101		251	103
	30.0 (1770)						117.929				

PARTICULATE SAMPLING DATA SHEET

[illegible]

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE <i>EIELSON</i>	DATE <i>12 JUNE 89</i>	RUN NUMBER <i>RUN # 2</i>
BUILDING NUMBER <i>BLDG 6203 POWER PLANT</i>		SOURCE NUMBER <i>BOILER #4</i>

I. PARTICULATES			
ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	<i>0.4717</i>	<i>0.2884</i>	<i>0.1833</i>
ACETONE WASHINGS (Probe, Front Half Filter)	<i>102.8578</i>	<i>102.7352</i>	<i>0.1226</i>
BACK HALF (If needed)			
Total Weight of Particulates Collected			<i>0.3059 gm</i>

II. WATER			
ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H2O)	<i>122</i>	<i>100</i>	<i>22</i>
IMPINGER 2 (H2O)	<i>152</i>	<i>100</i>	<i>52</i>
IMPINGER 3 (Dry)	<i>26.6</i>	<i>0</i>	<i>26.6</i>
IMPINGER 4 (Silica Gel)	<i>230.5</i>	<i>200</i>	<i>30.5</i>
Total Weight of Water Collected			<i>131 gm</i>

III. GASES (Dry)					
ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO ₂	<i>10.6</i>	<i>10.6</i>	<i>10.6</i>		<i>10.6</i>
VOL % O ₂	<i>8.2</i>	<i>8.4</i>	<i>8.4</i>		<i>8.3</i>
VOL % CO					
VOL % N ₂					

$\text{Vol \% N}_2 = (100\% - \% \text{CO}_2 - \% \text{O}_2 - \% \text{CO})$

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER # 3	DATE 12 JUNE 59	PLANT RIVER PLANT, BDA 6203	BASE EIELSON HFB	SAMPLE BOX NUMBER	METER BOX NUMBER # 2	Qw/Qm	Co
SCHEMATIC OF STACK CROSS SECTION meter box A 17							
EQUATIONS $^{\circ}R = ^{\circ}F + 460$ $H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co} \right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$ Pickup check @ 15" Hg - Good Pilot tube check - Good Post leak check - @ 19" Hg - Good							
AMBIENT TEMP				70			
STATION PRESS				29.756 in Hg			
HEATER BOX TEMP				250			
PROBE HEATER SETTING				250			
PROBE LENGTH				72			
NOZZLE AREA (sq ft)				.25			
Cp				.84			
DRY GAS FRACTION (Fd)							

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H2O)	STACK TEMP		VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (in)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP			3 SAMPLE BOX TEMP (°F)	4 IMPINGER OUTLET TEMP (°F)
			1 (°F)	(Ts) (°R)				6 IN (°F)	AVG (Tm) (°R)	7 OUT (°F)		
1	25		300		.95	3.20	148.312	85		87	238	70
2	25		400		1.20	3.12		90		90	242	60
3	5.0		400		1.30	3.40		95		90	244	62
4	7.5		410		1.30	3.30		97		90	246	68
5	10.0	12	412		1.30	3.36		96		90	247	73
6	12.5	13	412		1.30	3.36		99		90	248	79
7	15.0	13	413		1.30	3.36		99		90	247	81
8	17.5	13	414		1.30	3.36		99		91	249	84
9	20.0	14	414		1.25	3.23		99		91	250	85
10	22.5	15	414		1.20	3.11		100		92	250	86
11	25.0	9	413		1.20	3.11		100		92	250	85
12	27.5	8.5	412		1.85	3.20		99		92	252	83
	30.0 (564)						176,509					

RUN NUMBER #3 2/3	SCHEMATIC OF STACK CROSS SECTION	EQUATIONS $^{\circ}R = ^{\circ}F + 460$ $H = \left[\frac{5130 \cdot F_d \cdot C_p \cdot A}{C_o} \right]^2 \cdot \frac{T_m}{T_s} \cdot V_p$	AMBIENT TEMP of
STATION PRESS			in Hg
HEATER BOX TEMP			of
PROBE HEATER SETTING			of
PROBE LENGTH			in
NOZZLE AREA (A)			sq ft
C _p			of
DRY GAS FRACTION (F _d)	of		

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H ₂ O)	STACK TEMP		VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP			SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
			T (°F)	(T _s) (°R)				t _{IN} (°F)	Avg (T _m) (°R)	T _{OUT} (°F)		
1	0		431		.90	2.73	176.509	93		92	217	81
2	2.5	10	400		1.40	3.65		92		91	251	73
3	5.0	17	400		1.50	3.93		97		91	251	66
4	7.5	18	412		1.40	3.63		98		91	250	66
5	10.0	18	413		1.40	3.63		98		92	251	65
6	12.5	18	413		1.30	3.30		98		91	250	65
7	15.0	17	414		1.20	3.10		97		92	249	65
8	17.5	15	413		1.20	3.10		97		91	252	64
9	20.0	15	412		1.20	3.10		96		91	249	64
10	22.5	14	412		1.20	3.10		96		91	250	63
11	25.0	14	412		1.20	3.10		96		90	251	62
12	27.5	14	412		1.10	2.84		95		90	252	62
Σ	30.0 (stop)											
							205.215		VOL =	56.9030		
						ΔH =	~~XXXXXX~~ 3.23					
						I _S =	~~XXXXXX~~ 31.5314					

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE EIELSON	DATE 12 JUNE 59	RUN NUMBER #3
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BUILDING NUMBER BLDG 6203 POWER PLANT	SOURCE NUMBER BOILER #4
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I. PARTICULATES			
ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	0.4602	0.2897	0.1705
ACETONE WASHINGS (Probe, Front Half Filter)	93.7880	93.6284	0.1596
BACK HALF (if needed)			
	Total Weight of Particulates Collected		0.3301 gm

II. WATER			
ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H2O)	144	100	44
IMPINGER 2 (H2O)	132	100	32
IMPINGER 3 (Dry)	10	0	10
IMPINGER 4 (Silica Gel)	225.1	200	25.1
	Total Weight of Water Collected		111 gm

III. GASES (Dry)					
ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO ₂	10.8	11.0	11.0		10.9
VOL % O ₂	8.2	8.2	8.2		8.2
VOL % CO					
VOL % N ₂					

$$\text{Vol \% N}_2 = (100\% - \% \text{CO}_2 - \% \text{O}_2 - \% \text{CO})$$

VISIBLE EMISSION OBSERVATION FORM

No. one

COMPANY NAME <u>Eielson AFB, AK USAF</u>		
STREET ADDRESS <u>Central Heat & Power Plant</u>		
CITY <u>Eielson AFB</u>	STATE <u>AK</u>	ZIP
PHONE (KEY CONTACT) <u>George Ponche</u>	SOURCE ID NUMBER	

PROCESS EQUIPMENT <u>Coal Boiler #4</u>	OPERATING MODE <u>100K lbs steam/hr</u>
CONTROL EQUIPMENT <u>Cyclone separators</u>	OPERATING MODE <u>optimal</u>

DESCRIBE EMISSION POINT <u>steel stack</u>	
HEIGHT ABOVE GROUND LEVEL <u>100'</u>	HEIGHT RELATIVE TO OBSERVER Start <u>16'</u> End <u>✓</u>
DISTANCE FROM OBSERVER Start <u>50'</u> End <u>✓</u>	DIRECTION FROM OBSERVER Start <u>NNW</u> End <u>✓</u>

DESCRIBE EMISSIONS Start <u>Bypass</u> End <u>✓</u>	
EMISSION COLOR Start <u>White</u> End <u>✓</u>	IF WATER DROPLET PLUME Attached ☐ <u>N/A</u> Detached ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED Start <u>0-5' beyond stack</u> End <u>✓</u>	

DESCRIBE PLUME BACKGROUND Start <u>Sky</u> End <u>✓</u>	
BACKGROUND COLOR Start <u>Blue</u> End <u>✓</u>	SKY CONDITIONS Start <u>Clr</u> End <u>✓</u>
WIND SPEED Start <u><5</u> End <u>✓</u>	WIND DIRECTION Start <u>VAR</u> End <u>✓</u>
AMBIENT TEMP Start <u>69</u> End <u>✓</u>	WET BULB TEMP Start <u><10</u> End <u>✓</u>

Stick with Plume <u>✓</u> Sun <u>+</u> Wind <u>→</u>	SOURCE LAYOUT SKETCH Draw North Arrow <u>↑</u> Emission Point Observer's Position Sun Location Line 140°
--	---

OBSERVATION DATE <u>12 June 1989</u>		START TIME <u>1006</u>				END TIME <u>1021</u>
SEC	0	15	30	45	COMMENTS	
1	5	5	10	5		
2	5	5	5	5		
3	5	5	10	5		
4	5	5	5	5		
5	5	5	5	5		
6	5	5	5	5		
7	5	5	10	10		
8	5	5	5	5		
9	5	10	10	5		
10	5	5	5	5		
11	5	15	10	10		
12	10	5	5	5		
13	5	5	5	5		
14	5	5	5	5		
15	5	5	5	5		
16						
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23						
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25						
26						
27						
28						
29						
30						

OBSERVER'S NAME (PRINT) <u>Paul T. Scott, Capt, USAF</u>		DATE <u>12 June 89</u>
OBSERVER'S SIGNATURE <u>Paul T. Scott</u>		
ORGANIZATION <u>AFOEHL/ECQ Air Function</u>		
CERTIFIED BY <u>Texas Air Control Board</u>		DATE <u>17 May 89</u>

ADDITIONAL INFORMATION

VISIBLE EMISSION OBSERVATION FORM

No. TWO

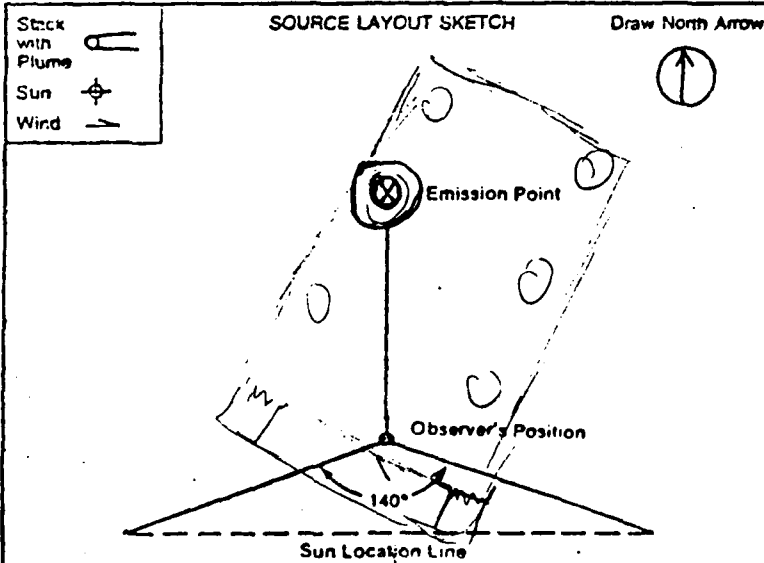
COMPANY NAME <u>USAF</u>		
STREET ADDRESS <u>Central Heat & Power Plant (CHPD)</u>		
CITY <u>Edelson AFB</u>	STATE <u>AK</u>	ZIP
PHONE (KEY CONTACT) <u>George Pouché</u>	SOURCE ID NUMBER <u>Boiler 4</u>	

PROCESS EQUIPMENT <u>Coal Boiler</u>	OPERATING MODE <u>100K lbs/hr</u>
CONTROL EQUIPMENT <u>Cyclone separator</u>	OPERATING MODE <u>Normal</u>

DESCRIBE EMISSION POINT <u>Steel stack</u>	
HEIGHT ABOVE GROUND LEVEL <u>100' +</u>	HEIGHT RELATIVE TO OBSERVER Start <u>16</u> End
DISTANCE FROM OBSERVER Start <u>50</u> End ☒	DIRECTION FROM OBSERVER Start <u>N</u> End ☒

DESCRIBE EMISSIONS Start <u>Brown</u> End ☒	
EMISSION COLOR Start <u>White</u> End ☒	IF WATER DROPLET PLUME Attached ☐ <u>N/A</u> Detached ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED Start <u>0-5' above stack</u> End	

DESCRIBE PLUME BACKGROUND Start <u>Sky</u> End ☒	
BACKGROUND COLOR Start <u>Blue</u> End ☒	SKY CONDITIONS Start <u>CLR</u> End ☒
WIND SPEED Start <u><5</u> End ☒	WIND DIRECTION Start <u>VAR</u> End ☒
AMBIENT TEMP Start <u>70</u> End ☒	WET BULB TEMP RH, percent <u><10</u>



ADDITIONAL INFORMATION

OBSERVATION DATE <u>12 June 89</u>				START TIME <u>1145</u>	END TIME <u>1202</u>
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	5	
5	5	5	5	5	
6	5	5	5	5	
7	5	5	5	5	
8	5	5	5	5	
9	5	5	5	10	
10	5	5	5	5	
11	5	5	5	65	suit blow at 1155:40
12	35	25	20	40	
13	70	45	25	20	
14	20	20	20	15	
15	15	15	15	10	
16	15	15	15	15	
17	10	10	5	5	
18	5	5	5	5	
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

OBSERVER'S NAME (PRINT) <u>Paul T. Scott</u>	DATE <u>12 June 89</u>
OBSERVER'S SIGNATURE <u>Paul T. Scott</u>	
ORGANIZATION <u>AF OETL/ECQ Air Function Book AR</u>	
CERTIFIED BY <u>Texas Air Control Board</u>	DATE <u>17 Mar 89</u>

VISIBLE EMISSION OBSERVATION FORM

No. 3

COMPANY NAME USAT		
STREET ADDRESS CHPP		
CITY Eielson AFB	STATE AK	ZIP
PHONE (KEY CONTACT) George Ponche	SOURCE ID NUMBER Boiler #4	

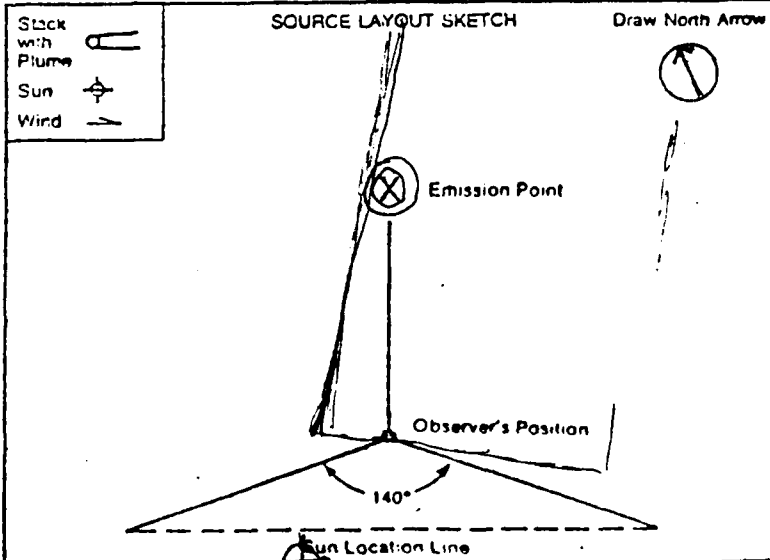
PROCESS EQUIPMENT Coal fired Boiler	OPERATING MODE 100K lbs H ₂ O/hr
CONTROL EQUIPMENT Cyclone separator	OPERATING MODE nom.

DESCRIBE EMISSION POINT steel stack
--

HEIGHT ABOVE GROUND LEVEL 100 +	HEIGHT RELATIVE TO OBSERVER Start 16 End ✓
DISTANCE FROM OBSERVER Start 50 End ✓	DIRECTION FROM OBSERVER Start NNE End ✓

DESCRIBE EMISSIONS Start Buoyant End ✓	
EMISSION COLOR Start White End ✓	IF WATER DROPLET PLUME Attached ☐ n/a Detached ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED Start 0-5' above stack End ✓	

DESCRIBE PLUME BACKGROUND Start Blue Sky End ✓	
BACKGROUND COLOR Start Blue End ✓	SKY CONDITIONS Start End ✓
WIND SPEED Start <5 End ✓	WIND DIRECTION Start VRB End ✓
AMBIENT TEMP Start 73 End ✓	WET BULB TEMP RH, percent 45



OBSERVATION DATE				START TIME	END TIME
12 June 89				11:32.3	
SEC	0	15	30	45	COMMENTS
MIN					
1 ₃	5	5	5	5	
2	5	5	5	5	
3 ₂₅	5	5	10	10	
4	5	5	5	5	
5	10	5	5	5	
6 ₁₈	5	5	5	5	
7	5	5	5	5	
8	5	5	5	5	
9	10	5	5	5	
10 ₃₄	10	5	10	5	
11	5	10	5	5	
12	5	5	5	5	
13					
14					
15					
16					
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26					
27					
28					
29					
30					

OBSERVER'S NAME (PRINT) Paul T. Scott	
OBSERVER'S SIGNATURE Paul T. Scott	DATE 12 June
ORGANIZATION AFCEHL / ECG Air Function	
CERTIFIED BY Troy Air Control Board	DATE 11 M, 12 89

ADDITIONAL INFORMATION

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APPENDIX F
Boiler 4, Field Data, 14 July 89

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PRELIMINARY SURVEY DATA SHEET NO. 2 (Velocity and Temperature Traverse)			
BASE EIELSON		DATE 14 JUNE 89	
BOILER NUMBER #4			
INSIDE STACK DIAMETER 52"		Inches	
STATION PRESSURE 28.968		In Hg	
STACK STATIC PRESSURE - .72		In H ₂ O	
SAMPLING TEAM AF OEHLE			
TRAVERSE POINT NUMBER	VELOCITY HEAD, V _p IN H ₂ O	$\sqrt{V_p}$	STACK TEMPERATURE (°F)
1.	.91		392
2	1.3		393
3	1.3		395
4	1.3		395
5	1.2		395
6	1.10		394
7	.94		394
8	.90		393
9	.86		393
10	.84		391
11	.85		388
12	~~1.67~~ .70		389
	$V_{avg} =$	73	
	T _s =	393	
	ΔP =	1.02	
	Nozzle dia =	0.2381	
	actual dia =	0.25	
	AVERAGE		

PARTICULATE SAMPLING DATA SHEET

Y = 1.002

RUN NUMBER #1		DATE 11/2		PLANT POWER PLANT		BASE FIELSON		SAMPLE BOX NUMBER #1		METER BOX NUMBER 2		Qw/Qm		Co													
SCHEMATIC OF STACK CROSS SECTION														EQUATIONS $OR = OF + 460$ $H = \left[\frac{5130 \cdot F \cdot G \cdot A}{Co} \right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$ plot tube check - good pre leak check @ 15" Hg - good post leak check @ 13" Hg - good Soot Blow													
AMBIENT TEMP STATION PRESS 28.96g HEATER BOX TEMP PROBE HEATER SETTING PROBE LENGTH 72 NOZZLE AREA (A) - DIA 1/4 Op .84 DRY GAS FRACTION (F_d)																											

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H ₂ O)	1. STACK TEMP		VELOCITY HEAD (V _p)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	6. GAS METER TEMP 7			3. SAMPLE BOX TEMP (°F)	4. IMPINGER OUTLET TEMP (°F)
			(°F)	(T _s) (°R)				IN (°F)	AVG (T _m) (°R)	OUT (°F)		
1	0		393		1.1	2.62	206.500	64		64	244	63
2	25		393		1.3	2.86		67		65	260	53
3	5		388		1.3	3.13		69		66	266	53
4	75	3	387		1.5	3.61		70		66	271	55
5	10		390		1.2	2.89		73		66	272	58
6	125	3	393		1.1	2.65		75		67	282	64
7	150		394		.99	2.38		75		67	284	69
8	175	2.5	394		.92	2.21		76		67	284	74
9	20		394		.91	2.19		77		68	285	76
10	225	2.5	394		.91	2.19		76		68	282	76
11	25	2.5	394		.89	2.14		75		68	280	75
12	275		394		.87	2.09		75		68	288	72
13	30 (Stop)						230.931					
			</									

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE KIRKSON	DATE 14 JUNE 89	RUN NUMBER #1
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BUILDING NUMBER BLDG 6203, POWER PLANT	SOURCE NUMBER BOILER #4
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I. PARTICULATES			
ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	0.4539	0.2843	0.1696
ACETONE WASHINGS (Probe, Front Half Filter)	98.8264	98.6688	0.1576
BACK HALF (if needed)			
Total Weight of Particulates Collected			0.3272 gm

II. WATER			
ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
* 2 IMPINGER # (H2O)	126 ml/s	100	26 ml/s
* 1 IMPINGER # (H2O)	178 ml/s	100	78 ml/s
IMPINGER 3 (Dry)	6 ml/s	0	6 ml/s
IMPINGER 4 (Silica Gel)	219.79	200	19.79 g
Total Weight of Water Collected			130 gm

III. GASES (Dry)					
ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO ₂	12.4	12.6	12.5	—	12.5
VOL % O ₂	6.8	6.7	6.8	—	6.8
VOL % CO					
VOL % N ₂					

$$\text{Vol \% N}_2 = (100\% - \% \text{CO}_2 - \% \text{O}_2 - \% \text{CO})$$

PARTICULATE SAMPLING DATA SHEET

SCHEMATIC OF STACK CROSS SECTION				EQUATIONS				AMBIENT TEMP			
TRaverse POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H ₂ O)	STACK TEMP (°F)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	IN (°F)	AVG (Tm) (°R)	OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
1	0		373	0.54	1.30	255.54	69		70	220	64
2	2.5		373	0.48	1.15		71		70	233	60
3	5	1	373	0.48	2.36		73		70	244	56
4	7.5		388	1.1	2.67		75		70	253	59
5	10		386	1.1	2.65		77		71	246	58
6	12.5		397	1.1	2.65		78		71	251	57
7	15	1	398	1.0	2.41		77		71	254	60
8	17.5	1	398	1.1	2.65		78		71	257	60
9	20		398	1.1	2.65		78		72	262	63
10	22.5		398	1.1	2.65		79		73	264	66
11	25		398	1.1	2.65		79		73	259	65
12	27.5		397	0.99	2.39	274.69	80		73	254	66
3 (step)											
Tm = 75						TOT VOL = 49,381					
Ts = 396											
411 = 2.50											
PSIS = 29.6210											

RUN NUMBER	# 2-
DATE	1/2
PLANT	14 JUNE 89
BASE	POWER PLANT
SAMPLE BOX NUMBER	FILELSON
METER BOX NUMBER	# 2
Qw/Qm	
Co	

STATION PRESS	28.968
HEATER BOX TEMP	
PROBE HEATER SETTING	
PROBE LENGTH	72
NOZZLE AREA (sq ft)	0.84
DRY GAS FRACTION (Fd)	

$H = \left[\frac{5130 \cdot Fd \cdot Co \cdot A}{Co} \right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$
 Pitot tube check - Good
 Pre leak @ 15" Hg - Good
 Post leak check @ 11" Hg - Good

PARTICULATE SAMPLING DATA SHEET

[illegible]

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE EIELSON	DATE 14 JUNE 89	RUN NUMBER #2
------------------------	---------------------------	-------------------------

BUILDING NUMBER BLDG 6203, POWER PLANT	SOURCE NUMBER BOILER #4
--	-----------------------------------

I. PARTICULATES			
ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	0.4652	0.2915	0.1737
ACETONE WASHINGS (Probe, Front Half Filter)	102.8113	102.7352	0.0761
BACK HALF (If needed)			
Total Weight of Particulates Collected			0.2498 gm

II. WATER			
ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H2O)	146	100	46
IMPINGER 2 (H2O)	140	100	40
IMPINGER 3 (Dry)	11.8	0	11.8
IMPINGER 4 (Silica Gel)	220	200	20
Total Weight of Water Collected			118 gm

III. GASES (Dry)					
ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO ₂	10.0	10.0	10.0	10.0	10.0
VOL % O ₂	9.2	9.4	9.6	9.2	9.3
VOL % CO					
VOL % N ₂					

$$\text{Vol \% N}_2 = (100\% - \% \text{CO}_2 - \% \text{O}_2 - \% \text{CO})$$

AMBIENT TEMP	OF
STATION PRESS	in Hg
28.969	
HEATER BOX TEMP	OF
PROBE HEATER SETTING	
PROBE LENGTH	in
72	
NOZZLE AREA (A) C.A.	$\frac{A}{L^2}$
	sq ft
Cp	
84	
DRY GAS FRACTION (F _D)	

EQUATIONS

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

$$H = \left[\frac{5130 \cdot F_d \cdot C_p \cdot A}{C_o} \right]^2 \cdot \frac{T_m}{T_s} \cdot V_p$$

Plot check - Good

Pre test leak check @ 15" Hg - Good

Post test leak check @ 12" Hg - Good

A hand-drawn schematic of a stack cross-section. On the right side, there is a chimney-like structure with a circular opening at the top and a small rectangular base. On the left side, there is a rectangular structure labeled "meter". A horizontal line separates the two sides.

RUN NUMBER	#3	1/2
DATE	14 JUNE 89	
PLANT	POWER PLANT	
BASE	FEILSON	
SAMPLE BOX NUMBER	# ~~1~~ #2	
METER BOX NUMBER	#2	
Qw/Qm		
Co		

TRAVERSE POINT NUMBER	SAMPLING TIME A (min)	VAC STATIC PRESSURE (in H ₂ O)	STACK TEMP		VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP			SAMPLE BOX TEMP (°F)	IMPINGING OUTLET TEMP (°F)
			(°F)	(T _s) (°R)				IN (°F)	AVG (T _m) (°R)	OUT (°F)		
1	0	8	373		.78	2.35	305.669	69		69	233	63
2	25		373		1.3	3.13		72		70	243	55
3	5		396		1.3	3.12		73		70	249	53
4	7.5		398		1.3	3.12		74		70	250	54
5	10	8	400		1.2	3.07		75		70	251	56
6	12.5		400		1.1	2.63		75		70	249	60
7	15		400		1.0	2.39		75		69	249	62
8	17.5		399		.98	2.34		74		69	253	62
9	20	7	399		.94	2.25		74		69	253	62
10	22.5		399		.92	2.20		74		69	252	62
11	25	6	398		.90	2.15		73		68	252	62
12	27.5		398		.76	1.82		73		68	247	61
	30(stop)						330.214					
						WGV60						

PARTICULATE SAMPLING DATA SHEET

SCHEMATIC OF STACK CROSS SECTION				EQUATIONS				AMBIENT TEMP			
RUN NUMBER #3 DATE 14 JUNE 89 PLANT POWER PLANT BASE KEILSON SAMPLE BOX NUMBER #2 METER BOX NUMBER #2 Qw/Qm Co				$^{\circ}R = ^{\circ}F + 460$ $H = \left[\frac{5130 \cdot F_d \cdot C_p \cdot A}{C_o} \right]^2 \cdot \frac{T_m}{T_s} \cdot V_p$				STATION PRESS 28.968 HEATER BOX TEMP OF PROBE HEATER SETTING OF PROBE LENGTH 72 NOZZLE AREA (in ²) DIA 1.44 Cp 1.84 DRY GAS FRACTION (Fd)			
TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H ₂ O)	STACK TEMP		VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP		SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
			(°F)	(Ts) (°R)				IN (°F)	AVG (Tm) (°R)		
1	0	✓	373		.74	1.77	330.214	71		246	55
2	25		393		.97	2.33		72		250	53
3	5	6	387		1.0	2.42		72		248	53
4	75		396		1.1	2.63		72		253	52
5	10		398		.79	2.36		72		251	53
6	12.5		400		1.0	2.38		73		252	53
7	15		399		1.0	2.38		72		248	53
8	17.5		399		1.1	2.62		73		251	53
9	20		400		1.1	2.63		74		254	54
10	22.5		400		1.0	2.38		74		255	55
11	25		399		.91	2.18		76		242	55
12	27.5		378		.60	1.44		76		251	55
13	30 (stop)						353.608				
Tm = 71 Ts = 397 At = 2.41 Pst = 29.2904 TOT VOL = 47.740 ST3											

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE FIELSON	DATE 14 JUNE 89	RUN NUMBER #3
------------------------	---------------------------	-------------------------

BUILDING NUMBER BLDG 6203, POWER PLANT	SOURCE NUMBER BOILER #4
--	-----------------------------------

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	0.4773	0.2867	0.1906
ACETONE WASHINGS (Probe, Front Half Filter)	93.7152	93.6285	0.0867
BACK HALF (if needed)			
Total Weight of Particulates Collected			0.2773 gm

II. WATER

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H2O)	183	100	83.0
IMPINGER 2 (H2O)	116	100	16.0
IMPINGER 3 (Dry)	3.0	0	3.0
IMPINGER 4 (Silica Gel)	218.4	200	18.4
Total Weight of Water Collected			120 gm

III. GASES (Dry)

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO ₂	10.4	10.6	10.6		10.5
VOL % O ₂	8.8	9.0	8.8		8.9
VOL % CO					
VOL % N ₂					

$$\text{Vol \% N}_2 = (100\% - \% \text{CO}_2 - \% \text{O}_2 - \% \text{CO})$$

VISIBLE EMISSION OBSERVATION FORM

No. one

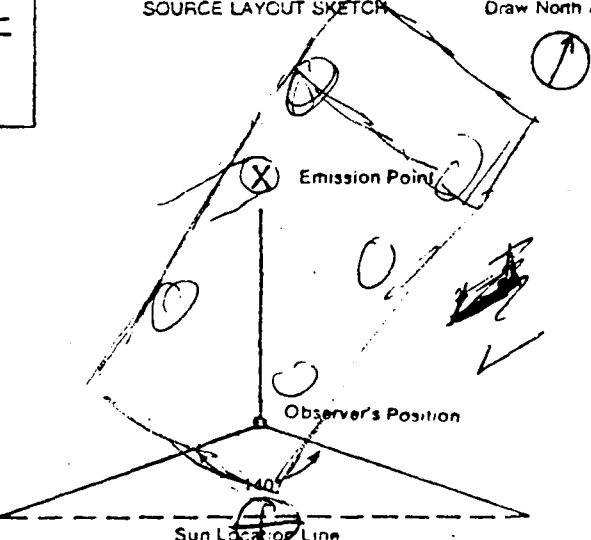
COMPANY NAME <u>USAF</u>		
STREET ADDRESS <u>CHETP</u>		
CITY <u>Edison AT-3</u>	STATE <u>AK</u>	ZIP
PHONE (KEY CONTACT) <u>Ted Tisdale</u>	SOURCE ID NUMBER <u>Boile #1</u>	

PROCESS EQUIPMENT <u>Coal Fired Boiler</u>	OPERATING MODE <u>100Klbs steam/hr</u>
CONTROL EQUIPMENT <u>cyclone separators</u>	OPERATING MODE <u>normal</u>

DESCRIBE EMISSION POINT <u>Steel Stack</u>	
HEIGHT ABOVE GROUND LEVEL <u>100' ±</u>	HEIGHT RELATIVE TO OBSERVER Start <u>16'</u> End ☒
DISTANCE FROM OBSERVER Start <u>50</u> End	DIRECTION FROM OBSERVER Start <u>NNW</u> End ☒

DESCRIBE EMISSIONS Start <u>black lifting</u> End ☒	
EMISSION COLOR Start <u>white/brown</u> End ☒	IF WATER DROPLET PLUME Attached ☐ <u>PIA</u> Detached ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED Start <u>0-5ft</u> End ☒	

DESCRIBE PLUME BACKGROUND Start <u>sky</u> End ☒	
BACKGROUND COLOR Start <u>white</u> End	SKY CONDITIONS Start <u>over</u> End
WIND SPEED Start <u>15 mph</u> End ☒	WIND DIRECTION Start <u>NE</u> End ☒
AMBIENT TEMP Start <u>66</u> End	WET BULB TEMP Start <u><10</u> End

Stack with Plume  Sun  Wind 	SOURCE LAYOUT SKETCH 
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OBSERVATION DATE <u>14 June 87</u>				START TIME <u>1024</u>	END TIME <u>1036</u>
SEC MIN	0	15	30	45	COMMENTS
1	5	5	5	5	
2	5	5	50	45	<u>sat above 25'</u>
3	25	20	20	40	
4	35	25	25	15	
5	20	15	15	10	
6	10	10	5	5	
7	5	5	10	5	
8	5	5	5	5	
9	5	10	10	5	
10	5	5	5	5	
11	5	5	5	5	
12	5	5	5	5	
13	5	5	5	5	
14					
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29					
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OBSERVER'S NAME (PRINT) <u>Paul T. Scott, Capt</u>	DATE <u>14 June 87</u>
OBSERVER'S SIGNATURE <u>Paul T. Scott</u>	
ORGANIZATION <u>AF OETL/ECQ Air Function</u>	
CERTIFIED BY <u>Paul T. Scott</u>	DATE <u>14 June 87</u>

ADDITIONAL INFORMATION

VISIBLE EMISSION OBSERVATION FORM

No. **NO**

COMPANY NAME USAF		
STREET ADDRESS CHG PP		
CITY Edwards AFB	STATE AK	ZIP
PHONE/KEY CONTACT Ted Tizkalo		SOURCE ID NUMBER Bortner #4

PROCESS EQUIPMENT Coal-Burner	OPERATING MODE 100K lbs steam/hr
CONTROL EQUIPMENT Cyclone Separator	OPERATING MODE nominal

DESCRIBE EMISSION POINT
Steel Stack

HEIGHT ABOVE GROUND LEVEL 100+'	HEIGHT RELATIVE TO OBSERVER Start 16' End ☒
DISTANCE FROM OBSERVER Start 50 End ☒	DIRECTION FROM OBSERVER Start NNW End ☒

DESCRIBE EMISSIONS

Start **Left** End ☒

EMISSION COLOR
Start **Brown/White** End ☒

IF WATER DROPLET PLUME
Attached ☐ **N/A** Detached ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED
Start **D-5** End

DESCRIBE PLUME BACKGROUND

Start **SKY** End

BACKGROUND COLOR
Start **Blue/White** End ☒

SKY CONDITIONS
Start **Thin Bkn** End

WIND SPEED
Start **25 mph** End ☒

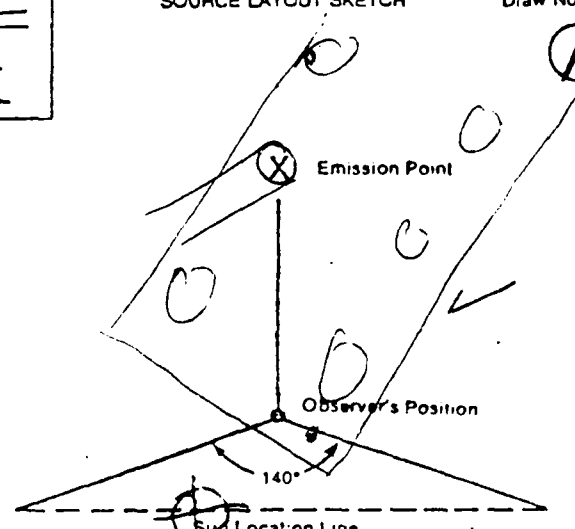
WIND DIRECTION
Start **NE** End

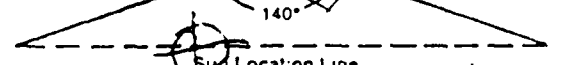
AMBIENT TEMP
Start **68** End

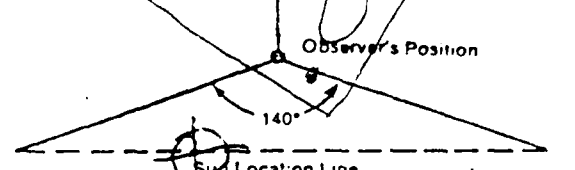
WET BULB TEMP RH, percent

SOURCE LAYOUT SKETCH

Draw North Arrow

Stack with Plume 

Sun 

Wind 

Observer's Position

140°

ADDITIONAL INFORMATION

OBSERVATION DATE 14 Jun 1988				START TIME 1156	END TIME 1207
SEC MIN	0	15	30	45	COMMENTS
1	5	5	5	5	
2	5	5	5	5	
3	5	5	10	5	
4	5	5	5	10	
5	10	5	5	5	
6	5	5	5	5	
7	5	5	5	5	
8	5	5	5	10	
9	5	5	5	5	
10	10	10	5	5	
11	5	5	10	5	
12	5	5	10	10	
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

OBSERVER'S NAME (PRINT)
Paul T. Scott, Capt

OBSERVER'S SIGNATURE
Paul T. Scott

DATE
14 Jun 88

ORGANIZATION
HFOEHL

CERTIFIED BY
Texas Air Control Board

DATE
17 Mar 89

VISIBLE EMISSION OBSERVATION FORM

No. THREE

COMPANY NAME <u>USA F</u>		
STREET ADDRESS <u>CH&DP</u>		
CITY <u>Eielson AFB</u>	STATE <u>AK</u>	ZIP
PHONE (KEY CONTACT) <u>Ted Tisdale</u>	SOURCE ID NUMBER <u>Boxer #4</u>	

PROCESS EQUIPMENT <u>Coal Boiler</u>	OPERATING MODE <u>100K/hr steam/hr</u>
CONTROL EQUIPMENT <u>Cyclone Separators</u>	OPERATING MODE <u>NORMAL</u>

DESCRIBE EMISSION POINT <u>Steel Stack</u>	
HEIGHT ABOVE GROUND LEVEL <u>100+</u>	HEIGHT RELATIVE TO OBSERVER Start <u>16'</u> End <u>✓</u>
DISTANCE FROM OBSERVER Start <u>50'</u> End <u>✓</u>	DIRECTION FROM OBSERVER Start <u>NNW</u> End <u>✓</u>

DESCRIBE EMISSIONS	
Start <u>BBN</u> End <u>✓</u>	IF WATER DROPLET PLUME
EMISSION COLOR Start <u>Brown White</u> End <u>✓</u>	Attached ☒ <u>N/A</u> Detached ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	
Start <u>0-5' above stack</u> End <u>✓</u>	

DESCRIBE PLUME BACKGROUND	
Start <u>SKY</u> End <u>✓</u>	SKY CONDITIONS
BACKGROUND COLOR Start <u>Blue White</u> End <u>✓</u>	Start <u>-BKN</u> End <u>✓</u>
WIND SPEED Start <u>25 Kts</u> End <u>✓</u>	WIND DIRECTION Start <u>NE</u> End <u>✓</u>
AMBIENT TEMP Start <u>68</u> End <u>✓</u>	WET BULB TEMP <u>< 10</u>

Stack with Plume Sun Wind	SOURCE LAYOUT SKETCH	Draw North Arrow

OBSERVATION DATE <u>14 June</u>				START TIME <u>1329</u>	END TIME <u>1340</u>
SEC	0	15	30	45	COMMENTS
MIN					
29 ¹	5	5	5	5	
30 ²	5	5	5	5	
31 ³	5	5	5	5	
32 ⁴	5	5	5	5	
33 ⁵	5	5	10	10	
34 ⁶	10	5	5	5	
35 ⁷	5	5	5	5	
36 ⁸	5	10	5	5	
37 ⁹	5	5	5	5	
38 ¹⁰	10	5	5	10	
39 ¹¹	5	5	5	5	
40 ¹²	5	5	5	5	
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

OBSERVER'S NAME (PRINT) <u>Paul L. Scott, Capt</u>	DATE <u>14 Jun 87</u>
OBSERVER'S SIGNATURE <u>Paul L. Scott</u>	
ORGANIZATION <u>AFCEHL</u>	
CERTIFIED BY <u>/</u>	DATE

ADDITIONAL INFORMATION

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APPENDIX G
Acetone Blank Results

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BLANK ANALYTICAL DATA FORM

Plant EIELSON AFB
 Sample location BLANK
 Relative humidity —
 Liquid level marked and container sealed —
 Density of acetone (ρ_a) 0.78 g/ml
 Blank volume (V_a) 100 ml
 Date and time of wt 12 JUNE 1800h Gross wt 105.2623 mg
 Date and time of wt 13 JUNE 1800h Gross wt 105.2623 mg
 Average gross wt 105.2623 mg
 Tare wt 105.2623 mg
 Weight of blank (m_{ab}) 0.0000 mg

$$C_a = \frac{m_{ab}}{V_a \rho_a} = \frac{(0.0000)}{(100)(0.78)} = 0.0000 \text{ mg/g}$$

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 Paul J. Scott
 Signature of reviewer My. Jamison

Quality Assurance Handbook M5-5.4

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APPENDIX H
Emissions Calculations

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XROM "METH 5"

RUN NUMBER
BOILER 4, RUN 1

METER BOX Y? RUN

1.0020 RUN

DELTA H? RUN

3.0700 RUN

BAR PRESS ? RUN

29.2500 RUN

METER VOL ? RUN

55.3950 RUN

MTR TEMP F? RUN

91.0000 RUN

% OTHER GAS
REMOVED BEFORE
DRY GAS METER ? RUN

STATIC HOH IN ? RUN

-1.3000 RUN

STACK TEMP. RUN

393.0000 RUN

ML. WATER ? RUN

122.0000 RUN

IMP. % HOH = 9.9

% HOH=9.9

% CO2? RUN

10.5000 RUN

% OXYGEN? RUN

8.3000 RUN

% CO ? RUN

MOL WT OTHER? RUN

MWD =30.01
MW WET=28.83

SQRT PSTS ? RUN

31.5287 RUN

TIME MIN ? RUN

60.0000 RUN

NOZZLE DIA ? RUN

.2500 RUN

STK DIA INCH ? RUN

52.0000 RUN

* VOL MTR STD = 52.395
STK PRES ABS = 29.15
VOL HOH GAS = 5.74
% MOISTURE = 9.88
MOL DRY GAS = 0.901
% NITROGEN = 81.20
MOL WT DRY = 30.01
MOL WT WET = 28.83
VELOCITY FPS = 76.10
STACK AREA = 14.75
STACK ACFM = 67.111.
* STACK DSCFM = 37.567.
% ISOINETIC = 100.67

XROM "METH 5"

RUN NUMBER
BOILER 4, RUN 2

METER BOX Y? RUN

1.0020 RUN

DELTA H? RUN

3.2200 RUN

BAR PRESS ? RUN

29.2500 RUN

METER VOL ? RUN

57.6380 RUN

MTR TEMP F? RUN

94.0000 RUN

% OTHER GAS
REMOVED BEFORE
DRY GAS METER ? RUN

STATIC HOH IN ? RUN

-1.3000 RUN

STACK TEMP. RUN

400.0000 RUN

ML. WATER ? RUN

131.0000 RUN

IMP. % HOH = 10.2

% HOH=10.2

% CO2? RUN

10.6000 RUN

% OXYGEN? RUN

8.3000 RUN

% CO ? RUN

MOL WT OTHER? RUN

MWD =30.03
MW WET=28.80

SQRT PSTS ? RUN

32.4204 RUN

TIME MIN ? RUN

60.0000 RUN

NOZZLE DIA ? RUN

.2500 RUN

STK DIA INCH ? RUN

52.0000 RUN

* VOL MTR STD = 54.245
STK PRES ABS = 29.15
VOL HOH GAS = 6.17
% MOISTURE = 10.21
MOL DRY GAS = 0.899
% NITROGEN = 81.10
MOL WT DRY = 30.03
MOL WT WET = 28.80
VELOCITY FPS = 80.75
STACK AREA = 14.75
STACK ACFM = 71.096.
* STACK DSCFM = 38.192.
% ISOINETIC = 102.45

XROM "METH 5"

RUN NUMBER
BOILER 4, RUN 3

METER BOX Y? RUN

1.0020 RUN

DELTA H? RUN

3.2300 RUN

BAR PRESS ? RUN

29.2500 RUN

METER VOL ? RUN

56.9000 RUN

MTR TEMP F? RUN

93.0000 RUN

% OTHER GAS
REMOVED BEFORE
DRY GAS METER ? RUN

STATIC HOH IN ? RUN

-1.3000 RUN

STACK TEMP. RUN

394.0000 RUN

ML. WATER ? RUN

110.0000 RUN

IMP. % HOH = 6.8

% HOH=6.8

% CO2? RUN

10.9000 RUN

% OXYGEN? RUN

8.2000 RUN

% CO ? RUN

MOL WT OTHER? RUN

MWD =30.07
MW WET=29.01

SQRT PSTS ? RUN

31.5314 RUN

TIME MIN ? RUN

60.0000 RUN

NOZZLE DIA ? RUN

.2500 RUN

STK DIA INCH ? RUN

52.0000 RUN

* VOL MTR STD = 53.452
STK PRES ABS = 29.15
VOL HOH GAS = 5.13
% MOISTURE = 8.90
MOL DRY GAS = 0.912
% NITROGEN = 80.90
MOL WT DRY = 30.07
MOL WT WET = 29.01
VELOCITY FPS = 77.50
STACK AREA = 14.75
STACK ACFM = 65.857.
* STACK DSCFM = 37.354.
% ISOINETIC = 102.04

XROM "MASSFLOW"

RUN NUMBER
BOILER 4, RUN 1, 12 JUNE
RUN

VOL MTR STD ?
52.3990 RUN
STACK DSCFM ?
37,567.0000 RUN
FRONT 1/2 MG ?
500.6000 RUN
BACK 1/2 MG ?
0.0000 RUN

F GR/DSCF = 0.1474
F MG/MMH = 337.3764
F LB/HR = 47.4736
F KG/HR = 21.5340

XROM "MASSFLOW"

RUN NUMBER
BOILER 4, RUN 2, 12 JUNE
RUN

VOL MTR STD ?
54.2460 RUN
STACK DSCFM ?
38,192.0000 RUN
FRONT 1/2 MG ?
305.9000 RUN
BACK 1/2 MG ?
0.0000 RUN

F GR/DSCF = 0.0070
F MG/MMH = 199.1401
F LB/HR = 28.4890
F KG/HR = 12.9222

XROM "MASSFLOW"

RUN NUMBER
BOILER 4, RUN 3, 12 JUNE
RUN

VOL MTR STD ?
53.6520 RUN
STACK DSCFM ?
37,854.0000 RUN
FRONT 1/2 MG ?
330.1000 RUN
BACK 1/2 MG ?
0.0000 RUN

F GR/DSCF = 0.0949
F MG/MMH = 217.2734
F LB/HR = 30.8070
F KG/HR = 13.9741

XROM "METH 5"

RUN NUMBER
BOILER 4, RUN 1, 14 JUNE
RUN

METER BOX Y?
1.0020 RUN

DELTA H?
2.5100 RUN

BAR PRESS ?
28.9680 RUN

METER VOL ?
48.5250 RUN

MTR TEMP F?
71.0000 RUN

% OTHER GAS
REMOVED BEFORE
DRY GAS METER ?
RUN

STATIC HOH IN ?
-.7200 RUN

STACK TEMP.
394.0000 RUN

ML. WATER ?
130.0000 RUN

IMP. % HOH = 11.5

% HOH=11.5

% CO2?
12.5000 RUN

% OXYGEN?
6.7000 RUN

% CO ?
RUN

MOL WT OTHER?
RUN

MWd =30.27
MW WET=28.86

SORT PSTS ?
29.7371 RUN

TIME MIN ?
60.0000 RUN

NOZZLE DIA ?
.2500 RUN

STK DIA INCH ?
52.0000 RUN

* VOL MTR STD = 47.187
STK PRES ABS = 28.92
VOL HOH GAS = 6.12
% MOISTURE = 11.50
MOL DRY GAS = 0.885
% NITROGEN = 80.80
MOL WT DRY = 30.27
MOL WT WET = 28.86
VELOCITY FPS = 73.93
STACK AREA = 14.75
STACK ACFM = 63.416.
* STACK DSCFM = 34.593.
% ISOINETIC = 98.25

XROM "METH 5"

RUN NUMBER
BOILER 4, RUN 2, 14 JUNE
RUN

METER BOX Y?
1.0020 RUN

DELTA H?
2.5000 RUN

BAR PRESS ?
28.9680 RUN

METER VOL ?
49.3810 RUN

MTR TEMP F?
75.0000 RUN

% OTHER GAS
REMOVED BEFORE
DRY GAS METER ?
RUN

STATIC HOH IN ?
-.7200 RUN

STACK TEMP.
396.0000 RUN

ML. WATER ?
118.0000 RUN

IMP. % HOH = 10.5

% HOH=10.5

% CO2?
10.0000 RUN

% OXYGEN?
9.2000 RUN

% CO ?
RUN

MOL WT OTHER?
RUN

MWd =29.97
MW WET=28.72

SORT PSTS ?
29.6210 RUN

TIME MIN ?
60.0000 RUN

NOZZLE DIA ?
.2500 RUN

STK DIA INCH ?
52.0000 RUN

* VOL MTR STD = 47.578
STK PRES ABS = 28.92
VOL HOH GAS = 5.55
% MOISTURE = 10.45
MOL DRY GAS = 0.895
% NITROGEN = 80.80
MOL WT DRY = 29.97
MOL WT WET = 28.72
VELOCITY FPS = 73.82
STACK AREA = 14.75
STACK ACFM = 65.320.
* STACK DSCFM = 34.867.
% ISOINETIC = 98.45

XROM "METH 5"

RUN NUMBER
BOILER 4, RUN 3, 14 JUNE
RUN

METER BOX Y?
1.0020 RUN

DELTA H?
2.4100 RUN

BAR PRESS ?
28.9680 RUN

METER VOL ?
47.9400 RUN

MTR TEMP F?
71.0000 RUN

% OTHER GAS
REMOVED BEFORE
DRY GAS METER ?
RUN

STATIC HOH IN ?
-.7200 RUN

STACK TEMP.
397.0000 RUN

ML. WATER ?
120.0000 RUN

IMP. % HOH = 10.8

% HOH=10.8

% CO2?
10.5000 RUN

% OXYGEN?
8.8000 RUN

% CO ?
RUN

MOL WT OTHER?
RUN

MWd =30.03
MW WET=28.73

SORT PSTS ?
29.2904 RUN

TIME MIN ?
60.0000 RUN

NOZZLE DIA ?
.2500 RUN

STK DIA INCH ?
52.0000 RUN

* VOL MTR STD = 46.527
STK PRES ABS = 28.92
VOL HOH GAS = 5.65
% MOISTURE = 10.63
MOL DRY GAS = 0.892
% NITROGEN = 80.70
MOL WT DRY = 30.03
MOL WT WET = 28.73
VELOCITY FPS = 73.95
STACK AREA = 14.75
STACK ACFM = 64.577.
* STACK DSCFM = 34.287.
% ISOINETIC = 97.81

XROM "MASSFLO"

RUN NUMBER

BOILER 4, RUN 1, 14 JUNE
RUN

VOL MTR STD ?

47.1878 RUN

STACK DSCFM ?

34,593.0000 RUN

FRONT 1/2 MG ?

327.2000 RUN

BACK 1/2 MG ?

0.0000 RUN

F GR/DSCF = 0.1072

F MG/MMM = 245.2871

F LB/HR = 31.7838

F KG/HR = 14.4167

RUN NUMBER

BOILER 4, RUN 2, 14 JUNE
RUN

VOL MTR STD ?

47.5780 RUN

STACK DSCFM ?

34,867.0000 RUN

FRONT 1/2 MG ?

249.8000 RUN

BACK 1/2 MG ?

0.0000 RUN

F GR/DSCF = 0.0810

F MG/MMM = 185.4100

F LB/HR = 24.2147

F KG/HR = 10.9838

XROM "MASSFLO"

RUN NUMBER

BOILER 4, RUN 3, 14 JUNE
RUN

VOL MTR STD ?

46.5278 RUN

STACK DSCFM ?

34,287.0000 RUN

FRONT 1/2 MG ?

277.3000 RUN

BACK 1/2 MG ?

0.0000 RUN

F GR/DSCF = 0.0920

F MG/MMM = 210.4707

F LB/HR = 27.0304

F KG/HR = 12.2610

APPENDIX I
Calibration Data

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NOZZLE CALIBRATION DATA FORM

Date _____ Calibrated by _____

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.)		
12 JUNE 89 1/4 in	.250	.250	.250	0	.250
14 JUNE 89 1/4 in	.250	.250	.250	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.),
 $\Delta D \leq (0.10 \text{ mm}) 0.004 \text{ in.}$

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

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METER BOX CALIBRATION DATA AND CALCULATION FORM

(English units)

Date 21 Nov 88

Meter box number Nutch #2

Barometric pressure, $P_b = 30.02$ in. Hg Calibrated by Scott & Vaughn

Orifice manometer setting (ΔH), in. H ₂ O	Gas volume		Temperature				Time (θ), min	Y_i	$\Delta H \theta_i$ in. H ₂ O
	Wet test meter (V_w), ft ³	Dry gas meter (V_d), ft ³	Wet test meter (t_w), °F	Dry gas meter					
				Inlet (t_{d_i}), °F	Outlet (t_{d_o}), °F	Avg ^a (t_d), °F			
0.5	5	5.057	75 535	77 82	75 77	537.75	12.40	0.9926	1.73
1.0	5	5.031	76 536	77 81	77 80	542.5	9.14	1.0034	1.87
1.5	10	10.101	77 537	77 90	81 84	547.75	15.35	1.0061	1.97
2.0	10	10.230	78 538	78 97	85 87	552.0	13.45	0.9981	2.00
3.0	10	10.170	78 538	78 100	87 87	554.75	10.92	1.0065	1.97
4.0	10	10.191	78 538	78 105	87 91	557.0	9.35	1.0061	1.92
Avg								1.002	1.91

ΔH , in. H ₂ O	$\frac{\Delta H}{13.6}$	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6}) (t_w + 460)}$	$\Delta H \theta_i = \frac{0.0317 \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460) \theta}{V_w} \right]^2$
0.5	0.0368	$\frac{(5)(30.02)(537.75)}{(5.057)(30.02 + \frac{0.5}{13.6})(535)}$	$\frac{(0.0317)(.5)}{(30.02)(537.75)} \left[\frac{(535)(12.4)}{(5)} \right]^2$
1.0	0.0737	$\frac{(5)(30.02)(542.5)}{(5.031)(30.02 + \frac{1.0}{13.6})(536)}$	$\frac{(0.0317)(1.0)}{(30.02)(542.5)} \left[\frac{(536)(9.14)}{5} \right]^2$
1.5	0.110	$\frac{(10)(30.02)(547.75)}{(10.101)(30.02 + \frac{1.5}{13.6})(537)}$	$\frac{(0.0317)(1.5)}{(30.02)(547.75)} \left[\frac{(537)(15.35)}{10} \right]^2$
2.0	0.147	$\frac{(10)(30.02)(552.0)}{(10.230)(30.02 + \frac{2.0}{13.6})(538)}$	$\frac{(0.0317)(2.0)}{(30.02)(552.0)} \left[\frac{(538)(13.45)}{10} \right]^2$
3.0	0.221	$\frac{(10)(30.02)(554.75)}{(10.170)(30.02 + \frac{3.0}{13.6})(538)}$	$\frac{(0.0317)(3.0)}{(30.02)(554.75)} \left[\frac{(538)(10.92)}{10} \right]^2$
4.0	0.294	$\frac{(10)(30.02)(557.0)}{(10.191)(30.02 + \frac{4.0}{13.6})(538)}$	$\frac{(0.0317)(4.0)}{(30.02)(557.0)} \left[\frac{(538)(9.35)}{10} \right]^2$

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

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test number One Date 23 Jun 89 Meter box number Nutech 2 Plant Clearfield

Barometric pressure, $P_b = 29.123$ in. Hg Dry gas meter number _____ Pretest Y 1.002

Orifice manometer setting, (ΔH), in. H_2O	Gas volume		Temperature			Time (θ), min	Vacuum setting, in. Hg	Y_i	$V_w P_b (t_d + 460)$ $V_d (P_b + \frac{\Delta H}{13.6}) (t_w + 460)$
	Wet test meter (V_w), ft^3	Dry gas meter (V_d), ft^3	Wet test meter (t_w), $^{\circ}F$	Inlet (t_{d_i}), $^{\circ}F$	Outlet (t_{d_o}), $^{\circ}F$	Average (t_d), $^{\circ}F$			
<u>1.4</u>	10	<u>10.212</u>	<u>80</u> <u>540</u>	<u>87</u> <u>550</u>	<u>85</u> <u>545</u>	<u>547.5</u>	<u>4.0</u>	<u>0.989</u>	<u>10.347 (29.123) (540)</u> <u>10.347 (29.123) (540)</u>
<u>1.4</u>	10	<u>10.223</u>	<u>81</u> <u>541</u>	<u>87</u> <u>554</u>	<u>82</u> <u>546</u>	<u>550</u>	<u>4.0</u>	<u>0.991</u>	<u>10.347 (29.123) (541)</u> <u>10.347 (29.123) (541)</u>
<u>1.4</u>	10	<u>10.347</u>	<u>81</u> <u>541</u>	<u>87</u> <u>555</u>	<u>82</u> <u>547.5</u>	<u>551.5</u>	<u>4.0</u>	<u>0.982</u>	<u>10.347 (29.123) (541)</u> <u>10.347 (29.123) (541)</u>
								<u>Y = .987</u>	

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

where

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, $^{\circ}F$.

t_{d_i} = Temperature of the inlet gas of the dry gas meter, $^{\circ}F$.

t_{d_o} = Temperature of the outlet gas of the dry gas meter, $^{\circ}F$.

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

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 $Y \pm 0.05Y$.

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

$$y \pm 0.050$$

$$1.052 \leftarrow y \rightarrow 0.952$$

STACK SENSOR CALIBRATION: 19-20 Oct 88

SENSOR #	REFERENCE TEMPERATURE (deg K) X axis	TEST TEMPERATURE (deg K) Y axis
-------------	---	--

P1	273.30	273.60
	371.90	373.60
	447.00	450.20

Regression Output:

Constant	-4.30
Std Err of Y Est	0.20
R Squared	1.00
No. of Observations	3.00
Degrees of Freedom	1.00

X Coefficient(s)	1.02
Std Err of Coef.	0.00

% Deviation @ 2000 F(1093.3 K) = 1.29%

P2	273.30	273.60
	371.80	373.60
	447.60	450.80

Regression Output:

Constant	-4.27
Std Err of Y Est	0.11
R Squared	1.00
No. of Observations	3.00
Degrees of Freedom	1.00

X Coefficient(s)	1.02
Std Err of Coef.	0.00

% Deviation @ 2000 F(1093.3 K) = 1.25%

P3	273.30	274.10
	371.90	374.10
	447.60	450.80

Regression Output:

Constant	-2.96
Std Err of Y Est	0.03
R Squared	1.00
No. of Observations	3.00
Degrees of Freedom	1.00

X Coefficient(s)	1.01
Std Err of Coef.	0.00

% Deviation @ 2000 F(1093.3 K) = 1.11%

P4	273.30	273.60
	371.80	373.60
	447.60	450.80

Regression Output:

Constant	-4.27
Std Err of Y Est	0.11
R Squared	1.00
No. of Observations	3.00
Degrees of Freedom	1.00

X Coefficient(s)	1.02
Std Err of Coef.	0.00

% Deviation @ 2000 F(1093.3 K) = 1.27%

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 19²⁰/OCT 88 Thermocouple number 101 IMPINBER
 Ambient temperature 26 °C Barometric pressure 29.232 in. Hg
 Calibrator GARRISON/SCOTT Reference: mercury-in-glass NBS
 other _____

Reference point number ^a	Source ^b (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference, °C ^c *
0	ICE BATH	0	0	—
—	ROOM TEMP	25.5	26.1	0.6

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

^b Type of calibration system used.

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

* MUST BE WITHIN 1°C OF REF

Quality Assurance Handbook M2-2.10

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Date 19³⁰ OCT 88 Thermocouple number 1mPINGER D2
 Ambient temperature 26° °C Barometric pressure 29.232/29.175 in. Hg
 Calibrator GARRISON/SCOTT Reference: mercury-in-glass NBS
 other _____

Reference point number ^a	Source ^b (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference, °C % °C *
0	ICE BATH	0	0	—
—	ROOM TEMP	26.0	26.6	0.6

^aEvery 30°C (50°F) for each reference point.

^bType of calibration system used.

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

* MUST BE WITHIN 1°C OF REF

Quality Assurance Handbook M2-2.10

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

IMPINGER

Date 19/10/88 Thermocouple number D3
 Ambient temperature 26 °C Barometric pressure 29.232/29.175 in. Hg
 Calibrator GARRISON/SCOTT Reference: mercury-in-glass NBS
 other _____

Reference point number ^a	Source ^b (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference, °C *OC*
C	ICE BATH	0	0.6	0.6
—	ROOM TEMP	25.8	25.6	0.2

^aEvery 30°C (50°F) for each reference point.

^bType of calibration system used.

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

* MUST BE WITHIN 1°C OF REF

Quality Assurance Handbook M2-2.10

TYPE S PITOT TUBE INSPECTION DATA FORM

#6B

Pitot tube assembly level? ☒ yes ☐ no

Pitot tube openings damaged? ☐ yes (explain below) ☒ no

$\alpha_1 = 0^\circ (<10^\circ)$, $\alpha_2 = 0^\circ (<10^\circ)$, $\beta_1 = 0^\circ (<5^\circ)$,

$\beta_2 = 1^\circ (<5^\circ)$

(1.0625)

$\gamma = 0^\circ$, $\theta = 0^\circ$, $A = 1/16$ in. (in.)

$z = A \sin \gamma = 0.0$ in. (in.); <0.32 cm ($<1/8$ in.),

$w = A \sin \theta = 0.0$ in. (in.); $<.08$ cm ($<1/32$ in.)
0.0313

$P_A = 17/32 (0.53)$ in. (in.) $P_b = 17/32 (0.53)$ in. (in.)

$D_t = 0.375$ in. (in.)

Comments: CONSTRUCTED IAW 40 CFR 60, APP A, METH 2,
FIG 2.2. ASSIGNED BASELINE COEFFICIENT = 0.84

Calibration required? ☐ yes ☒ no

#6C

Pitot tube assembly level? ✓ yes no

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

$\alpha_1 = \underline{0}^\circ (<10^\circ)$, $\alpha_2 = \underline{0}^\circ (<10^\circ)$, $\beta_1 = \underline{0}^\circ (<5^\circ)$,

$\beta_2 = \underline{1}^\circ (<5^\circ)$

$\gamma = \underline{3}^\circ$, $\theta = \underline{0}^\circ$, $A = \underline{29/32}$ ~~in.~~ (in.)

$z = A \sin \gamma = \underline{.047}$ ~~in.~~ (in.); <0.32 cm ($<1/8$ in.),

$w = A \sin \theta = \underline{0}$ ~~in.~~ (in.); $<.08$ cm ($<1/32$ in.)

$P_A = \underline{29/64}$ ~~in.~~ (in.) $P_B = \underline{29/64}$ ~~in.~~ (in.)

$D_t = \underline{.375}$ ~~in.~~ (in.)

Comments: CONSTRUCTED 14W 40 CFR 60, APPA, METH-2
FIG 2.2. ASSIGNED BASELINE COEFFICIENT = 0.84

Calibration required? yes ✓ no

STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

NOTECH #2

Date 3 JAN 89 Thermocouple number INLET/OUTLET

Ambient temperature 26 °C Barometric pressure _____ in. Hg

Calibrator GARRISON Reference: mercury-in-glass ASTM 63F
SCOTT other _____

Reference point number	Source ^a (specify)	Reference thermometer temperature, °C	Thermocouple potentiometer temperature, °C	Temperature difference, ^b °C *
INLET				
-	HOT WATER BATH	43.5	43	.5
-	ROOM TEMP	26	26	0
OUTLET				
-	HOT WATER BATH	43.5	42	1
-	ROOM TEMP	26	26.5	.5

^aType of calibration system used.

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

Quality Assurance Handbook M5-2.5

* MUST BE WITHIN 3°C OF REFERENCE

APPENDIX J
EPA Method 9 Certification Documentation

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The Texas Air Control Board
Certifies That

PAUL T. SCOTT

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



Date Certified March 17, 1989

September 15, 1989

This Certificate Expires

Ch. D. ... 2/15/89
Certifying Officer Date

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