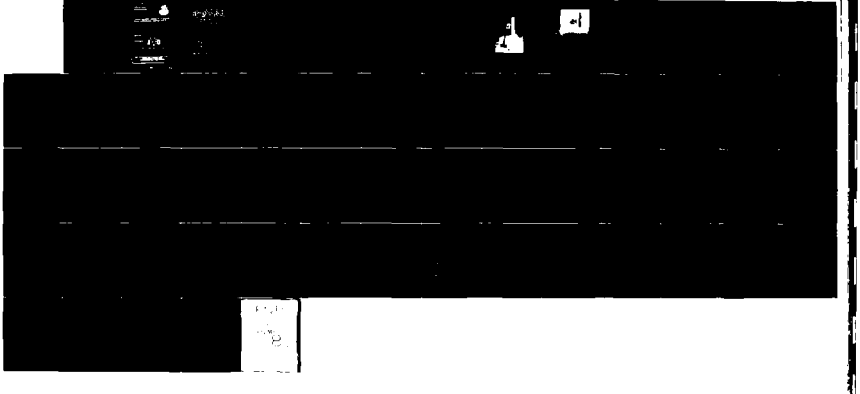
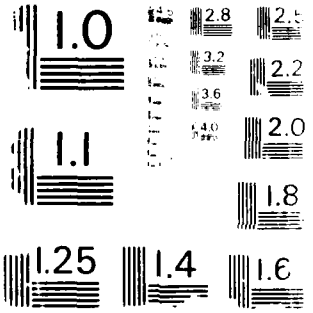
AD-A209 500 SOURCE EMISSION TESTING OF CLASSIFIED WASTE INCINERATOR 1/1
GRIFFISS AFB NEW..(U) AIR FORCE OCCUPATIONAL AND
ENVIRONMENTAL HEALTH LAB BROOKS AF.. P T SCOTT APR 89
UNCLASSIFIED USAFOEHL-89-031E00079FEF F/G 24/1 NL

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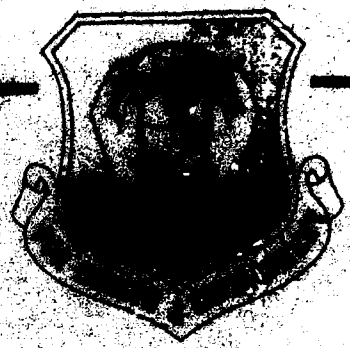
USAFOEHL REPORT
88-031EQ0907/0EF



SOURCE EMISSION TESTING OF CLASSIFIED WASTE INCINERATOR, GRIFFISS AFB NY

PAUL T. SCOTT, Capt, USAF, BSC

April 1989

Field Report

[redacted] Laboratory
[redacted]

NOTICES

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The Public Affairs Office has reviewed this report, and it is releasable to the National Technical Information Service, where it will be available to the general public, including foreign nations.

This report has been reviewed and is approved for publication.

Paul T. Scott

PAUL T. SCOTT, Capt, USAF
Consultant, Air Quality Meteorologist

DENNIS R. SKALKA, Lt Col, USAF, BSC
Chief, Consultant Services Division

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James C. Rock

JAMES C. ROCK, Colonel, USAF, BSC
Commander

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SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

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FIELD	GROUP	SUB-GROUP	Emission Testing, Compliance Testing, Classified Waste, Air Quality

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

At the request of 416 Strategic Hospital/SGPB, personnel of the AFOEHL Air Quality Function conducted source emission testing for particulates, HCl, and opacity on the classified waste incinerator at Griffiss AFB. The New York Department of Environmental Conservation (NYDEC) required testing for permit compliance.

Particulate Emissions were well above the emission limits allowed by the State of New York. Action is recommended to bring the classified waste incinerator into compliance.

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Capt Paul T. Scott	(512) 536-2891 AV 240	USAFOEHL/ECO

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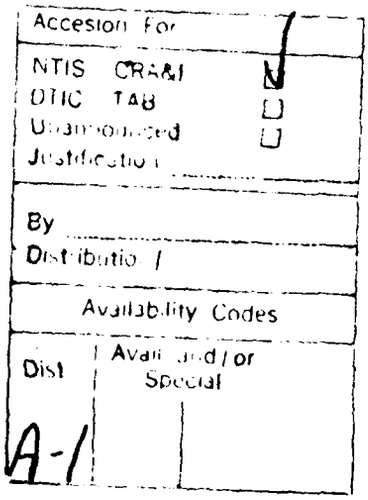
CONTENTS



ILLUSTRATIONS

I. INTRODUCTION

On 19-23 Sep 88, a stationary source sampling survey for opacity, particulate emissions, and hydrogen chloride emissions was conducted on the new classified waste incinerator at Griffiss AFB NY by personnel from the Air Quality Function of the AF Occupational and Environmental Health Laboratory (AFOEHL). This survey was requested by the 416 Strategic Hospital/SGPB via HQ SAC/SGPB to meet permit requirements established by the New York State Department of Environmental Conservation (NYSDEC). Personnel involved with on-site testing are listed in Appendix A.

II. DISCUSSION

A. Background: Griffiss AFB had an accumulated amount of classified waste material which needed to be destroyed. A shredding machine had been used, but was inadequate; and, the accumulation was considered a potential security risk. Before placing a new classified waste incinerator on line, the NYSDEC ordered compliance testing as a condition for obtaining an operating permit. Compliance testing included opacity, particulate emissions, and hydrogen chloride (HCl) emissions. HCl was a concern because of the potential for incinerating small percentages of classified microfiche and other chlorinated plastics.

B. Site Description: The classified waste incinerator is located in a separate building approximately 50 yards east of bldg 19. Figure 1 is a photograph of the incinerator building and stack. The incinerator, Model CAI-750-MI, was manufactured by Advanced Combustion Systems, Bellingham, Washington and has no pollution control equipment. A view of the incinerator can be seen in Figure 2. The following are operating parameters:

1. Two-chamber design
2. Fired by #2 fuel oil
3. Load capacity
    a. 500 lbs/hr for type 0 waste
    b. 750 lbs/hr for type 1 waste

C. Applicable Standards: The monitoring requirements and regulations for opacity and particulates are defined under Codes, Rules, and Regulations of the State of New York, Title 6, Chapter III--Air Resources, Subchapter A--Prevention and Control of Air Contamination and Air Pollution, Part 219. Appendix B has a copy of the applicable state laws. Particulate emissions are based on a charge of 300 lbs per hour and are extrapolated from Figure 1 of Appendix 2 in Part 219. There are no applicable standards for chloride emissions but testing for chlorides was requested. Proposed new incinerator emission standards (Part-219.5) do not apply to existing Type 0 waste incinerators. The following is a summary of the applicable standards:

1. Particulate emissions: 0.85 lbs/hr

2. Opacity: not to exceed 20% or No. 1 on the Ringleman Chart

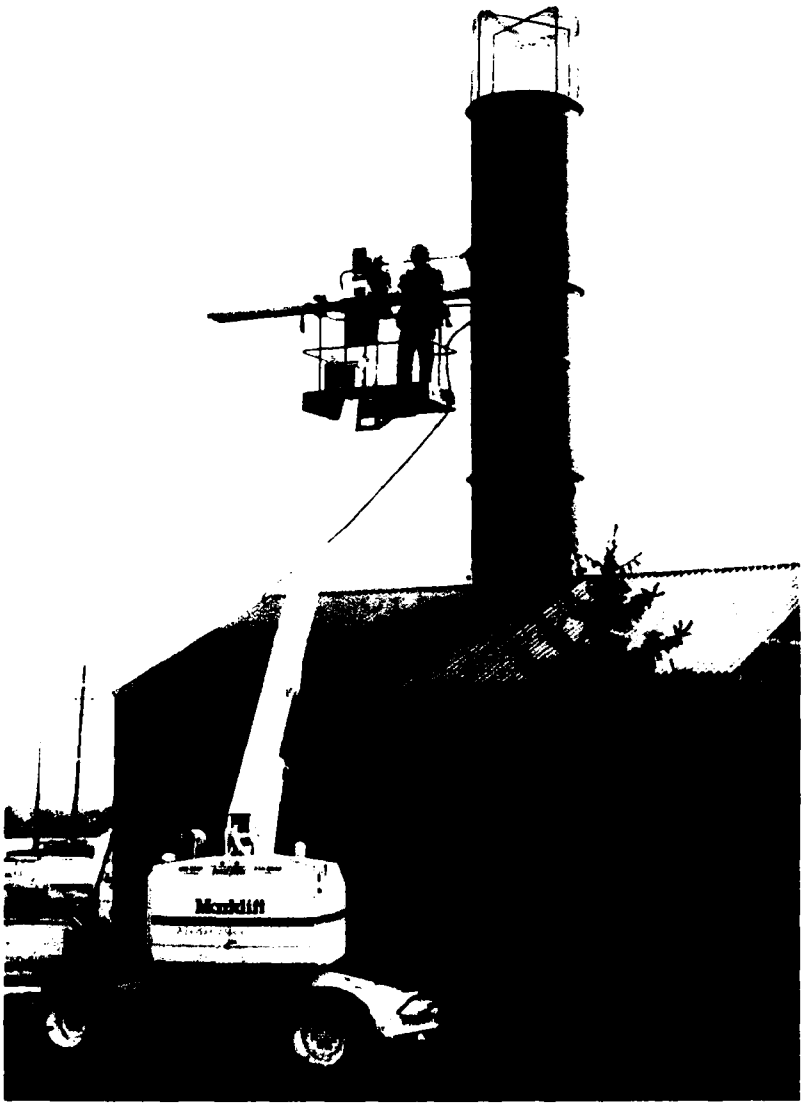


Figure 1: Classified Waste Incinerator Building and Stack

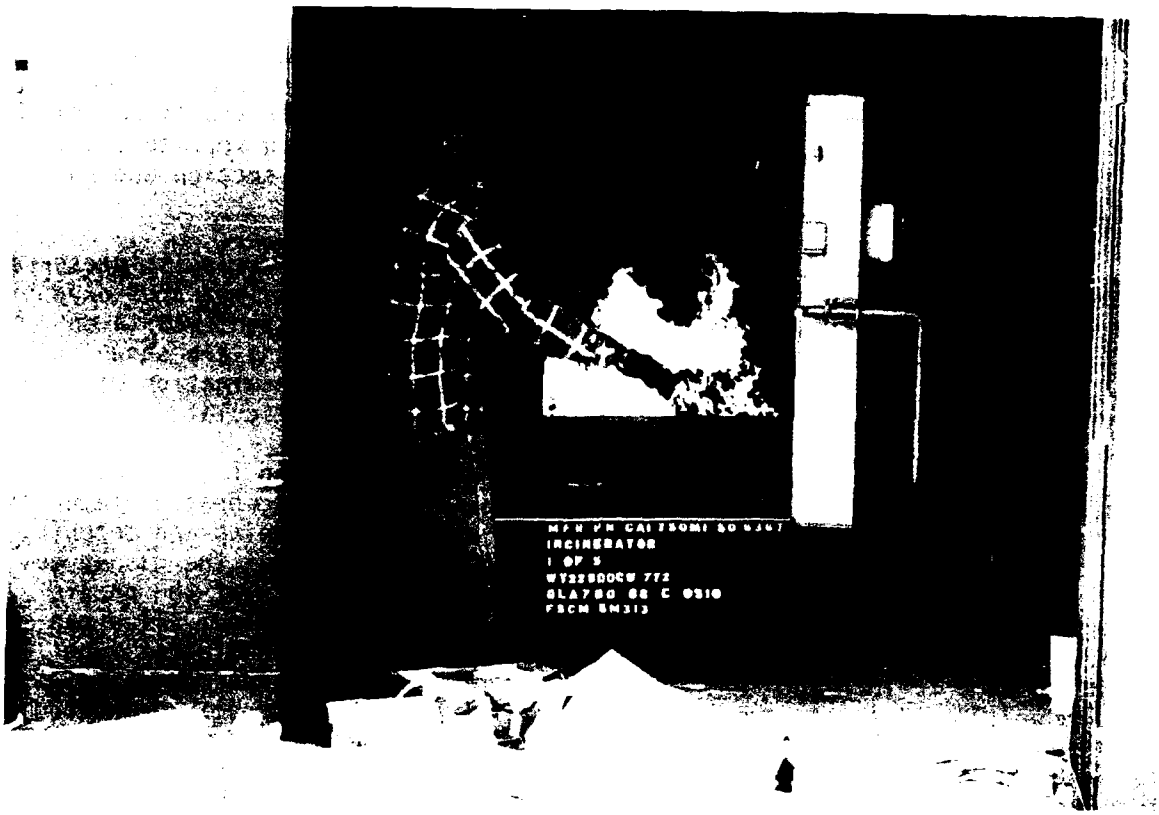


Figure 2: View of Incinerator

D. Sampling Methods and Procedures

New York State Codes, Rules, and Regulations, Title 6, Chapter III--Air Resources, require that emission testing be conducted in accordance with Appendix A to Title 40, Code of Federal Regulations, Part 60 (40 CFR 60). Therefore, sample train preparation, sampling and recovery, calculations and quality assurance were done in accordance with the methods and procedures outlined in 40 CFR 60, Appendix A.

For testing purposes, the incinerator was operated with Type 0 waste at a load rate of 300 lbs/hr, although the maximum rated load was 500 lbs/hr. Griffiss AFB personnel were unable to provide an estimate of the amount or frequency in which they would burn, since they had not operated the

incinerator previously. It was determined that 300 lb/hr would be more than a sufficient charge. This change was coordinated with the State with the stipulation that the load rate used for testing would be the maximum load rate for future incinerator use.

Sampling ports were already in place approximately 4.5 duct diameters downstream and 1.5 duct diameters upstream from any flow disturbance. Based on the inside stack diameter, port locations, and type of sample (particulate), 24 four traverse points (12 per diameter) were used to collect a representative particulate sample. Appendix C shows a typical stack cross section and the actual traverse point locations for each stack surveyed.

Prior to testing, cyclonic flow was determined and a velocity pressure traverse was accomplished. A grab sample for Orsat analysis (measures oxygen and carbon dioxide for stack gas molecular weight determination) was taken during each sample run. Orsat sampling and analysis equipment are shown in Figures 3 and 4. Flue gas moisture content, needed for determination of flue gas molecular weight determination, was obtained during particulate sampling.

Particulate samples were collected using the sampling train shown in Figure 5. The train consisted of a button-hook probe nozzle, heated stainless steel probe liner, heated glass filter, impingers, and a 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 a 10-inch inclined-vertical manometer. Type K thermocouples were used to measure flue gas as well as sampling train temperatures. The heated, stainless steel-lined probe was used due to the extremely high stack temperature. The heated filter was used to collect particulates and pass condensable materials. The impinger train (first, third and fourth impingers were modified Greenburg-Smith type; second impinger standard Greenburg-Smith design) was used as a condenser to collect stack gas moisture and condensable particulates. The first and second impingers were filled with 200 ml each of 0.100 N sodium carbonate to collect any HCl. The third and fourth impingers were empty and contained 200 grams of indicating silica gel, respectively, to collect any remaining moisture. The pumping and metering system was used to control and monitor the sample gas flow rate. Each of the three tests were 84 minutes in duration.

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. All field data and resulting emission calculations are presented in Appendix D. Calibration Data is presented in Appendix E.

III. CONCLUSIONS

The emission survey results did not satisfy the New York State's emission limits. Opacity was well within limits and did not exceed 5% at any time during the test. However, particulate emissions were well above the limit.

The high particulate emissions were somewhat of a surprise since the opacity averaged near zero. The average particulate emission was 2.6677 lbs/hr compared to the limit of 0.85 lbs/hr. The average HCl emission rate was 0.01579 lbs/hr. The stack emission test results can be found in Table 2.

IV. RECOMMENDATIONS

The Classified Waste Incinerator is not in compliance with particulate emission limits. Considering the incinerator is new and of good design, it is not obvious where the problem may lie. The particulate collected was primarily a white ash so incineration was complete. However, it was observed that forced air to the primary chamber caused turbulence in the chamber and could be sending ash up the stack. The design of the chamber should limit exit gas velocities such that nonoxidized particulate matter and ash are not entrained in the exhaust gases and carried up to the secondary chamber and out the stack. Perhaps an adjustment here might alleviate the problem. Also, further reducing the charge rate may bring emissions below standards. Finally, we recommend a re-evaluation of the incinerator after NYSDEC action or any procedural or equipment adjustments have been accomplished.

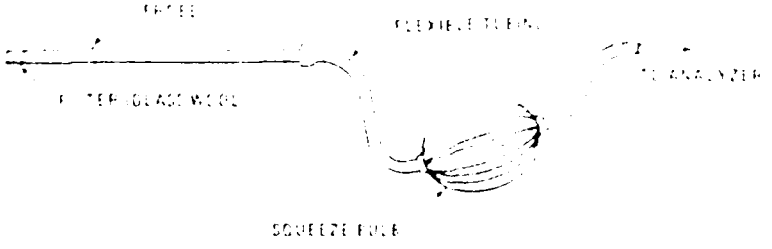


Figure 3: Schematic of Grab Bag Sampling Train

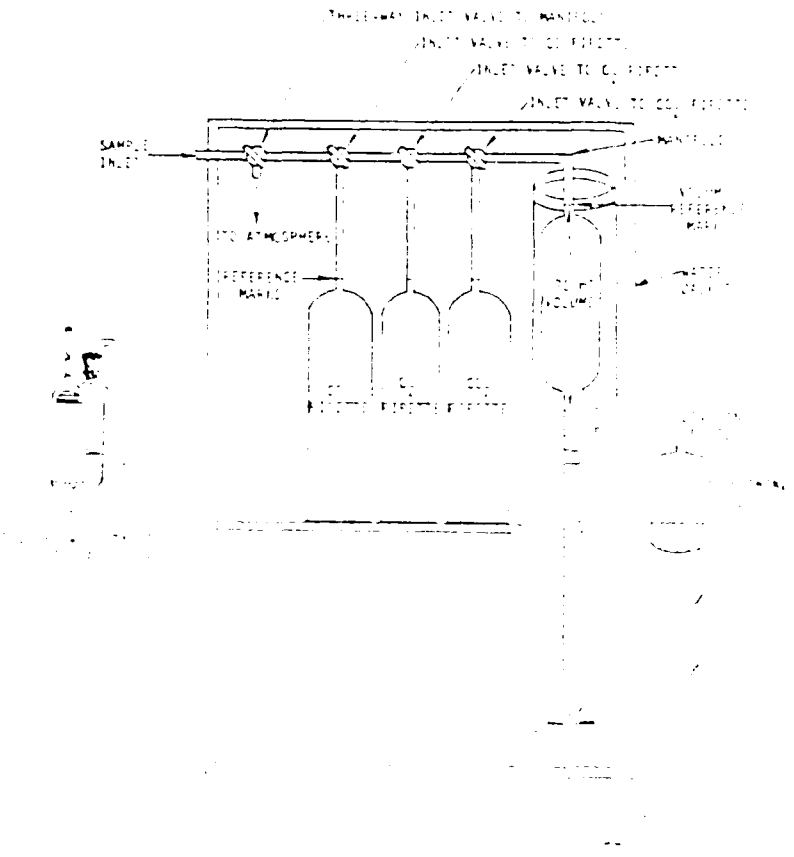


Figure 4: Schematic of ORSAT Apparatus

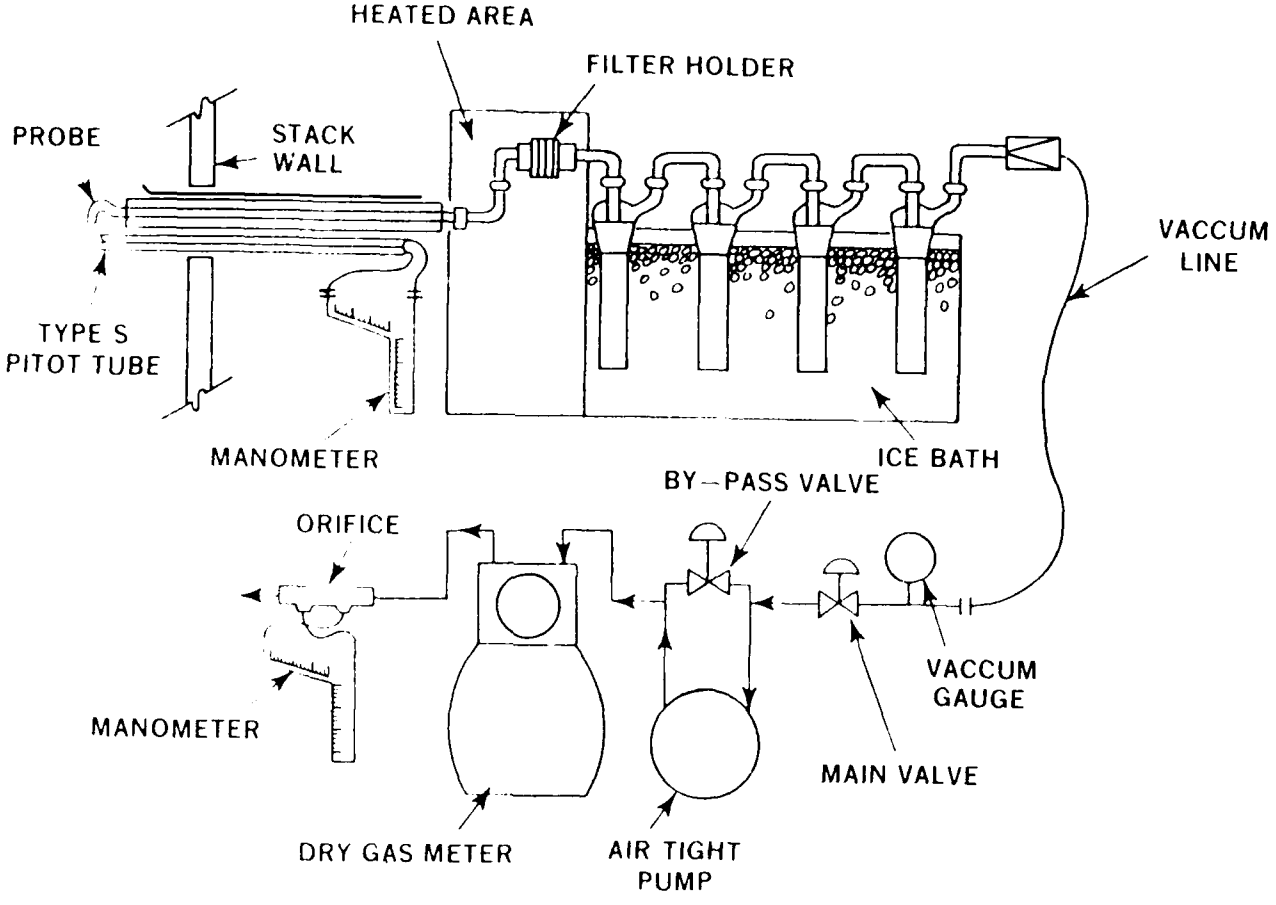


Figure 5: Schematic of Particulate Sampling Train

TABLE 1

SUMMARY OF EMISSION DATA

RUN #	CHARGE RATE (lbs/hr)	PERCENT ISOKINETICS (%)	SAMPLE VOLUME (dscf)	STACK GAS FLOW RATE (dscfm)	PARTICULATE CATCH (mg)	CHLORIDE CATCH (mg)
1	300	98.85	34.3610	1255	683.5	2.7824
2	300	99.62	35.4670	1293	603.1	3.4282
3	300	102.87	33.2880	1168	444.4	3.7504

TABLE 2

STACK EMISSION TEST RESULTS
GRIFFISS AFB CLASSIFIED WASTE INCINERATOR

RUN #	STACK GAS		PARTICULATE EMISSIONS (lbs/hr)	HCl EMISSIONS (lbs/hr)	PASS STANDARDS (Y or N)
	%O2	$\%CO_2$			
1	8.7	10.6	3.3021	0.01344	N
2	10.3	9.0	2.9083	0.01653	N
3	9.5	9.4	2.0626	0.01741	N
AVERAGE			2.6677	0.01579	N

REFERENCES

1. Code of Federal Regulations. Vol 40, Parts 53-60, The Office of the Federal Register National Archives and Records Service, General Services Administration, Washington DC, July 1987.

2. Quality Assurance Handbook for Air Pollution Measurement Systems - Volume III, Stationary Source Specific Methods, US 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, US Environmental Protection Agency, EPA-340/1-85-018, Research Triangle Park, North Carolina, May 1987.

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APPENDIX A

Test Participants

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1. AFOEHL Test Team

Maj James A. Garrison, Chief, Air Quality Function
Capt Paul T. Scott, Consultant, Air Quality Meteorologist
TSgt Benjamen Hernandez, Environmental Quality Technician
SSgt Daniel Schillings, Industrial Hygiene Technician

AFOEHL/ECQ
Brooks AFB TX 78235-5501

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

2. Griffiss AFB On-site Representatives

Capt Richard Tourjee	416 Strategic Hospital Griffiss/SGPB
MSgt Donald Watkins	AUTOVON 587-3617
Ms Gilda Bielba	416 CSG/DAD
Mr Ryan Ziminski	AUTOVON 587-7708
Mr Bruce Mero	416 CSG/DEEV
Mr Fred Conover	AUTOVON 587-2098
Mr Walt Hyde	416 CSG/DEMM

3. New York State Department of Environmental Conservation (Region 6)

Mr David Prosser, PE (via phone)
Regional Air Pollution Engineer
(315) 785-2513

Mr David Hathaway
Principal Engineering Technician
(315) 793-2554

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APPENDIX B

State Incinerator Regulations

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PART 218
VEHICLES PROPELLED BY DIESEL ENGINES

(Effective May 1, 1972; May 10, 1981)

Section 218.1 Applicability. This Part shall apply to all vehicles propelled by a diesel engine, excluding marine vessels.

218.2 Prohibitions. (a) No person who owns, operates or leases a vehicle propelled by a diesel engine or who owns, leases or occupies land and has actual or apparent dominion or control over the operation of a vehicle propelled by a diesel engine which is present on said land, shall operate said vehicle or allow or permit it to be operated, in such a manner that exhaust emissions of a shade of blue, black or grey equal to or greater than Number 1 on the Ringelmann chart or equivalent standard acceptable to the Commissioner are produced for a continuous period of more than five seconds, when the vehicle is in motion.

(b) No person who owns, operates or leases a bus or truck, the motive power for which is provided by a diesel engine or who owns, leases or occupies land and has the actual or apparent dominion or control over the operation of a bus or truck present on such land, the motive power for which said bus or truck is provided by a diesel engine, shall allow or permit the diesel engine of such bus or truck to idle for more than five consecutive minutes when the bus or truck is not in motion, except as otherwise permitted by section 218.3.

218.3 Exceptions. The prohibitions of subdivision (b) of Section 218.2 shall not apply when:

(a) A bus or truck is forced to remain motionless because of traffic conditions over which the operator thereof has no control;

(b) Regulations adopted by federal, state or local agencies having jurisdiction require the maintenance of a specific temperature for passenger comfort. The idling time specified in subdivision (b) of section 218.2 may be increased but only to the extent necessary to comply with such regulations;

(c) A diesel engine is being used to provide power for an auxiliary purpose, such as loading, discharging, mixing or processing cargo; controlling cargo temperature; construction; lumbering; oil or gas well servicing; farming; or when operation of the engine is required for the purpose of maintenance.

(d) Fire, police and public utility trucks or other vehicles are performing emergency services.

(e) Trucks owned or operated by persons engaged in mining and quarrying are used within the confines of such persons' property.

(f) A truck is to remain motionless for a period exceeding two hours, and during which period the ambient temperature is continuously below twenty-five degrees Fahrenheit.

PART 219
INCINERATORS

(Effective May 1, 1972)

Section 219.1 Title. These rules shall be known as the New York State rules to prevent air pollution from incinerators.

219.2 Applicable geographical area. This Part shall apply to the entire State of New York.

219.3 Definitions. (a) Incinerator. Any structure or furnace in which combustion takes place and type 0, 1, 2, 3, or 4 refuse is used as fuel, alone or in conjunction with fossil fuel.

(b) Refuse. All waste material, including but not limited to, garbage, rubbish, incinerator residue, street cleanings, dead animals, and offal. Refuse is classified in accordance with Table 1, Appendix 2.

(c) Smoke. An air contaminant consisting of small gas-borne particles emitted by an air contamination source in sufficient number to be observable.

219.4 Emission limits. (a) All incinerators having a capacity of 2,000 lb/hr or less and built and installed after January 1, 1968, shall be designed, built, installed and operated to meet the emission limits of figure 1*.

(b) No incinerator larger than 2,000 lb/hr capacity and built after January 1, 1970, shall be operated so as to produce particulate emissions which exceed the amount shown in figure 1*.

(c) No incinerator having a capacity of 2,000 lb/hr or less and built or installed between April 1, 1962, and January 1, 1968, shall be operated so as to produce particulate emissions which exceed 0.5 lb/hr for every 100 lb/hr of refuse charged, unless a final order by the commissioner provides otherwise.

(d) Any incinerator having a capacity of 2,000 lb/hr or less and built or installed prior to April 1, 1962, shall either meet the requirements of 219.4(c) or shall be equipped with adequate control devices or redesigned and rebuilt so as to meet the requirements of 219.4(a) by January 1, 1969.

(e) No incinerator larger than 2,000 lb/hr capacity and built between April 1, 1962, and January 1, 1970, shall be operated so as to produce particulate emissions which exceed 0.5 lb/hr for every 100 lb/hr of refuse charged, unless a final order by the commissioner provides otherwise.

(f) Any incinerator larger than 2,000 lb/hr capacity and built prior to April 1, 1962, shall either meet the requirements of 219.4(e) or shall be equipped with adequate control devices or redesigned an rebuilt so as to meet the requirements of 219.4(b) by January 1, 1970.

219.5 Smoke emissions. (a) No incinerator, built or installed after January 26, 1967, regardless of size, shall emit smoke of an opacity denser than 20 percent or No. 1 of the Ringelmann chart or equivalent, under normal operating conditions.

(b) No incinerator built or installed prior to January 26, 1967, regardless of size, shall be operated so as to emit smoke of an opacity denser than 40 percent or No. 2 of the Ringelmann chart or equivalent, under normal operating conditions.

219.6 Tests. (a) All incinerators larger than 2,000 lb/hr capacity shall be tested using isokinetic sampling techniques in accordance with test procedures acceptable to the commissioner.

(b) All incinerators built or installed after January 1, 1968, and having a capacity of 2,000 lb/hr or less shall be tested in

*See Appendix 2.

accordance with special test procedures promulgated by the commissioner. Units which are representative models may be tested instead of an actual installation, in accordance with special test procedures promulgated by the commissioner.

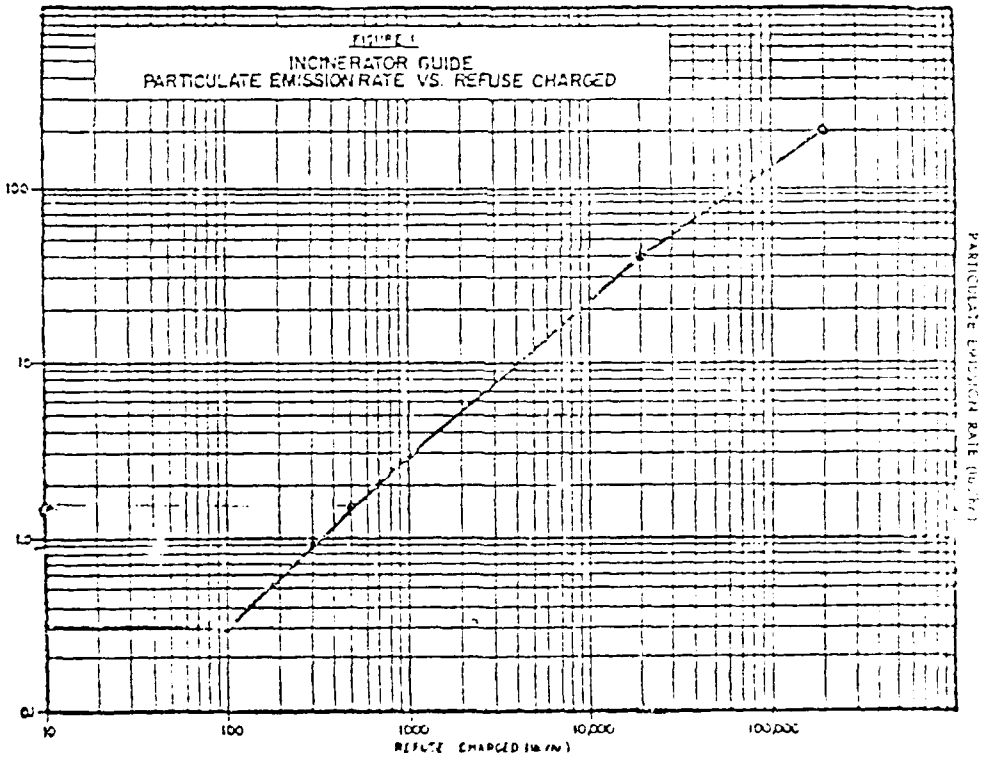
219.7 Abatement. (a) Where the commissioner has reason to believe that an incinerator installation is violating the emissions standards of section 219.– he may have tests conducted. The owner shall provide, at his expense, sampling holes and pertinent allied facilities as needed, at the request of the commissioner.

(b) If such tests indicate a contravention of the emission limits, the commissioner may require the installation of appropriate control equipment or he may seal the incinerator if such equipment is not installed within the time limit specified by the commissioner.

(c) The commissioner may order the cleaning, repair, replacement or alteration of any equipment or control equipment which causes it is operated so as to cause a violation of this Part.

(d) The commissioner may order a change in the manner of operation of any incinerator which is operated so as to cause a violation of this Part.

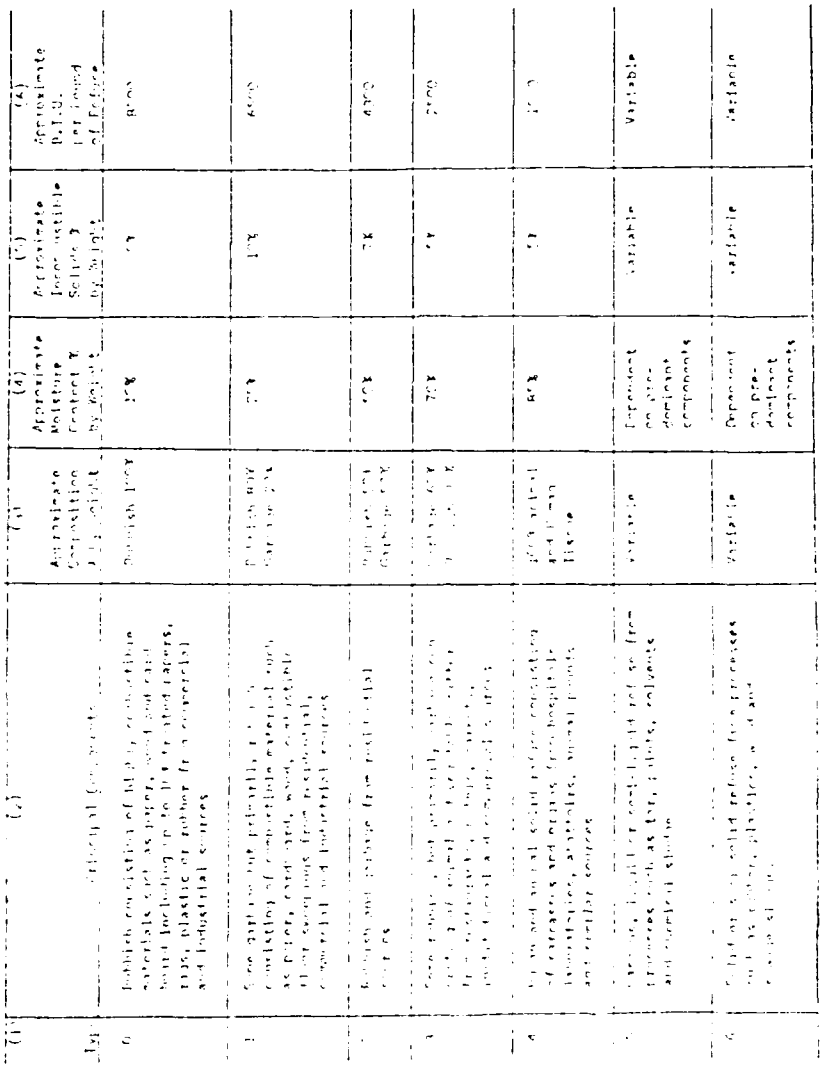
APPENDIX 2



APPENDIX 2

TABLE 1

Classification of Refuse



PART 220
PORTLAND CEMENT PLANTS
(Effective March 16, 1973; May 10, 1984)

Section 220.1 Definitions. (a) For the purpose of this Part, the general definitions of Part 200 of this Title apply.

(b) For the purpose of this Part, the following definitions also apply:

(1) Dry process portland cement plant. A portland cement plant where the raw material kiln feed entering the kiln is a powder form has a moisture content of one percent or less by weight.

(2) Feed to the kiln. The weight of all materials, excluding fuels and uncombined water, introduced into the kiln during the time when a stack sample is being taken to determine compliance with sections 220.2 and 220.3 of this Part.

(3) Upset condition. Any unavoidable

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APPENDIX C

Sampling Port Location

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DETERMINATION OF MINIMUM NUMBER OF TRAVERSE POINTS

Stack ID: _____ Stack diameter at ports: 3.4 (ft)

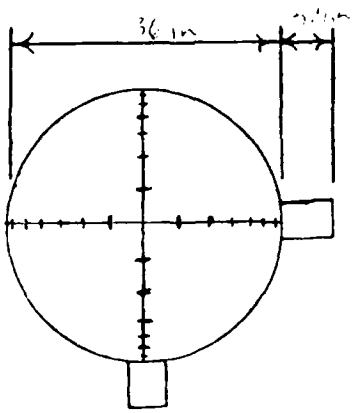
Distance A (ft) _____ (duct diameters) 1.5

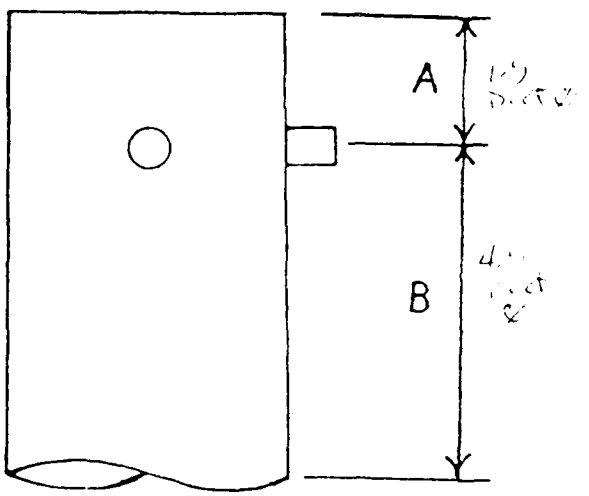
Recommended number of traverse points as determined by distance A: _____

Distance B (ft) _____ (duct diameters) _____

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

Number of traverse points used: 24





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APPENDIX D

Sampling Data and Calculations

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PRELIMINARY SURVEY DATA SHEET NO. 1

(Stack Geometry)

BASE: Griffiss AFB	PLANT: Griffiss Classified Waste Incinerator
DATE: 21 Sept 88	SAMPLING TEAM: OEHL
SOURCE TYPE AND MAKE: Int'l CAT 750-MI	
SOURCE NUMBER: Classified Waste Incin.	INSIDE STACK DIAMETER: 3' Inches
RELATED CAPACITY: 50 Gallon/hr Type 6	TYPE FUEL: OIL
DISTANCE FROM OUTSIDE OF NIPPLE TO INSIDE DIAMETER: 550 in. 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			6.5
2			7.9
3			9.8
4			11.9
5			14.5
6			18.3
7			25.7
8			32.5
9			35.1
10			37.2
11			37.1
12			40.5

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PRELIMINARY SURVEY DATA SHEET NO. 2

(Velocity and Temperature Traverse)

BASE: Griffiss AFB

DATE: 21 Sept 90

BOILER NUMBER: Confined Waste Incinerator

INSIDE STACK DIAMETER: 36.0 Inches

STATION PRESSURE: 29.39Ø In Hg

STACK STATIC PRESSURE: -Ø.Ø5 In H20

SAMPLING TEAM: OEHL

TRAVERSE POINT NUMBER	VELOCITY HEAD, V_p IN H20	$\sqrt{V_p}$	STACK TEMPERATURE (°F)
1	.Ø14	Ø	~~1Ø6Ø~~
2	.Ø1Ø	Ø	1351
3	.Ø24	—	1394
4	.Ø15	Ø	14ØØ
5	.Ø1Ø	Ø	1412
6	.ØØ5	Ø	1419
7	.ØØ1	Ø	14Ø6
8	.Ø1	Ø	1425
9	.Ø2	5	1426
10	.Ø3	5	1416
11	.Ø3	5	14Ø1
12	.Ø3	5	1398
~~13~~			
			~~T~~ 1376
			FPS = 13
			FPM = 762
			~~VP~~ = .Ø2
AVERAGE			

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE	DATE	RUN NUMBER
Griffiss AFB	22 Sept 88	ONE

BUILDING NUMBER	SOURCE NUMBER
Classified Waste Incinerator	Model CAI-750-MI

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	.5213	.2866	0.2347
ACETONE WASHINGS (Probe, Front Half Filter)	98.5648	98.1160	0.4488
BACK HALF (If needed)			
	Total Weight of Particulates Collected		.6835 gm

II. WATER

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H20)	242.0	200.0	42.0
IMPINGER 2 (H20)	210.0	200.0	10.0
IMPINGER 3 (Dry)	0.0	0.0	0.0
IMPINGER 4 (Silica Gel)	207.2	200.0	7.2
	Total Weight of Water Collected		59.2 gm

III. GASES (Dry)

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	10.6	10.6	10.6		10.6
VOL % O_2	8.8	8.8	8.6		8.7
VOL % CO					
VOL % N_2					

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

Page 2 of 2

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER: ONE

DATE: 22 Sept 88

PLANT: Clayton Concrete Inc

BASE: Griffiss

SAMPLE BOX NUMBER:

METER BOX NUMBER: Nutech

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION

EQUATIONS

$^{o}R = {}^{o}F + 460$

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

Post leak checks ok

AMBIENT TEMP: 64 °F

STATION PRESS: 30.02 in Hg

HEATER BOX TEMP: °F

PROBE HEATER SETTING:

PROBE LENGTH: 48 in

NOZZLE AREA (A): sq ft

Cp: .84

DRY GAS FRACTION (Fd):

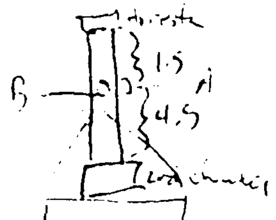
TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H2O)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
B 1	0	2.4	1210		0.001	0.06	236.072	78		74	226	54
2	3.5	2.4	1370		0.85	0.84		79		75	230	58
3	7.0	2.4	1390		0.85	0.86		80		76	240	55
4	10.5	2.4	1451		0.815	0.83		81		77	250	54
5	14.0	2.5	1466		0.812	0.76		83		77	242	58
6	17.5	2.4	1486		0.805	0.77		81		77	242	58
7	21.0	2.4	1479		0.805	0.77		81		77	254	59
8	24.5	2.4	1486		0.810	0.55		83		78	237	58
9	28.4	3.0	1487		0.824	1.09		82		79	235	56
10	31.5	3.4	1479		0.824	1.10		83		78	256	57
11	35.0	3.6	1476		0.826	1.19		84		78	256	58
12	38.5	3.4	1464		0.815	0.83	252.274	84		78	249	57
	+3.0											
$\bar{T}_M = 75$												
$\bar{T}_S = 1421$												
$\bar{\Delta H} = 0.71$												
$\sqrt{\Delta P}_S = 4.6773$												

CU FT = 32.164

OEHL FORM 18 MAY 78

Page 1 of 2

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER	SCHEMATIC OF STACK CROSS SECTION	EQUATIONS	AMBIENT TEMP
ONE		$^{o}R = ^{o}F + 460$	60 55[illegible] °F
DATE 22 Sept 80	Pre leak check [illegible]	$H = \left[\frac{5130 \cdot Fd \cdot Cp \cdot A}{Co}\right]^2 \cdot \frac{Tm}{Ts} \cdot Vp$	STATION PRESS 30.02 in Hg
PLANT Chemical Waste Dem.		% H_2O 8.0	HEATER BOX TEMP 225-275 °F
BASE Griffiss AFB		M_{CO_2} 29.5	PROBE HEATER SETTING 170
SAMPLE BOX NUMBER		Static [illegible]	PROBE LENGTH 48 in
METER BOX NUMBER Nutech		Time = 0550 EDT	NOZZLE AREA (A) .0521 sq ft
Qw/Qm			Cp .84
Co			DRY GAS FRACTION (Fd)

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
A 1	0	2.0	1005		.002	0.14	220.110	66		64	245	58
2	3.5	2.0	1358		.005	0.29		70		66	248	62
3	7.0	2.[illegible]	1412		.01	0.56		71		66	248	63
4	10.5	2.5	1424		.015	0.83		73		65	251	56
5	14.0	[illegible]	1441		.015	0.82		73		68	225	58
6	17.5	2.2	1453		.015	0.82		74		69	234	55
7	21.0	2.0	1445		.002	0.11		75		69	237	57
8	24.5	2.0	1447		.005	0.27		76		70	230	56
9	28.0	2.5	1468		.015	0.82		77		71	248	56
10	31.5	3.0	1470		.020	1.09		77		72	245	56
11	35.0	3.0	1467		.025	1.37		78		72	244	56
12	38.5	3.4	1464		.025	1.37	236.072	79		73	240	56
	stop [illegible]											

FORM 19

Run#1 Calculations

```
        XROM "METH 5"
RUN NUMBER
          1.0000    RUN
METER BOX Y?
          1.0770    RUN
DELTA H?
           .7100    RUN
BAR PRESS ?
         30.0200    RUN
METER VOL ?
         32.1640    RUN
MTR TEMP F?
         75.0000    RUN
% OTHER GAS
REMOVED BEFORE
DRY GAS METER ?
                    RUN
STATIC H2O IN ?
          -.0500    RUN
STACK TEMP.
       1,421.0000   RUN
ML. WATER ?
         59.3000    RUN

% CO2?
         10.6000    RUN
% OXYGEN?
          8.7000    RUN
% CO ?
                    RUN
MOL WT OTHER?
                    RUN

Mwd =30.04
MW WET=29.14

SQRT DPS ?
          4.6777    RUN
TIME MIN ?
         84.0000    RUN
NOZZLE DIA ?
           .6540    RUN
STK DIA INCH ?
         36.0000    RUN

* VOL MTR STD = 34.36[illegible]
  STK PRES ABS = 30.0[illegible]
  VOL H2O STD = 2.79
  % MOISTURE = 7.50
  MOL DRY GAS = 0.925
  % NITROGEN = 80.70
  MOL WT DRY = 30.04
  MOL WT WET = 29.14
  VELOCITY FPS = [illegible]
  [illegible] AREA = [illegible]
  [illegible] DSCFM = [illegible]
* [illegible] DSCFM = 1,[illegible]
  % ISOKINETIC = 91.[illegible]

END OF FIELD DATA
```

VISIBLE EMISSION OBSERVATION FORM

No. RUN #1

COMPANY NAME		
GRIFFISS AFB		
STREET ADDRESS		
CITY	STATE	ZIP
ROME	NY	
PHONE (KEY CONTACT)	SOURCE ID NUMBER	
	CLASS. WASTE/INCINERATOR	

PROCESS EQUIPMENT	OPERATING MODE
2 STAGE INCINERATOR	BATCH 300 LB
CONTROL EQUIPMENT	OPERATING MODE
NONE	—

DESCRIBE EMISSION POINT
STEEL 3.5' OD STACK WITH CINDER BLK SCREEN APEX 2' HIGH.

HEIGHT ABOVE GROUND LEVEL	HEIGHT RELATIVE TO OBSERVER
28'	Start 28' End ✓
DISTANCE FROM OBSERVER	DIRECTION FROM OBSERVER
Start 100' End ✓	Start NW End ✓

DESCRIBE EMISSIONS
Start HEAT WAVES - NO CAPACITY End ✓

EMISSION COLOR	IF WATER DROPLET PLUME
Start NONE End ✓	Attached ☐ —— Detached ☐

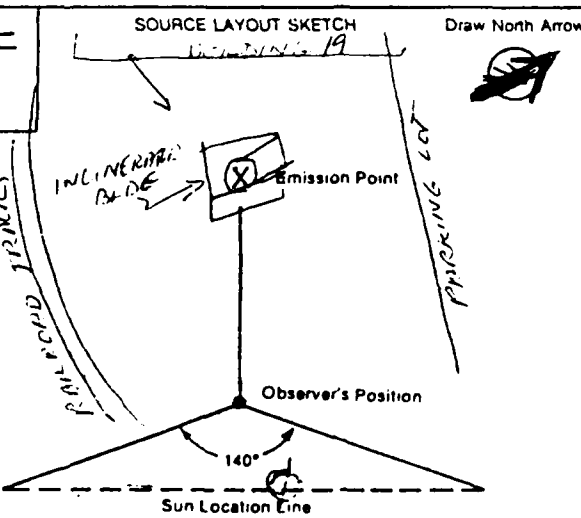
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED
Start 5' ABOVE STACK End ✓

DESCRIBE PLUME BACKGROUND CLEAR - NO HAZE
Start READ AGAINST SKY End ✓

BACKGROUND COLOR	SKY CONDITIONS
Start BLUE/GRAY End ✓	Start SCATTERED End ✓
WIND SPEED	WIND DIRECTION
Start 3 K End ✓	Start SW End ✓
AMBIENT TEMP	WET BULB TEMP / RH, percent
Start 60 End ✓	55

Stack with Plume
Sun
Wind

SOURCE LAYOUT SKETCH



OBSERVATION DATE	START TIME	END TIME
22 SEPT 85	0850	0920

SEC / MIN	0	15	30	45	COMMENTS
1	0	0	0	0	300 LB CHARGE
2	0	0	0	0	LOOK PAPER
3	0	0	0	0	SHEETS IN COMBUSTI
4	0	0	0	0	PAPER ETC.
5	0	0	0	0	NO OPACITY - ONL
6	0	0	0	0	HEAT WAVES. STACK
7	0	0	0	0	at ABOUT 145°F.
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	5	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	STACK WAS MONITO
25	0	0	0	0	FOR REMAINDER
26	0	0	0	0	OF STACK TEST.
27	0	0	0	0	SUBSEQUENT
28	0	0	0	0	READINGS
29	0	0	0	0	REMAINED THE SAME
30	0	0	0	0	

OBSERVER'S NAME (PRINT)	
JAMES A. GARRISON	
OBSERVER'S SIGNATURE	DATE
James A. Garrison	22 SEPT 85
ORGANIZATION	782-5561
USAFOEHL/ECA BROOKS AFB, TX	
CERTIFIED BY	DATE
TEXAS AIR CONTROL BOARD	16 SEPT 85

ADDITIONAL INFORMATION
FUEL NO 2 FUEL OIL
CAPACITY, 500 lbs

CONTINUED ON VEO FORM NUMBER

US EPA 0552 CONTRACTOR

STACK #1 1412

2. LABORATORY PERFORMING ANALYSIS		3. REQUESTOR SAMPLE NO
OEHL	063116	CN881265

SAMPLE COLLECTION INFORMATION

SITE DESCRIPTION	DATE RECEIVED BY LAB	DATE ANALYSIS COMPLETED
15 25	7 Oct, 88	17 Oct, 88

6. SITE LOCATION NO	6. FLOWRATE AT SITE GAL/MIN	WEATHER	WATER TEMP	pH UNITS	TEMP

11. COLLECTION DATE PERIOD

13. SAMPLING TECHNIQUE

15. REASON FOR SAMPLE SUBMISSION

NEEDS

ANALYSES REQUESTED AND RESULTS 063116 GROUP 6 291

PARAMETER	TOTAL	MG/L
PRESERVATION GROUP A		
Chemical Oxygen Demand	00340	
Total Organic CARBON as C	00680	
PRESERVATION GROUP B		
OIL & GREASE FREON-IR Method	00560	
PRESERVATION GROUP C		
AMMONIA as N	00610	
NITRATE as N Cd Reduct. Method	00620	
NITRITE as N	00615	
TOTAL KJELDAHL NITROGEN as N	00625	
PHOSPHORUS Orth. PO4 as P	70507	
PHOSPHORUS as P	00665	
PRESERVATION GROUP D		
CYANIDE	00720	
CYANIDE Free Amenable to Cl_2	00722	
PRESERVATION GROUP E		**µG/L**
PHENOLS	32730	

PRESERVATION GROUP F PARAMETER	DISSOLVED	TOTAL	µG/L
ARSENIC			
BARIUM			
CADMIUM	01025	01027	
CHROMIUM			
CHROMIUM Hexavalent			
COPPER		01042	
IRON	01046	01045	
LEAD	01049	01051	
MANGANESE	01056	01055	
MERCURY	71890	71900	
NICKEL			
SELENIUM	01145	01147	
SILVER			
ZINC			
CALCIUM as Ca	00915	00916	mg/l
MAGNESIUM as Mg	00925	00927	mg/l
POTASSIUM			mg/l
SODIUM			mg/l

PARAMETER	TOTAL	MG/L
BORON	01022	µg/l
BORON, Dissolved	01020	µg/l
CHLORIDE	00940	47
COLOR	00080	units
FLUORIDE	00951	
Residue Filterable TDS	00515	
Residue Non Filt. SS	00530	
Residue	00500	
Residue Volatile	00505	
Specific Conductance	00095	µmho
SULFATE as SO_4	00945	
SURFACTANTS MBAS as LAS	38260	
TURBIDITY	00076	
PRESERVATION GROUP		

ORGANIZATION REQUESTING ANALYSIS

ECQ

CHEMIST: JSC

REVIEWED BY

APPROVED BY [signature]

AFSC FORM 3145, DEC 85 REPLACES AFSC FORM ... WHICH IS OBSOLETE — NON-POTABLE WATER ANALYSIS

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE	DATE	RUN NUMBER
Griffiss	22 Sept 88	TWØ

BUILDING NUMBER	SOURCE NUMBER
Classified Waste Incinerator	Model CAI-750-MI

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	.4780	.2862	.1918
ACETONE WASHINGS (Probe, Front Half Filter)	105.1808	104.7695	.4113
BACK HALF (If needed)			
	Total Weight of Particulates Collected		.6031 gm

II. WATER

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H20)	245.Ø	2ØØ.Ø	45.Ø
IMPINGER 2 (H20)	2Ø4.Ø	2ØØ.Ø	4.Ø
IMPINGER 3 (Dry)	Ø.Ø	Ø.Ø	Ø.Ø
IMPINGER 4 (Silica Gel)	2Ø7.2	2ØØ.Ø	7.2
	Total Weight of Water Collected		56.2 gm

III. GASES (Dry)

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	9.Ø	9.Ø	9.Ø		9.Ø
VOL % O_2	1Ø.4	1Ø.4	1Ø.4		1Ø.3
VOL % CO					
VOL % N_2					

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

AMD FORM FEB 84 651 REPLACES OEHL 20, MAY 78, WHICH IS OBSOLETE.

Page 1 of 2

PARTICULATE SAMPLING DATA SHEET

Scott

RUN NUMBER: TWO

DATE: 22 Sept 93

PLANT: Classified Waste Inc

BASE: Griffiss AFB

SAMPLE BOX NUMBER:

METER BOX/NUMBER: Nutech

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION

EQUATIONS

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

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

MW = 29.5

Static ΔP = -.05

$\%H_2O \approx 8.\emptyset$

Pre leak check good at 15 in Hg

Std 1120

AMBIENT TEMP: 60 63 55 63 °F

STATION PRESS: 30.02Ø in Hg

HEATER BOX TEMP: 225-275 °F

PROBE HEATER SETTING: Not needed

PROBE LENGTH: 48 in

NOZZLE AREA (A): .654 sq ft

Cp: .8-1

DRY GAS FRACTION (Fd):

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
A 1	0	2.Ø	1232		.ØlØ	Ø.62	252.514	76		76	246	56
2	3.5	2.Ø	1340		.Ø1Ø	Ø.54		76		76	247	57
3	7.Ø	2.5	1420		.Ø15	Ø.84		77		76	247	56
4	10.5	2.5	1395		.Ø12	Ø.68		79		77	247	56
5	14.0	2.5	1394		.Ø15	Ø.85		79		76	251	56
6	17.5	2.5	1508		.Ø2Ø	1.08		81		78	251	56
7	21.0	2.Ø	1502		.ØØ5	Ø.27		80		76	251	57
8	24.5	2.Ø	1410		.ØØØ	Ø.57		80		76	251	57
9	28.0	2.Ø	1456		.Ø14	Ø.55		81		76	251	57
10	31.5	2.Ø	1500		.Ø15	Ø.81		81		77	251	57
11	35.0	2.5	1419		.Ø2Ø	1.13		81		77	254	58
12	38.5	3.4	1502		.Ø2Ø	1.08		81		77	254	6Ø
	42.0 stop											

Page 2 of 2

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER: RNO

DATE: 22 Sept 88

PLANT: Classified cluster

BASE: Griffiss

SAMPLE BOX NUMBER:

METER BOX NUMBER: Nutech

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION: See page 1 of 2

EQUATIONS

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

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

Post leak check at Sunday

AMBIENT TEMP: 11 °F

STATION PRESS: 11 in Hg

HEATER BOX TEMP: 11 °F

PROBE HEATER SETTING: 11

PROBE LENGTH: 11 in

NOZZLE AREA (A): 11 sq ft

Cp: 11

DRY GAS FRACTION (Fd):

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H20)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
B 1	0	1.5	1256		.0061	0.010	261.510	76		75	253	57
2	3.5	2.0	1392		.0040	0.57		76		75	249	63
3	7	2.5	1460		.0015	0.82		78		75	252	54
4	10.5	2.5	1483		.0012	0.65		79		76	252	54
5	14.0	2.0	1495		.0010	0.54		81		76	253	55
6	17.5	2.0	1504		.0010	0.54		82		77	255	56
7	21	2.0	1517		.0005	0.27		83		77	257	59
8	24.5	2.0	1460		.0015	0.83		83		78	257	61
9	28	3.0	1506		.0020	1.08		83		78	255	55
10	31.5	3.0	1409		.0020	1.14		84		78	257	55
11	35	3.0	1416		.0020	1.14		87		78	259	57
12	38.5	3.0	1492		.0010	0.55	285.848	85		79	260	57
	42 stop											
$\overline{T_M}$ = 78												
$\overline{T_S}$ = 1436		CU FT = 33.384										
$\overline{\Delta H}$ = 0.72												
$\sqrt{\overline{\Delta H}}$ = 4.8196												

OEHL FORM MAY 78 18

Run #2

38

VISIBLE EMISSION OBSERVATION FORM

No. RUN #2

COMPANY NAME		
GRIFFISS AFB		
STREET ADDRESS		
CITY	STATE	ZIP
ROME	NY	
PHONE (KEY CONTACT)	SOURCE ID NUMBER	
	CLASS. WASTE INCINERATOR	

PROCESS EQUIPMENT	OPERATING MODE
2 STAGE INCINERATOR	BATCH 300 lb
CONTROL EQUIPMENT	OPERATING MODE
NONE	—

DESCRIBE EMISSION POINT

STEEL 3.5' OD STACK WITH CYLINDER/ASH SCREEN APPROX 2' HIGH

HEIGHT ABOVE GROUND LEVEL	HEIGHT RELATIVE TO OBSERVER
25'	Start 2-8' End ✓
DISTANCE FROM OBSERVER	DIRECTION FROM OBSERVER
Start 100 End	Start NW End

DESCRIBE EMISSIONS

Start HEAT WAVES - VISIBLE PLUM End NO OPACITY +/- OR VERY LITTLE. NO ✓ AFTER 8-40'.

EMISSION COLOR	IF WATER DROPLET PLUME
Start LIGHT BROWN End WHEN VISIBLE ✓	Attached ☐ N/A Detached ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED

Start N/A 5' FROM STACK End

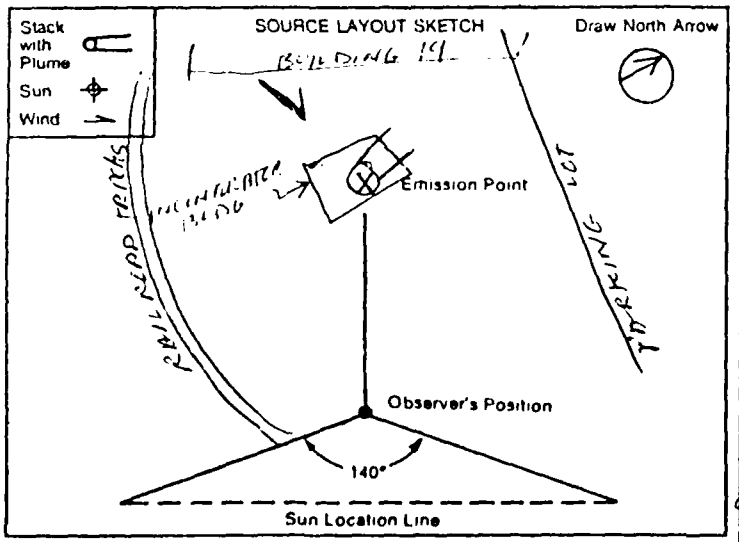
DESCRIBE PLUME BACKGROUND NO HAZE

Start SKY OVERCAST End

BACKGROUND COLOR	SKY CONDITIONS
Start GRAY End ✓	Start OVERCAST End ✓
WIND SPEED	WIND DIRECTION
Start 5K End ✓	Start SW End ✓
AMBIENT TEMP	WET BULB TEMP / RH, percent
Start 62 End ✓	

Stack with Plume
Sun
Wind

SOURCE LAYOUT SKETCH



ADDITIONAL INFORMATION

FUEL: NO 2 FUEL OIL

CAPACITY: 500 lb/hr

OBSERVATION DATE	START TIME	END TIME
22 SEPT 88	1120	1150

SEC / MIN	0	15	30	45	COMMENTS
1	0	0	0	0	300 lb CHARGE
2	0	0	0	0	LESS PAPER
3	0	0	0	0	SHEETS, COMPUTER
4	0	5	5	5	PAPER, FORMS ETC
5	5	5	5	5	PLUS APPROX 10 lb.
6	5	5	5	5	MICROFICHE.
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	STACK MONITORED
25	0	0	0	0	DURING REMAINDER
26	0	0	0	0	OF STACK TEST,
27	0	0	0	0	SUBSEQUENT VIS
28	0	0	0	0	EMISSIONS
29	0	0	0	0	REMAINED THE
30	0	0	0	0	SAME.

OBSERVER'S NAME (PRINT)	
JAMES A. GARRISON	
OBSERVER'S SIGNATURE	DATE
James A. Garrison	22 SEPT 88
ORGANIZATION	78235-5501
USAFOEHL/ECQ BROOKS AFB	
CERTIFIED BY	DATE
TEXAS AIR CONTROL BOARD	16 SEPT 88

CONTINUED ON VEO FORM NUMBER

STACK Run #2 14.12

2. LABORATORY PERFORMING ANALYSIS		4. REQUESTOR SAMPLE NO
OEHL	063117	CN881266

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION		5. DATE RECEIVED BY LAB	6. DATE ANALYSIS COMPLETED
25		10 Jun 88	17 Jun 88

ON-SITE ANALYTICAL RESULTS

8. SITE LOCATION NO	9. FLOWRATE AT SITE 00058 GAL/MIN	10. [illegible]	11. WATER TEMP 00010 °C	12. [illegible] UNITS	13. DISS O_2 00300 MG/L

11. COLLECTION DATE/PERIOD	12. COLLECTOR'S NAME	14. RESULTS OF OTHER ON-SITE ANALYSES
13. SAMPLING TECHNIQUE	14. PHONE NUMBER	
15. REASON FOR SAMPLE SUBMISSION		
NPDES #		

ANALYSIS REQUESTED AND RESULTS 063117

PRESERVATION GROUP A

PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	00340	•
Total Organic CARBON as C	00680	•
		•

PRESERVATION GROUP B

PARAMETER	TOTAL	MG/L
OIL & GREASE FREON-IR Method	00560	•

PRESERVATION GROUP C

PARAMETER	TOTAL	MG/L
AMMONIA as N	00610	•
NITRATE as N Cd Reduct. Method	00620	•
NITRITE as N	00615	•
TOTAL KJELDAHL NITROGEN as N	00625	•
PHOSPHORUS Ortho PO4 as P	70507	•
PHOSPHORUS as P	00665	•

PRESERVATION GROUP D

PARAMETER	TOTAL	MG/L
CYANIDE	00720	•
CYANIDE Free, Amenable to Cl_2	00722	•

PRESERVATION GROUP E

PARAMETER	TOTAL	µG/L
PHENOLS	32730	•
		•

PRESERVATION GROUP F

PARAMETER	DISS	TOTAL	µG/L
ARSENIC	01000	01002	•
BARIUM	01005	01007	•
CADMIUM	01025	01027	•
CHROMIUM	01030	01034	•
CHROMIUM Hexavalent		01032	•
COPPER	01040	01042	•
IRON	01045	01045	•
LEAD	01049	01051	•
MANGANESE	01056	01055	•
MERCURY	71890	71900	•
NICKEL	01065	01067	•
SELENIUM	01145	01147	•
SILVER	01075	01077	•
ZINC	01090	01092	•
CALCIUM as Ca	00915	00916	• mg/l
MAGNESIUM as Mg	00925	00927	• mg/l
POTASSIUM	00935	00937	• mg/l
SODIUM	00930	00929	• mg/l

PRESERVATION GROUP G (291)

PARAMETER	TOTAL	MG/L
BORON	01022	• µg/l
BORON, Dissolved	01020	• µg/l
CHLORIDE	00940	61 •
COLOR	00080	Units
FLUORIDE	00951	•
Residue Filterable (TDS)	00515	•
Residue Non Filt (SS)	00530	•
Residue	00500	•
Residue Volatile	00505	•
Specific Conductance	00095	µmhos
SULFATE as SO_4	00945	•
SURFACTANTS MBAS as LAS	38260	•
TURBIDITY	00076	Units

PRESERVATION GROUP J

PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS	CHEMIST
Griffiss AFB.	JSO
	REVIEWED BY
	APPROVED BY

AFSC Form 3145, DE - 85 REPLACES AMD FORM 2[illegible] MAR 83 WHICH IS OBSOLETE

NON-POTABLE WATER ANALYSIS

AIR POLLUTION PARTICULATE ANALYTICAL DATA

BASE	DATE	RUN NUMBER
Griffiss	22 Sept 88	THREE

BUILDING NUMBER	SOURCE NUMBER
Classified Waste Incinerator	Model CAI-750-HI

I. PARTICULATES

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT PARTICLES (gm)
FILTER NUMBER	.4284	Ø.2874	.141Ø
ACETONE WASHINGS (Probe, Front Half Filter)	1Ø3.1Ø77	1Ø2.8Ø43	.3Ø34
BACK HALF (If needed)			
	Total Weight of Particulates Collected		.4444 gm

II. WATER

ITEM	FINAL WEIGHT (gm)	INITIAL WEIGHT (gm)	WEIGHT WATER (gm)
IMPINGER 1 (H20)	246.Ø	2ØØ.Ø	46.Ø
IMPINGER 2 (H20)	2Ø6.Ø	2ØØ.Ø	6.Ø
IMPINGER 3 (Dry)	Ø.Ø	Ø.Ø	Ø.Ø
IMPINGER 4 (Silica Gel)	2Ø6.6	2ØØ.Ø	6.6
	Total Weight of Water Collected		58.6 gm

III. GASES (Dry)

ITEM	ANALYSIS 1	ANALYSIS 2	ANALYSIS 3	ANALYSIS 4	AVERAGE
VOL % CO_2	9.4	9.4	9.4		9.4
VOL % O_2	9.4	9.6	9.6		9.5
VOL % CO					
VOL % N_2					

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

AMD FORM FEB 84 651 REPLACES OEHL 20, MAY 78, WHICH IS OBSOLETE.

Run #3

```
XROM "METH 5"
RUN NUMBER
        3.0000    RUN
METER BOX Y?
        1.0770    RUN
DELTA H?
         .6100    RUN
BAR PRESS ?
       30.0200    RUN
METER VOL ?
       31.3070    RUN
MTR TEMP F?
       77.4000    RUN
% OTHER GAS
REMOVED BEFORE
DRY GAS METER ?
                  RUN
STATIC H2O IN ?
        -.0500    RUN
STACK TEMP.
    1,443.1700    RUN
ML. WATER ?
       59.6000    RUN

% CO2?
        5.4000    RUN
% OXYGEN?
        9.5000    RUN
% CO ?
        0.0000    R
MOL WT OTHER?
        0.0000    RUN

Mwd =29.[illegible]
MW WET=2[illegible].97


SORT PSTS ?
        4.4000    RUN
TIME MIN ?
       24.0000    RUN
NOZZLE DIA ?
         .6540    RUN
STK DIA INCH ?
       36.0000    RUN

* VOL MTR STD = 3[illegible]
  STK PRES ABS = [illegible]
  VOL H2O GAS = [illegible]
  % MOISTURE = [illegible]
  MOL DRY GAS = 0.9[illegible]
  % NITROGEN = [illegible]
  MOL WT DRY = 29.[illegible]
  MOL WT WET = 2[illegible]
  VELOCITY FPS = 10.7[illegible]
  STACK AREA = 7.07
  STACK ACFM = 4,544.
* STACK DSCFM = 1,[illegible]
  % ISOKINETIC = [illegible]

END OF FIELD DATA
```

```
XROM "PARSPL"

RUN NUMBER
        3.00000   R

VOL MTR STD ?
       3[illegible].[illegible]300   R
STACK DSCFM ?
    1,[illegible]8.00000   R
FRONT [illegible] MG ?
      444.40000   RUN
BACK [illegible] MG ?
        0.00000   RUN

[illegible] GR DSCF = 0.2[illegible]
[illegible] MG MMM = 471.44[illegible]
[illegible] LB HR = [illegible]
[illegible] KG HR = 0.[illegible]
```

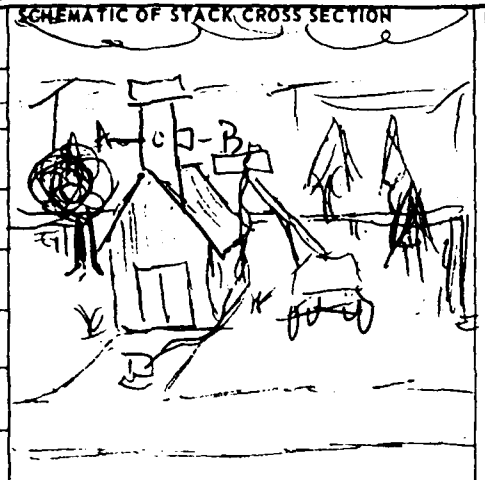
```
XROM "[illegible]"

RUN NUMBER
THREE [illegible]

VOL MTR [illegible]
        [illegible]
STACK DSCFM ?
      1,1[illegible].00000   R
FRONT [illegible] MG ?
        [illegible]
BACK [illegible]
        [illegible]

[illegible] GR DSCF = 0.00[illegible]
[illegible] MG MMM = [illegible]
[illegible] LB HR = 0.0[illegible]
[illegible] KG HR = 0.00[illegible]
```

Page 1 of 2

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER: THREE
DATE: 22 Sept 88
PLANT: Classified Waste
BASE: Griffiss
SAMPLE BOX NUMBER:
METER BOX NUMBER:
Qw/Qm:
Co:

SCHEMATIC OF STACK CROSS SECTION



EQUATIONS

$°R = °F + 460$

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

$MW_d = 29.5$
$B_{wm}H_2O = 8.0$
$\alpha @ 2.07$
$\Delta P_s = .05$

START 1336 EDT

AMBIENT TEMP: C (°F
STATION PRESS: 30.02 in Hg
HEATER BOX TEMP: °F
PROBE HEATER SETTING:
PROBE LENGTH: 48 in
NOZZLE AREA ~~(A)~~ (C): .054 sq ft
Cp: .84
DRY GAS FRACTION (Fd):

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	~~STATIC PRESSURE (in H2O)~~ VAC	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
A 1	0	2.0	1322		.00	.06	286.163	76		76	244	56
2	3.5	2.0	1359		.01	.57		76		76	246	57
3	7.0	2.0	1445		.01	.55		78		77	247	56
4	10.5	2.0	1423		.01	.56		79		77	248	56
5	14.0	2.0	1517		.01	.53		79		76	240	55
6	17.5	2.0	1484		.005	.27		79		76	242	55
7	21.0	2.0	1425		.005	.28		80		76	243	56
8	24.5	2.5	1497		.015	.82		80		77	247	56
9	28.0	2.5	1446		.024	1.11		80		77	243	57
10	31.5	3.0	1476		.026	1.10		81		78	249	53
11	35.0	3.0	1448		.027	1.10		81		77	249	54
12	38.5	3.0	1472		.020	1.10		81		77	250	55
	42 stop											

Thanks!

Page 2 of 2

PARTICULATE SAMPLING DATA SHEET

RUN NUMBER: THREE

DATE: 22 Sept 88

PLANT: Classified Waste Incin

BASE: Griffiss

SAMPLE BOX NUMBER: 11

METER BOX NUMBER: 4

Qw/Qm:

Co:

SCHEMATIC OF STACK CROSS SECTION

EQUATIONS

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

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

Post leak check

AMBIENT TEMP: 41 °F

STATION PRESS: 11 in Hg

HEATER BOX TEMP: R °F

PROBE HEATER SETTING: 5

PROBE LENGTH: 11 in

NOZZLE AREA (A): 4 sq ft

Cp: "

DRY GAS FRACTION (Fd):

TRAVERSE POINT NUMBER	SAMPLING TIME (min)	STATIC PRESSURE (in H2O)	STACK TEMP (°F)	STACK TEMP (Ts) (°R)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	GAS METER TEMP IN (°F)	GAS METER TEMP AVG (Tm) (°R)	GAS METER TEMP OUT (°F)	SAMPLE BOX TEMP (°F)	IMPINGER OUTLET TEMP (°F)
1	0	-2.0	1326		.001	0.04	362.428	77		75	247	57
2	3.5	2.0	1406		.01	0.57		77		75	254	57
3	7	2.0	1436		.01	0.51		77		75	256	56
4	10.5	2.0	1461		.012	0.66		76		74	226	53
5	14	2.0	1397		.012	0.68		76		74	230	53
6	17.5	2.0	1403		.010	0.57		77		76	236	51
7	21	2.0	1445		.007	0.11		78		75	246	56
8	24.5	2.5	1537		.008	0.42		80		76	243	61
9	28	2.5	1504		.010	0.54		80		76	246	62
10	31.5	2.5	1516		.015	0.80		81		76	252	62
11	35	2.5	1388		.015	0.86		81		77	252	
12	38.5	2.5	1489		.012	0.65	317.470	81		77	252	
	42 stop						22.163					

TOT CU FT = 31.307

$\overline{\sqrt{\Delta P}} = 4.40$

$T_s = 1443.17$

$T_m = 77.4$

$\overline{\Delta H} = 0.61$

OEHL FORM 18 MAY 78

VISIBLE EMISSION OBSERVATION FORM

No. RUN # 3

COMPANY NAME: GRIFFISS AFB		
STREET ADDRESS:		
CITY: ROME	STATE: NY	ZIP:
PHONE (KEY CONTACT):	SOURCE ID NUMBER: CLASS-WASTE/INCINERATOR	

PROCESS EQUIPMENT: 2 STAGE INCINERATOR	OPERATING MODE: BATCH 300 lb
CONTROL EQUIPMENT: NONE	OPERATING MODE: —

DESCRIBE EMISSION POINT: STEEL 3.5' OD STACK WITH LINER/ASH SCREEN APPROX 2'/4/6/4

HEIGHT ABOVE GROUND LEVEL: 28'	HEIGHT RELATIVE TO OBSERVER: Start 28' End
DISTANCE FROM OBSERVER: Start 100 End ✓	DIRECTION FROM OBSERVER: Start S End ✓

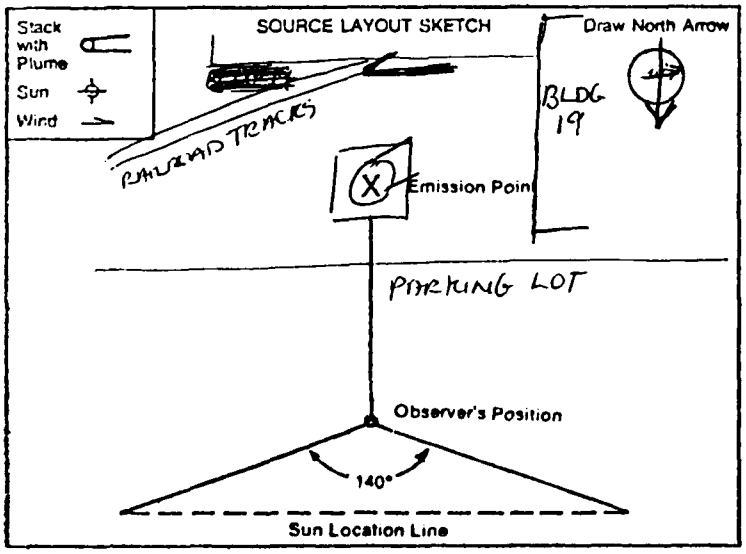
DESCRIBE EMISSIONS: Start LT BROWN WHEN VISIBLE — End ✓

EMISSION COLOR: Start LT BROWN ✓ End ✓	IF WATER DROPLET PLUME: Attached ☐ N/A Detached ☐

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: Start 3' FROM STACK End ✓

DESCRIBE PLUME BACKGROUND: Start OVERCAST SKY - NO HAZE End ✓

BACKGROUND COLOR: Start GRAY ✓ End ✓	SKY CONDITIONS: Start OVERCAST End ✓	
WIND SPEED: Start 5K End ✓	WIND DIRECTION: Start WEST End ✓	
AMBIENT TEMP: Start 61 End ✓	WET BULB TEMP	RH, percent



ADDITIONAL INFORMATION: FUEL: NO 2 FUEL OIL
CAPACITY: 500 lb/hr

OBSERVATION DATE	START TIME	END TIME
22 SEPT 88	1340	1410

SEC / MIN	0	15	30	45	COMMENTS
1	0	0	0	0	300 lb CHARGE
2	5	5	5	5	LOSE PUTER, COMPUT.
3	0	0	0	5	ETC
4	5	5	5	5	
5	5	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	STACK ILLUMINATED
25	0	0	0	0	FOR REMAINDER OF
26	0	0	0	0	STACK TEST:
27	0	0	0	0	SUBSEQUENT VIS.
28	0	0	0	0	EMISSIONS REMAIN
29	0	0	0	0	THE SAME.
30	0	0	0	0	

OBSERVER'S NAME (PRINT): JAMES A. GARRISON

OBSERVER'S SIGNATURE: James A. Garrison — DATE: 22 SEPT 88

ORGANIZATION: USAF OEHL/ECQ BROOKS AFB TX. 78235-5501

CERTIFIED BY: TEXAS AIR CONTROL BOARD — DATE: 16 SEPT 88

CONTINUED ON VEO FORM NUMBER

7. STACK RUN #3 17.1

2. LABORATORY PERFORMING ANALYSIS		3. REQUESTOR SAMPLE NO
OEHL	063118	CN881267 00029

SAMPLE COLLECTION INFORMATION

7. SITE DESCRIPTION 7 OCT 88 15 25		5. DATE RECEIVED BY LAB 7 Oct. 88	6. DATE ANALYSIS COMPLETED 17 Oct. 88
8. SITE LOCATION NO	9. FLOWRATE AT SITE 00058 GAL/MIN	10. WEATHER	
11. COLLECTION DATE PERIOD	12. COLLECTOR'S NAME		
13. SAMPLING TECHNIQUE	14. PHONE NUMBER		
15. REASON FOR SAMPLE SUBMISSION NPDES #			

ON-SITE ANALYTICAL RESULTS

16. WATER TEMP 00010 °C	17. PH 00400 UNITS	18. DISS O_2 00300 MG/L

19. RESULTS OF OTHER ON-SITE ANALYSES

ANALYSES REQUESTED AND RESULTS 063118 (291)

PRESERVATION GROUP A		
PARAMETER	TOTAL	MG/L
Chemical Oxygen Demand	00340	.
Total Organic CARBON as C	00680	.
		.

PRESERVATION GROUP B		
PARAMETER	TOTAL	MG/L
OIL & GREASE FREON-IR Method	00560	.

PRESERVATION GROUP C		
PARAMETER	TOTAL	MG/L
AMMONIA as N	00610	.
NITRATE as N Cd Reduct. Method	00620	.
NITRITE as N	00615	.
TOTAL KJELDAHL NITROGEN as N	00625	.
PHOSPHORUS Ortho PO4 as P	70507	.
PHOSPHORUS as P	00665	.

PRESERVATION GROUP D		
PARAMETER	TOTAL	MG/L
CYANIDE	00720	.
CYANIDE Free, Amenable to Cl_2	00722	.

PRESERVATION GROUP E		
PARAMETER	TOTAL	µG/L
PHENOLS	32730	.
		.

PRESERVATION GROUP F			
PARAMETER	DISS	TOTAL	µG/L
ARSENIC	01000	01002	.
BARIUM	01005	01007	.
CADMIUM	01025	01027	.
CHROMIUM	01030	01034	.
CHROMIUM Hexavalent		01032	.
COPPER	01040	01042	.
IRON	01046	01045	.
LEAD	01049	01051	.
MANGANESE	01056	01055	.
MERCURY	71890	71900	.
NICKEL	01065	01067	.
SELENIUM	01145	01147	.
SILVER	01075	01077	.
ZINC	01090	01092	.
CALCIUM as Ca	00915	00916	. mg/l
MAGNESIUM as Mg	00925	00927	. mg/l
POTASSIUM	00935	00937	. mg/l
SODIUM	00930	00929	. mg/l

GROUP G		
PARAMETER	TOTAL	MG/L
BORON	01022	. µg/l
BORON, Dissolved	01020	. µg/l
CHLORIDE	00940	64.
COLOR	00080	Units
FLUORIDE	00951	.
Residue Filterable (TDS)	00515	.
Residue Non Filt (SS)	00530	.
Residue	00500	.
Residue Volatile	00505	.
Specific Conductance	00095	µmhos
SULFATE as SO_4	00945	.
SURFACTANTS MBAS as LAS	38260	.
TURBIDITY	00076	Units

PRESERVATION GROUP J		
PARAMETER		

1. ORGANIZATION REQUESTING ANALYSIS: Griffiss AFB

CHEMIST: JSO

REVIEWED BY:

APPROVED BY: [signature]

AFSC Form 3145, DEC 85 REPLACES AMD FORM 201 MAR 83 WHICH IS OBSOLETE — NON-POTABLE WATER ANALYSIS

APPENDIX E

Calibration Data

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NOZZLE CALIBRATION DATA FORM

Wright Patterson

Date Dec 85 Calibrated by Garrison

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.)		
	.654	.654	.653	.001	.654

where:

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

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

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

METER BOX CALIBRATION DATA AND CALCULATION FORM

(English units)

Date 12 Jul 88 Meter box number 2010 NUTECH

Barometric pressure, P_b = 29.119 in. Hg Calibrated by Fagin & Scott

Vac in Hg	Orifice manometer setting (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: Wet test meter (t_w), °F/R	Temperature: Dry gas meter: Inlet (t_{d_i}), °F/R	Temperature: Dry gas meter: Outlet (t_{d_o}), °F/R	Temperature: Dry gas meter: Avg[a] (t_d), °F/R	Time (θ), min	Y_i	$\Delta H@_i$ in. H_2O
4	0.5	5	4.668	78/79 538	76/83 539.5	78/78 536.5	538	13.1	1.070	2.010
4	1.0	5	4.670	78/78 538	89/89 546.5	78/81 539.5	543	9.3	1.078	2.008
4	1.5	10	9.390	78/78 538	90/96 553	82/86 544	548.5	15.5	1.082	2.070
4	2.0	10	9.455	79/80 539.5	96/101 558.5	87/90 548.5	553.5	13.5	1.070	2.087
4	3.0	10	9.470	80/81 540.5	101/106 563.5	90/93 551.5	557.5	11.1	1.081	2.109
4	4.0	10.1	9.590	81/81 541	106/109 567.5	94/96 555	561.3	9.8	1.082	2.138
								Avg	1.077	2.070

ΔH, in. H_2O	$\frac{\Delta H}{13.6}$	$Y_i = \frac{V_w P_b (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6})(t_w + 460)}$	$\Delta H@_i = \frac{0.0317\ \Delta H}{P_b (t_d + 460)} \left[\frac{(t_w + 460)\ \theta}{V_w}\right]^2$
0.5	0.0368	$Y_1 = \frac{(5)(29.119)(538)}{(4.668)(29.119 + \frac{.5}{13.6})(538)}$	$\Delta H@_1 = \frac{(.0317)(.5)}{(29.119)(538)}\left[\frac{(538)(13.1)}{5}\right]^2$
1.0	0.0737	$Y_2 = \frac{(5)(29.119)(543)}{(4.67)(29.119 + \frac{1}{13.6})(538)}$	$\Delta H@_2 = \frac{(.0317)(1)}{(29.119)(543)}\left[\frac{(538)(9.3)}{5}\right]^2$
1.5	0.110	$Y_3 = \frac{(10)(29.119)(548.5)}{(9.39)(29.119 + \frac{1.5}{13.6})(538)}$	$\Delta H@_3 = \frac{(.0317)(1.5)}{(29.119)(548.5)}\left[\frac{(538)(15.5)}{10}\right]^2$
2.0	0.147	$Y_4 = \frac{(10)(29.119)(553.5)}{(9.455)(29.119 + \frac{2}{13.6})(539.5)}$	$\Delta H@_4 = \frac{(.0317)(2.0)}{(29.119)(553.5)}\left[\frac{(539.5)(13.5)}{10}\right]^2$
3.0	0.221	$Y_5 = \frac{(10)(29.119)(557.5)}{(9.47)(29.119 + \frac{3}{13.6})(540.5)}$	$\Delta H@_5 = \frac{(.0317)(3)}{(29.119)(557.5)}\left[\frac{(540.5)(11.1)}{10}\right]^2$
4.0	0.294	$Y_6 = \frac{(10.1)(29.119)(561.3)}{(9.59)(29.119 + \frac{4}{13.6})(541)}$	$\Delta H@_6 = \frac{(.0317)(4)}{(29.119)(561.3)}\left[\frac{(541)(9.8)}{10.1}\right]^2$

[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 numbers 1, 2, 3 Date 17 Oct 88 Meter box number Nutech Plant Griffiss (Post)

Barometric pressure, P_b = 29.305 in. Hg Dry gas meter number Rockwell Pretest Y 1.077 (±.0539)

Orifice manometer setting, (ΔH), in. H_2O	Gas volume: Wet test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: Wet test meter (t_w), °F	Temperature: Dry gas meter: Inlet (t_{d_i}), °F	Temperature: Dry gas meter: Outlet (t_{d_o}), °F	Temperature: Dry gas meter: Average (t_d), °F [a]	Time (θ), min	Vacuum setting, in. Hg	Y_i	$Y_i \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
Ø.6	10	9.252	76 536	78 541	77 541.5	541.25	23.40	4.0	1.Ø9Ø	(10)(29.305)(541.25) / (9.252)(29.305 + 0.6/13.6)(536)
Ø.6	10	9.272	76 536	84 545	83 544.5	545.ØØ	24.1Ø	4.Ø	1.Ø95	(10)(29.305)(545.0) / (9.272)(29.349)(536)
Ø.6	10	9.317	76 536	87 548	83 544.5	545.75	25-6	4.Ø	1.Ø91	(10)(29.305)(545.75) / (9.317)(29.349)(536)
									Y = 1.Ø92	

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

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

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

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

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

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

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

ΔH = Pressure differential across orifice, in H_2O.

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

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

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

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