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Ref 30

REPORT ON
PARTICULATE AND HCL EMISSION TESTS
ON
THERM-TEC INCINERATOR STACK

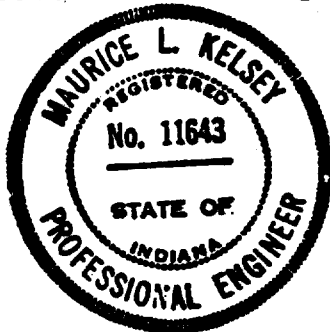
AT
THERM-TEC DESTRUCTION SERVICE
860 Taylor Street
Elyria, Ohio

DATE OF TESTS
JANUARY 24, 1989

TESTS PERFORMED BY
MAURICE L. KELSEY & ASSOCIATES, INC.
6835 Fox Lake Court
Indianapolis, Indiana 46278

IN ASSOCIATION WITH
THE ALMEGA CORPORATION
Bensenville, Illinois

Tests Certified By:



Maurice L. Kelsey
Maurice L. Kelsey, P.E.
Ohio Reg. No. E-033514

MAURICE L. KELSEY & ASSOCIATES, INC.

CONSULTING ENGINEERS

TELEPHONE (317) 872-6832

6835 FOX LAKE CT.
INDIANAPOLIS, INDIANA 46278

January 27, 1989

Therm-Tec Destruction Service of Ohio
P. O. Box 1105
Tualatin, Oregon 97062

Attn: Mr. Dean Robbins

Re: Results of Particulate and HCL Emission Tests on
Therm-Tec Incinerator Stack at TDS, Elyria, Ohio

Dear Mr. Robbins:

As per your request a complete series of particulate and HCL emission tests were performed on the baghouse exhaust stack serving the Therm-Tec Incinerator at TDS, Elyria, Ohio on January 24, 1989. Visible Emission tests were also performed at the same time as the emission tests.

The emission tests were performed by Mr. Carl Celli of the Almega Corp. under the supervision of Maurice L. Kelsey, P.E. Analysis of the test catch to determine HCL content was performed on site by Mr. Richard Tyzupek of Almega Corp. Visible Emission readings were taken by Mr. Jon Hays who is a certified reader. Maurice L. Kelsey, P.E. monitored incinerator operation and witnessed the weighing and loading of the incinerator.

All tests were witnessed by Mr. Jim Varis of Ohio EPA.

The attached report contains all of the test data, calculations, test procedures, calibration of test equipment, visible emission test log sheets, and waste burned log sheets for all tests.

Therm-Tec Destruction Service of Ohio
January 27, 1989
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Following is a summary of test results:

<u>Test No.</u>	<u>1</u>	<u>2</u>	<u>3</u>
Stack Temperature - °F	297	289	306
Stack Flow - ACFM	5087	4413	5002
Waste Burned - Lbs./hr.	1057	1127.6	1032.4
Particulate Emission-Lbs./hr.	.1331	.0572	.0948
Particulate Emission-Lbs./ 100# Charge	.0126	.0051	.0092
HCL Emission - Lbs./hr.	1.040	1.035	0.7683
Opacity - %	0	0	0

Summary and Conclusions

The average charge rate for all three tests was 1072.3 lbs./hr. and the average particulate emission was .00897 lbs. per 100 lbs. of charge which is well within the allowable particulate emission rate of .06 lbs./100 lbs.charge.

The HCL emission average for all three tests was .9478 lbs./hr. which is also well below the allowable HCL emission of 4.0 lbs./hr.

The visible emission tests indicated a constant zero (0) % opacity for all tests.

We appreciated the excellent cooperation of all TDS personnel during the performance of this series of tests. Please do not hesitate to contact us if we can be of further service or if you need additional information concerning this series of tests.

Yours truly,


Maurice L. Kelsey P.E.
President

MLK/k
Encl.

The ALMEGA CORPORATION

607 C Country Club Drive
Bensenville, Illinois 60106
Phone: (312) 595-0175

January 27, 1989

Maurice L. Kelsey & Associates, Inc.
6835 Fox Lake Court
Indianapolis, Indiana 46278

Attention: Mr. Maurice L. Kelsey, P.E.

Subject: Therm-Tec Destruction Service
Elyria, Ohio
Incinerator Stack Particulate
and HCl Emission Test
January 24, 1989
The Almega Corporation Project I-6403

Gentlemen:

INTRODUCTION

Particulate and HCl emission testing was conducted on the stack of the incinerator at Therm-Tec Destruction Service in Elyria, Ohio on January 24, 1989.

The purpose of this test series was to determine the degree of compliance of this incinerator with the applicable particulate emission codes.

Stack emission test methods followed those detailed in Title 40, Code of Federal Regulations (40: CFR) (Ref. 1).

Emission testing was conducted by C. Celli and R. Trzupek of The Almega Corporation using an Andersen Samplers EPA Method 5 style sampling train.

The incinerator was operated normally by plant personnel.

Mr. Maurice L. Kelsey, P.E. of Indianapolis was present to monitor incinerator operations throughout the test series.

This report summarizes the test methods, procedures and findings of this test series. Attached as appendices is a complete documentation of all procedures, field test and laboratory analysis data and calculation summaries.

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SUMMARY OF TEST METHODS

Particulate emission testing was conducted on the stack of the incinerator at Therm-Tec Destruction Service in Elyria, Ohio on January 24, 1989.

Emission testing was conducted using an Andersen Samplers, Inc., USEPA Method 5 sampling train following the procedural requirements as detailed in Title 40: Code of Federal Regulations (Ref. 1).

Particulate emission testing was conducted using the two existing sampling ports set into this 17-3/4 inch I.D. stack.

The selection and location of the sampling points for each stack test followed Method 1 (Ref. 1) included in Appendix A. Specifically, sampling was conducted for 5 minutes at each of 12 points, 6 points on each of two diameters.

The gas velocity was determined using an S type pitot tube and followed Method 2 (Ref. 1) included in Appendix B.

Exhaust gas Orsat samples were taken following Method 3 (Ref. 1) included in Appendix C for determination of CO₂, O₂ and molecular weight.

The exhaust gas moisture was determined following Method 4 (Ref. 1) included in Appendix D.

Particulate concentration and emission rate was determined following Method 5 (Ref. 1) included in Appendix E. The gas velocity, and moisture determination were conducted simultaneously with the particulate emission testing.

The particulate catch used for the calculations included nozzle, probe, cyclone and prefilter washings and filter particulates as detailed in Method 5.

A glass sampling probe with a nominal 5/16 in. I.D. nozzle was used for the three test repetitions.

Hydrochloric acid concentration and emission rate was determined by analysis of the impinger catch following the modified analytical protocol included in Appendix F.

SUMMARY OF TEST FINDINGS

Findings of this test series are summarized in Table 1. Field test data, calculation summaries and equipment calibrations are included in Appendix G.

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CONCLUSION

Particulate emission testing was conducted on the stack of the incinerator at Therm-Tec Destruction Service in Cincinnati, Ohio on January 24, 1989.

Emission testing was conducted following the Title 40: Code of Federal Regulations (Ref. 1).

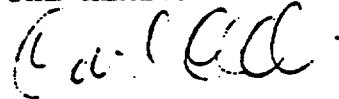
Findings of this test series indicate the following particulate and HCl emission rates:

Test Repetition Number	Incinerator Charge Rate lbs/hr	Stack Particulate			HCl	
		Concentration grains/dscf	Emission Rate lbs/hr	lbs/100 lbs Charge	Concentration grains/dscf	Emission Rate lbs/hr
1	1057	0.004827	.1331	0.0126	0.0377	1.040
2	1128	0.002319	.05718	0.0051	0.0420	1.035
3	1032	0.003520	.09477	0.0092	0.0285	0.7683

The Almega Corporation is pleased to have been of service to Kelsey & Associates and Therm-Tec Destruction Service.

Respectfully submitted,

THE ALMEGA CORPORATION



Carl Celli
Environmental Engineer



Richard Trzupek
Manager, Analytical Services

CC/RT:dml

Enclosures

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SUMMARY OF EMISSION TEST DATA

TABLE:	1		
PLANT:	Therm-Tec Destruction Service, Cincinnati, OH		
SOURCE:	Stack: Incinerator		
OPERATORS:	C. Celli and R. Trzupek		
TEST DATE:	January 24, 1989		
REPETITION #:	1	2	3
TEST TIME:	10:13-11:24AM	12:40-1:44PM	2:27-3:31PM
<u>STACK GAS</u>			
Temperature, average °F	297	289	306
Velocity average fps	49.37	42.81	48.53
Volume flow x 10 ⁵ scfh db	1.930	1.725	1.884
	acfm		
Orsat, average % CO ₂	5.087	4.413	5.002
% O ₂	5.0	3.4	4.0
Moisture %	15.0	15.0	14.2
	8.73	6.92	8.20
<u>PARTICULATE SAMPLE</u>			
Time, mins.	60	60	60
Volume scf db	56.576	51.890	57.423
Particulate collected, mg.	17.7	7.8	13.1
Isokinetic Ratio %	98.7	101.9	102.6
<u>CHARGE RATE (lbs/hr)</u>			
Total	1,057	1,128	1,032
<u>PARTICULATE</u>			
Concentration, grains/scf db	0.004827	0.002319	0.003520
Emissions, lbs/hr	0.1331	0.0572	0.0948
lbs/100 lbs charge	0.0126	0.0051	0.0092
<u>HCl</u>			
Concentration, grains/scf db	0.0377	0.0420	0.0285
Emissions, lbs/hr	1.040	1.035	0.7683

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REFERENCE

- 1 Title 40: Code of Federal Regulations

APPENDICES

- A Method 1 -- Sample and Velocity Traverses for Stationary Sources
- B Method 2 -- Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)
- C Method 3 -- Gas Analysis for Carbon Dioxide, Oxygen, Excess Air and Dry Molecular Weight
- D Method 4 -- Determination of Moisture Content in Stack Gases
- E Method 5 -- Determination of Particulate Emissions from Stationary Sources
- F HCl Sampling and Analytical Procedures
- G Field Test Data, Calculation Summaries, Laboratory Analyses and Equipment Calibrations
- H Burn Log Sheets-All Tests
- I Visible Emission Data Sheets-All Tests
- J V. E. Certification for Jon Hays
- K Schematic Layout of System

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APPENDIX F

HCl SAMPLING AND ANALYTICAL PROCEDURES

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HCl ANALYTICAL PROTOCOL

A) INTRODUCTION

Previous tests of hospital waste incinerators using Magnesium Oxide as a means of Hydrochloric Acid (HCl) control have shown that significant quantities of particulate magnesium chloride salts can pass through the filter of a USEPA Method 5 train into the impingers. These extremely fine particulate salts then resolubilize in whatever aqueous solution (DI H₂O, NaCOOCH₃, NaOH, etc.) is used to collect the HCl. Upon analysis, which assumes that only gaseous HCl passes through the filter, these particulate chloride salts show up as chloride. If an alkaline solution (e.g. NaOH or NaCOOCH₃) is used for collection, it is impossible to distinguish the sodium chloride salts formed by reaction with HCl from the magnesium chloride salts which pass through the filter.

The analytical protocol detailed below calls for 1) collection of both HCl and the fine magnesium chloride salts in DI H₂O, 2) analysis for total chlorides by ion specific electrode, 3) driving off the HCl and DI H₂O by heating, leaving only particulate chloride salts, 4) resolubilizing the particulate chloride salts in DI H₂O and 5) analysis of the particulate chloride salts by ion specific electrode. This procedure (performed on-site to eliminate any evaporation of HCl in solution) follows very closely the Pennsylvania Department of Environmental Resources (PADER) HCl method. The added step of evaporating the HCl and DI H₂O followed by re-leaching and analysis for chloride salts allows the tester to calculate the true HCl mass in the impingers by subtraction of the two chloride masses.

B) SAMPLING

1) Hydrochloric acid (HCl) will be collected in the back-half of the USEPA Method 5 train. The train will be modified as follows:

- a) Impingers 1, 2 and 3 (rather than impingers 1 and 2 only) will be charged with 100 ml each of distilled/deionized water.

C) ANALYSIS

- 1) Immediately after sampling, the total amount of chloride in each impinger will be determined by ion specific electrode following the analytical protocol of NIOSH S246 (attached).

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- 2) Each sample will then be completely dried on a hot plate at 105°C. in order to drive off any HCl in the sample.
- 3) The particulate residue from each dried sample will then resolubilize in distilled/deionized water (DI H₂O) as follows:
 - a). approximately 100 ml of DI H₂O will be added to each beaker containing particulate residue
 - b) the particulate matter will be resolubilized by gentle boiling on a hot plate
- 4) The amount of chloride salts will be determined by ion specific electrode following the analytical protocol of NIOSH S246.

D) CALCULATIONS

- 1) The total mass of hydrochloric acid for each run will then be calculated as:

$$\sum_{i=3}^n (Cl_t - Cl_s) 36.5/35.5$$

where: Cl_t = total mass of chlorides in sample
(from C-1) as Cl^-

Cl_s = mass of chlorides in sample (from C-4)
resulting from chloride salts as Cl^-

36.5 = molecular weight of HCl

35.5 = molecular weight of Cl^-

E) CONCLUSION

A protocol for the sampling and analysis of HCl in the presence of particulate chloride salts has been presented. In it, both total chlorides and particulate chlorides in solution are measured and the mass of HCl present determined by difference.

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APPENDIX G

**FIELD TEST DATA, CALCULATION
SUMMARIES, LABORATORY ANALYSES
AND EQUIPMENT CALIBRATIONS**

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STACK VOLUME FLOW RATE CALCULATION SUMMARY

COMPANY: Therm Tek

REPETITION NO: 1, 2, 3

SOURCE: Incinerator Stack

TEST DATE: 1/24/88

Dry molecular weight of stack gas

$$M_d = 0.44 (\%CO_2) + 0.32 (\%O_2) + 0.28 (\%N_2 + \%CO) \quad \text{Run 1} \quad \text{Run 2} \quad \text{Run 3}$$

$$= \underline{29.400 \quad 29.144 \quad 29.268} \quad \text{lb/lb-mole}$$

Molecular weight of stack gas, wet basis

$$M_s = M_d (1 - B_{ws}) + 18 B_{ws}$$

$$= \underline{28.405 \quad 28.372 \quad 28.289} \quad \text{lb/lb-mole}$$

Pitot tube coefficient

$$C_p \quad (\text{from calibration curve})$$

$$= \underline{0.84 \quad 0.84 \quad 0.84}$$

Average velocity head of stack gas, inches H₂O

$$(\sqrt{\Delta P}) \text{ avg.}$$

$$= \underline{0.7258 \quad 0.6925 \quad 0.7076}$$

Average absolute stack gas temperature

$$(T_s) \text{ avg.} = \frac{R_1 + R_2 + R_3}{3} + 460$$

$$= \underline{757.0 \quad 748.8 \quad 766.3} \quad ^\circ R$$

Absolute stack gas pressure

$$P_s = P_B + (P_{stat}/13.6)$$

$$(P_{stat} = 31.30 \text{ in. H}_2\text{O})$$

$$= \underline{29.707 \quad 29.708 \quad 29.700} \quad \text{in. Hg}$$

Stack gas velocity

$$(V_s) \text{ avg.} = (85.49) C_p (\sqrt{\Delta P}) \text{ avg.} \sqrt{\frac{(T_s) \text{ avg.}}{P_s M_s}}$$

$$= \underline{49.367 \quad 42.811 \quad 48.528} \quad \text{ft/sec.}$$

Stack gas volume flow rate

$$60 V_s A_s \quad (A_s = 1.718 \text{ ft}^2)$$

$$= \underline{5.087 \quad 4.413 \quad 5.002} \quad \text{acfm}$$

Stack gas volume flow rate, dry basis

$$Q_s = 3,600 (1 - B_{ws}) V_s A_s \left[\frac{T_{std} \cdot P_s}{(T_s) \text{ avg.} \cdot P_{std}} \right]$$

$$= \underline{1930.175 \quad 1.884} \quad \times 10^5 \text{ dscf/h}$$

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PARTICULATE CALCULATION SUMMARY

COMPANY: Therm Tek
 SOURCE: Incinerator Stack

REPETITION NO: 1, 2, 3
 TEST DATE: 1/24/88

ENGLISH UNITS
 (29.92 in. Hg 68°F)

Volume of sample at standard conditions on dry basis

$$V_{mstd} = \left[\frac{17.64}{0.9937} \right] V_{mY} \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m} \right] \quad \text{Run1 Run2 Run3}$$

= 56.576 51.890 57.423 dscf

Volume of water vapor in sample at standard conditions

$$V_{wstd} = \left[\frac{0.04707 \text{ cu. ft.}}{115.88 \text{ Run2 Run3}} \right] V_{lc} \quad = \underline{5.413 \ 3.860 \ 5.131} \text{ scf}$$

$V_{lc} = 115.88 \ 109 \text{ ml}$

Fractional moisture content of stack gas

$$B_{ws} = \frac{V_{wstd}}{V_{mstd} + V_{wstd}} \quad = \underline{0.08732 \ 0.06924 \ 0.08203}$$

Particle concentration in stack gas on dry basis

$$c's = \left[\frac{0.01543 \text{ gr}}{\text{mg}} \right] \left[\frac{M_n}{V_{mstd}} \right] \quad M_n = 17.7 \quad 7.8 \quad 13.1 \text{ mg}$$

= 0.004827 0.002319 0.003520 grains/dscf

= 0.6398 0.3315 0.5030 x 10⁻⁶ lbs/dscf

Stack gas volume flow rate on dry basis

$$Q_s = 3600 (1 - B_{ws}) V_s A_s \left[\frac{T_{std} \cdot P_s}{(T_s)_{avg} \cdot P_{std}} \right] \quad = \underline{1.930 \ 1.725 \ 1.884} \times 10^5 \text{ dscf/hr}$$

(A_s = sq.ft. V_s = ft/sec)

Process rate or BTU rating P_w = 1057.6 1127.6 1032.4 lb load/hr

Emission rate

Q_s c's = 0.1331 0.05718 0.07477 lbs/hr

$\frac{Q_s \text{ c's (100)}}{P_w} = \underline{0.01260 \ 0.00507 \ 0.00918}$ lbs/100 lb load

Isokinetic sampling rate

$$I = \left(\frac{1.667 \text{ min}}{\text{sec}} \right) T_s \left[\frac{\left(0.002669 \frac{\text{in. Hg. cu. ft.}}{\text{ml.}^\circ\text{R}} V_{lc} \right) + \frac{V_m}{T_m} \gamma \left(P_{bar} + \frac{\Delta H}{13.6} \right)}{9V_s P_s A_s} \right]$$

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HCL PARTICULATE CALCULATION SUMMARY

COMPANY: Therm Tek

REPETITION NO: 1, 2, 3

SOURCE: Incinerator Stack

TEST DATE: 1/24/88

ENGLISH UNITS
(29.92 in. Hg 68°F)

Volume of sample at standard conditions on dry basis

$$V_{mstd} = \left[17.64 \right] V_m \gamma \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m} \right] = \underline{8.576} \quad \underline{51.890} \quad \underline{57.423} \text{ dscf}$$

$\gamma =$ _____

Volume of water vapor in sample at standard conditions

$$V_{wstd} = \left[0.04707 \frac{\text{cu. ft.}}{\text{ml}} \right] V_{lc} = \underline{5.413} \quad \underline{3.860} \quad \underline{5.131} \text{ scf}$$

$V_{lc} =$ _____ ml

Fractional moisture content of stack gas

$$B_{ws} = \frac{V_{wstd}}{V_{mstd} + V_{wstd}} = \underline{0.08732} \quad \underline{0.06924} \quad \underline{0.08203}$$

Particle concentration in stack gas on dry basis

$$c's = \left[0.01543 \frac{\text{gr}}{\text{mg}} \right] \left[\frac{M_n}{V_{mstd}} \right] = \underline{0.0377} \quad \underline{0.0426} \quad \underline{0.0285} \text{ grains/dscf}$$

$$= 2.205 \cdot 10^{-6} \frac{M_n}{V_{mstd}} = \underline{5.386} \quad \underline{6.000} \quad \underline{4.078} \times 10^{-6} \text{ lbs/dscf}$$

$$M_n = 138.2 \quad 141.2 \quad 106.2 \text{ mg HCL}$$

Stack gas volume flow rate on dry basis

$$Q_s = 3600 (1 - B_{ws}) V_s A_s \left[\frac{T_{std} \cdot P_s}{(T_s)_{avg} \cdot P_{std}} \right] = \underline{1.930} \quad \underline{1.725} \quad \underline{1.884} \times 10^5 \text{ dscf/hr}$$

$$(A_s = \text{sq. ft. } V_s = \text{ft/sec})$$

Process rate or BTU rating P_w

$$=$$

Emission rate

$$Q_s \text{ c's} = \underline{1.040} \quad \underline{1.035} \quad \underline{0.7683} \text{ lbs/hr}$$

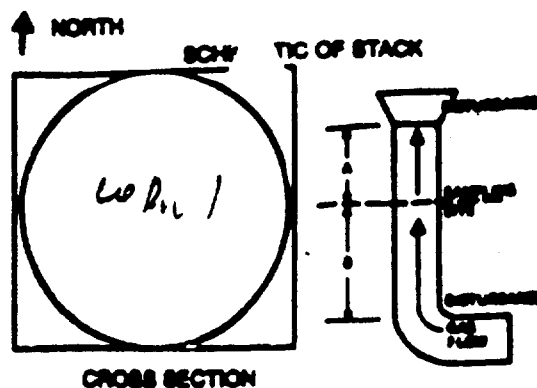
$$\frac{Q_s \text{ c's}}{P_w} =$$

Isokinetic sampling rate

$$I = \left(1.667 \frac{\text{min}}{\text{sec}} \right) T_s \left[\frac{\left(0.002669 \frac{\text{in. Hg. cu. ft.}}{\text{ml.}^\circ \text{R}} V_{lc} \right) + \frac{V_m \gamma}{T_m} \left(\frac{P_{bar} + \frac{\Delta H}{13.6}}{13.6} \right)}{9V_s P_s A_n} \right]$$

PLANT Theriacal
DATE 11/27/89
LOCATION Elyria OH
ASTOR C.C.
STACK NO. Incubator
FILM NO. 3
SAMPLE BOX NO. 7
METER BOX NO. 3
METER # 08517
Yr. 1993
TIME START - 2:27 PM

AMBIENT TEMPERATURE 75
BAROMETRIC PRESSURE 29.73
ASSAIED MOISTURE, % 8
PROBE LENGTH, in. 31 ± 1
NOZZLE DIAMETER, in. 306.306.306
STACK DIAMETER, in. 17.75
PROBE HEATER SETTING 741 ± 15
HEATER BOX SETTING 248 ± 15
△Cp FACTOR 0.84
FILTER NO. 1611
FILTER TARE WEIGHT 116.7 gm



PRE-TEST LEAK CHECK

METER	NO	26	in H ₂ O
PITOTS	NO	1	in H ₂ O
ORAT	ch.		

[illegible]

NO ORG - 3:31 DM

76.3°R

598.1'R

POST-TEST LEARNING OBJECTIVES

METER
PITCHES
ORBAT

VOLUME OF LIQUID WATER COLLECTED	REFLECTOR VOLUME	SLICK OIL WEIGHT,
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11
12	12	12
13	13	13
14	14	14
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92	92	92
93	93	93
94	94	94
95	95	95
96	96	96
97	97	97
98	98	98
99	99	99
100	100	100

GAS MEASUREMENT		TIME	CO ₂	O ₂	CO	H ₂
1			4.6	16.2		21.
2						
3						
4						

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PARTICULATE ANALYTICAL DATA FORM

COMPANY: Therma Tek STACK NUMBER: _____
 LOCATION: Elyria, Ohio RUN NUMBER: 1
 DATE: 1/24/89 RELATIVE HUMIDITY: 50 %
 ACETONE DENSITY (Pa): 0.7850 g/ml

LIQUID LEVEL MARKED AND CONTAINER SEALED? ☒
 ACETONE BLANK RESIDUE CONCENTRATION (Ca) _____ mg/g
 ACETONE RINSE VOLUME (Vaw) _____ ml
 BLANK RESIDUE IN ACETONE RINSE (Wa) = Ca.Vaw.Pa = _____ mg

NOTE: IN NO CASE SHOULD A BLANK RESIDUE 0.01 mg/g OR 0.001 % OF THE WEIGHT OF ACETONE USED BE SUBTRACTED FROM THE SAMPLE WEIGHT.

1763

DATE OF WEIGHING 1/26 GROSS WT. 94735.3 mg
 TIME OF WEIGHING 1400
 DATE OF WEIGHING 1/27 GROSS WT. 94735.5 mg
 TIME OF WEIGHING 0000
 AVERAGE GROSS WT. 94735.4 mg

LESS BLANK RESIDUE (Wa) _____ mg

TARE WT. 94717.7 mg

WEIGHT OF PARTICULATE IN ACETONE RINSE 17.7 mg

1625

DATE OF WEIGHING 1/26 GROSS FILTER WT. 614.5 mg
 TIME OF WEIGHING 1400
 DATE OF WEIGHING 1/27 GROSS FILTER WT. 614.5 mg
 TIME OF WEIGHING 0000
 AVERAGE GROSS WT. 614.5 mg

FILTER TARE WT. 614.5 mg

WEIGHT OF PARTICULATE ON FILTER 0.0 mg

WEIGHT OF PARTICULATE IN ACETONE RINSE 17.7 mg

TOTAL WEIGHT OF PARTICULATE 17.7 mg

REMARKS: _____

ANALYST: GP

The Almega Corporation

PARTICULATE ANALYTICAL DATA FORM

COMPANY: TREM TEK STACK NUMBER: _____
LOCATION: Elyria, Ohio RUN NUMBER: 2
DATE: 1/24/79 RELATIVE HUMIDITY: 50 %
ACETONE DENSITY (Pa): 0.7850 g/ml

LIQUID LEVEL MARKED AND CONTAINER SEALED? ✓
ACETONE BLANK RESIDUE CONCENTRATION (Ca) _____ mg/g
ACETONE RINSE VOLUME (Vaw) _____ ml
BLANK RESIDUE IN ACETONE RINSE (Wa) = Ca.Vaw.Pa = _____ mg

NOTE: IN NO CASE SHOULD A BLANK RESIDUE 0.01 mg/g OR 0.001 % OF THE WEIGHT OF ACETONE USED BE SUBTRACTED FROM THE SAMPLE WEIGHT.

J 764

DATE OF WEIGHING 1/26 GROSS WT. 97256.8 mg
TIME OF WEIGHING 1400
DATE OF WEIGHING 1/27 GROSS WT. 97257.1 mg
TIME OF WEIGHING 0000
AVERAGE GROSS WT. 97257.0 mg

LESS BLANK RESIDUE (Wa) — mg

TARE WT. 97249.2 mg

WEIGHT OF PARTICULATE IN ACETONE RINSE 7.8 mg

1623

DATE OF WEIGHING 1/26 GROSS FILTER WT. 619.6 mg
TIME OF WEIGHING 1400
DATE OF WEIGHING 1/27 GROSS FILTER WT. 619.6 mg
TIME OF WEIGHING 0000
AVERAGE GROSS WT. 619.6 mg

FILTER TARE WT. 619.6 mg

WEIGHT OF PARTICULATE ON FILTER 0.0 mg

WEIGHT OF PARTICULATE IN ACETONE RINSE 7.8 mg

TOTAL WEIGHT OF PARTICULATE 7.8 mg

REMARKS: _____

INITIALS OF ANALYST CNC

The ALMEGA CORPORATION

PARTICULATE ANALYTICAL DATA FORM

COMPANY: Trem TEK STACK NUMBER: _____
LOCATION: Elyria, Ohio RUN NUMBER: 3
DATE: 1/24/89 RELATIVE HUMIDITY: 50 %
ACETONE DENSITY (Pa): 0.7850 g/ml

LIQUID LEVEL MARKED AND CONTAINER SEALED? _____
ACETONE BLANK RESIDUE CONCENTRATION (Ca) _____ mg/g
ACETONE RINSE VOLUME (Vaw) _____ ml
BLANK RESIDUE IN ACETONE RINSE (Wa) = Ca.Vaw.Pa = _____ mg

NOTE: IN NO CASE SHOULD A BLANK RESIDUE 0.01 mg/g OR 0.001 % OF THE WEIGHT OF ACETONE USED BE SUBTRACTED FROM THE SAMPLE WEIGHT.

J765

DATE OF WEIGHING 1/26 GROSS WT. 102011.7 mg

TIME OF WEIGHING 1400

DATE OF WEIGHING 1/27 GROSS WT. 102012.0 mg

TIME OF WEIGHING 0000

AVERAGE GROSS WT. 102011.9 mg

LESS BLANK RESIDUE (Wa) — mg

TARE WT. 102003.5 mg

WEIGHT OF PARTICULATE IN ACETONE RINSE 8.4 mg

1611

DATE OF WEIGHING 1/26 GROSS FILTER WT. 621.8 mg

TIME OF WEIGHING 1400

DATE OF WEIGHING 1/27 GROSS FILTER WT. 621.4 mg

TIME OF WEIGHING 0000

AVERAGE GROSS WT. 621.6 mg

FILTER TARE WT. 616.9 mg

WEIGHT OF PARTICULATE ON FILTER 4.7 mg

WEIGHT OF PARTICULATE IN ACETONE RINSE 8.4 mg

TOTAL WEIGHT OF PARTICULATE 13.1 mg

REMARKS: _____

INITIALS OF ANALYST AR

Ther. k Elyria, Ohio

(1124189)

DATA SHEET

CL- Analyzer by Orion 601 IONANALYZER
+ CL- specific electrode

Run	mV	V _s	log C	conc mg/L	mg CL- (Wt% + XCL)	(Total CL- - XCL) $\frac{359}{359}$	mg HCL sample
Lab Blank	+397		-				
1 ppm std	+368		0				
10 ppm std	+359		1				
50 ppm std	+327		1.699				
100 ppm std	+308		2				
500 ppm std	+275		2.699				
1000 ppm std	+256		3				
10000 ppm std	+200		4				
100000 ppm std	+135		5				
01 Total CL-							
Exp 1+2	+254	320 ml		808	259		138
Exp 3	+357	138 ml		75	1.0		0.2
XCL							(138.2)
Exp 1+2	+270	(144 ml)*		391	125		
Exp 3	+362	(100 ml)*		6.0	0.8		
02 Total CL-							
Exp 1+2	+248	262 ml		1061	278		141
Exp 3	+356	105 ml		0.8	0.8		0.2
XCL							(141.2)
Exp 1+2	+263	(100 ml)*		537	141		
Exp 3	+364	(100 ml)*		0.6	0.6		

* dried on site

ANALYST

DATE

All samples prepared with 2 ml ISA (5 M NaNO₃)/100 ml Sample.

1

11/24/57

DATA SHEET

[illegible]

MAURICE L. KELSEY
& ASSOCIATES, INC.
6835 Fox Lake Ct.
INDIANAPOLIS, INDIANA 46278
(317) 872-6832

JOB THERM-TEC DESTRUCTION SERVICE OF OHIO
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE 1-24-89
CHECKED BY _____ DATE _____
SCALE PART. / HCL EMISSION TESTS

TEST No. 1

WASTE BURNED = 1057[#]/HR

TEST No. 2

WASTE BURNED = 1127.6[#]/HR

CO₂ = 3.4

O₂ = 15.0

TEST No. 3

WASTE BURNED = 1032.4[#]/HR

CO₂ = 4.0

O₂ = 14.2

TESTS WITNESSED BY:

OHIO EPA

LARRY BRUFFEY

JIM VARIS

Thermox Destruction Service of Ohio
860 Taylor Street
Elyria, Ohio (216) 223-4848

To:
Mr Jim Vores
Ohio E.P.A.
2110 E. Aurora Road
Twinsburg, Ohio 44087

EPA Sept 16, 1988

* WEEK ENDING : _____

APPENDIX H

SPECIAL REPORT FORM --- BURN LOG ---

DATE : 1-24-89

TEST #1 TOTAL ~~1163~~ LBS

Time	Load Number	Box Weight	Total Weight	Afterburner Temperature Degrees °C
1163 LBS IN 1 HR 1057 LBS/HR				
10:22	1	14 8 10 16 22 31	101 Lbs	973
10:29	2	20 16 16 14 8 28	102 Lbs	992
10:36	3	23 15 12 18 38 23	129 Lbs	996
10:43	4	19 17 14 12 10 60	132 Lbs	1037
10:50	5	18 23 12 16 34 36	139 Lbs	1056
10:56	6	21 31 16 12 11 34	135 Lbs	1075
11:04	7	28 12 15 15 29 33	132 Lbs	1078

HOURLY TOTAL -->>>

11:11	1	26 37 15 36 23 12	149 Lbs	1103
11:18	2	26 15 10 14 15 36	116 Lbs	1095
11:25	3	13 14 13 26	66 Lbs	1094

11:28	4	TOTAL LBS IN 1 HR 1163	1163 Lbs	
	5		Lbs	
	6		Lbs	
	7		Lbs	

HOURLY TOTAL -->>>

	1		Lbs	
	2		Lbs	
	3		Lbs	
	4		Lbs	
	5		Lbs	
	6		Lbs	
	7		Lbs	

HOURLY TOTAL -->>>

1057 LBS/HR. BURNED

TESTED BY Mark Holden P.E.

Therm Tec Destruction Service Of Ohio
860 Taylor Street
Elyria, Ohio (216) 223-4848

To:
Mr Jim Veres
Ohio E.P.A.
2110 E. Aurora Road
Twinsburg, Ohio 44087

EPA Sept 16, 1988

WEEK ENDING: _____

APPENDIX H

SPECIAL REPORT FORM --- BURN LOG ---

DATE: 1-24-89

TEST #2 TOTAL ~~1036~~ LBS

Time	Lead Number	Box Height	1184 th IN 1.05 HRS. Total Weight	Afterburner Temperature Degrees ° C
START 12:44	1	23 21 22 30 25 14	135 Lbs	971
12:51	2	30 20 22 35 13 13	133 Lbs	996
12:58	3	30 33 21 21 19	124 Lbs	991
1:05	4	20 23 25 26 17 17	128 Lbs	1009
1:12	5	19 22 28 30 19 19	137 Lbs	999
1:18	6	20 21 30 21 16 16	124 Lbs	986
1:25	7	19 21 21 45 15 16	137 Lbs	999

HOURLY TOTAL -->>>

1:32	1	16 17 25 29 17 14	118 Lbs	1094
1:39	2	18 19 21 18 19 28	123 Lbs	1046
1:45	3	24 32 16 16	88 Lbs	1014
FINISH 1:47	4		1184 Lbs	
	5		Lbs	
	6		Lbs	
	7		Lbs	

HOURLY TOTAL -->>>

	1		Lbs	
	2		Lbs	
	3		Lbs	
	4		Lbs	
	5		Lbs	
	6		Lbs	
	7		Lbs	

1127.6 Lbs / 142.

HOURLY TOTAL -->>>

121

Therm Tec Destruction Service Of Ohio
850 Taylor Street
Elyria, Ohio (216) 323-4848

To:
Mr Jim Veres
Ohio E.P.A.
2110 E. Aurora Road
Twinsburg, Ohio 44087

EPA Sept 16, 1980

WEEK ENDING : _____

APPENDIX H

DATE : 1-24-89

SPECIAL REPORT FORM --- BURN LOG ---

TEST #3 TOTAL ~~1,067~~

Time	Load Number	Box Height	1106.6 ² - 1.067 WRS Total 1032.4 ² / hr	Weight	Afterburner Temperature Degrees ° C
START 2:31	1	19 18 27 22 17 23		126 Lbs	1113
2:38	2	22 30 20 24 20 10		126 Lbs	1111
2:44	3	24 26 54 35		139 Lbs	1124
2:51	4	28 18 23 18 22 20		129 Lbs	1125
2:58	5	18 22 19 18 25 27		129 Lbs	1066
3:06	6	21 21 21 24 22 31		146 Lbs	1120
3:14	7	27 19 21 21 26 26		130 Lbs	1132

HOURLY TOTAL -->>>

3:23	1	22 23 20 18 16 24	123 Lbs	1173
3:32	2	23 22 30 34 9 17	125 Lbs	1120
3:35	3		1101.6 Lbs	
	4		Lbs	
	5		Lbs	
	6		Lbs	
	7		Lbs	

HOURLY TOTAL -->>>

	1		Lbs	
	2		Lbs	
	3		Lbs	
	4		Lbs	
	5		Lbs	
	6		Lbs	
	7		Lbs	

1032.4² / hr

HOURLY TOTAL -->>>

Lbs

TEST WITNESSED By: Martin L. Kibbey P.E.

VISIBLE EMISSIONS EVALUATION

APPENDIX I

TEST No. 1

Date Jan. 24, 1989

Stack Information

Source Therm-Tec Destruction Service

Distance from _____

Address 860 TAYLOR ST.

Height 24.5' 18" D.I.A.

ELYRIA, OHIO

Reading Conditions

Wind Speed ≈ 5 MPH

Observer Jon M. HAYS

Direction SE

Installation INCINERATOR W/ WASTE MT. BOILER/
BAGHOUSE

Sky Condition CLOUDY

Fuel GAS / HOSPITAL WASTE

Temperature 42°F

Time

Average Reading _____

Start 10:19 A

Percent Over 40 _____

Ended 11:19 A

Min.	Sec.				Min.	Sec.			
	15	30	45	60		15	30	45	60
0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
Readings									
0-20					41-60				
21-40					61-80				
					81-100				

VISIBLE EMISSIONS EVALUATION

APPENDIX E

TEST No 2

Date JAN 24, 1989

Stack Information

Source Therm-Tec Destruction Service

Distance from ~ 100'

Address 860 Taylor St

Height 24.5' 18" DIA

ELYRIA, OHIO

Reading Conditions

Wind Speed ~ 5 MPH

Direction SE

Observer TAN M HAYS

Installation INCINERATOR / waste heat Co. 100'

Sky Condition CLOUDY

Fuel GAS / HOSP. WASTE

3 Baghouse

Temperature 46°F

Time

Average Reading

Start 12:40 PM

Percent Over 40

Ended 1:40 PM

Min.	Sec.				Min.	Sec.			
	15	30	45	60		15	30	45	60
0	0	0	0	0	30	0	0	0	0*
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0*
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

Readings

0-20

21-40

41-60

61-80

81-100

APPENDIX I

Date 1-24-87

Stack Information

Source TIEM-TEC

Distance from 100'

Address 860 Taylor St
Elmira, Ohio

Height 24.5' 19" dia.

Reading Conditions

Wind Speed 2-5 MPH

Direction SE

Observer Don M. Hayes

Sky Condition cloudy

Installation INCINERATOR "S"

Temperature 4/6°

Fuel GAS / Heavy waste

Time

Average Reading ⊖

Start 2:28

Percent Over 40

Ended 3:28

Min.	Sec.				Min.	Sec.			
	15	30	45	60		15	30	45	60
0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
Readings									
0-20					41-60				
21-40					61-80				
					81-100				

APPENDIX I

CARL KOONTZ & ASSOCIATES
of Nashville, Tennessee

This is to acknowledge that

Jon M. Hays
successfully participated in Visible Emissions
training on October 6, 1988
and is qualified to evaluate Visible Emissions
for a period of six (6) months from the date of
certification.

Carl Koontz
Instructor

ATEC Environmental Consultants

Division of ATEC Associates, Inc.
5150 East 65th Street
Indianapolis, Indiana 46220-4871
(317) 849-4990, FAX # (317) 849-4278

Solid & Hazardous Waste Site Assessments
Remedial Design & Construction
Underground Tank Management
Asbestos Surveys & Analysis
Hydrogeologic Investigations & Monitoring
Analytical Testing / Chemistry
Industrial Hygiene / Hazard Communication
Environmental Audits & Permitting
Exploratory Drilling & Monitoring Wells

REPORT OF TEST RESULTS

ATEC Project Number 21-98075

DATE: February 8, 1989

CLIENT: Maurice Kelsey
6835 Fox Lake Court
Indianapolis, IN 46278

SAMPLE IDENTIFICATION: Therm-Tec Inc.
SAMPLE TAKEN BY: Client
DATE SAMPLE TAKEN: January 24, 1989
DATE RECEIVED: January 25, 1989
ANALYST: A.B., K.B.
MATRIX: Incinerator Ash
Units mg/l

ATEC Lab #890133

<u>Sample ID</u>	<u>Ash</u>	<u>EPA LIMITS</u>	<u>MDL*</u>	<u>SW 846 Method No.</u>
<u>EP-Tox Metals</u>				
Arsenic	<0.5	5.0	0.5	7060
Barium	1.8	100	1.0	7080
Cadmium	<0.1	1.0	0.1	7130
Chromium	<0.5	5.0	0.5	7190
Lead	0.8	5.0	0.5	7420
Mercury	<0.02	.2	0.02	7470
Selenium	<0.2	1.0	0.2	7740
Silver	<0.5	5.0	0.5	7760
Organic Carbon (%)	19			

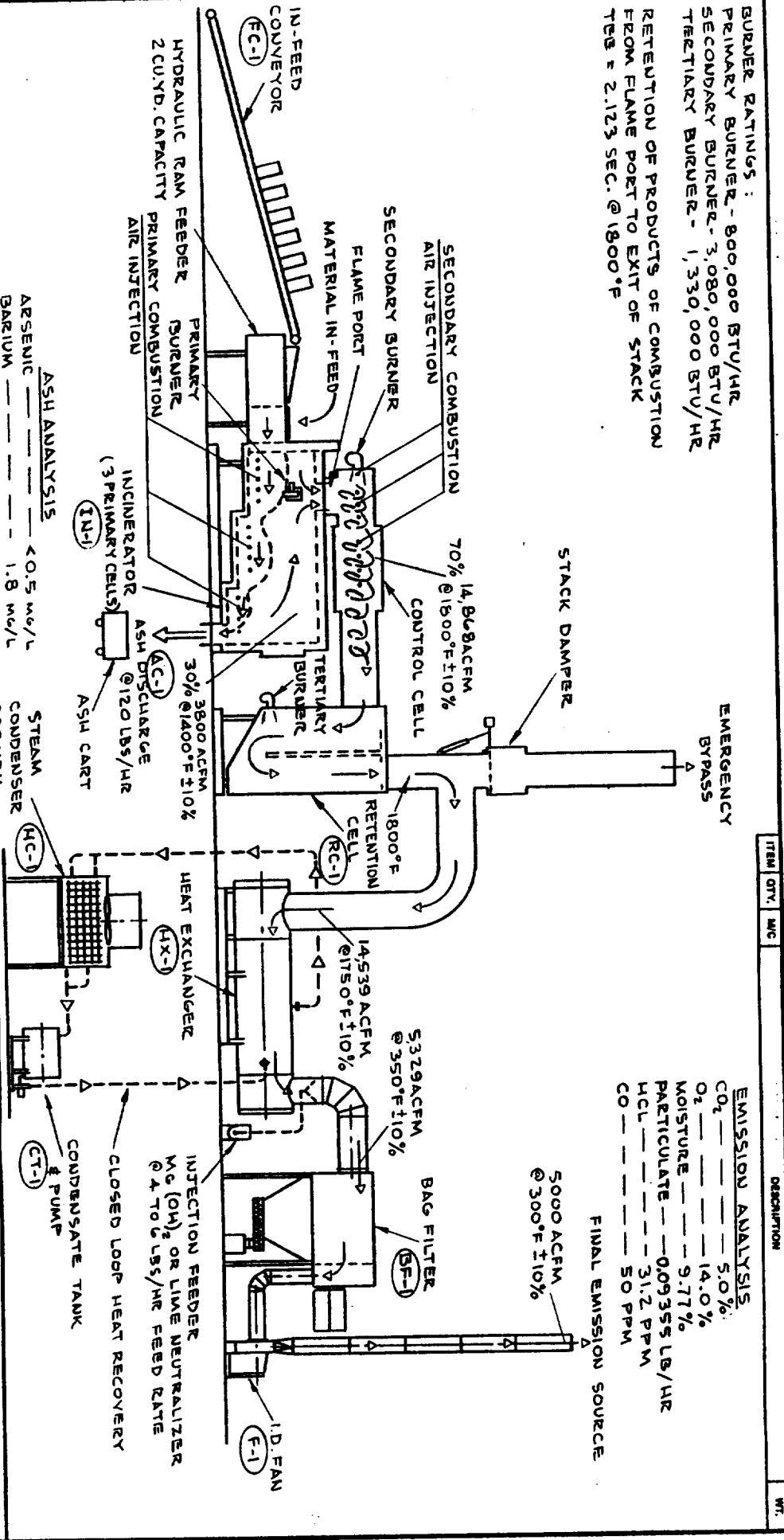
* Method Detection Limit

Respectfully submitted,

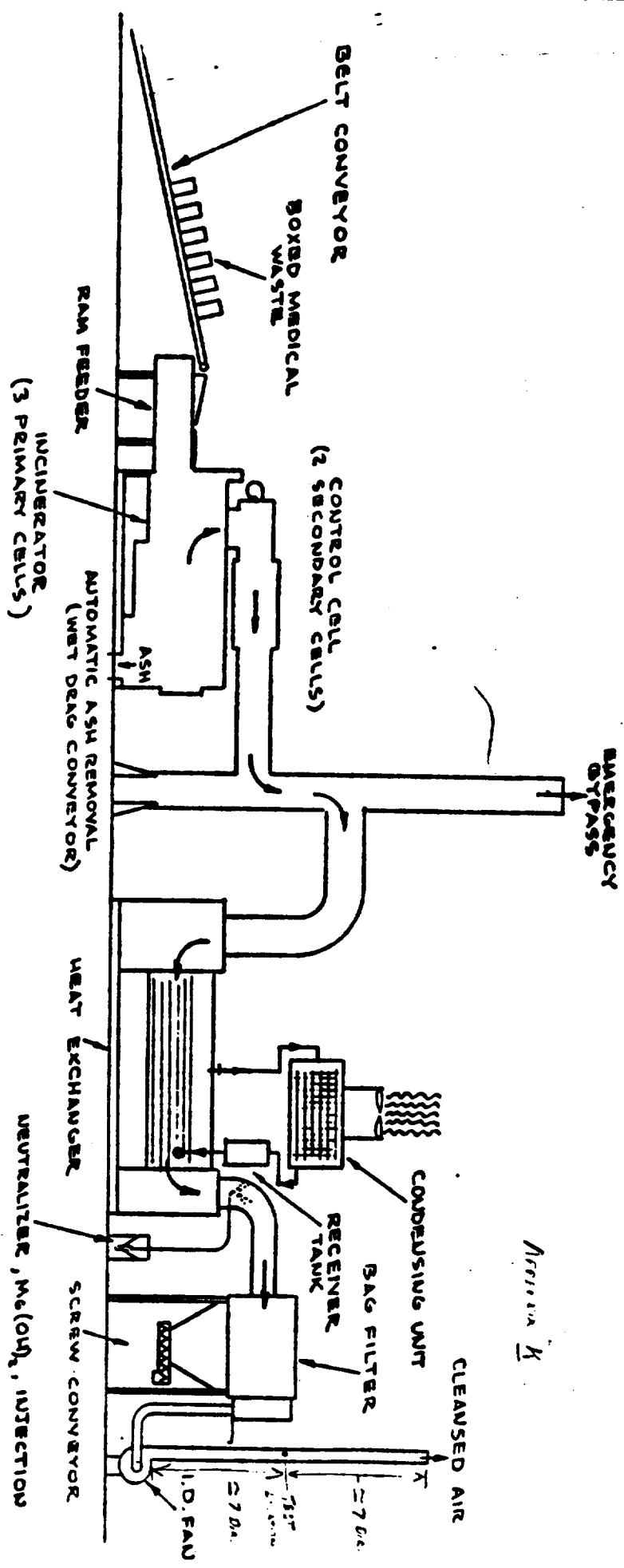
ATEC Associates, Inc.

John D. P... ..
Environmental/Analytical Testing Division
Consulting Environmental, Geotechnical and
Materials Engineers

EMISSION ANALYSIS	
CO ₂ -----	5.0%
O ₂ -----	14.0%
MOISTURE-----	9.77%
PARTICULATE-----	0.09355 LB/HK
HCL-----	31.2 PPM
CO-----	50 PPM



TOLERANCES		SCALE	 TRADE MARK - COPYRIGHT 1978
DECIMAL	DRAWN	NOVE	
$\frac{1}{2}$	A.O.		
FRACTIONAL	DATE		
$\frac{1}{2}$	12-6-83		
ANGULAR	LC		
PROCESS FLOW DIAGRAM MEDICAL WASTE INCINERATION SYSTEM			
B50-2264			
CHDL			



Approved *K*

THIS DOCUMENT DISCLOSES SUB-
JECT MATTER TO WHICH THEMATIC
TEC, INC., TUALATIN, OREGON
HAS PROPRIETARY RIGHTS AND
IS NOT TO BE USED IN ANY WAY
WITHOUT CONSENT OF THEMATIC
TEC, INC., TUALATIN, OREGON.

TOLERANCES	SCALE	NO. 1	DATE	PROCESS FLOW DIAGRAM FOR MEDICAL WASTE INCINERATION SYSTEM
ORIGINAL	NO. 1	DATE	1-13-89	
REPRODUCTION	NO. 1	DATE	1-13-89	
REVISION	NO. 1	DATE	1-13-89	



BSO-2091

Model AR-1350-2-78DS