AP42 Section:	11.27
Reference:	4
Title:	*Particulate Emission Test Report For A Scrubber Stack At International Minerals Corporation: Spruce Pine, NC, North Carolina Department of Natural Resources & Community Development, Division of Environmental Management, September 1981.*

Unit # 1 Feldspar

AP-42 Section 11.27
Reference 4
Report Sect. 4
Reference 2

PARTICULATE EMISSION TEST REPORT

For a Scrubber Stack at

INTERNATIONAL MINERALS CORPORATION

Spruce Pine, North Carolina

Performed by the Source Testing Staff
of the
North Carolina Department
of Natural Resources & Community Development
Division of Environmental Management
Monitoring Management
1-2 September, 1981

14

INTRODUCTION

This report presents the results of a source test performed September 1 & 2, 1981, on the Feldspar dryer-scrubber stack at IMC in Spruce Pine, North Carolina. The purpose of the test was to determine compliance with 15 NCAC 2D .0509 "Particulates from Mica or Feldspar Processing Plants" (Reference 1). Results indicate compliance during the test period.

Test personnel were R. E. Wooten and J. A. Shanklin from the North Carolina Source Test Section and Steve Evans from the Asheville Regional Office. Source contact person was Roy Riddle.

SOURCE DESCRIPTION

Crushed Feldspar which has been separated from the ore by froth flotation is de-watered and routed to a direct-fired rotary dryer. The dust-laden exhaust gases from the dryer are then cleaned in a scrubber and routed thru a Euroform demister to an ID fan and up the stack.

The production figures were supplied by the source. Determination of emission limits is discussed in Appendix G.

SAMPLING AND ANALYTICAL PROCEDURES

Particulate testing and analysis of samples were performed according to procedures developed by the U. S. Environmental Protection Agency and referred to as Method 5. Sampling port locations and number of test points to be used were determined according to Method 1. The above federal test methods appear in their original form in the December 23, 1971, Federal Register (Reference 2), with updated versions appearing in the August 18, 1977 Federal Register (Reference 3).

Test point locations and sampling port placement are shown in Appendix E. Usually, flue gas composition is determined by Method 3 of Reference 2. However, because of the large quantities of air relative to combustion products a value of 29.0 for dry molecular weight was used as described in Reference 4.

TEST SUMMARY - IMC 9/1-2/81

	Parameter	Run 1	Run 2	Run 3
Q_s	Stack volume flow rate, acfm	15608.	15633.	15403.
Q_{std}	Stack volume flow rate, scfm	12739.	12759.	12642.
V_{std}	Sample volume, scf	62.7	61.9	64.5
%I	Percent isokinetic	98.	97.	102.
pmr_{avg}	Emission rate, lb/hr	24.4	23.4	20.4
P	Process rate during test, ton/hr	19.	19.	19.

$\overline{pmr}$	Average emission rate, lb/hr	22.76 (70% of allowable)
E	Maximum allowable emission rate based on NCAC 2D .0509 lb/hr.	29.36

17

Calculation Summary

SOURCE IMC (Retest) Date 9/1-2/81

LOCATION Spruce Pine

ENTRY	RUN 1	RUN 2	RUN 3	ANSWER
ΔH (in H_2O)	3.4970	3.5600	3.6800	
P_{atm} (in Hg)	26.8000	26.8000	26.7200	
	27.0571	27.0618	26.9906	P_m (in Hg)
(gage)(in H_2O)	0.9200	0.9200	0.9200	
	26.8676	26.8676	26.7876	P_s (in Hg)
T_m (°R)	558.0000	567.0000	551.0000	
V_m (ft^3)	63.8800	64.1030	66.1180	
	54.8569	54.1839	57.3587	$V_{m_{std}}$ (ft^3)
V_{lq} (ml)	*165.6800	*163.6481	150.8000	
	7.8367	7.7406	7.1328	V_{vstd} (ft^3)
	62.6935	61.9244	64.4915	V_{std} (ft^3)
	* 12.5000	*12.5000	11.0601	%M
	0.8750	0.8750	0.8894	M_d
MW_d	29.0000	29.0000	29.0000	
	27.6250	27.6250	27.7834	M
T_s (°R)	583.0000	583.0000	578.0000	
$\Sigma\sqrt{\Delta p}$	31.7903	31.8405	31.5498	
$n_{\Delta p}$	30.0000	30.0000	30.0000	
	1.0597	1.0614	1.0517	Ave $\sqrt{\Delta p}$
C_p	0.8400	0.8400	0.8400	
	67.4350	67.5415	66.5462	v_s (ft/sec)
D_s (in)	0.0000	0.0000	0.0000	
	3.8576	3.8576	3.8576	A_s (ft^2)
	15608.	15633.	15403.	Q_s (ft^3/min)
	12739.	12759.	12642.	Q_{std} (ft^3/min)
W_t (gm)	0.9172	0.8734	0.7796	
	24.6567	23.8084	20.2184	pmr_c (lb/hr)
D_n (in)	0.2430	0.2430	0.2430	
	0.0464	0.0464	0.0464	A_n (in^2)
θ (min)	60.0000	60.0000	60.0100	
	24.2242	23.0674	20.5866	pmr_a (lb/hr)
	98.2461	96.8878	101.8214	%I
	24.4405	23.4379	20.4025	pmr_{avg} (lb/hr)
%CO				
$\%O_2$			22.7603	
$\%N_2$			TEST AVG.	
F Factor				HI (10^6 BTU/hr.)
				pmr_u (lbs/10^6BTU)

05 - 2/21/78

18

APPENDIX A.1 ADDENDUM FOR

LIQUID CATCH (V_{lq}) CORRECTIONS

The Federal Register, Vol. 42, No. 160 of Thursday, August 18, 1977, (Ref. 3) addresses the problem of water droplets in saturated gas streams thusly:

> "Note - In saturated or water droplet-laden gas streams, two calculations of the moisture content of the stack gas shall be made, one from the impinger analysis (Equation 5-3), and a second from the assumption of saturated conditions. The lower of the two values of B_{wo} shall be considered correct. The procedure for determining the moisture content based upon assumption of saturated conditions is given in the Note of Section 1.2 of Method 4. For the purposes of this method, the average stack gas temperature from Figure 5-2 may be used to make this determination, provided that the accuracy of the in-stack temperature sensor is ± 1° C (2° F)."

Use the following formula to calculate the theoretical moisture volume based on corrected dry meter volume and theoretical moisture percent at saturation:

$$V_{lq_t} = \frac{(\%M_t)(V_{m_{std}})}{(100-\%M_t)\ K_1}$$

Where:

- V_{lq_t} - total moisture catch, theoretical, ml
- $\%M_t$ - percent moisture by volume in stack gas at saturation
- $V_{m_{std}}$ - sample volume measured by dry gas meter corrected to std. conditions, DSCF
- K_1 - proportionality constant for water vapor per volume of condensate - 0.0473 SCF/ml

RUN 1	RUN 2	RUN 3
$V_{lq_t} = \frac{(12.5)(63.8800)}{[(100)-(12.5)].0473}$	$= \frac{(12.5)(163.6481)}{[(100)-(12.5)].0473}$	$= \frac{(\quad)(\quad)}{[(100)-(\quad)].0473}$
$= 165.6800$	$= 163.6481$	$= \_\_\_\_$

EQUATIONS

1. Absolute Pressure in Dry Gas Meter - P_m (in. Hg.)

$$P_m = P_{atm} + \frac{\Delta H}{13.6}$$

2. Absolute Stack Pressure - P_s (in. Hg.)

$$P_s = P_{atm} + \frac{P_{s(gage)}}{13.6}$$

3. Sample Volume at Standard Conditions - $V_{m_{std}}$ (ft^3)

$$V_{m_{std}} = V_m \frac{T_{std}}{T_m} \frac{P_m}{P_{std}}$$

4. Volume of Water Vapor Collected, Corrected to Standard Conditions - $V_{v_{std}}$ (ft^3)

$$V_{v_{std}} = K_2 V_{lq} \frac{T_{std}}{P_{std}} \qquad K_2 = 0.00267 \text{ (units conversion)}$$

5. Total Sample Volume at Standard Conditions - V_{std} (ft^3)

$$V_{std} = V_{m_{std}} + V_{v_{std}}$$

6. Percent Moisture in Stack Gas - %M

$$\%M = \frac{V_{v_{std}}}{V_{std}} \times 100$$

7. Mole Fraction of Dry Gas - M_d

$$M_d = \frac{100 - \%M}{100}$$

8. Molecular Weight of Wet Gas - M (lb/lb mole)

$$M = (MW_d \times M_d) + 18(1 - M_d)$$

9. Stack Velocity - v_s (ft/sec)

$$v_s = K_p C_p \sqrt{\frac{T_s}{P_s M}} \quad \frac{\Sigma\sqrt{\Delta p}}{n_{\Delta p}}$$

K_p = 85.48 (units conversion factor)

10. Stack Volume Flow Rate - Q_s (ft^3/min)

$$Q_s = K_1 \, v_s \, A_s' \qquad K_1 = 60 \text{ (units conversion)}$$

11. Stack Volume Flow Rate at Standard Conditions - Q_{std} (ft^3/min)

$$Q_{std} = \frac{T_{std}}{P_{std}} \, \frac{P_s}{T_s} \, Q_s$$

12. Pollutant Mass Rate Based on Particulate Concentration - pmr_c (lb/hr)

$$pmr_c = K_3 \, \frac{W_t \, Q_{std}}{V_{std}} \qquad K_3 = 0.1323 \text{ (units conversion)}$$

13. Pollutant Mass Rate Based on the Ratio of the Cross Sectional Area of the Stack and the Sampling Nozzle - pmr_a (lb/hr)

$$pmr_a = K_3 \, \frac{W_t}{\theta} \, \frac{A_s}{A_n} \qquad K_3 = 0.1323 \text{ (units conversion)}$$

14. Percent Isokineticity - %I

$$\%I = \frac{pmr_a}{pmr_c} \times 100$$

15. Average Pollutant Mass Rate - pmr_{avg} (lb/hr)

$$pmr_{avg} = \frac{pmr_a + pmr_c}{2}$$

16. Percent Excess Air - %EA

$$\%EA = \frac{\%O_2 - .5(\%CO)}{.264(\%N_2) - \%O_2 + .5(\%CO)} \; (100)$$

17. Heat Input Rate - HI (10^6 BTU/hr)

$$HI = \frac{60 \, Q_{std} \, M_d}{F(100 + \%EA)} \; (100)$$

18. Specific Emission Rate - pmr_u ($lb/10^6$ BTU)

$$pmr_u = \frac{pmr_{avg}}{HI}$$

21

NOMENCLATURE

A_n	(in^2), Cross sectional area of nozzle
A_s	(in^2), Cross sectional area of stack
A'_s	(ft^2), Cross sectional area of stack
C_p	Pitot tube calibration coefficient
%EA	Percent Excess Air
F	(scfd/10^6 BTU), F factor
ΔH	(in H_2O), Average orifice meter reading
HI	(10^6 BTU/hr), Heat Input Rate
%I	Percent Isokineticity
M	(lb/lb mole), Molecular Weight of wet gas
%M	Percent Moisture
M_d	Mole fraction of dry gas
MW_d	(lb/lb mole) Molecular weight of dry gas
$n_{\Delta p}$	Number of Δp readings
P_{atm}	(in Hg), Local atmospheric pressure
P_m	(in Hg), Absolute pressure in dry gas meter
P_s	(in Hg), Absolute stack pressure
$P_{s(gage)}$	(in H_2O), Measured static stack pressure
P_{std}	(29.92 in Hg), Standard pressure
pmr_a	(lb/hr), Pollutant mass rate based on ratio of areas
pmr_{avg}	(lb/hr), Average pollutant mass rate
pmr_c	(lb/hr), Pollutant mass rate based on concentration
pmr_u	(lb/10^6 BTU), Specific emission rate
Δp	(in H_2O), Velocity pressure
Q_s	(ft^3/min), Actual stack volume flow rate
Q_{std}	(ft^3/min), Stack volume flow rate at standard conditions

T_m	(^oR), Average dry gas meter temperature
T_s	(^oR), Average stack temperature
T_{std}	(530 ^oR), Standard temperature
V_{lq}	(ml), Liquid volume
V_m	(ft^3), Sample volume measured by dry gas meter
$V_{m_{std}}$	(ft^3), Sample volume at standard conditions
V_{std}	(ft^3), Total sample volume at standard conditions
$V_{v_{std}}$	(ft^3), Volume of water vapor collected, corrected to standard conditions
v_s	(ft/sec), Stack velocity
W_t	(gm), Total weight of particulate collected
θ	(min), Duration of test

√Meyer GTC, 09-09-81

APPENDIX C

ANALYTICAL DATA

Lab No. 2990

Plant IMC

Run Number 1 Date 1 Sept 81

Location Feldspar Dryer

Box 3

FILTER WEIGHTS

				TOTALS
Filter Number	55863			
Final Weight (g)				*
Tare Weight (g)	0.4148			

WASHINGS

				TOTALS
Beaker Number	5			
Volume (Acetone)	300.00ml			
Final Weight (g)	177.4624			
Tare Weight (g)	176.9572			

ACETONE BLANK

Lot Number	Fisher 705130
Beaker Number	B
Volume (ml)	500 ml
Final Weight (g)	182.0228
Tare Weight (g)	182.0223
Blank Residue (g)	0.0005

BLANK CORRECTION =

(Vol. Washings) / (Vol. Blank) x (Blank Residue)

(300 / 500) x (0.0005) = 0.0003

TOTAL PARTICULATE CATCH

Filter Final Weight *	
+ Washings, Final Weight	177.4624
- Filter Tare	0.4148
- Beaker Tare (Washings)	176.9572
- Corrected Blank	0.0003
= Total Particulate (g)	0.0901
+ OIL + GREASE (g)	0.8271
TOTAL (g)	0.9172

242
154
396

IMPINGERS (1, 2, 3)

Final Volume (ml)	396
Initial Volume (200 ml)	200
Water Collected (ml)	196

SILICA GEL

Final Weight (g)	218.9
Initial Weight (g)	200.0
Moisture Collected (g)	18.9

Total Water Collected (ml) 214.9

*These blocks will be blank if filter is weighed together with the washings.

10-23-75

24

Run #1 - Back half catch to be added to Total particulate.

Vol of H_2O 396 ml

conc. H_2SO_4 added in Lab 5 ml

FLASK #	G
FINAL WT.	107.9319
INITIAL WT	107.1048
BlK (g)	0
TOTAL oil + grease (g)	.8271

Trichlorotrifluoroethane Lot # 790237

Smeger

BTC, 09-09-81

APPENDIX C

ANALYTICAL DATA

Lab No. 2991

Plant: IMC

Run Number: 2   Date: 15 Sept 81

Location: Feldspar Dryer

Box 4

FILTER WEIGHTS

				TOTALS
Filter Number	55864			
Final Weight (g)				*
Tare Weight (g)	0.4087			

WASHINGS

				TOTALS
Beaker Number	17			
Volume (Acetone)	300.00 ml			
Final Weight (g)	176.6847			
Tare Weight (g)	176.1853			

ACETONE BLANK

Lot Number	705130
Beaker Number	B
Volume (ml)	500 ml
Final Weight (g)	182.0228
Tare Weight (g)	182.0223
Blank Residue (g)	0.0005

TOTAL PARTICULATE CATCH

Filter Final Weight	*
+ Washings, Final Weight	176.6847
- Filter Tare	0.4087
- Beaker Tare (Washings)	176.1853
- Corrected Blank	0.0003
= Total Particulate (g)	0.0904
+ OIL + GREASE (g)	0.7830
TOTAL (g)	0.8734

BLANK CORRECTION = $\frac{\text{(Vol. Washings)}}{\text{(Vol. Blank)}}$ x (Blank Residue)

$\left(\frac{300.00}{500.00}\right)$ x (0.0005) = 0.0003

238
152
390

IMPINGERS (1, 2, 3)

Final Volume (ml)	390
Initial Volume (200 ml)	200
Water Collected (ml)	190

SILICA GEL

Final Weight (g)	220.5
Initial Weight (g)	200.0
Moisture Collected (g)	20.5

Total Water Collected (ml) 210.5

*These blocks will be blank if filter is weighed together with the washings.

Run #2 Back half catch to be added to Total particulate

Vol of H_2O 390 ml

conc. H_2SO_4 added in Lab 5 ml

FlASK #		F
FINAL WT.		105.0873
INITIAL WT	−	104.3043
BlK (g)	−	0
TOTAL Oil & GREASE (g)		.7830

Trichlorotrifluoroethane Lot # 790237

GTC, 09-09-81

√Meyer

APPENDIX C

ANALYTICAL DATA

Lab No. 2992

Plant IMC

Run Number 3 Date 2 Sept 81

Location Feldspar Dryer

Box 5

FILTER WEIGHTS

				TOTALS
Filter Number	55865			
Final Weight (g)				*
Tare Weight (g)	0.4053			

WASHINGS

				TOTALS
Beaker Number	14			
Volume (Acetone)	350.00 ml			
Final Weight (g)	174.6543			
Tare Weight (g)	174.1340			

ACETONE BLANK

Lot Number	705130
Beaker Number	B
Volume (ml)	500 ml
Final Weight (g)	182.0228
Tare Weight (g)	182.0223
Blank Residue (g)	0.0005

TOTAL PARTICULATE CATCH

Filter Final Weight	*
+ Washings, Final Weight	174.6543
- Filter Tare	0.4053
- Beaker Tare (Washings)	174.1340
- Corrected Blank	0.0004
= Total Particulate (g)	0.1146
+ OIL + GREASE (g)	0.6650
TOTAL (g)	0.7796

BLANK CORRECTION =

$$\frac{\text{(Vol. Washings)}}{\text{(Vol. Blank)}} \times \text{(Blank Residue)}$$

$$\left(\frac{350}{500}\right) \times (0.0005) = 0.0004$$

220
109
329

IMPINGERS (1, 2, 3)

Final Volume (ml)	329
Initial Volume (200 ml)	200
Water Collected (ml)	129

SILICA GEL

Final Weight (g)	221.8
Initial Weight (g)	200.0
Moisture Collected (g)	21.8

Total Water Collected (ml) 150.8

*These blocks will be blank if filter is weighed together with the washings.

Run #3 Back half catch to be added to total particulate

Vol of H_2O 329 ml

conc. H_2SO_4 added in Lab 5 ml

Flask #		B
FINAL WT		105.6746
INITIAL WT	–	105.0096
BLK (g)	–	0
TOTAL oil & GREASE (g)		.6650

Trichlorotrifluoroethane Lot # 790237

#2

I. GENERAL DATA FOR PROCESSES

*Attach detailed process engineering drawings, equipment drawings and flow diagrams for the source(s) being constructed or altered.

Name of Process: DRYING

Total Weight of Materials Entering this Process: 12000 lb/hr ~~or ton/hr~~

Volume and Temperature of Air Flow Entering Control Device: 8500 CFM @ 200 °F

Pollutant(s) to be Controlled: Particulate Matter

Particulate Emission Rate (Before Control) 70 lb/hr

Particle Size Distribution: 0-5μ TR %, 5-10μ TR %, 10-20μ 5 %, 20-30μ 10 %, 30-40μ 35 %, 40-50μ 10 %, >50μ 40 (Estimated)

Gaseous Emission(s): Name (Chemical Formula) ~~μg/m³, PPM~~ or lb/hr

Name (Chemical Formula)	or lb/hr
Water Vapor	1330
CO_2	415

II. SUPPLEMENTARY DATA FOR INCINERATORS

Circle Type of Waste or Indicate Composition: Type 0 Type I Type II Type III Type IV

Combustible: ___ % Non-Combustible: ___ % Moisture: ___ % Heat Value: ___ BTU/lb

Total Waste Generated Per Day: ___ lb. Hours Incinerator will be Operated: ___ hrs/day

Design Capacity for Above Waste: ___ lbs/hr Manufacturer and Model Number; Approximate Cost: ___

Primary Chamber Volume: ___ ft.³ Secondary Chamber Volume: ___ ft.³

Air Requirements: Total Excess Air ___ % Draft: Natural ___ Induced ___ Other ___

Overfire Air: ___ cfm Underfire Air: ___ cfm

Flame Port Temperature: ___ °F Secondary Chamber Temperature: ___ °F

Stack:
Inside Area ___ ft.² Height ___ ft. Gas Velocity ___ ft/sec Temperature ___ °F Fan Capacity ___ cfm

Is there a Wet Scrubber?

Yes ___ No ___ Flow Rate of H_2O into Scrubber ___ gal/min Temperature Before Scrubber ___ °F

Aux. Fuel: Oil ___ Gas ___ Other ___ Burner Rating: Primary Chamber ___ BTU/hr Secondary Chamber ___ BTU/hr Stack ___ BTU/hr

Primary Burner: Is there a Preheat Timer? Yes ___ No ___ Preheating Time: ___ min.

Secondary Burner or Afterburner: Is there a Timer? Yes ___ No ___ Length of Time Burner is Operated ___ min.

Is the Timer Reset by Charging Door? Yes ___ No ___ Other Mode of Burner Control ___

Type of Feed: Manual ___ Automatic ___ If Automatic, Describe ___

Signature: L. Brennan Jr. Title: Area Manager

#1

I. GENERAL DATA FOR PROCESSES

...ach detailed process engineering drawings, equipment drawings and flow diagrams for the process(es) or source(s) ...ing constructed or altered.

...e of Process: Drying

Total Weight of Materials Entering this Process: 20 ~~xxxx~~ or ton/hr

Volume and Temperature of Air Flow Entering Control Device: 20,000 CFM @ 125 °F

Volume and Temperature of Effluent at Discharge Point to Atmosphere: ______ CFM @ ______ °F

Pollutant(s) to be Controlled: Particulate Matter

Height of Process Stack or Vent Above Ground Level 74 ft. Inside area of Stack 4.90 ft^2.

Particulate Emission Rate (Before Control) 280 lb/hr

Particle Size Distribution: 0-5μ Tr %, 5-10μ Tr %, 10-20μ 5 %, 20-30μ 10 %, 30-40μ 35 %, 40-50μ 10 %, >50μ 40 %

Gaseous Emission(s): Name (Chemical Formula) $\mu g/m^3$, PPM or lb/hr

Water Vapor

CO_2

II. SUPPLEMENTARY DATA FOR INCINERATORS (Including Conical Incinerators).

Circle Type of Waste or Indicate Composition: Type 0 Type I Type II Type III Type IV

Combustible: ____% Non-Combustible: ____% Moisture: ____% Heat Value: ____BTU/lb

Total Waste Generated Per Day: ______ lb. Hours Incinerator will be Operated: ______ hrs/day

Design Capacity for Above Waste: ______ lbs/hr Manufacturer and Model Number; Approximate Cost: ______

Primary Chamber Volume: ______ $ft.^3$ Secondary Chamber Volume: ______ $ft.^3$

Air Requirements: Total Excess Air ____% Draft: Natural ____ Induced ____ Other ____

Overfire Air: ____cfm Underfire Air: ____cfm

Is there an Electronically Controlled, Exhaust Gas Temperature Modulated, Damper Installed on the Conical Incinerator for: Overfire Air Supply____, Underfire Air Supply____, Dome____ Temperature Set Point____°

Flame Port Temperature: ______ °F Secondary Chamber Temperature: ______ °F

Is there a Continuous Exhaust Gas Temperature Recorder? Yes____ No____

Stack:

Inside Area ____$ft.^2$ Height ____ft. Gas Velocity ____ft/sec Temperature ____°F Fan Capacity ____cfm Stack Lined? ______

Is there a Wet Scrubber?

Yes ____ No ____ Flow Rate of H_2O into Scrubber ____gal/min Temperature Before Scrubber ____°F

Aux. Fuel: Oil ____ Gas ____ Other ____ Burner Rating: Primary Chamber ______BTU/hr Secondary Chamber ______BTU/hr Stack ______BTU/hr

Primary Burner: •Is there a Preheat Timer? Yes ____ No ____ Preheating Time: ______min.

Secondary Burner or Afterburner: Is there a Timer? Yes ____ No ____ Length of Time Burner is Operated ____min.

Is the Timer Reset by Charging Door? Yes ____ No ____ Other Mode of Burner Control ______

Type of Feed: Manual ____ Automatic ____ If Automatic, Describe ______

Distance from Incinerator to Nearest Structure(s) in which People Live and/or Work.____ft.

Signature: ______ Title: ______

12

III. SUPPLEMENTARY DATA FOR FUEL BURNING SOURCES

scaled dimensioned drawing or sketch showing internal features of dryers, wood or coal fired boilers, and boilers.

Fuel Burning Source #2 Fuel Oil Stack Height Above Ground Level 74 ft. Inside Area of Stack 4.90 ft

and Model Number Hauck 786-D Volume of ~~xxxxx~~ Combustion Chamber ~~157~~ ft^3

Specify Actual Amount of Each Fuel Used in Above Source (s):

Coal ____ lb/hr; Oil Grade 2 Amount 72 gal/hr, at ____ BTU/gal and ____ lb/gal or ____ lb/hr

Wood ____ lb/hr; Natural Gas ____ SCF/hr, at ____ BTU/SCF; Other ____________ (Specify type, amount and heating value)

Specify Maximum Rating for Each Fuel Burning Source:

Coal ____ Oil ____ Wood ____ Natural Gas ____ Other ____________

Maximum Sulfur Content of Fuel ____ % Specify Standby Fuel ____ Maximum % Sulfur ____

Type of Solid Fuel Burning Equipment Used: Hand Fired ___ Spreader Stoker ___ Underfeed Stoker ___ Chain Grate ___

Traveling Grate ___ Pulverizer ___ Cyclone Furnace ___ Other (Specify) ________

Ash Content of Fuel: Specify Method and Schedule of Tube Cleaning, if Applicable:

Coal ____ % Wood ____ % Other ____ % Lancing ________ Tube Blowing ________ Schedule ________

Emission Control Equipment (Describe in Detail in Sections IV and V)

Collection Device: Wet ___ Dry ___ Steam Injection ___ Air Injection ___ Is Collected Flyash Reinjected? ___

Draft on Boiler (Natural ____ Induced ____) ____ cfm at ____ °F

Total Number of Fuel Burning Sources Within Property Boundaries: ______

Maximum Capacity Rating, by Type, for All Fuel Burning Units Excluding that Itemized Above: (Total Like Units)

Coal ___ lb/hr Wood ___ lb/hr Oil ___ gal/hr Natural Gas ___ SCF/hr

IV. SUPPLEMENTARY DATA FOR WET COLLECTION DEVICES

**Attach detailed engineering drawings of the control device and particle size versus removal efficiency curves.*

Liquid Scrubbing Medium and Additives: Water

Total Liquid Injection Rate (Include Recirculated and Make-up Rates) 250 gal/min or gal/1000 ft^3

Operating Pressure Drop Across Device 10 in H_2O

ANSWER FOLLOWING QUESTIONS FOR SPECIFIC DEVICE:

VENTURI SCRUBBER: Inlet Area ___ in^2 Throat Area ___ in^2 Throat Velocity ___ ft/sec

GRAVITY SPRAY CHAMBER: Number of Nozzles 75 Liquid Droplet Size ___ u Co-Current ___ Countercurrent ___

WET CYCLONE:
Body Diameter ___ in Length ______ in
Inlet Area ____ in^2 Number of Nozzles ______
Outlet Area ____ in^2

PACKED TOWER OR PLATE TOWER:
Cross-Sectional Area 100 ft^2 Type of Plate Expanded Me
Length 24 ft Depth of Packing .75
Number of Plates 3 Type of Packing Charcoal

OTHER WET COLLECTION DEVICES: GIVE COMPLETE DESCRIPTION INCLUDING DESIGN PARAMETERS AND DETAILED ENGINEERING DRAWINGS.

Signature: ________________ Title: ________________

13