CSA COMPANY

(Custom Stack Analysis)

ENGINEERING REPORT

Reference #21

SOURCE EMMISSION TESTS

AT

ERA TECH, NORTHWOOD,OHIO

NORTH INCINERATOR BAGHOUSE STACK

JULY 27, 1989

WMI MEDICAL SERVICES

CONTENTS

Northwood, OH.

SOURCE EMISSION TESTS
AT
ERA TECH, NORTHWOOD OHIO
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Brief of Tests

Particulate emission tests were performed on the stack of the incinerator baghouse as per EPA Federal Register methods 1 through 5 as set forth in the Appendix to Part 60, "Standards of Performance for stationary sources", Subchapter C, Chapter 1, Title 40, Volume 42, No. 160, Thursday, August 18, 1977 as amended from the original Federal Register, Volume 36, No. 247, December 23, 1971. The number of traverse points used for method 1 was as per Federal Register Volume 48, No. 191, Friday, September 30, 1983.

The hdrochloric acid emision tests were a part of the method 5 tests using the condensable portion for determining the chloride ion conentration using method 9252.

The incinerator has a ram feeder charging the refuse to a primary chamber to reduce it to ash. The gases pass through a secondary burn-off chamber to a quench tower,absorption reactor and baghouse via induced draft fan to a stainless steel stack.

The tests were performed in the stack.

Results (See Table 1)

The average particulate emission rate was 0.0285 pounds per 100 pounds of refuse.

The average hydrochloric acid emission rate was 0.58 pounds per hour.

The average refuse firing rate was 1603 pounds per hour.

Test methods

A twelve point traverse was selected for the twenty four inch diameter stack as per method 1. Each point was sampled for five minutes for a total test time of 60 minutes.

The CO_2 and O_2 analysis were conducted by an orsat flue gas analyzer from an integrated sample taken at the test ports to provide data for method 3.

Method 5 was used to determine the particulate quantity, moi-

sture determination by method 4 and gas velocity by method 2 using a Research Appliance Corp. "Stacksamplr".

The hydrochloric acid emissions test was performed using a portion of the method 5 impinger catch. The analysis were conducted using the mercuric nitrate method.

Particulate Test Apparatus (See Figure 2)

The dust laden gases were passed through a heated pyrex lined probe and heated glass cyclone separator bypass followed by a four inch filter holder containing Gelman Type A-E fiberglass filter media. The gases leaving the filter were cooled in a series of three impingers packed in ice. The first and third impinger were the modified Greenburg-Smith type and the second one was a standard Greenburg-Smith. The first and second impingers were filled with 100 ml of 0.1M sodium hydroxide with the third one used as a dry trap. After leaving the dry trap, the gases passed through a "Drierite" column containing about 500 grams of calcium sulfate (CaS04) desicant to remove the remaining water vapor. The dry gas passed through the hose portion of the umbilical cord to a Research Appliance Corp. model 2343 "Stacksamplr" module. In the module the gas was moved through the system by a leakless air pump to a rockwell 175-S dry test meter. The dry test meter exhausted to a calibrated orifice to measure the flow rate of the gases passing through the sampling apparatus. A type "S" pitot tube was attached to the sheath of the heated probe to measure the velocity head of the flue gases near the tip of the probe nozzle. The orifice pressure taps and the pitot tube were connected to a Dwyer dual 10 inch combination inclined well type manometer. One half of the manometer measured the orifice differential (Δ H) and the other half measured the flue gas velocity head (Δ P).

The temperature of the flue gas was measured by a type "K" thermocouple connected to a PyroMation digital temperature indicator.

The CO_2 and 0_2 were measured with a Burrell "Industro" Model B orsat from an integrated sample taken by withdrawing a constant flow rate of gas from the stack and injecting it into a Tedlar bag. This was done by drawing the gas through an in-stack filter

via neoprene tubing to a condenser and condensate collector ahead of a leakless diaphragm vacuum-pressure pump. The pump discharged to the rotometer and the Tedlar bag. The apparatus is equipped with valves to by-pass the rotometer and bag when clearing the sample line as shown in figure 3.

Particulate Test Procedures

The probe, filter and glassware was assembled and leak tested in our lab before transporting to the job site. Three sets of equipment were used. At the job site a preliminary pitot traverse was performed to select the proper nozzle size. The nozzles were measured with an inside vernier caliper and micrometer calibrated with a one inch micrometer standard.

The impingers were filled with the hydroxide solution and the "Drierite" columns were connected just prior to elevating the probe into position.

After leak testing the apparatus at 10 inches of mercury the probe was inserted at the first sample point to start the test.

The isokinetic sampling rates were determined using a portable desk top computer programmed to calculate the proper ΔH setting at the flue gas temperature, pressure, density and the assumed moisture along with the temperature, ΔP and an assumed ΔH of the test module.

The sampling rate (ΔH) can be determined in less than 5 seconds using this technique.

The apparatus was leak tested after the test was completed at a vacuum exceeding that encountered during the test.

The moisture content was determined from the amount of condensate collected in the impingers and the difference of the tare and gross weight of the "Drierite" desicant column. The desicant column was weighed on an Ohaus 5 Kg industrial lab balance to the nearest half gram.

The filter media was dried in a desicator at room temperature to dryness before tare and gross weighing on a Stanton CL4D analytical balance.

The probe liner, nozzle, cyclone bypass and front half of the filter holder were washed with acetone and brush after testing and evaporated to dryness at room temperature in 500 ml beakers. The

beakers were dried and tare weighed prior to sample evaporation and gross weighed after allowing the samples to desicate to dryness. These weights were accomplished with the Stanton Balance.

The contents of the impingers along with the disilled water washings from the impingers,connecting glassware and graduate were placed into a 1000 ml volumetric flask and dilluted to the mark with distilled water. This solution was saved for the HCl test.

The integrated gas sampler was started at the beginning of the method 5 test with about two cubic foot of gas collected in the tedlar bag at the end of the test. The sampling rate was maintained constant during the test by maintaining a constant reading on the rotometer.

The orsat analysis was performed on the gases contained in the bag shortly after the test was completed.

HCl Test Procedures

The analysis of the HCl is performed using a portion of the contents of the 1000 ml voumetric flask as follows:

A Summary of method

1. After adjusting the pH, the chloride ion reacts quantitively with the mercuric ion to form a stable complex of mercuric chloride. The pH is adjusted to 3 using either NaOH or HNO3 as necessary. The titration is then carried out using mercuric nitrate as the titrant.

B Apparatus

1. 25 ml Class A Buret
2. 20 ml Class A Transfer Pipette
3. 125 ml Erlenmeyer flask
4. Dropper
5. 500 ml Graduate
6. Magnetic stirrer and burette stand

C Reagents

1. Hydrogen peroxide, 3% solution
2. Nitric acid solution 3:997 (V/V)
3. Sodium hydroxide solution, .25 M
4. Bromophenol Blue, Diphenyl Carbazone indicator solution. Dissolve 0.5g diphenylcarbazone and

0.5g bromophenol blue in 100 ml of 95% ethanol.

5. Mercuric nitrate solution 0.025 M. Dissolve 4.2830g $Hg(NO_3)_2$ $1H_2O$ in 25 ml of water acidified with .25 ml conc. HNO_3. Dilute to 1L with H_2O.

D Procedure

1. Pipette a 20 ml aloquot sample into a 125 ml Erlenmeyer flask.
2. Add 2 ml of 3% H_2O_2 solution and dilute to 50 ml.
3. Add 10 drops of dipheylcarbazone, 1-bromophenol-blue mixed indicator.
4. A yellow or orange color developed and .25 M NaOH was added dropwise until the color changed to blue. Add 3:997 HNO_3 until the color changes back to yellow, then add 20 drops excess.
5. Titrate the solution with 0.025 M $Hg(NO_3)_2$ solution to a reddish, violet endpoint.
6. Calculations

   The gas volume calculations are the same as those of the Federal Register for the method 5 test. The HCl emission rate is calculated using the weight of HCl in place of particulate weight. The calculation of this weight is shown in the appendix "HCL Titration and Calculation Sheet" and is self explanitory.

The Calculations were performed as per Federal Register using the Tandy computer.

The data input and output is shown in Appendix I.

The"Intent To Test Information"is shown in Appendix II.

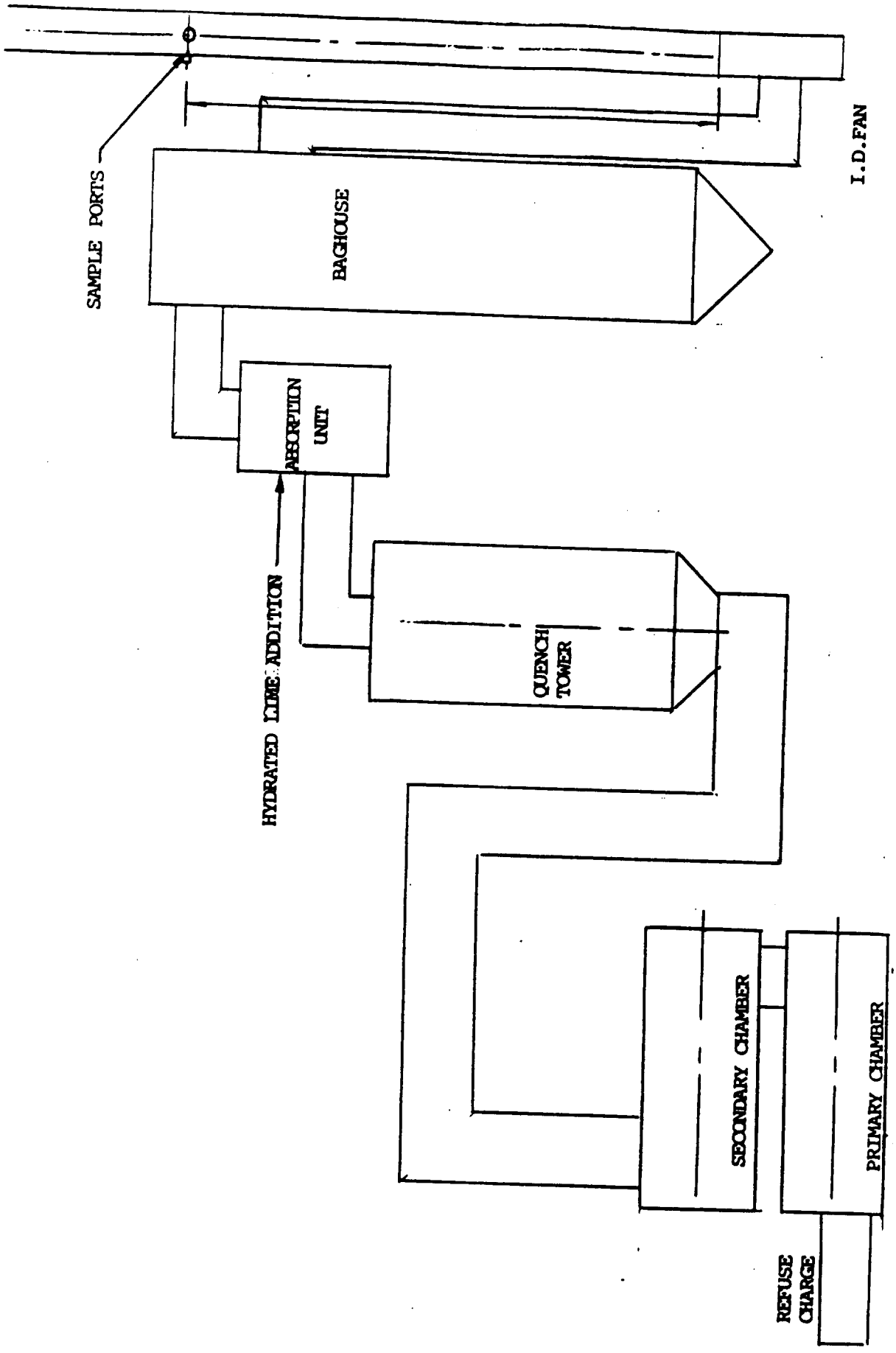
Submitted by

Ernest L. Kolm

Test	1	2	3	Avg.
Date	7/27/89	7/27/89	7/27/89	
Time	10:15/11/52	12:15/13:20	14:03/15:05	
PARTICULATE QUANTITY				
Grains/f3 Dry STP	0.0093	0.0096	0.0094	0.0094
Grains/STP 12% CO2	0.0220	0.0240	0.0209	0.0223
Pounds/Hr.	0.4375	0.4700	0.4626	0.4567
Pounds /100 lb Refuse	0.0278	0.0286	0.0291	0.0285
REFUSE FIRING RATE				
Pounds Per Hour	1572.0	1645.0	1592.0	1603.0
ACID EMISSIONS				
HCL Lbs/Hour	.53	.6	.61	0.5800
HF Lbs/Hour	0	0	0	0.0000
STACK GAS CONDITIONS				
Temperature -dg. F	399	410	410	406.333
Static Pressure-in H2O	0	0	0	0
CO2 - %	5.1	4.8	5.4	5.1
O2 - %	14	14.6	14.1	14.2333
H2O - %	30.4575	30.0141	29.755	30.0755
Velocity - FPS	68.5184	72.0753	71.8571	70.8169
Stack Area - sqr. ft.	3.14	3.14	3.14	3.14
Gas Flow - ACFM	12909	13579	13538	13342
Gas Flow (DSTP) CFH	327112	341908	343413	337478
SAMPLE TRAIN CONDITIONS				
Pitot Delta P in H2O	.809	.885	.886	
Orifice Delta P in H2O	1.32	1.43	1.46	
Temp. Meter - dg. F	88	98	100	
Gas Volume - CF Dry STP	35.1196	37.8551	37.4869	
Barometer - in Hg	29.45	29.45	29.56	
Probe Tip Dia. - in.	.251	.252	.251	
Isokinetic Var. - %	98.5382	100.812	100.187	

ERA TECH
NORTHWOOD OH
NORTH INCINERATOR BAGHOUSE STACK
COMPILED DATA

Table 1



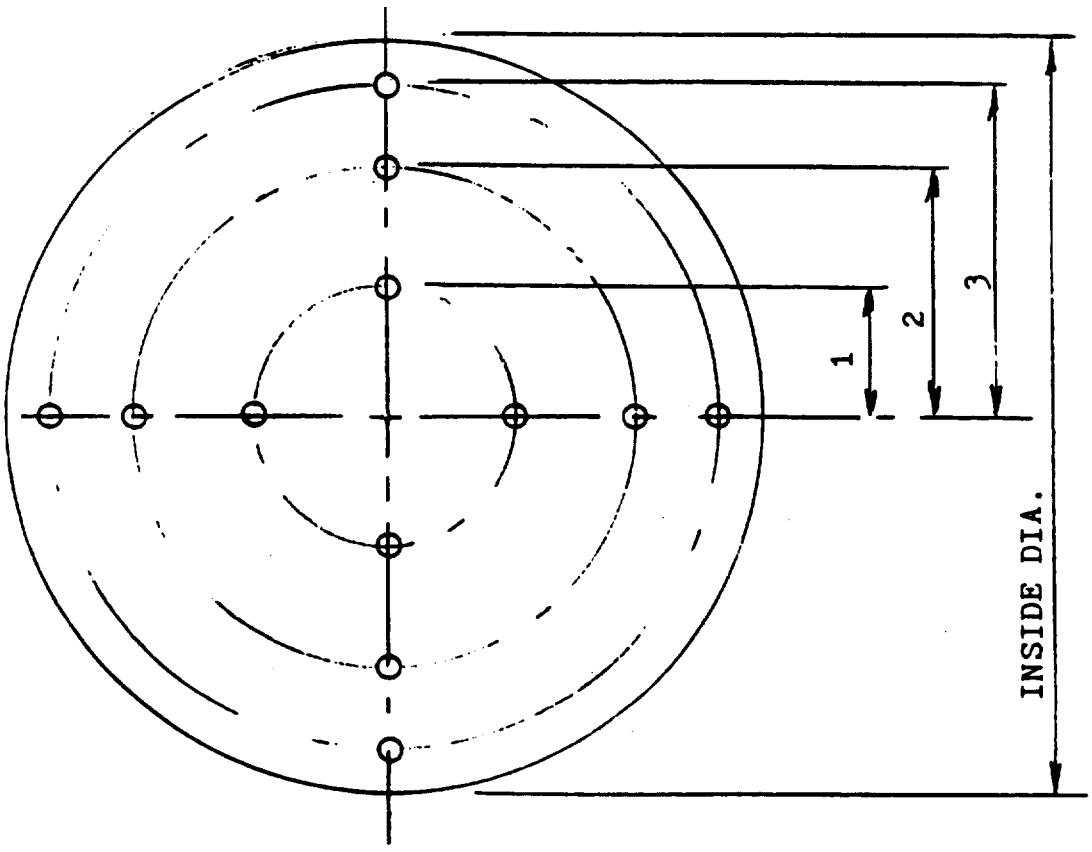
LOCATION OF SAMPLE PORTS

FIGURE 1A

Sample Points For Round Ducts

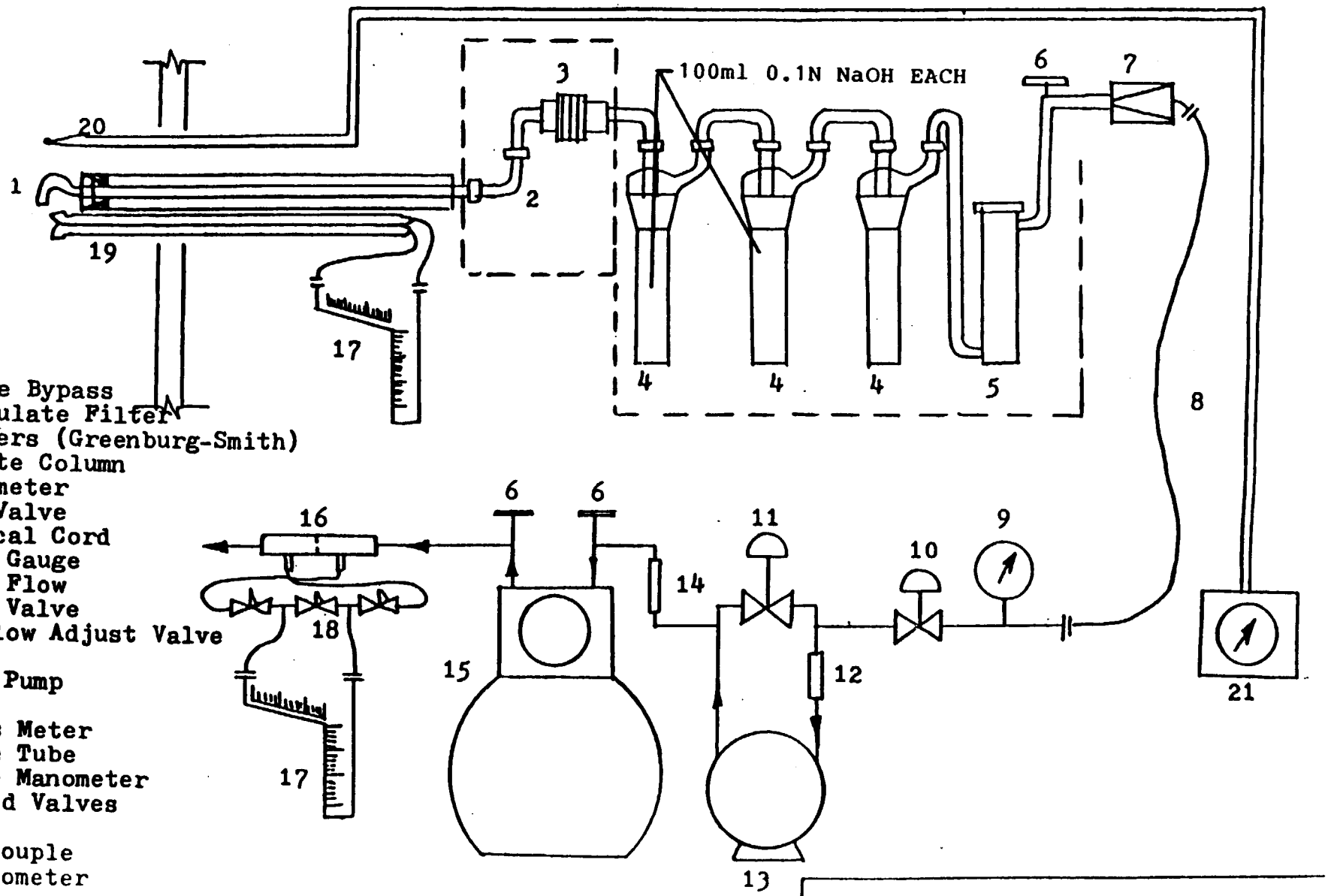
Diameter of duct in inches = 24
Area = 3.14159
Radius = 12
Total No. Of Points = 12

(1)- 4.89898
(2)- 8.48528
(3)- 1Ø.9545



SAMPLE POINT LOCATION

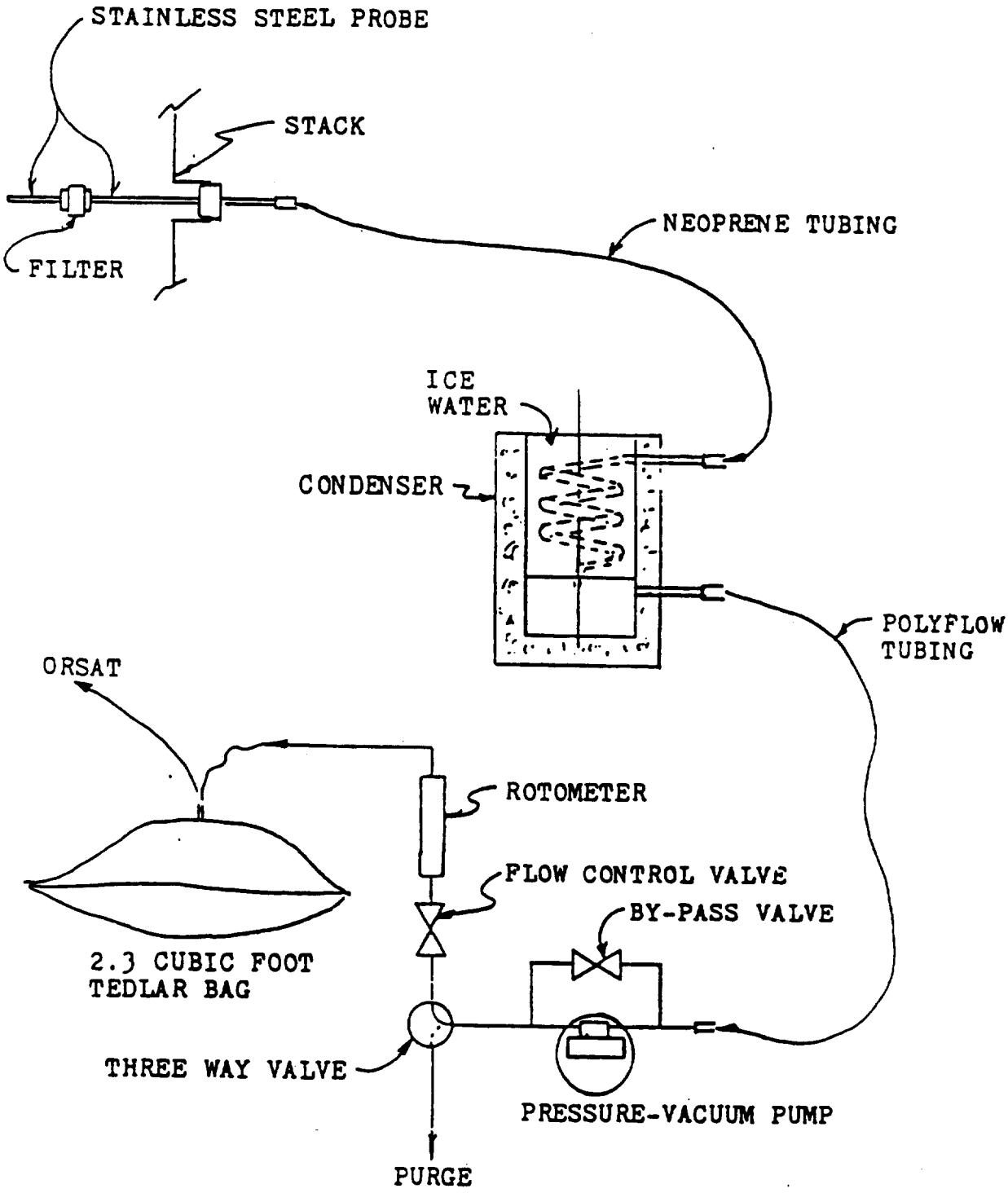
FIGURE 1E



C.S.A. Co.

MODIFICATION OF R.A.C. SAMPLE TRA

USING DRIERITE COLUMN IN PLACE OF IMPINGER DESICANT



INTEGRATED SAMPLER

FIGURE 3

APPENDIX I

COMPUTER NOMENCLATURE

SYMBOL	DESCRIPTION	UNITS
VM, FT^3	METER VOLUME	CUBIC FEET
Pb, IN.H2O	BAROMETER	INCHES MERCURY
ΔH, IN H2O	ORIFICE DIFFERENTIAL	INCHES WATER
PMA, IN Hg	ABSOLUTE METER PRESSURE	INCHES MERCURY
TM, ^{o}F	METER TEMPERATURE	DEGREES FARENHEIT
TS, F	STACK TEMPERATURE	DEGREES FARENHEIT
PG, IN H2O	STACK STATIC PRESSURE	INCHES WATER
PSA, IN Hg	ABSOLUTE STACK PRESSURE	INCHES MERCURY
CP,	PITOT COEFFICIENT	DIMENTIONLESS
$\sqrt{\Delta P}$, IN H2O	AVERAGE SQUARE ROOT OF ΔP	INCHES $WATER^{\frac{1}{2}}$
%CO2	CARBON DIOXIDE	PERCENT
%O2	OXYGEN	PERCENT
%CO	CARBON NONOXIDE	PERCENT
%N2	NITROGEN	PERCENT
MD	MOLECULAR WEIGHT DRY	DIMENTIONLESS
VLC,ML	VOLUME OF CONDENSATE	MILLILITERS
AS, FT2	STACK AREA	SQUARE FEET
MN, MG	TOTAL PARTICULATE CATCH WEIGHT	MILLIGRAMS
O, MIN	TEST TIME	MINUTES
DN, IN	NOZZLE DIAMETER	INCHES
AN, FT2	NOZZLE AREA	SQUARE FEET
L, #/HR	EMISSION RATE	POUNDS PER HOUR
I, %	ISOKINETIC VARIATION	PERCENT
VMSTP, FT3	METER VOLUME @ STANDARD TEMP. & PRESS. (DRY)	CUBIC FEET
VWSTP	METER VOLUME @ STANDARD TEMP. & PRESS. (WET)	CUBIC FEET
BWO%	MOISTURE	PERCENT
MS	MOLECULAR WEIGHT @ STACK CONDITIONS	DIMENTIONLESS
VS, FT/SEC	STACK VELOCITY	FEET PER SECOND
QS, FT3/HR	STACK GAS FLOW	CUBIC FEET PER HOUR
CS, #/SCF	EMISSION RATE	LB./DRY F3 @ STP
C"S,GR/SCF	EMISSION RATE	GRAINS/DRY F3 @ STP
C"S12	EMISSION RATE CORRECTED TO 12% CO2	GRAINS/DRY F3 @ STP

CALCULATIONS

Dry Molecular Weight lb/lb-mole

$$Md = 0.44\ (\%CO_2) + 0.32\ (\%O_2) + 0.28\ (\%N_2 + \%\ CO)$$

Dry Gas Volume (standard conditions), ft^3

$$Vmstd = (17.71\ \frac{^oR}{in.\ Hg})\ Vm(\frac{Pbar + \frac{\Delta H}{13.6}}{Tm + 460})$$

Volume of Water (standard conditions) ft^3

$$Vwstd = (0.0474\ \frac{ft^3}{ml})\ Vlc$$

Moisture Content (proportion by volume)

$$Bwo = \frac{Vwstd}{Vmstd + Vwstd}$$

Molecular Weight of Stack Gas (wet basis) lb/lb-mole

$$Ms = Md\ (1-Bwo) + 18\ Bwo$$

Stack Gas Velocity, ft/sec

$$Vs = 85.48Cp\sqrt{\Delta P}\sqrt{\frac{Tsa}{Psa\ Ms}}$$

Stack Gas Volumetric Flow Rate dry basis, standard conditions, ft^3/hr

$$Qs = 3600\ (1-Bwo)\ VsAs\ (\frac{530}{Tsa})\ (\frac{Psa}{29.92})$$

Concentration (particulate matter in stack gas), lb/s.c.f. dry basis

$$Cs = 2.205 \times 10^{-6}\ \frac{Mn}{Vmstd}$$

Load (particulate matter in stack gas), lb/hour

$$L = (Qs)\ (Cs)$$

Isokinetic Variation, %

$$I = \frac{Tsa\ (1.667\ \frac{Min}{Sec})\ \left[(0.00267\ \frac{in\ Hg\ ft^3}{ml\ ^oR})\ Vlc + \frac{VmPoa}{Tma}\right]}{\Theta Vs\ Psa\ An}$$

Concentration (particulate matter in stack gas), gr/s.c.f., dry basis

$$C"s = (0.0154\ \frac{gr}{mg})\ (\frac{Mn}{Vmstd})$$

Concentration (particulate matter in stack gas), gr/S.C.F., dry basis corrected to 12% CO_2

$$C_{12} = \frac{12\ C"s}{\%CO_2}$$

INCINERATION

MULTITECH INDUSTRIES, INC. - TOLEDO, OH

DATE 7-27-89
OPERATOR Chris J. [illegible]
INCINERATOR NORTH
PAGE 1 OF 1

CUSTOMER NAME

MANIFEST NUMBER SHEET 1 OF 2 DATE RECEIVED 7-27/89 TRAILER NO.

BOX #	WEIGHT	BOX #	WEIGHT	BOX #	WEIGHT	BOX #	WEIGHT
1	133-5	26	148-6 10:57	51	169-6 1:33	76	
2	122-4 +1 RAW	27	152-7 11:03	52	141-5 1:39	77	
3	134-5	28	150-5 11:09	53	157-4 1:45	78	
4	130-5	29	165-7 11:21	54	162-4 1:51	79	
5	127-5	30	172-7 11:27	55	162-5 1:57	80	
6	125-2	31	150-6 11:33	56	158-4 2:03	81	
7	149-5	32	161-6 11:39	57	148-5 2:09	82	
8	143-5	33	153-6 11:45	58	171-6 2:15	83	
9	128-4	34	171-7 11:51	59	146-5 1411 2:21	84	
10	118-5	35	176-7 11:57	60		85	
11	120-3	36	152-6 12:03	61		86	
	119-4	37	163-5 12:09	62		87	
13	123-4	38	175-6 12:15	63		88	
14	130-5	39	154-5 12:21	64		89	
15	121-4	40	173-6 12:27	65		90	
16	128-5	41	161-5 12:33	66		91	
17	166-6	42	169-6 12:39	67		92	
18	161-6	43	158-5 12:45	68		93	
19	155-13 10:15	44	159-5 12:51	69		94	
20	150-6 10:21	45	162-6 12:57	70		95	
21	153-6 10:27	46	172-6 1:03	71		96	
22	162-7 10:33	47	162-5 1:09	72		97	
23	166-7 10:39	48	158-5 1:15	73		98	
24	162-6 10:45	49	158-5 1:21	74		99	
	155-8 3480 10:51	50	167-5 4041 1:27	75		100	

TEST #1 — DOWN — 1572 #/HR

TEST 1 TOTAL WT = 2201 TIME = 1.4 HRS RATE

12:15 TEST 2 — 1643 #/HR TEST 2

TEST 2 — SEE SHEET 2

TEST 3 WT = 1592#

CHARGE: 2:30
1ST CHARGE: 7:30
BURNING TIME: 7 hrs.

GAS @
GAS @
GAS USED 18607

TOTAL LBS. 8935
TOTAL CHARGES 59
AVG. LBS/CHARGE 157.4

INCINERATION

MULTITECH INDUSTRIES, INC. – TOLEDO, OH

DATE 7-27-89
OPERATOR Chuck L. Ward
INCINERATOR NORTH
PAGE 1 OF 1

CUSTOMER NAME MULTI-TECH YOUNGSTOWN OH.

MANIFEST NUMBER 890744 DATE RECEIVED 7-26-89 INVOICE NO. 580338

SHEET 2 OF 2

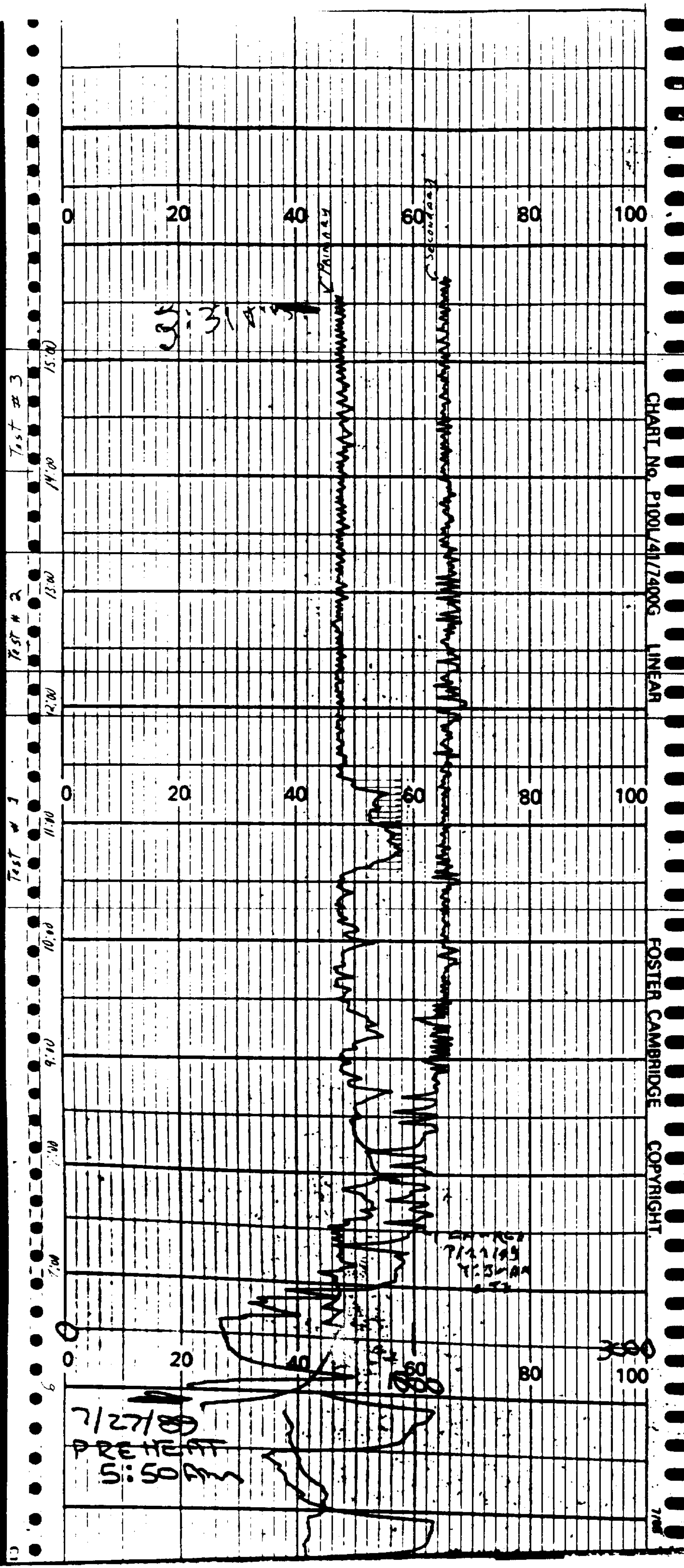
BOX #	WEIGHT	BOX #	WEIGHT	BOX #	WEIGHT	BOX #	WEIGHT
1	170-6 2:27	26		51		76	
2	165-7 2:33	27		52		77	
3	160-7 2:39	28		53		78	
4	150-6 2:45	29		54		79	
5	158-6 2:51	30		55		80	
6	166-6 2:57	31		56		81	
7	163-6 3:03	32		57		82	
8	154-6 3:09	33		58		83	
9	160-6 3:15	34		59		84	
10	154-6 3:21	35		60		85	
11	153-6 3:27	36		61		86	
12	118-6 3:33	37		62		87	
13	85-6+1 RAW 3:39			63		88	
14		39		64		89	
15		40		65		90	
16		41		66		91	
17		42		67		92	
18		43		68		93	
19		44		69		94	
20		45		70		95	
21		46		71		96	
22		47		72		97	
23		48		73		98	
24		49		74		99	
25		50		75		100	

TEST

CHARGE:
1ST CHARGE: 2:36
BURNING TIME:

GAS @:
GAS @:
GAS USED

TOTAL LBS.
TOTAL CHARGES
AVG. LBS/CHARGE


0 20 40 60 80 100
CHART No. P100L/41/7400G LINEAR
FOSTER CAMBRIDGE COPYRIGHT
Test # 1
Test # 2
Test # 3
PRIMARY
SECONDARY
7/27/89
PREHEAT
5:50 Am

HYDROCHLORIC ACID TITRATION AND WEIGHT CALCULATIONS

0.1 MOLAR NaCl = 3.5453 GRAMS/LITER OR 3.5453 mg/ml OF Cl^-.
10.0 ml OF 0.1 M NaCl = 35.453 mg Cl^-.
TITRATE 10 ml OF NaCl STANDARD WITH MERCURIC NITRATE, $Hg(NO_3)_2$, TO STANDARDIZE TITRANT.

10 ml NaCl, 42.2 ml $Hg(NO_3)_2$ 1st TITRATION.
42.2 " " 2nd "
" " 3rd "
42.2 AVERAGE

35.453/42.2 AVERAGE = .84 mg Cl^-/ml $Hg(NO_3)_2$ = VT_s

VH_t =VOLUME OF TITRANT USED FOR ALOQUOT SAMPLE.
V_t =TOTAL SAMPLE VOLUME
V_a =ALOQUOT SAMPLE VOLUME.
1.028 = mg HCl/mgCl^-
VH_t X VT_s X V_t X 1.028/V_a = mg HCl.

TEST NO. 1
.6 X .84 X 1000 1.028 / 20 = 25.91 mg HCl
TEST NO. 2
.7 X .84 X 1000 1.028 / 20 = 30.22 mg HCl
TEST NO. 3
.7 X .84 X 1000 X 1.028 / 20 = 30.22 mg HCl
TEST NO. _____
_____ X _____ X _____ X 1.028 / _____ = _____ mg HCl
TEST NO. _____
_____ X _____ X _____ X 1.028/ _____ = _____ mg HCl
TEST NO. _____
_____ X _____ X _____ X 1.028 /_____ = _____ mg HCl

PLANT EARTECH NORTHWOOD OH DATE 7/27/89 BY [illegible]
LOCATION NORTH INCINERATOR BAGHOUSE STACK

C.S.A. CO. (EPA METHOD 5) DATA SHEET

TEST NO. 1 PLANT ERM TECH TOLEDO DATE 7/27/89

LOCATION INCINERATOR BAGHOUSE STACK BY RK GT

BAROMETER 29.45 AMBIENT TEMP ASSUMED MOISTURE 30

MODULE NO. 2031 PROBE NO. 3-1 FILTER NO. HEATER NO. 3 NOZZLE DIA. .251

TEST POINT	METER VOLUME (Vm)	METER TEMP (Tm) IN	METER TEMP (Tm) OUT	COND TEMP °F	FILTER HEATER TEMP °F	STACK TEMP °F (Ts)	STACK PRESS (Ps)	VACUUM IN. Hg	ORIFICE (ΔH) (Pm) IN. H_2O	VEL HEAD (ΔP)	TIME
1	356.6	78	76	68	250	396	0	10	1.7	1.05	10:15
1	359.7	80	76	66	250	399		10	1.7	1.05	20
2	363.3	86	76	66	250	401		11	1.7	1.1	25
3	367.2	94	78	66	250	403		11	1.8	1.1	30
4	370.6	96	80	66	250	405		11	1.7	1.1	35
5	374.1	97	82	66	250	405		10-	1.5	.91	40
6	377.7	100	85	61	250	406		10-	1.6	.97	45
1	377.7	96	86	68	250	400		7-	.73	.45	48
1	379.2	96	86	62	250	396		7-	.73	.45	51
2	382.0	98	86	64	250	397		7-	.77	.47	54
3	384.5	98	86	64	250	394		7+	.84	.51	01
4	386.6	98	86	64	250	394		7+	.87	.53	08
5	390.9	88	88	68	250	396		9	1.3	.80	11:42
6	393.5	98	90	60	250	397	√	10-	1.6	.98	11:52
	36.6										
TOTAL	36.9	93.1	82.9								
AVERAGE		98		~	~	399	0	MAX 11	1.32	.88	60 min

ORSAT DATA N_2 = 80.9

TIME	46			INTEGRATED		AVG
CO2		5.2	5.1	5.1		5.1
O2		14.0	14.0	14.0		14.0
CO						

CONDESATE COLLECTED

	FINAL	INITIAL	TOTAL
DRIERITE	996.5	984	12.5
IMPINGER	512	200 ml	312
GRAND TOTAL (Vlw)			324.5

FILTER WEIGHT	PROBE WASH WT	IMPINGER WASH WT	LEAK RATE @ 14 "Hg = <.01
GROSS .6719	174.6374		
TARE .6531	174.6332	H Cl	AVERAGE $\sqrt{\Delta P}$ = .8994
NET .0188	.0042		

TOTAL PARTICULATE WEIGHT (Mn) 21.3 mg STACK AREA (As) 3.14 FT^2

0.1 m NaOH 25.91

REFUSE WT 1572

HYDROCHLORIC ACID EMISSION TEST

DATA INPUT

Pb.In Hg	Barometer	29.45
VM,ft3	Meter Volume	36.9
ΔH,In H2O	Orifice Differential	1.32
PG,In H2O	Stack Static Pressure	0 *
Tm,F	Meter Temperature	88
Ts,F	Stack Temperature	399 *
CP	Pitot Coefficient	.84 *
$\sqrt{\Delta P}$,In H2O	Average Square Root Of Delta P	.8994 *
% CO2	Carbon Dioxide	5.1 *
% O2	Oxygen	14 *
% N	Nitrogen	80.9 *
VCL,Ml	Volume Of Condensate	324.5 *
HCL,Mg	Total HCL Weight	25.91
Ø,Min	Test Time	60

RESULTS

Pma,In Hg	Absolute Meter Pressure	29.55
PSA,In Hg	Absolute Stack Pressure	29.45
MD	Molecular Weight Dry Gas	29.38
MS	Molecular Weight @ Stack Conditions	25.91
VMSTP,ft3	VM Standard Temp.& Press. Dry	35.12
VWSTP,ft3	VM Standard Temp.& Press. Wet	15.38
BWO,%	Moisture	30.46
L,#/Hr	Emission Rate	0.53

* From Method 5 Test

ERA TECH
NORTHWOOD OH
NORTH INCINERATOR BAGHOUSE STACK
7/27/89
TEST 1

E.P.A. Method 5

DATA INPUT

Pb,In Hg	Barometer	29.45
VM,ft3	Meter Volume	36.9
ΔH,In H2O	Orifice Differential	1.32
PG,In H2O	Stack Static Pressure	0
Tm,F	Meter Temperature	88
Ts,F	Stack Temperature	399
CP	Pitot Coefficient	.84
$\sqrt{\Delta P}$,In H2O	Average Square Root Of Delta P	.8994
% CO2	Carbon Dioxide	5.1
% O2	Oxygen	14
% N	Nitrogen	80.9
VCL,Ml	Volume Of Condensate	324.5
AS,ft2	Stack Area	3.14
MN,Mg	Total Particulate Catch Weight	21.3
Ø,Min	Test Time	60
DN,In	Diameter Of Nozzle	.251
R,#/HR	Pounds Per Hour Refuse	1572

RESULTS

Pma,In Hg	Absolute Meter Pressure	29.55
PSA,In Hg	Absolute Stack Pressure	29.45
MD	Molecular Weight Dry Gas	29.38
MS	Molecular Weight @ Stack Conditions	25.91
VMSTP,ft3	VM Standard Temp.& Press. Dry	35.12
VWSTP,ft3	VM Standard Temp.& Press. Wet	15.38
BWO,%	Moisture	30.46
I,%	Isokinetic Variation	98.54
VS,ft/Sec	Stack Velocity	68.52
QA,ASCFM	Stack Gas Flow (Actual)	12909
QS,ft3/Hr	Stack Gas Flow (Dry STP)	327112
L,#/Hr	Emission Rate	.437456
CS,#/SCF	Particulate Emission	1.33733E-06
C''S,Grn/SCF	Particulate Emission	9.34008E-03
L2,#/100#	Pounds Particulate Per 100 Pounds Refuse	.027828
C12,GR/SCF	C''S Corrected to 12% CO_2	.0219767

ERA TECH
NORTHWOOD OH
NORTH INCINERATOR BAGHOUSE STACK
7/27/89
TEST 1

C.S.A. CO. (EPA METHOD 5) DATA SHEET

TEST NO. 2 PLANT ERA Tech DATE 7/27/85

LOCATION Incinerator Baghouse Stack BY BK GT

BAROMETER 29.45 AMBIENT TEMP ASSUMED MOISTURE 30

MODULE NO. 2031 PROBE NO. 3-2 FILTER NO. HEATER NO. 4 NOZZLE DIA. .252

TEST POINT	METER VOLUME (Vm)	METER TEMP(Tm) IN	METER TEMP(Tm) OUT	COND TEMP °F	FILTER HEATER TEMP °F	STACK TEMP °F(Ts)	STACK PRESS (Ps)	VACUUM IN. Hg	ORIFICE (ΔH)(Pm) IN.H_2O	VEL HEAD (ΔP)	TIME
1	393.1	88	68	70	250	405	0	8-	1.4	.84	12:15
1	396.7	94	90	64	250	406	0	8-	1.4	.91	20
2	400.0	98	90	66	250	406	0	9+	1.5	.98	25
3	403.4	104	92	64	250	407		10	1.6	1.02	30
4	406.8	104	94	64	250	407		8-	1.3	.78	35
5	410.1	104	94	58	250	408		8-	1.3	.80	40
6	413.7	104	94	58	250	409		9	1.4	.83	45
1	412.7	100	94	66	250	411		8-	1.2	.70	50
1	416.1	102	94	64	250	412		8-	1.3	.70	55
2	420.1	104	96	60	250	412		8+	1.3	.80	13:00
3	423.2	105	96	61	250	413		9-	1.5	.90	05
4	426.7	108	96	62	250	414		9+	1.6	.95	10
5	430.1	110	98	64	250	415		9+	1.6	.95	15
6	433.6	112	98	66	250	415		10-	1.7	.98	20
	40.5										
TOTAL	40.5	102.6	93.9								
AVERAGE		98		~	~	410	0	MAX 10	1.428	.885	60 MIN

ORSAT DATA						AVG
TIME				INTEGRATED		
CO2		4.8	4.8			4.8
O2		14.6	14.6			14.6
CO						

N2= 80.6

CONDESATE COLLECTED	FINAL	INITIAL	TOTAL
DRIERITE	920	908.5	11.5
IMPINGER	531	200	331
GRAND TOTAL (Vlw)			342.5

FILTER WEIGHT	PROBE WASH WT	IMPINGER WASH WT	LEAK RATE @ 15 "Hg = .00
GROSS .6616	172.123		
TARE .6444	172.1167	+ Cl	AVERAGE $\sqrt{\Delta P}$ = .9407
NET .0172	.0064		

TOTAL PARTICULATE WEIGHT (Mn) 23.6 mg STACK AREA(As) 3.14 FT^2

0.1 M NaOH

REFUSE WT 1645 #/HR

30.22

E.P.A. Method 5

DATA INPUT

Pb,In Hg	Barometer	29.45
VM,ft3	Meter Volume	40.5
ΔH,In H2O	Orifice Differential	1.43
PG,In H2O	Stack Static Pressure	0
Tm,F	Meter Temperature	98
Ts,F	Stack Temperature	410
CP	Pitot Coefficient	.84
$\sqrt{\Delta P}$,In H2O	Average Square Root Of Delta P	.9407
% CO2	Carbon Dioxide	4.8
% O2	Oxygen	14.6
% N	Nitrogen	80.6
VCL,Ml	Volume Of Condensate	342.5
AS,ft2	Stack Area	3.14
MN,Mg	Total Particulate Catch Weight	23.6
Θ,Min	Test Time	60
DN,In	Diameter Of Nozzle	.252
R,#/HR	Pounds Per Hour Refuse	1645

RESULTS

Pma,In Hg	Absolute Meter Pressure	29.56
PSA,In Hg	Absolute Stack Pressure	29.45
MD	Molecular Weight Dry Gas	29.35
MS	Molecular Weight @ Stack Conditions	25.94
VMSTP,ft3	VM Standard Temp.& Press. Dry	37.86
VWSTP,ft3	VM Standard Temp.& Press. Wet	16.23
BWO,%	Moisture	30.01
I,%	Isokinetic Variation	100.81
VS,ft/Sec	Stack Velocity	72.08
QA,ASCFM	Stack Gas Flow (Actual)	13579
QS,ft3/Hr	Stack Gas Flow (Dry STP)	341908
L,#/Hr	Emission Rate	.470009
CS,#/SCF	Particulate Emission	1.37466E-06
C''S,Grn/SCF	Particulate Emission	9.60081E-03
L2,#/100#	Pounds Particulate Per 100 Pounds Refuse	.028572
C12,GR/SCF	C''S Corrected to 12% CO_2	.024002

ERA TECH
NORTHWOOD OH
NORTH INCINERATOR BAGHOUSE STACK
7/27/89
TEST 2

HYDROCHLORIC ACID EMISSION TEST

DATA INPUT

Pb,In Hg	Barometer	29.45
VM,ft3	Meter Volume	40.5
ΔH,In H2O	Orifice Differential	1.43
PG,In H2O	Stack Static Pressure	0 *
Tm,F	Meter Temperature	98
Ts,F	Stack Temperature	410 *
CP	Pitot Coefficient	.84 *
$\sqrt{\Delta P}$,In H2O	Average Square Root Of Delta P	.9407 *
% CO2	Carbon Dioxide	4.8 *
% O2	Oxygen	14.6 *
% N	Nitrogen	80.6 *
VCL,Ml	Volume Of Condensate	342.5 *
HCL,Mg	Total HCL Weight	30.22
0,Min	Test Time	60

RESULTS

Pma,In Hg	Absolute Meter Pressure	29.56
PSA,In Hg	Absolute Stack Pressure	29.45
MD	Molecular Weight Dry Gas	29.35
MS	Molecular Weight @ Stack Conditions	25.94
VMSTP,ft3	VM Standard Temp.& Press. Dry	37.86
VWSTP,ft3	VM Standard Temp.& Press. Wet	16.23
BWO,%	Moisture	30.01
L,#/Hr	Emission Rate	0.60

* From Method 5 Test

ERA TECH
NORTHWOOD OH
NORTH INCINERATOR BAGHOUSE STACK
7/27/89
TEST 2

C.S.A. CO. (EPA METHOD 5) DATA SHEET

TEST NO. 3 PLANT ERA TECK TOLEDO DATE 7/27/89

LOCATION INCINERATOR BAGHOUSE STACK BY MK GT

BAROMETER 29.56 AMBIENT TEMP ASSUMED MOISTURE 30

MODULE NO. 2031 PROBE NO. 3-> FILTER NO. HEATER NO. 5 NOZZLE DIA. 251

TEST POINT	METER VOLUME (Vm)	METER TEMP (Tm) IN	METER TEMP (Tm) OUT	COND TEMP °F	FILTER HEATER TEMP °F	STACK TEMP °F (Ts)	STACK PRESS (Ps)	VACUUM IN. Hg	ORIFICE (ΔH) (Pm) IN. H_2O	VEL HEAD (ΔP)	TIME
1	434.3	90	90	70	250	410	0	7+	1.5	.83	14:03
1	437.4	94	92	66	250	410		7+	1.5	.93	08
2	440.8	100	94	60	250	410		8	1.6	.98	12
3	443.6	102	94	62	250	409		9	1.6	.98	18
4	447.1	104	94	62	250	409		9	1.6	.98	23
5	451.5	104	94	64	250	409		8	1.3	.80	28
6	454.5	104	94	64	250	409		8+	1.4	.85	33
1	454.5	100	94	64	250	411		7	1.1	.66	38
1	457.5	104	96	64	250	410		7	1.1	.64	40
2	460.3	104	96	64	250	411		7+	1.2	.70	45
3	463.7	106	96	66	250	412		8-	1.4	.86	50
4	466.4	108	96	68	250	412		9+	1.7	1.0	55
5	470.7	108	98	66	250	411		10-	1.8	1.05	15:00
6	474.1	110	98	64	250	411		9	1.6	.91	05
	34.3										
TOTAL	40.1	102.7	94.9								
AVERAGE		100		~	~	410	0	MAX 10	1.46	.886	60 min

ORSAT DATA N_2 = 80.5

TIME				INTEGRATED		AVG
CO_2		5.4	5.4	5.4		5.4
O_2		14.1	14.0	14.1		14.1
CO						

CONDESATE COLLECTED

	FINAL	INITIAL	TOTAL
DRIERITE	931	917	14
IMPINGER	521	200*	321
GRAND TOTAL (Vlw)			335

FILTER WEIGHT	PROBE WASH WT	IMPINGER WASH WT
GROSS .6672	191.8728	
TARE .6509	191.8662	HCl
NET .0163	.0066	

LEAK RATE @ 14"Hg = <.01

AVERAGE $\sqrt{\Delta P}$ = .9411

TOTAL PARTICULATE WEIGHT (Mn) 22.9 mg

STACK AREA (As) 3.14 FT^2

* .1 M NaOH

30.22

REFUSE WT 1592 LB/HR

E.P.A. Method 5

DATA INPUT

Pb,In Hg	Barometer	29.56
VM,ft3	Meter Volume	40.1
ΔH,In H2O	Orifice Differential	1.46
PG,In H2O	Stack Static Pressure	0
Tm,F	Meter Temperature	100
Ts,F	Stack Temperature	410
CP	Pitot Coefficient	.84
$\sqrt{\Delta P}$,In H2O	Average Square Root Of Delta P	.9411
% CO2	Carbon Dioxide	5.4
% O2	Oxygen	14.1
% N	Nitrogen	80.5
VCL,Ml	Volume Of Condensate	335
AS,ft2	Stack Area	3.14
MN,Mg	Total Particulate Catch Weight	22.9
Ø,Min	Test Time	60
DN,In	Diameter Of Nozzle	.251
R,#/HR	Pounds Per Hour Refuse	1592

RESULTS

Pma,In Hg	Absolute Meter Pressure	29.67
PSA,In Hg	Absolute Stack Pressure	29.56
MD	Molecular Weight Dry Gas	29.43
MS	Molecular Weight @ Stack Conditions	26.03
VMSTP,ft3	VM Standard Temp.& Press. Dry	37.49
VWSTP,ft3	VM Standard Temp.& Press. Wet	15.88
BWO,%	Moisture	29.75
I,%	Isokinetic Variation	100.19
VS,ft/Sec	Stack Velocity	71.86
QA,ASCFM	Stack Gas Flow (Actual)	13538
QS,ft3/Hr	Stack Gas Flow (Dry STP)	343413
L,#/Hr	Emission Rate	.462575
CS,#/SCF	Particulate Emission	1.34699E-06
C''S,Grn/SCF	Particulate Emission	9.40756E-03
L2,#/100#	Pounds Particulate Per 100 Pounds Refuse	.0290562
C12,GR/SCF	C''S Corrected to 12% CO_2	.0209057

ERA TECH
NORTHWOOD OH
NORTH INCINERATOR BAGHOUSE STACK
7/27/89
TEST 3

HYDROCHLORIC ACID EMISSION TEST

DATA INPUT

Pb,In Hg	Barometer	29.56
VM,ft3	Meter Volume	40.1
ΔH,In H2O	Orifice Differential	1.46
PG,In H2O	Stack Static Pressure	0 *
Tm,F	Meter Temperature	100
Ts,F	Stack Temperature	410 *
CP	Pitot Coefficient	.84 *
$\sqrt{\Delta P}$,In H2O	Average Square Root Of Delta P	.9411 *
% CO2	Carbon Dioxide	5.4 *
% O2	Oxygen	14.1 *
% N	Nitrogen	80.5 *
VCL,Ml	Volume Of Condensate	335 *
HCL,Mg	Total HCL Weight	30.22
Ø,Min	Test Time	60

RESULTS

Pma,In Hg	Absolute Meter Pressure	29.67
PSA,In Hg	Absolute Stack Pressure	29.56
MD	Molecular Weight Dry Gas	29.43
MS	Molecular Weight @ Stack Conditions	26.03
VMSTP,ft3	VM Standard Temp.& Press. Dry	37.49
VWSTP,ft3	VM Standard Temp.& Press. Wet	15.88
BWO,%	Moisture	29.75
L,#/Hr	Emission Rate	0.61

* From Method 5 Test

ERA TECH
NORTHWOOD OH
NORTH INCINERATOR BAGHOUSE STACK
7/27/89
TEST 3

APPENDIX II

Agency Use Only
Date Received _____
No. Assigned _____
Premise No. _____

INTENT TO TEST NOTIFICATION

Proposed Test Date JUNE 13, 1989
Pre-Test Meeting Desired? Yes [ ] No [X]

A. Facility Information

Name ERA TECH
Address 6551 WALES ROAD, NORTHWOOD, OH
Contact Person DENIS SHAW
Telephone Number (513) 859-8998

B. Testing Firm Information

Name CSA CO. (CUSTOM STACK ANALYSIS)
Address 24385 CENTER ROAD, ALLIANCE, OH 44601
Contact Person ERNIE KOLM
Telephone Number (216) 525-5119

C. Source Sampling Information: Identify all sources and pollutants to be sampled.

Source	Control Equipment	Monitoring Equipment	Pollutant to be Tested	EPA Test Method	Filter Box Temperature	Number of Sampling Points	Total Time for Test Run	Number of Sampling Runs
INCINERATOR	BAGHOUSE	—	PARTICULATE	5	250	12	60MIN	3
	LIME INJECTION	—	HCl	5*	SAME TRAIN AS ABOVE			3

Any modifications to USEPA Reference Method(s)? Yes [ ] No [ ] ; If yes explain *BACK HALF FOR MOISTURE DETERMINATION AND HCl TITRATION, FRONT HALF FOR PARTICULATE

Sampling Location(s): Inlet [ ] Outlet [X] Simultaneous [ ] Will cyclonic flow check(s) be conducted? Yes [ ] No [X]

Fuel Sampling: Coal - Proximate [ ] Ultimate [ ] Other (specify) _____

Emission Rate to be calculated using: F Factor [ ] Ultimate Coal Analysis [ ] Other (specify) _____

Are concurrent Method 9 readings to be performed? Yes [ ] No [ ]

D. Sample Train Calibration: All affected measuring and metering equipment should be calibrated within 60 days of the scheduled testing.

28

AIR POLLUTION SOURCE TESTING PHONE -216- 525-5119

CSA COMPANY

CUSTOM STACK ANALYSIS
24661 CENTER ROAD
P.O. BOX 3750
ROUTE 5
ALLIANCE, OHIO 44601

GENERAL

Source emission tests will be performed at ERA TECH on JUNE 13, 1989 with testing to commence at about 9:00 O'clock ✓ AM PM as per INTENT TO TEST NOTIFICATION.

The sample train is a Research Appliance Corp modle 2043 using a PYREX lined probe heated to ~250 °F. The filter media is A/E FIBERGLASS enclosed in pyrex holders heated to ~250 °F. The contents of the impingers will be used for (a) moisture determination only, (b) ✓ moisture determination and particulate weight. The gas drying agent after the impingers is calcium sulfate contained in a "Drierite" desicant column. The probe and glassware will be washed using ACETONE & BRUSH. If impinger contents are used as part of the particulate weight, they will be dried by OVEN at 90 °C. The test and analytical procedures used are as per latest FEDERAL EPA REGULATIONS AS WRITTEN IN THE FEDERAL REGISTER.

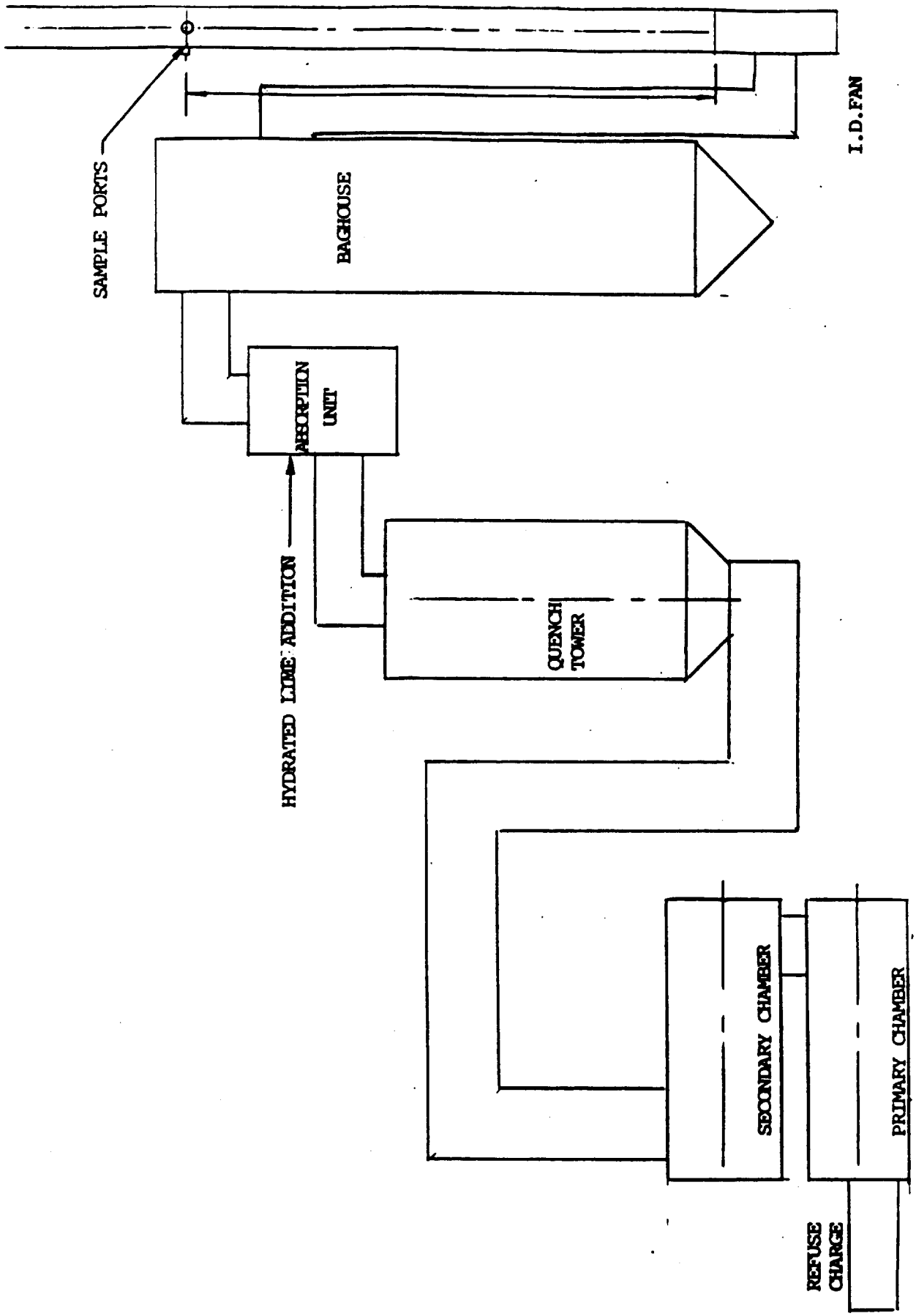
An equivalent emissions opacity test is requested

DESCRIPTION OF PLANT OPERATION

MEDICAL WASTE INCINERATOR WITH RETENTION CHAMBER (AFTER BURNER), QUENCH TOWER TO COOL GAS, ABSORPTION UNIT WITH HYDRATED LIME ADDITION FOR HCl REMOVAL AND BAGHOUSE FOR PARTICULATE & SPENT LIME REMOVAL.

STACK AND VENT DESCRIPTION

SEE ATTACHED SKETCHES



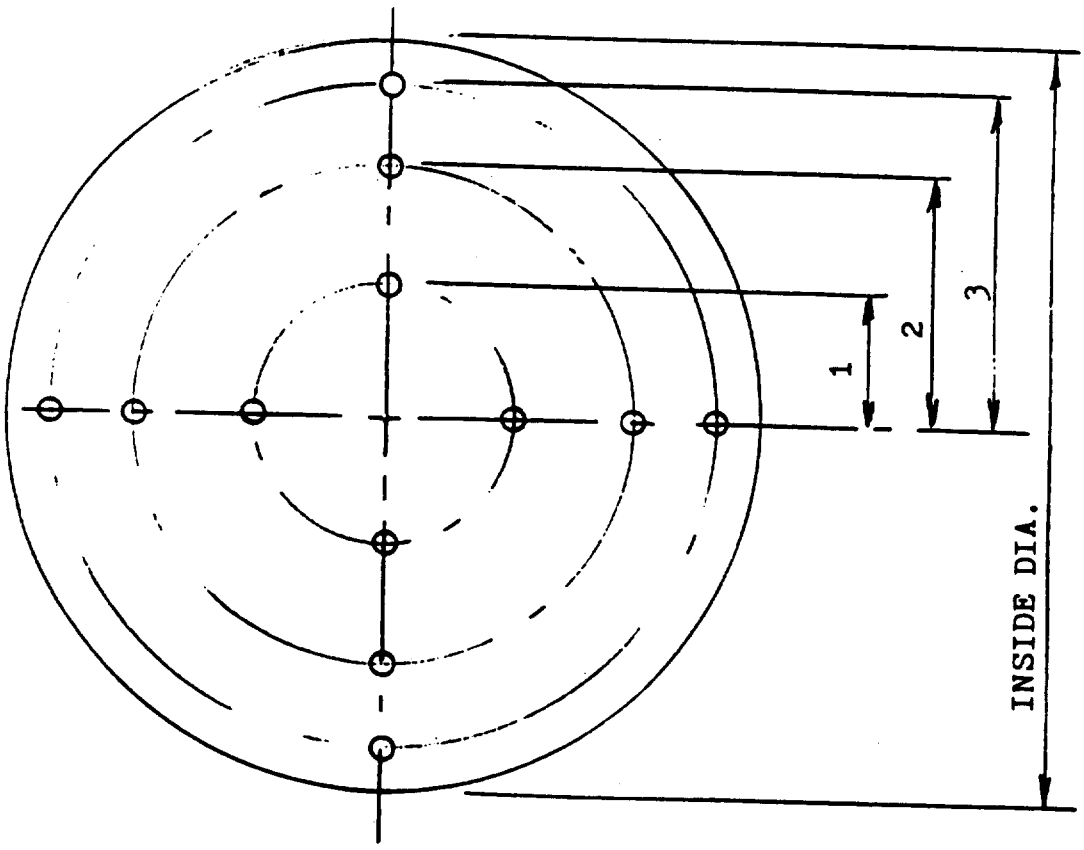
LOCATION OF SAMPLE PORTS

FIGURE 1A

Sample Points For Round Ducts

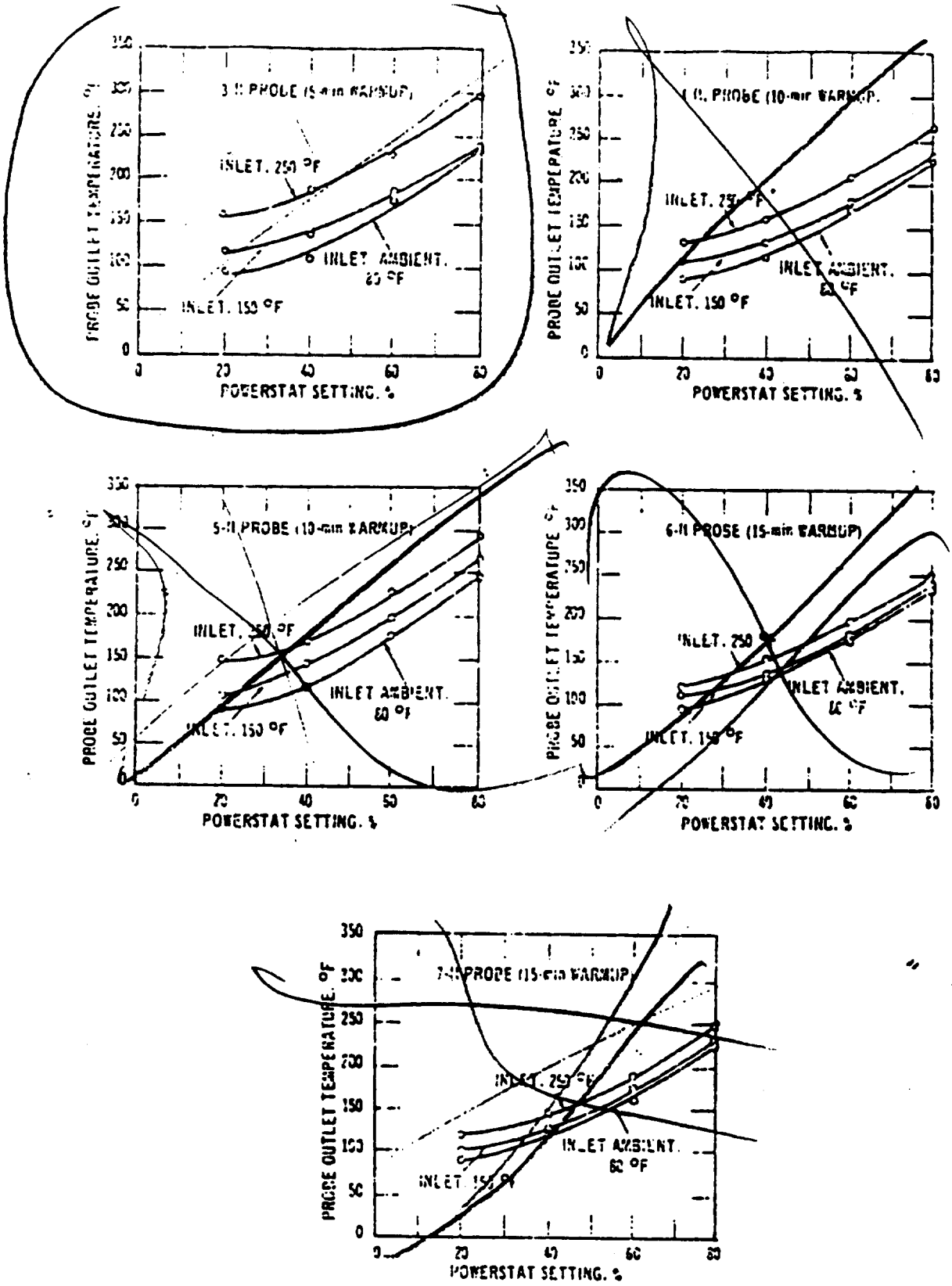
Diameter of duct in inches = 24
Area = 3.14159
Radius = 12
Total No. Of Points = 12

(1)- 4.89898
(2)- 8.48528
(3)- 1Ø.9545



SAMPLE POINT LOCATION

FIGURE 1B



NOTE: Flow rate held constant at 0.75; 50% change in flow rate has little effect on probe temperature.

Figure 16

Probe Temperatures

Sampling Method for Particulate and HCl for Waste Incinerators

Construction materials of equipment need not be altered for incinerators with heat exchangers operating at less than 800°F. For temperatures between 800° F. and 1300° F., a quartz probe liner should be used in place of the pyrex probe liner. For temperatures above 1300° F. a special probe with quartz liner and quartz nozzle as one piece should be used in place of the stainless steel nozzle and pyrex probe liner. The quartz can be used to temperatures of about 2000° F The stainless steel nozzle would flake material from the nozzle itself to give erronious results.

The impingers are filled with ~~150~~ 125 ml of ~~.25 M NaOH~~ Dw in each of the first and second impingers. The third impinger is used as a dry trap A desicant of calcium sulfate follows the third impinger to remove the remaining water vapor. The impingers and desicant are packed in crushed ice.

The test is performed in the same manner as the method 5 test.

The analysis of the particulate is the same as the method 5 test but the contents of the impingers is handled as follows.

1) Pour contents of impingers into a 500 ml beaker and record the volume for moisture determination.
2) Dillute to ~~500~~ 1000 ml with distilled water for the total sample and determine the chloride ion.

A Summary of method

1. After adjusting the pH, the chloride ion reacts quantitatively with the mercuric ion to form a stable complex of mercuric chloride. The pH is adjusted to 3 using either NaOH or HNO_3 as necessary. The titration is then carried out using mercuric nitrate as the titrant.

B Apparatus

1. 25 ml Class A Buret
2. 20 ml Class A Transfer Pipette
3. 125 ml Erlenmeyer flask
4. Dropper
5. 500 ml Graduate
6. Magnetic stirrer and burette stand

C Reagents

1. Hydrogen peroxide, 3% solution
2. Nitrate acid solution 3:997 (V/V)
3. Sodium hydroxide solution, .25 M

4. Bromophenol Blue, Diphenyl Carbazone indicator solution. Dissolve 0.5 g diphenylcarbazone and 0.5g bromophenol blue in 100 ml of 95% ethanol.
5. Mercuric nitrate solution 0.025 M. Dissolve 4.2830g $Hg(NO_3)_2$ $1H_2O$ in 25 ml of water acidified with .25 ml conc. HNO_3. Dilute to 1L with H_2O. Standize vs. .05 M NaCl solution.

D. Procedure

1. Pipette a 20 ml aloquot sample into a 125 ml Erlenmeyer flask.
2. Add 2 ml of 3% H_2O_2 solution and dilute to 50 ml.
3. Add 10 drops of dipheylcarbazone, 1-bromophenol-blue mixed indicator.
4. If a yellow or orange color develops, add .25 M NaOH dropwise until the color changes to blue. Add 3:997 HNO_3 until the color changes back to yellow, then add 20 drops excess.
5. If a blue or red color develops, add 3:997 HNO_3 dropwise until the color changes to yellow, then add 20 drops excess.
6. Titrate the solution with 0.025 M $Hg(NO_3)_2$ solution to a redish, violet endpoint.
7. Calculations

   mgHcl x 2.2046×10^{-6} + Vmstd = pounds HCl/f3 STP dry
   (Vmstd, use same calculations as method 5)
   pounds HCl/f3 STP dry x Qs (Cubic ft./hour STP dry)
   = pounds/hour Hcl
   (Qs from method 5)

Alternate Method

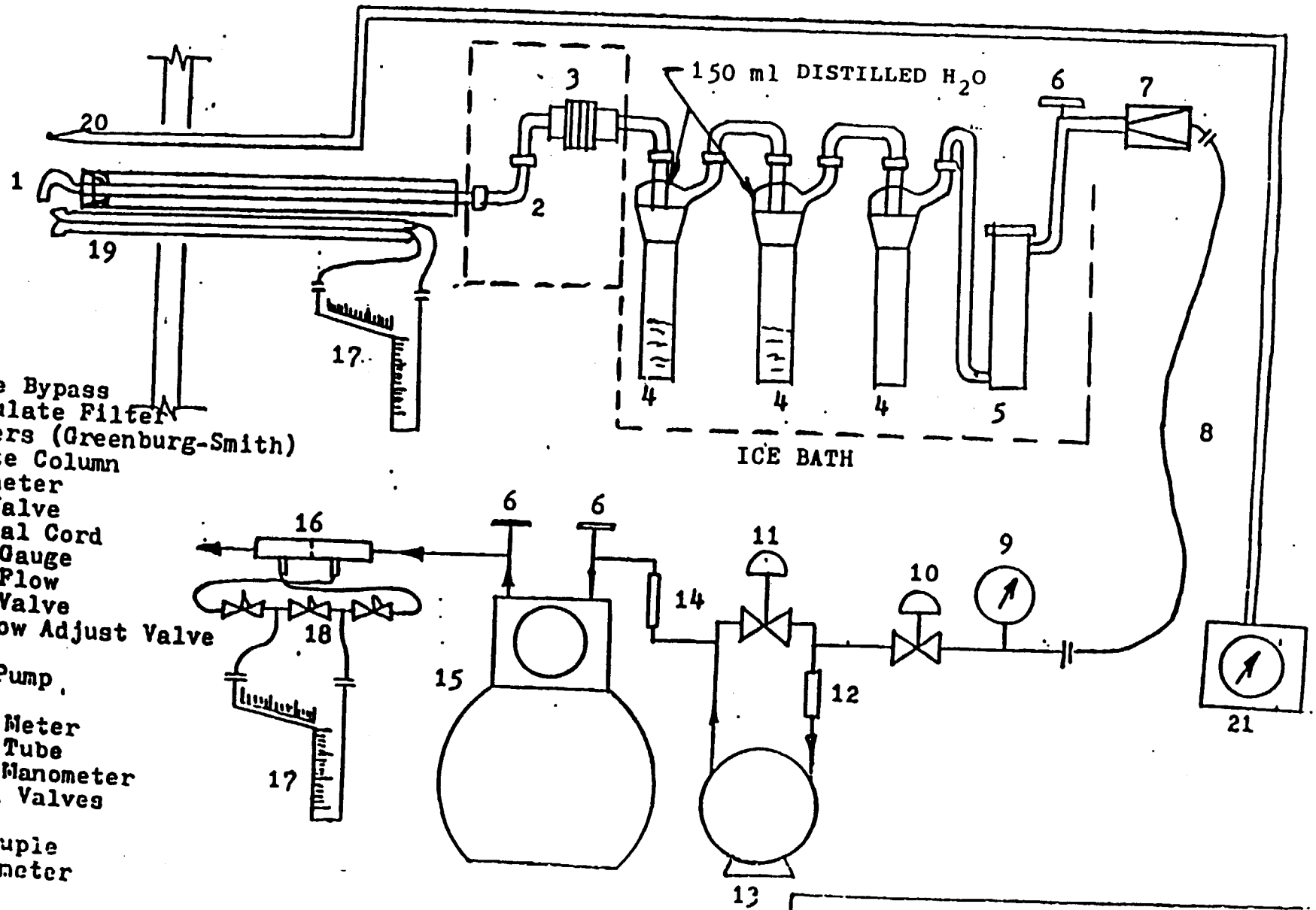
In cases where the impinger catch is evaporated to dryness and the weight of the material collected is added to the probe wash and filter weight for the total particulate emission, a seperate test apparatus is used as shown in figure 2.

A seperate probe of purex or appropriate material is used in place of the heated probe and filter. The sample can be taken from the same ports as the method 5 test or a seperate port near the method 5 ports. It is performed at the same time as the method 5 tests with

a sample volume comparable to the method 5 tests. The sample can be taken from a single point and need not be isokinetically proccur.

The Analytical Procedure consists of washing the entire sample train, probe through dry trap into a 1000 volumetric flask, dilluting to 1000 ml and following the same procedure as above "summary of method."

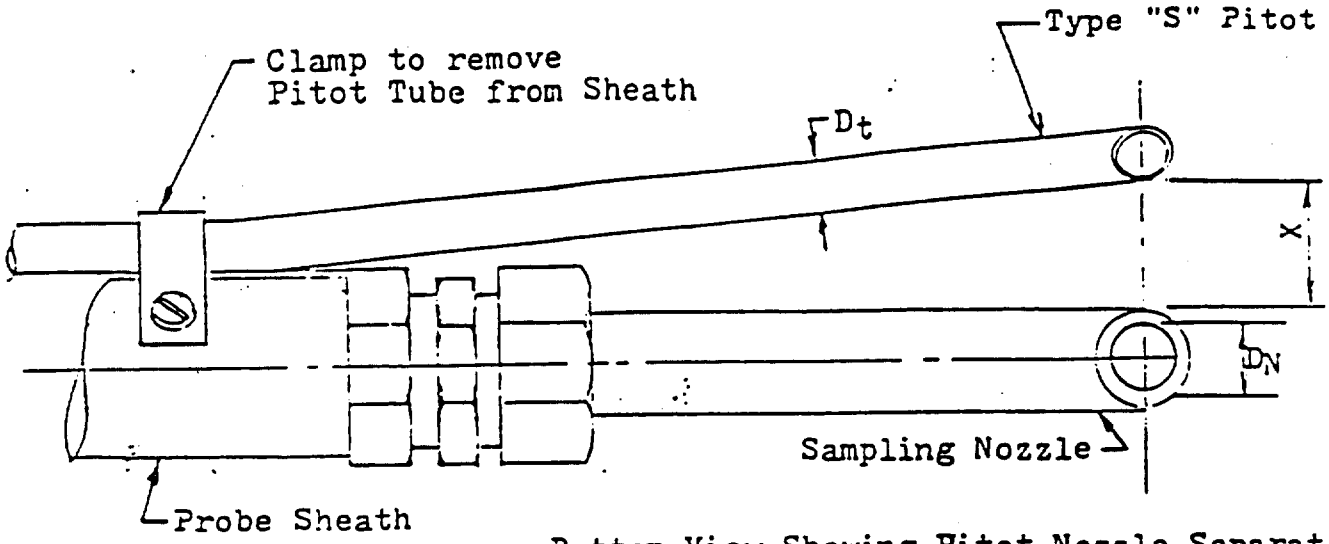
C.S.A. CO.
11/18/87 ELK



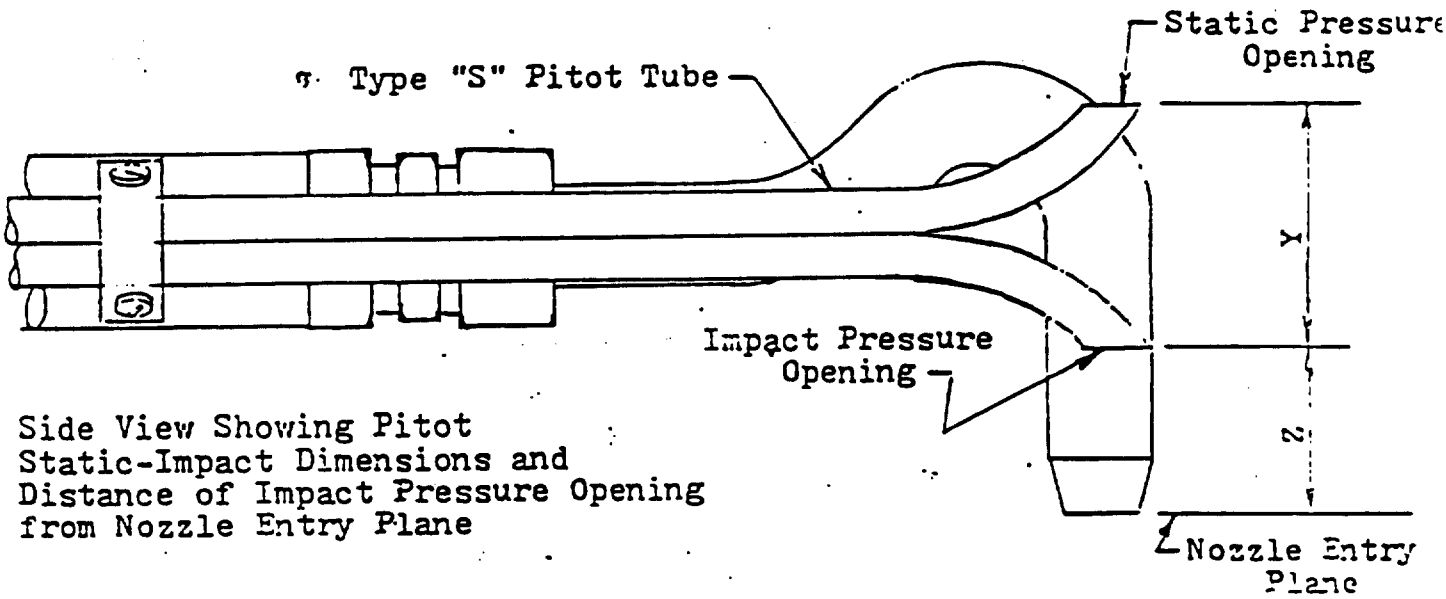
1) Probe
2) Cyclone Bypass
3) Particulate Filter
4) Impingers (Greenburg-Smith)
5) Drierite Column
6) Thermometer
7) Check Valve
8) Umbilical Cord
9) Vacuum Gauge
10) Course Flow Adjust Valve
11) Fine Flow Adjust Valve
12) Oiler
13) Vacuum Pump
14) Filter
15) Dry Gas Meter
16) Orifice Tube
17) Incline Manometer
18) Solenoid Valves
19) Pitot
20) Thermocouple
21) Potentiometer

TEST APPARATUS FOR COMBINED PARTICULATE AND HCl

C.S.A. Co.
MODIFICATION OF R.A.C. SAMPLE TR
USING DRIERITE COLUMN IN PLACE O



Bottom View Showing Pitot-Nozzle Separation



Side View Showing Pitot
Static-Impact Dimensions and
Distance of Impact Pressure Opening
from Nozzle Entry Plane

X & Z 1/16" Tolerance

D_N - Inches (Nominal)	X	Y	Z	D_t
3/16	1	1 7/16	5/16	3/8
1/4	15/16	1 7/16	5/16	3/8
5/16	7/8	1 7/16	5/16	3/8
3/8	3/4	1 7/16	5/16	3/8
1/2	5/8	1 7/16	1/2	3/8

PITOT TUBE INTERFERENCE DIMENSIONS

HCl TITRATION AND WEIGHT CALCULATION SHEET

0.1 Molar NaCl = 3.5453 grams/liter or 3.5453 mg/ml of Cl^-.
10.0 ml of 0.1 M NaCl = 35.453 mg Cl^-.
Titrate 10 ml of NaCl standard with mecuric nitrate, $Hg(NO_3)_2$, to standardize titrant.

10 ml NaCL, _____ ml $Hg(NO_3)_2$ 1st titration
_____ " " 2nd "
_____ " " 3rd "
_____ average

35.453/_____ average = _____ mg Cl^-/ml $Hg(NO_3)_2$ = Vts

Vht = volume of titrant used for aloquot sample
1.028 = mg HCl/mg Cl^-
Vt = total sample volume
Va = aloquot sample volume

Vht X Vts X Vt X 1.028/Va = mg HCl
_____ X _____ X _____ X 1.028 / _____ = _____ mg HCl

TEST NO._____ PLANT _____ DATE _____
LOCATION_____ BY _____

C.S.A. CO. (EPA METHOD 5) DATA SHEET

TEST NO. PLANT DATE

LOCATION BY

BAROMETER AMBIENT TEMP ASSUMED MOISTURE

MODULE NO. PROBE NO. FILTER NO. HEATER NO. NOZZLE DIA.

TEST POINT	METER VOLUME (Vm)	METER TEMP(Tm) IN	METER TEMP(Tm) OUT	COND TEMP °F	FILTER HEATER TEMP °F	STACK TEMP °F(Ts)	STACK PRESS (Ps)	VACUUM IN. Hg	ORIFICE (ΔH)(Pm) IN.H_2O	VEL HEAD (ΔP)	TIME
TOTAL											
AVERAGE											

ORSAT DATA N_2= AVG

TIME				INTEGRATED		
CO2						
O2						
CO						

CONDESATE COLLECTED

	FINAL	INITIAL	TOTAL
DRIERITE			
IMPINGER			
GRAND TOTAL (Vlw)			

FILTER WEIGHT	PROBE WASH WT	IMPINGER WASH WT
GROSS		
TARE		
NET		

LEAK RATE @ "Hg =

AVERAGE $\sqrt{\Delta P}$ =

TOTAL PARTICULATE WEIGHT (Mn) mg

STACK AREA(As) FT^2

C.S.A. CO.

STACKSAMPLR CALIBRATION SHEET

Customer _____ Order No. _____

Date 3/11/89 Serial No. 2033 RAC Order No. _____

Pump CLEANED & SET Pump Oil CHANGED Clean Quik Disconnects —

Manometers CH$_3$ OIL Dry Test Meter OK Thermometers OK

Lights OK Electrical Check OK Variac OK

Vacuum Gauge OK Leak Check @ 27"Hg Vacuum NO LEAKS

Remarks PRESSURE TEST @ 10" H_2O - NO LEAKS

Computer Entry Order → 1 2 - 3 4 5 - 6 7 8

9 Pb 29.13

K	N	ΔH	CFw	CFd	Tw	ITd	OTd	TD avg.	t	H	Y
.0158	.0368	0.5	5	5.04	72	80	74	77	12.73	1.863	1.000
0317	.0737	1.0	5	5.05	72	84	76	80	9.00	1.862	1.001
.0634	.147	2.0	10	10.15	72	86	76	83	12.72	1.851	1.00
.1268	.249	4.0	10	10.24	72	94	78	91	9.01	1.859	1.00
.1902	.431	6.0	10	10.14	72	97	80	89	7.36	1.854	1.003
.2536	.588	8.0	10	10.10	72	102	80	91	6.37	1.851	1.005

Tolerances H = 1.6-1.84 -2.1

Y = 0.99 -1.00-1.01

$$H = \frac{K}{Pb\,(OTd + 460)} \times \left[\frac{(Tw + 460)\,t}{CFw}\right]^2$$

$$Y = \frac{CFw\ Pb\ (Td\ avg + 460)}{CFd\ (Pb + N)\ (Tw + 460)}$$

AVG H = 1.857

AVG Y = 1.002

ΔH= Orifice pressure drop-in. H_2O

CFw= Volume wet test meter - f^3

CFd= Volume dry test meter - f^3

Tw= Temp wet test meter

ITd= Inlet temperature dry test meter

Td=Outlet temperature dry test meter

Td Avg.=Average temperature dry test meter

t= Time-minutes

Pb= Barometer press

C.S.A. Co.
STACKSAMPLR CALIBRATION SHEET

Customer _____ Order No. _____
Date 6/17/89 Serial No. 2031 RAC Order No. _____

Pump OK Pump Oil OK Clean Quick Disconnects YES
Manometers OK Dry Test Meter OK Thermometers OK
Lights OK Electrical Check OK Variac OK
Vacuum Gauge OK Leak Check @ 27''Hg Vacuum OK
Remarks PRESSURE TEST AT 10" H2O

Barometer (Pb) 29.03

K	N	DH	CFw	CFd	Tw	ITd	OTd	TD	t	H	Y
.0158	.0368	0.5	5	5.03	70	74	71	72	12.68	1.852	0.997
.0317	.0737	1.0	5	5.05	70	76	70	73	8.95	1.854	0.993
.0634	.1470	2.0	10	10.10	70	84	72	78	12.68	1.854	1.000
.1268	.2490	4.0	10	10.11	70	85	75	80	8.96	1.841	0.999
.1902	.4310	6.0	10	10.11	70	86	76	81	7.34	1.850	0.995
.2536	.5880	8.0	10	10.09	70	88	76	82	6.33	1.834	0.993

Tolerances H=1.6-1.84-2.1 , Y=0.99-1.00-1.01

$H=(K/(Pb(OTd+460)))*(((Tw+460)t)/CFw)^2$

$Y=(CFw\ Pb\ (Td\ avg.+460))/(CFd\ (Pb+N)\ (Tw+460))$

DH= Orifice pressure drop - in. H_2O
CFw= Volume wet test meter - f^3
CFd= Volume dry test meter - f^3
Tw= Temp. wet test meter
ITd= Inlet temperature dry test meter
OTd= Outlet temperature dry test meter
Td avg.= Average temperature dry test meter
t= Time - minutes
Pb=Barometer press.

WMI Northwood, OH

State of Ohio Environmental Protection Agency

Permit to Install
Terms and Conditions

Application No. 03-3774
APS Premise No. 0387000292
Permit Fee: $1170.

Name of Facility: MULTITECH GROUP INC

Person to Contact: ROBERT L. KOHNEN

Address: P.O. BOX 638
DAYTON, OHIO 45449

Location of proposed source(s): 6551 WALES RD
NORTHWOOD, OHIO

Description of proposed source(s): 2 HEALTH CARE WASTE INCINERATORS.

Date of Issuance: OCTOBER 5, 1988

Effective Date: OCTOBER 5, 1988

The above named entity is hereby granted a permit to install for the above described source(s) pursuant to Chapter 3745-31 of the Ohio Administrative Code. Issuance of this permit does not constitute expressed or implied approval or agreement that, if constructed or modified in accordance with the plans included in the application, the above described source(s) of environmental pollutants will operate in compliance with applicable State and Federal laws and regulations, and does not constitute expressed or implied assurance that if constructed or modified in accordance with those plans and specifications, the above described source(s) of pollutants will be granted the necessary permits to operate (air) or NPDES permits as applicable.

This permit is granted subject to the conditions attached hereto.

Ohio Environmental Protection Agency

Richard L. Shank

Director

WMI MEDICAL SERVICES

EPA 3156

Substantial construction for installation must take place within eighteen months of the effective date of this permit. This deadline may be extended by up to twelve months, if application is made to the Director within a reasonable time before the termination date and the party shows good cause for any such extension.

The Director of the Ohio Environmental Protection Agency, or his authorized representatives, may enter upon the premises of the above-named applicant during construction and operation at any reasonable time for the purpose of making inspections, conducting tests, examining records or reports pertaining to the construction, modification or installation of the above described source of environmental pollutants.

As specified in OAC Rule 3745-31-05, all new sources must employ Best Available Technology (BAT). Compliance with the terms and conditions of this permit will fulfill this requirement.

The specified permit fee must be remitted within 15 days of the effective date of this permit to install.

The proposed source shall be constructed in strict accordance with the plans and application submitted for this permit to the Director of the Ohio Environmental Protection Agency. There may be no deviation from the approved plans without the express, written approval of the Agency. Any deviations from the approved plans or the above conditions may lead to such sanctions and penalties as provided under Ohio law. Approval of these plans does not constitute an assurance that the proposed facilities will operate in compliance with all Ohio laws and regulations. Additional facilities shall be installed upon orders of the Ohio Environmental Protection Agency if the proposed sources are inadequate or cannot meet applicable standards.

EMISSION SUMMARY

The air contaminant sources listed below comprise the Permit to Install for MultiTech Group Inc. located in Wood County. The sources listed below shall not exceed the emission limits/control requirements contained in the following table:

Ohio EPA Source No.	Source Identification	BAT Determination	Applicable Ohio EPA rule	Allowable Emissions (lb/hr, lb/MMBTU, gr/DSCF, etc.)
P001	Health care wastes incinerator unit #1	*	3745-31-05 (A)(3) 3745-17-09 (B)-(C)	0.1 lb part/100 lbs charged; 1.7 lb/hr part.; 7.5 TPY part 4.0 lbs hydrogen chloride (HCl)/hr

Ohio EPA Source No.	Source Identification	BAT Determination	Applicable Ohio EPA rule	Allowable Emissions (lb/hr, lb/MMBTU, gr/DSCF, etc.)
J002	Health care wastes incinerator unit #2	*	3745-31-05 (A)(3) 3745-17-09 (B)-(C)	0.1 lb part/100 lbs. charged; 1.7 lb/hr part.; 7.5 TPY part. 4.0 lbs hydrogen chloride (HCl)/hr

*Use of a secondary chamber with minimum temperature of 1800°F and minimum retention time of 2 seconds. Continuous recording of the temperature in the secondary chamber. Charging lock out system on the secondary chamber effective if temperature drops below 1800°F. Limiting visible emission of <5% opacity or less.

SUMMARY
TOTAL NEW SOURCE EMISSIONS

Pollutant	Tons/Year
Particulate	15
HCl	35

This condition in no way limits the applicability of any other state or federal regulation.

APPLICABILITY

This Permit to Install is applicable only to the air contaminant sources listed and does not include the installation or modification of wastewater disposal systems ~~or solid waste disposal facilities~~. Separate application must be made to the Director for the installation or modification of any such wastewater disposal systems or solid waste disposal facilities.

Remov

CONSTRUCTION STATUS

The Northwest District Office shall be notified in writing as to (a) the construction starting date (b) the construction completion date and (c) the date the facilities were placed into operation.

PERFORMANCE TEST REQUIREMENTS

The permittee shall conduct, or have conducted, performance testing on the air contaminant source(s) in accordance with procedures approved by the Agency. Two copies of the written report shall be submitted and signed by the person responsible for the test, describing the test procedures followed and the results of such tests. The Director or an Ohio EPA representative shall be allowed to witness the tests, examine testing equipment and

require the acquisition or submission of data and information necessary to assure that the source operation and testing procedures provide a valid characterization of the emissions from the source and/or the performance of the control equipment.

A. A completed Intent to Test form shall be submitted to the appropriate Ohio EPA District Office or Local Air Pollution Control Agency where the original permit application was filed. This notice shall be made thirty (30) days in advance and shall specify the source operating parameters, the proposed test procedures and the time, date, place and person(s) conducting such tests.

B. Two copies of the test results shall be submitted within thirty (30) days after the completion of the performance test.

C. Tests shall be performed for the following sources and pollutants:

Source	Pollutant
N001	Particulate Hydrogen chloride
N002	Particulate Hydrogen chloride

WASTE DISPOSAL

The owner/operator shall comply with any applicable state and federal requirements governing the storage, treatment, transport, and disposal of any waste material generated by the operation of the sources.

REPORTING

Any reports required by the Permit to Install shall be submitted to Northwest District Office, 1035 Devlac Grove Dr., Bowling Green, Ohio 43402.

PERMIT TO OPERATE APPLICATION

A Permit to Operate Application and a $15 application fee must be submitted to the appropriate field office for each source in this Permit to Install. In accordance with OAC rule 3745-35-02, the application shall be made at least ninety days prior to start-up of the source.

PUBLIC DISCLOSURE

The facility is hereby notified that this permit, and all agency records concerning the operation of this permitted source are subject to public disclosure in accordance with OAC Rule 3745-49-03.

ADDITIONAL SPECIAL TERMS AND CONDITIONS

1. Emissions from each source shall not exceed:

   0.1 pounds of particulate emissions per 100 pounds of material.

   4 pounds of hydrogen chloride (HCl) per hour.

   Visible emissions from this source shall not exceed a minimum average opacity of five (5%) percent for more than ten minutes in any one hour period while waste material is being burnt. Opacity shall be determined according to U.S. EPA Reference Method Nine (9) as set forth in CFR Part 60.

2. Operating Parameters

   a. The secondary chamber shall be operated at a temperature of not less than 1800°F with a minimum retention time of 2.0 seconds while waste material is being burnt.

   b. The incinerator shall be equipped with an automatic feeding device which can be "locked-out" if the secondary chamber temperature monitor indicates a temperature of less than 1800 degrees Fahrenheit.

   c. These sources, including all associated equipment and grounds, shall be designed, operated, and maintained so as to prevent the emission of objectionable odors.

   d. The operators shall be instructed in proper operating and charging techniques.

   e. Both primary and secondary burners shall be operational during the entire time the incinerator is in use.

   f. Multi Tech Group Inc. shall continuously record the temperature in the secondary chamber of each unit while operating. These records shall be kept on file for a minimum of one year. Multi Tech Group Inc. shall notify the Northwest District Office of the Ohio EPA if the temperature in the secondary chamber drops below 1800°F while the waste is being charged to the unit.

   g. Multi Tech Group Inc. may not receive or incinerate any hazardous waste materials as defined in 40 CFR Part 261, Subpart D.

3. ~~Hazardous~~ Solid Waste Handling

a. Multitech Group, Inc. may not accept more than 18.4 tons of waste per day.

b. Containers containing ash being stored prior to disposal must be kept covered at all times.

c. Daily records of operation shall be maintained and submitted to the Ohio Environmental Protection Agency, if requested.

d. The Ohio EPA may require the permittee to sample and analyze the ash residue resulting from incineration at this facility.

e. The local health department having jurisdiction shall be notified prior to start of construction so that construction of this project can be routinely inspected and approved by the local health department before being placed in operation.

f. This permit does not relieve the Multitech Group, Inc. of the obligation to apply for and obtain any other federal, state, or local permits or approval that may be required by law.

OhioEPA
ate of Ohio Environmental Protection Agency

ERMIT TO OPERATE AN AIR CONTAMINANT SOURCE

ıte of Issuance 11/17/89

Application No. 0387000292N001

ective Date 11/17/89

Permit Fee $270

ıis document constitutes issuance to:

MULTI TECH INDUSTRIES, INC.
6551 WALES RD
NORTHWOOD OHIO 43619

a permit to operate for:

HEALTH CARE WASTES INCINERATOR W/DRY SCRUBBING SYS
UNIT #1

ıe following terms and conditions are hereby expressly incorporated into this permit to operate:

1. This permit to operate shall be effective until 11/17/92
   You will be contacted approximately six months prior to this date regarding the renewal of this permit. If you are not contacted, please write to the appropriate Ohio EPA field office.
2. The above-described source is and shall remain in full compliance with all applicable State and federal laws and regulations and the terms and conditions of this permit.
3. Prior to any modification of this source, as defined in rule 3745-31-01 of the Ohio Administrative Code (OAC), a permit to install must be granted by the Ohio EPA pursuant to OAC Chapter 3745-31.
4. The Director of the Ohio EPA or an authorized representative may, subject to the safety requirements of the permit holder, enter upon the premises of this source at any reasonable time for purposes of making inspections, conducting tests, examining records or reports pertaining to any emission of air contaminants, and determining compliance with any applicable State and federal air pollution laws and regulations and the terms and conditions of this permit.
5. A permit fee in the amount specified above must be remitted within 15 days from the issuance date of this permit.
6. Any transferee of this permit shall assume the responsibilities of the prior permit holder. The appropriate Ohio EPA field office must be notified in writing of any transfer of this permit.
7. This source and any associated air pollution control system(s) shall be maintained regularly in accordance with good engineering practices in order to minimize air contaminant emissions. Any malfunction of this source or any associated air pollution control system(s) shall be reported immediately to the appropriate Ohio EPA field office in accordance with OAC rule 3745-15-06. Except as provided in that rule, any scheduled maintenance or malfunction necessitating the shutdown or bypassing of any air pollution control system(s) shall be accompanied by the shutdown of this source.
8. Any unauthorized or emergency release of an air contaminant from this source which, due to the toxic or hazardous nature of the material, may pose a threat to public health, or otherwise endanger the safety or welfare of the public, shall be reported immediately to the appropriate Ohio EPA field office (during normal business hours) or to the Ohio EPA's Emergency Response Group (1-800-282-9378). (Additional reporting may be required pursuant to the federal Comprehensive Environmental Response, Compensation, and Liability Act.)
9. The appropriate Ohio EPA field office is:
   OHIO EPA, NORTHWEST DISTRICT OFFICE
   AIR POLLUTION GROUP 1035 DEVLAC GROVE DR.
   BOWLING GREEN, OH 43402 (419) 352-8461
0. ☒ If this term and condition is checked, the permit holder is subject to the attached special terms and conditions.

)HIO ENVIRONMENTAL PROTECTION AGENCY

Richard L. Shank

irector

APPLICATION NUMBER: 0387000292N001

FACILITY NAME: MultiTech Industries, Inc.

EQUIPMENT DESCRIPTION: Health Care Waste Incinerator w/Dry Scrubber System

COMPANY I.D.: Unit #1

SPECIAL TERMS AND CONDITIONS

1. The following rules of the Ohio Administrative Code establish the applicable emission limitations for this source. This condition in no way limits the applicability of other requirements of the OAC to this source:

Pollutant	Applicable Rules	Allowable Emission Rate
Particulates	OAC 3745-17-07 OAC 3745-17-09	.1 pounds of particulate emissions per 100 pounds charged
Hydrogen Chloride (HCl)	OAC 3745-31-05	4 lbs/hr

2. This source, including all associated equipment and grounds, shall be designed, operated, and maintained so as to prevent the emission of objectionable odors.

3. Visible emissions from this source shall not exceed an average opacity of five (5%) percent for more than ten minutes in any one hour period while waste material is being burned. Opacity shall be determined in accordance with U.S. EPA Reference Method 9 as set forth in CFR Part 60.

4. The secondary chamber shall be preheated by allowing the secondary burner (afterburner) to operate for 15 minutes before charging any waste material. Both primary and secondary burners shall be operational the entire time waste material is being incinerated.

5. The secondary chamber shall be operated at a temperature of not less than 1800°F with a minimum retention time of 2.0 seconds while waste material is being burnt.

6. The operator(s) shall be instructed in proper operating and charging techniques.

7. MultiTech Industries, Inc., may not incinerate any hazardous waste materials as defined in 40 CFR Part 261, Subpart D.

transport, and disposal of any waste material generated by the operation of the sources.

INFECTIOUS AND SOLID WASTE SPECIAL TERMS AND CONDITIONS

1. MultiTech Industries, Inc., shall provide for the proper maintenance and operation of the waste facility in accordance with the provisions of Rule 3745-27 of the Ohio Administrative Code.

2. Daily records of operation shall be maintained and submitted to the Ohio EPA, if requested.

3. This permit does not provide for acceptance of any hazardous wastes. No hazardous wastes are to be accepted without prior approval by the Ohio EPA Hazardous Waste Facility Board.

4. MultiTech Industries, Inc., shall adhere to a waste management plan which has been approved by the Ohio EPA, Northwest District Office. Such plan shall detail the handling of solid waste received, stored, and incinerated onsite, as well as the handling, storage, and disposal of ash residue. The waste management plan shall include:

   a. Procedures and methods for temporary onsite storage of wastes accepted for incineration.

   b. Maximum onsite storage capacity and maximum length of time allowed for onsite storage.

   c. Procedures for removing and ensuring proper disposal of wastes from temporary onsite storage.

   d. Procedures to ensure minimal or no temporary onsite storage of wastes during routine or planned inspection and maintenance on incinerators.

   e. Measures and methods for temporary onsite storage of the ash residue resulting from incineration.

   f. Maximum temporary onsite storage capacity and maximum length of time allowed for onsite storage of ash residue resulting from incineration.

   g. Procedures for testing, removing, and ensuring proper disposal of ash residue resulting from incineration.

hioEPA
te of Ohio Environmental Protection Agency

ERMIT TO OPERATE AN AIR CONTAMINANT SOURCE

e of Issuance 11/17/89 Application No. 0387000292N002

ctive Date 11/17/89 Permit Fee $270

is document constitutes issuance to:

MULTI TECH INDUSTRIES, INC.
6551 WALES RD
NORTHWOOD OHIO 43619

a permit to operate for:

HEALTH CARE WASTE INCINERATOR W/DRY SCRUBBING SYS
UNIT #2

e following terms and conditions are hereby expressly incorporated into this permit to operate:

This permit to operate shall be effective until 11/17/92
You will be contacted approximately six months prior to this date regarding the renewal of this permit. If you are not contacted, please write to the appropriate Ohio EPA field office.

. The above-described source is and shall remain in full compliance with all applicable State and federal laws and regulations and the terms and conditions of this permit.

. Prior to any modification of this source, as defined in rule 3745-31-01 of the Ohio Administrative Code (OAC), a permit to install must be granted by the Ohio EPA pursuant to OAC Chapter 3745-31.

. The Director of the Ohio EPA or an authorized representative may, subject to the safety requirements of the permit holder, enter upon the premises of this source at any reasonable time for purposes of making inspections, conducting tests, examining records or reports pertaining to any emission of air contaminants, and determining compliance with any applicable State and federal air pollution laws and regulations and the terms and conditions of this permit.

. A permit fee in the amount specified above must be remitted within 15 days from the issuance date of this permit.

. Any transferee of this permit shall assume the responsibilities of the prior permit holder. The appropriate Ohio EPA field office must be notified in writing of any transfer of this permit.

. This source and any associated air pollution control system(s) shall be maintained regularly in accordance with good engineering practices in order to minimize air contaminant emissions. Any malfunction of this source or any associated air pollution control system(s) shall be reported immediately to the appropriate Ohio EPA field office in accordance with OAC rule 3745-15-06. Except as provided in that rule, any scheduled maintenance or malfunction necessitating the shutdown or bypassing of any air pollution control system(s) shall be accompanied by the shutdown of this source.

. Any unauthorized or emergency release of an air contaminant from this source which, due to the toxic or hazardous nature of the material, may pose a threat to public health, or otherwise endanger the safety or welfare of the public, shall be reported immediately to the appropriate Ohio EPA field office (during normal business hours) or to the Ohio EPA's Emergency Response Group (1-800-282-9378). (Additional reporting may be required pursuant to the federal Comprehensive Environmental Response, Compensation, and Liability Act.)

. The appropriate Ohio EPA field office is:

OHIO EPA, NORTHWEST DISTRICT OFFICE
AIR POLLUTION GROUP 1035 DEVLAC GROVE DR.
BOWLING GREEN, OH 43402 (419) 352-8461

. ☒ If this term and condition is checked, the permit holder is subject to the attached special terms and conditions.

HIO ENVIRONMENTAL PROTECTION AGENCY

Richard L. Shank

rector

APPLICATION NUMBER: 0387000292N002

FACILITY NAME: MultiTech Industries, Inc.

EQUIPMENT DESCRIPTION: Health Care Waste Incinerator w/Dry Scrubber System

COMPANY I.D.: Unit #2

SPECIAL TERMS AND CONDITIONS

1. The following rules of the Ohio Administrative Code establish the applicable emission limitations for this source. This condition in no way limits the applicability of other requirements of the OAC to this source:

Pollutant	Applicable Rules	Allowable Emission Rate
Particulates	OAC 3745-17-07 OAC 3745-17-09	.1 pounds of particulate emissions per 100 pounds charged
Hydrogen Chloride (HCl)	OAC 3745-31-05	4 lbs/hr

2. This source, including all associated equipment and grounds, shall be designed, operated, and maintained so as to prevent the emission of objectionable odors.

3. Visible emissions from this source shall not exceed an average opacity of five (5%) percent for more than ten minutes in any one hour period while waste material is being burned. Opacity shall be determined in accordance with U.S. EPA Reference Method 9 as set forth in CFR Part 60.

4. The secondary chamber shall be preheated by allowing the secondary burner (afterburner) to operate for 15 minutes before charging any waste material. Both primary and secondary burners shall be operational the entire time waste material is being incinerated.

5. The secondary chamber shall be operated at a temperature of not less than 1800^{o}F with a minimum retention time of 2.0 seconds while waste material is being burnt.

6. The operator(s) shall be instructed in proper operating and charging techniques.

7. MultiTech Industries, Inc., may not incinerate any hazardous waste materials as defined in 40 CFR Part 261, Subpart D.

transport, and disposal of any waste material generated by the operation of the sources.

INFECTIOUS AND SOLID WASTE SPECIAL TERMS AND CONDITIONS

1. MultiTech Industries, Inc., shall provide for the proper maintenance and operation of the waste facility in accordance with the provisions of Rule 3745-27 of the Ohio Administrative Code.

2. Daily records of operation shall be maintained and submitted to the Ohio EPA, if requested.

3. This permit does not provide for acceptance of any hazardous wastes. No hazardous wastes are to be accepted without prior approval by the Ohio EPA Hazardous Waste Facility Board.

4. MultiTech Industries, Inc., shall adhere to a waste management plan which has been approved by the Ohio EPA, Northwest District Office. Such plan shall detail the handling of solid waste received, stored, and incinerated onsite, as well as the handling, storage, and disposal of ash residue. The waste management plan shall include:

   a. Procedures and methods for temporary onsite storage of wastes accepted for incineration.

   b. Maximum onsite storage capacity and maximum length of time allowed for onsite storage.

   c. Procedures for removing and ensuring proper disposal of wastes from temporary onsite storage.

   d. Procedures to ensure minimal or no temporary onsite storage of wastes during routine or planned inspection and maintenance on incinerators.

   e. Measures and methods for temporary onsite storage of the ash residue resulting from incineration.

   f. Maximum temporary onsite storage capacity and maximum length of time allowed for onsite storage of ash residue resulting from incineration.

   g. Procedures for testing, removing, and ensuring proper disposal of ash residue resulting from incineration.

No. 4

Ohio EPA

1989

SOLID WASTE DISPOSAL LICENSE

STATE OF OHIO

AMDWR - 36.8 Tons/Day

NAME WMI Medical Services of Ohio, Inc.

ADDRESS 6551 Wales Road

CITY Northwood, Ohio 43619

HEALTH DISTRICT
Wood County

This license has been issued in accordance with the requirements of state law and is subject to revocation or suspension for cause and is not transferable without consent of the licensor and the Director of the Ohio Environmental Protection Agency.

EXPIRES DECEMBER 31 OF THIS YEAR

October 18, 1989
Date issued

Nancy Kenney, R.N., M.P.H.
Health Commissioner

CONDITIONS OF LICENSURE ON REVERSE SIDE

EPA 6001

"Treats Infectious Waste"

OHIO STATE BOARD OF PHARMACY
77 S. HIGH ST., 17TH FLOOR
COLUMBUS ,OHIO 43266-0320

CATEGORY III LICENSE

TERMINAL DISTR DANGEROUS DRUGS

SIGN, POST AND DISPLAY

Before change of ownership, control address or location, notify secretary of the Ohio Board of Pharmacy immediately.

Be it known that

MULTITECH INDUSTRIES, INC.
RALPH C. BULTMAN, MGR.
6551 WALES ROAD
NORTHWOOD, OH 43619

SIGNED Ralph C. Bultman
SIGNATURE OF RESPONSIBLE PHARMACIST OR PRACTICTIONER

CLASS 27

IDENTIFICATION NUMBER 02-555400

Expiration Date 12/31/89

has given satisfactory evidence that all statutory requirements as required by the Revised Code have been met. (Wholesale - R.C. 4729.52 and 4729.53. Terminal - R.C. 4729.54 and 4729.55). In witness whereof this certificate is issued under seal.

AUDIT NUMBER 009536

Ohio State Board of Pharmacy

OT - 00290

ACORD. CERTIFICATE OF INSURANCE

ISSUE DATE (MM/DD/YY)

PRODUCER

THE BROWER INSURANCE AGENCY
2 RIVERPLACE, SUITE 200
POST OFFICE BOX 37
DAYTON, OHIO 45401

CODE SUB-CODE

INSURED

MULTITECH INDUSTRIES, INC.
4343 INFIRMARY ROAD
WEST CARROLLTON, OH 45449

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW

COMPANIES AFFORDING COVERAGE

COMPANY LETTER A — INDIANA INSURANCE COMPANY
COMPANY LETTER B
COMPANY LETTER C
COMPANY LETTER D
COMPANY LETTER E

COVERAGES

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED, NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

CO TR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	ALL LIMITS IN THOUSANDS	
	GENERAL LIABILITY					
A	X COMMERCIAL GENERAL LIABILITY	42 054 017	08-01-88	08-01-89	GENERAL AGGREGATE	$ 2,000,
	CLAIMS MADE X OCCUR.				PRODUCTS-COMP/OPS AGGREGATE	$ 2,000,
	OWNER'S & CONTRACTOR'S PROT.				PERSONAL & ADVERTISING INJURY	$ 1,000,
					EACH OCCURRENCE	$ 1,000,
					FIRE DAMAGE (Any one fire)	$ 50,
					MEDICAL EXPENSE (Any one person)	$ 5,
	AUTOMOBILE LIABILITY					
A	X ANY AUTO	22 062 622	12-11-88	12-11-89	COMBINED SINGLE LIMIT	$ 1,000,
	ALL OWNED AUTOS				BODILY INJURY (Per person)	$
	SCHEDULED AUTOS				BODILY INJURY (Per accident)	$
	X HIRED AUTOS				PROPERTY DAMAGE	$
	X NON-OWNED AUTOS					
	GARAGE LIABILITY					
	EXCESS LIABILITY				EACH OCCURRENCE $	AGGREGATE $
	OTHER THAN UMBRELLA FORM					
	WORKER'S COMPENSATION AND EMPLOYERS' LIABILITY				STATUTORY	
					$	(EACH ACCIDENT)
					$	(DISEASE—POLICY LIMIT)
					$	(DISEASE—EACH EMPLOYEE)
	OTHER					

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/RESTRICTIONS/SPECIAL ITEMS

NORTH JACKSON LOCATION

CERTIFICATE HOLDER

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL ENDEAVOR TO MAIL 10 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE COMPANY, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE Frederick J. Brewing

OMB NO. 2125-0074

orm MCS-90
(7/83)

ENDORSEMENT FOR MOTOR CARRIER POLICIES OF INSURANCE FOR PUBLIC LIABILITY UNDER SECTIONS 29 AND 30 OF THE MOTOR CARRIER ACT OF 1980

DEFINITIONS AS USED IN THIS ENDORSEMENT

CCIDENT includes continuous or repeated exposure to conditions which results in bodily injury, property damage, or environmental damage hich the insured neither expected nor intended.

IOTOR VEHICLE means a land vehicle, machine, truck, tractor, trailer, or semitrailer propelled or drawn by mechanical power and used ' a highway for transporting property, or any combination thereof.

ODILY INJURY means injury to the body, sickness, or disease to any person, including death resulting from any of these.

NVIRONMENTAL RESTORATION means restitution for the loss, damage or destruction of natural resources arising out of the accidental ischarge, dispersal, release or escape into or upon the land, atmosphere, watercourse, or body of water, of any commodity transported y a motor carrier. This shall include the cost of removal and the cost of necessary measures taken to minimize or mitigate damage or otential for damage to human health, the natural environment, fish, shellfish and wildlife.

ROPERTY DAMAGE means damage to or loss of use of tangible property.

UBLIC LIABILITY means liability for bodily injury, property damage, and environmental restoration.

he insurance policy to which this endorsement is attached provides automobile liability insurance and is amended to assure compliance y the insured, within the limits stated herein, as a motor carrier of property, with Sections 29 and 30 of the Motor Carrier Act of 1980 nd the rules and regulations of the Federal Highway Administration's Bureau of Motor Carrier Safety (Bureau) and the Interstate Commerce ommission (ICC).

consideration of the premium stated in the policy to which this endorsement is attached, the insurer (the company) agrees to pay, within e limits of liability described herein, any final judgment recovered against the insured for public liability resulting from negligence in the eration, maintenance or use of motor vehicles subject to the financial responsibility requirements of Sections 29 and 30 of the Motor arrier Act of 1980 regardless of whether or not each motor vehicle is specifically described in the policy and whether or not such negligence ccurs on any route or in any territory authorized to be served by the insured or elsewhere. Such insurance as is afforded for public liability oes not apply to injury to or death of the insured's employees while engaged in the course of their employment, or property transported the insured, designated as cargo.

is understood and agreed that no condition, provision, stipulation, or limitation contained in the policy, this endorsement, or any other ndorsement thereon, or violation thereof, shall relieve the company from liability or from the payment of any final judgment, within the mits of liability herein described, irrespective of the financial condition, insolvency or bankruptcy of the insured. However, all terms, onditions, and limitations in the policy to which the endorsement is attached shall remain in full force and effect as binding between the nsured and the company. The insured agrees to reimburse the company for any payment made by the company on account of any accident, laim, or suit involving a breach of the terms of the policy, and for any payment that the company would not have been obligated to make nder the provisions of the policy except for the agreement contained in this endorsement.

is further understood and agreed that, upon failure of the company to pay any final judgment recovered against the insured as provided erein, the judgment creditor may maintain an action in any court of competent jurisdiction against the company to compel such payment.

he limits of the company's liability for the amounts prescribed in this endorsement apply separately to each accident and any payment nder the policy because of any one accident shall not operate to reduce the liability of the company for the payment of final judgments esulting from any other accident.

he policy to which this endorsement is attached provides primary or excess insurance, as indicated by "X", for the limits shown:

[X] This insurance is primary and the company shall not be liable for amounts in excess of $1,000,000 for each accident.

[ ] This insurance is excess and the company shall not be liable for amounts in excess of $_____ for each accident in excess of the underlying limit of $_____ for each accident.

henever required by the Bureau or the ICC the company agrees to furnish the Bureau or the ICC a duplicate of said policy and all its ndorsements. The company also agrees, upon telephone request by an authorized representative of the Bureau or the ICC, to verify that he policy is in force as of a particular date. The telephone number to call is: 513-436-2307

ancellation of this endorsement may be effected by the company or the insured by giving (1) thirty five (35) days notice in writing to he other party (said 35 days notice to commence from the date the notice is mailed, proof of mailing shall be sufficient proof of notice), nd (2) if the insured is subject to the ICC's jurisdiction, by providing thirty (30) days notice to the ICC (said 30 days notice to commence rom the date notice is received by the ICC at its office in Washington, D.C.).

ssued to MULTI TECH INDUSTRIES, INC of WEST CARROLLTON, OH

ated at DAYTON, OH this 1ST day of MAY 19 89

mending Policy No. 22 062 622

ffective Date 12/11/88

Countersigned by Micki Myers
Authorized Company Representative

Name of Insurance Company INDIANA INSURANCE COMPANY