

**ANIMAL CREMATORIES
AIR GENERAL PERMIT EXAMPLE REGISTRATION WORKSHEET**

Facility Identification Number - If known (seven digit number)

0250320-005-AG

0250320

Registration Type

Check one:

INITIAL REGISTRATION - Notification of intent to:

- Construct and operate a proposed new facility.
- Operate an existing permitted facility not currently using an air general permit (e.g., a facility proposing to go from an air operation permit to an air general permit). If the facility currently holds one or more air operation permits, such permit(s) must be surrendered by the owner or operator upon the effective date of this air general permit. (See "Surrender of Existing Air Operation Permit(s)" below.)
- Operates an existing facility not currently permitted or using an air general permit.

RE-REGISTRATION (for facilities currently using an air general permit) - Notification of intent to:

- Continue operating the facility after expiration of the current term of air general permit use.
- Continue operating the facility after a change of ownership.
- Make an equipment change requiring re-registration pursuant to Rule 62-210.310(2)(e), F.A.C.
- Any other change not considered an administrative correction under Rule 62-210.310(2)(d), F.A.C.

Surrender of Existing Air Operation Permit(s) - For Initial Registrations Only, if Applicable

All existing air operation permits for this facility are hereby surrendered upon the effective date of this air general permit; specifically permit number(s):

General Facility Information

Facility Owner/Company Name (Name of corporation, agency, or individual owner who or which owns, leases, operates, controls, or supervises the facility.)
Zoo Miami - Miami-Dade County

Site Name (Name, if any, of the facility site; e.g., Plant A, Metropolis Plant, etc. If more than one facility is owned, a complete registration must be submitted for each.)
Zoo Miami

Facility Location (Physical location of the facility, not necessarily the mailing address.)

Street Address: 12400 SW 152 Street

City: Miami

County: Miami-Dade

Zip Code: 33177

Facility Start-Up Date (Estimated start-up date of proposed new facility.)(N/A for existing facility.)

August-September 2013

Facility Contact

Name and Position Title (Plant manager or person to be contacted regarding day-to-day operations at the facility.)

Print Name and Title: Christine L. Miller, DVM - zoo veterinarian

Facility Contact Telephone Numbers

Telephone: 305-253-5050

Fax: 305-254-1483

Cell phone: _____

E-mail: cmiller@miamidade.gov

Facility Contact Mailing Address

Organization/Firm: Zoo Miami

Mailing Address: 12400 SW 152 Street

City: Miami

County: Miami-Dade

Zip Code: 33177

Correspondence Contact/Representative (to serve as additional Department contact)

Name and Position Title

Print Name and Title: Linda Cunningham - zoo hospital manager

Correspondence Contact/Representative Telephone Numbers

Telephone: 305-253-5050

Fax: 305-254-1483

Cell phone: _____

E-mail: lcunnin@miamidade.gov

Correspondence Contact/Representative Mailing Address

Organization/Firm: Zoo Miami

Mailing Address: 12400 SW 152 Street

City: Miami

County: Miami-Dade

Zip Code: 33177

Government Facility Code (check only one)

- Facility not owned or operated by a federal, state, or local government.
- Facility owned or operated by the federal government.
- Facility owned or operated by the state.
- Facility owned or operated by the county.
- Facility owned or operated by the municipality.
- Facility owned or operated by a water management district.

Emission Unit Details

MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	RATED CAPACITY**
MATTHEWS CREMATION	IEB-20	TBD	150 lbs/hr

**** Note: Any animal crematory unit at the facility shall not exceed a design capacity of 500 lbs/hour.**

Design Calculations

If this is an initial registration for a proposed new animal crematory unit, provide design calculations to confirm a sufficient volume in the secondary chamber combustion zone to provide for at least a 1.0 second gas residence time at 1800 degrees F.

- Design calculations attached.
- Registration is not for proposed new animal crematory unit(s).

Helpful Definitions

“Animal Crematory” - Any combustion apparatus used solely for the cremation of animal remains.

“Biomedical Waste” - Any solid or liquid waste which may present a threat of infection to humans, including nonliquid-tissue, body parts, blood, blood products, and body fluids from humans and other primates; laboratory and veterinary wastes which contain human disease-causing agents; and discarded sharps. The following are also included:

1. Used absorbent materials saturated with blood, blood products, body fluids, or excretions or secretions contaminated with visible blood; and absorbent materials saturated with blood or blood products that have dried.
2. Non-absorbent, disposable devices that have been contaminated with blood, body fluids, or secretions or excretions visibly contaminated with blood, but have not been treated by a method listed in Section 381.0098, F.S., or a method approved pursuant to Rule 64E-16, F.A.C.

“Department” or “DEP” - The State of Florida Department of Environmental Protection.

“Emissions Unit” - Any part or activity of a facility that emits or has the potential to emit any air pollutant.

“Facility” - All of the emissions units which are located on one or more contiguous or adjacent properties, and which are under the control of the same person (or persons under common control).

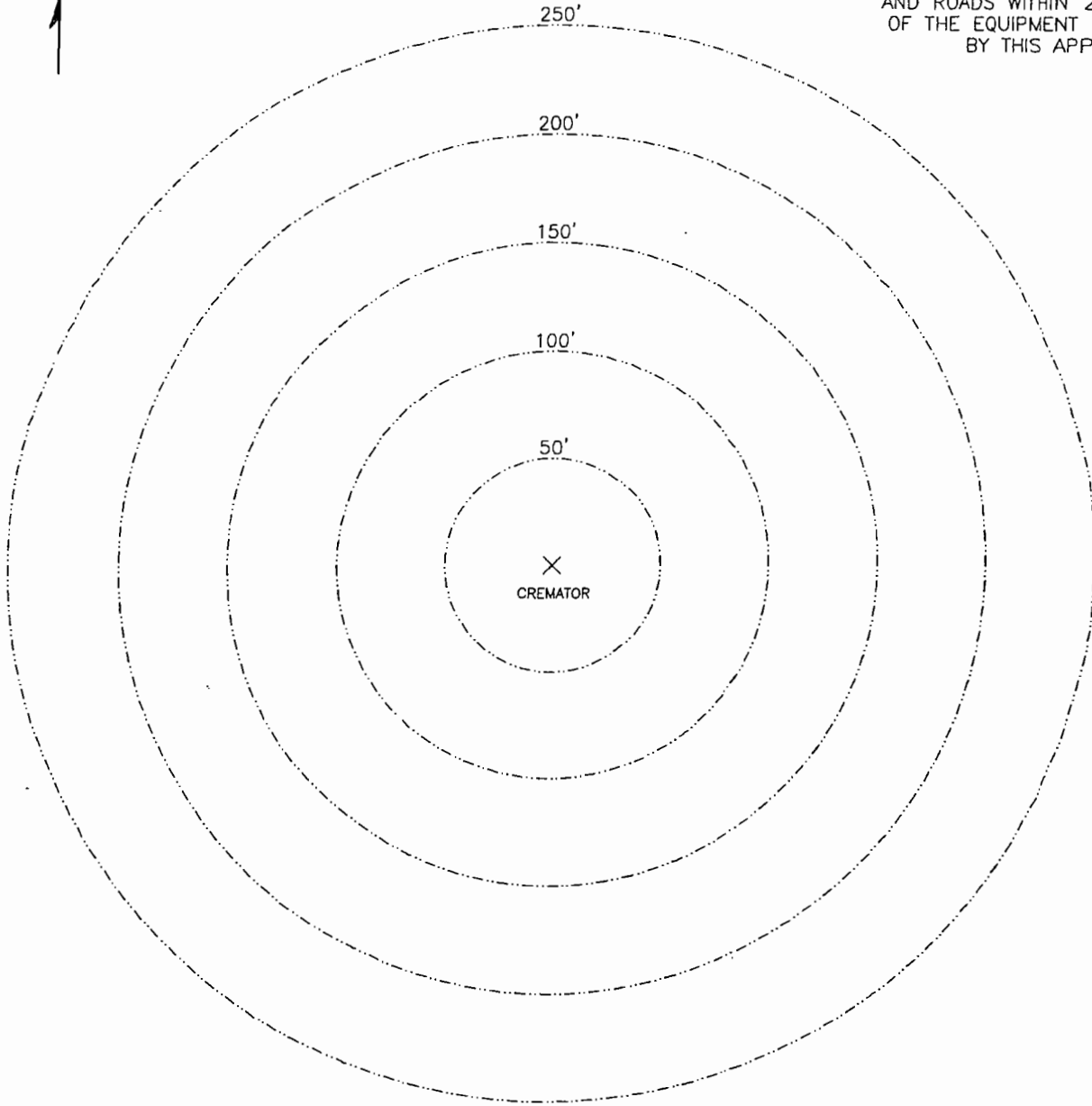
“Owner” or “Operator” - Any person or entity who or which owns, leases, operates, controls or supervises an emissions unit or facility.

PLOT PLAN

NORTH



SHOW ALL SURROUNDING BUILDINGS
AND ROADS WITHIN 250 FEET
OF THE EQUIPMENT COVERED
BY THIS APPLICATION.



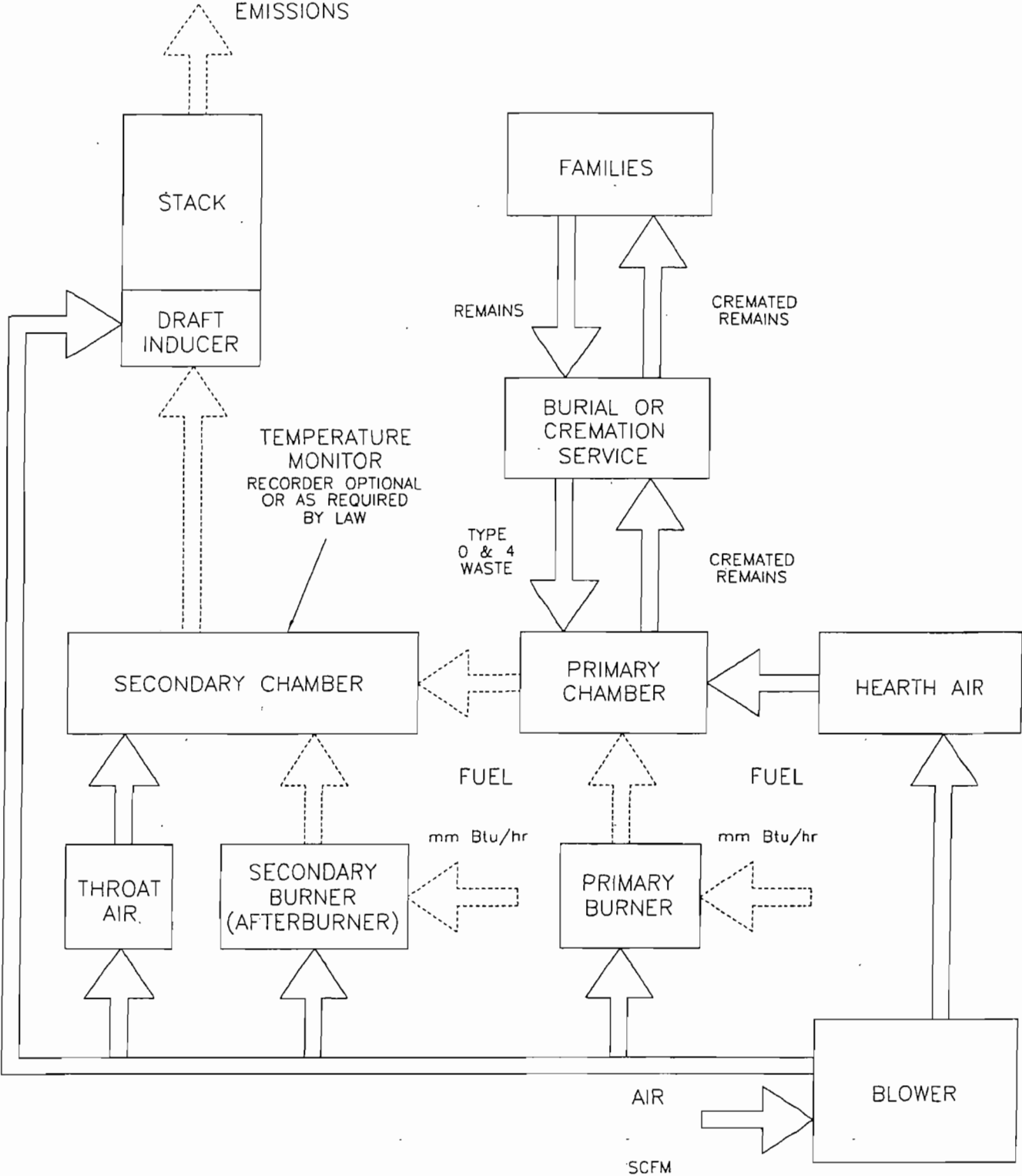
STRUCTURE DESCRIPTION

INSTRUCTIONS

1. INDICATE LOCATION AND TYPE OF BUILDING BY THE USE OF SMALL NUMBERED CIRCLES WITH THE DESCRIPTION BELOW.
2. SHOW ROADS AS LINES REPRESENTING THE ROAD EDGES. INDICATE STREET NAMES AND HIGHWAY NUMBERS.
3. SHOW WOODED OR CLEARED AREA BY APPROXIMATE BOUNDARY LINES AND THE WORDS "WOODS," "CLEARED," "CORNFIELD," ETC.

- (1)
- (2)
- (3)
- (4)
- (5)
- (6)
- (7)
- (8)
- (9)
- (10)

PROCESS FLOW DIAGRAM CREMATOR



SPECIFICATIONS- Model IEB Series 20

1. Equipment Type..... Model IEB Series 20
 - A. Model No: IE43-IEB 20
 - B. Underwriters Laboratories Listing and File No. MH14647

2. Dimensions
 - A. Footprint 10' – 7 ½" x 6' – 8" (3.24 m x 2.03 m)
 - B. Maximum Length 12' – 9 ½" (3.90 m)
 - C. Maximum Width 6' -5" (1.96 m)
 - D. Maximum Height 8' - 4" (2.54 m)
 - E. Chamber Loading Opening..... 25 ¾" H x 39 ½" W (655 mm x 990 mm)

3. Weight..... 21,000 lbs. (9,525.44 kg)

4. Utility/Air Requirements
 - A. Gross Gas Input, Natural or LP Gas 2,000,000 BTU/hr. (2,110,112 kJ/h)
2,750,000 BTU/hr. (2,901,404 kJ/h) if operating
temperature is greater then 1,600° F
 - Running Gas Pressure, Natural Gas 11 inches (279 mm) water column or greater
 - Running Gas Pressure, LP Gas 11 inches (279 mm) water column or greater
 - B. Electrical Supply 230 volt, 3Ø or 1Ø, 50/60 hz (other available)
 - C. Air Supply 2,500 cfm (70.8 standard m³/min)

5. Incineration Capacity..... 150 lbs./hr. (68 kg/h)

6. Typical Loading Capacity of Waste Types 500 lbs. (226.8 kg)

7. Construction and Safety Standards..... Incineration Institute of America, Underwriters
Laboratories, Canadian Standards Association

8. Steel Structure Construction
 - A. Frame..... 2" (51 mm) square tubing
 - B. Front/Rear Plates..... 3/8" (9.5 mm) plate
 - C. Floor Plates 3/16" (5 mm) plate
 - D. Outer Side Casing 12 gauge (3 mm) plate
 - E. Inner Side Casing..... 12 gauge (3 mm) plate

9. Stack Construction
 - A. Inner Wall 3" (76 mm) insulating firebrick or castable
 - B. Outer Wall..... 12 gauge (3 mm) sheet, 304 s.s., welded seams
(unlined stack available)

10. Draft Nozzle Construction Schedule 40 type 316 s.s. pipe, welded
connections

11. Main Chamber Door Construction
 - A. Steel Shell 3/16" (5 mm) steel, welded with reinforcement
 - B. Outer Refractory 1" (25 mm) insulating block
 - C. Inner Refractory 4½" (110 mm) insulating firebrick

12. Primary Chamber Wall Construction
 - A. Outer Casing Wall 12 gauge (3 mm) sheet
 - B. Inner Frame/Air Compartment..... 2" (51 mm) air compartment
 - C. Inner Casing Wall..... 12 gauge (3 mm) sheet

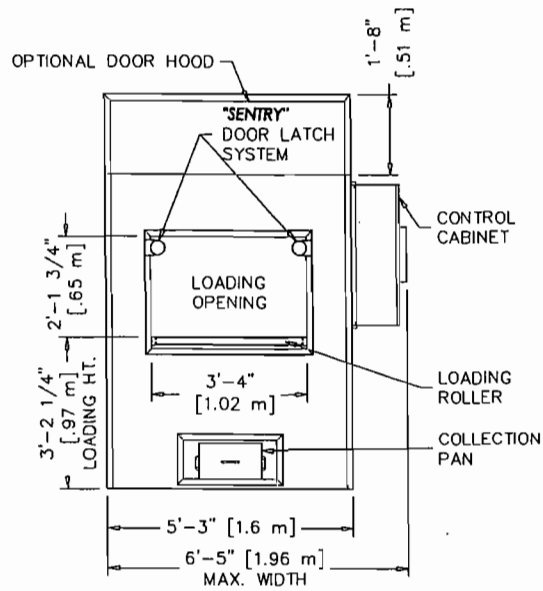
SPECIFICATIONS- Model IEB Series 20

- D. Outer Refractory Wall..... 5" (127 mm) insulating block
 E. Inner Refractory Wall..... 4½" (114 mm) firebrick
13. Secondary Chamber Wall Construction
- A. Outer Casing Wall 12 gauge (3 mm) sheet
 B. Inner Frame/Air Compartment..... 2" (51 mm) air compartment
 C. Inner Casing Wall..... 12 gauge (3 mm) sheet
 D. Outer Refractory Wall..... 6" (152 mm) insulating block
 E. Inner Refractory Wall..... 4½" (114 mm) firebrick
14. Refractory Temperature Ratings
- A. Standard Firebrick..... 3,100° F. (1704° C)
 B. Insulating Firebrick 2,600° F. (1427° C)
 C. Castable Refractory (Hearth)..... 2,550° F. (1399° C)
 D. Castable Refractory 2,550° F. (1399° C)
 E. Insulating Block 1,900° F. (1038° C)
 F. Bonding Mortar 3,200° F. (1760° C)
15. Chamber Volumes (not including external flues, stacks or chimneys)
- A. Primary Chamber 45 cubic feet (1.27 m³)
 B. Secondary Chamber..... 55 cubic feet (1.56 m³)
16. Emission Control Features
- A. Secondary Chamber with Afterburner Included
 B. Opacity Monitor and Controller with Visual and Audible Alarms Included
 C. Auxiliary Air Control System..... Included
 D. Microprocessor Temperature Control System Included
17. Operating Temperatures
- A. Primary Chamber 1,200° F. - 1,800° F. (649° C - 982° C)
 B. Secondary Chamber..... 1,400° F. - 1,800° F. (760° C - 982° C) as required
18. Secondary Chamber Retention Time..... > 1 second
19. Ash Removal..... Door functions as a heat shield. Sweep out beneath front door into hopper that fills collection pan.
20. Safety Interlocks
- A. High Gas Pressure Optional
 B. Low Gas Pressure Optional
 C. Blower Air Pressure..... Included
 D. Door Position Included
 E. Opacity..... Included
 F. Motor Starter Function Included
 G. Chamber Temperature Included
 H. Motor Overload..... Included
 I. Flame Quality..... Included
 J. Burner Safe Start..... Included
22. Burner Description..... The nozzle mix burners used on this cremation

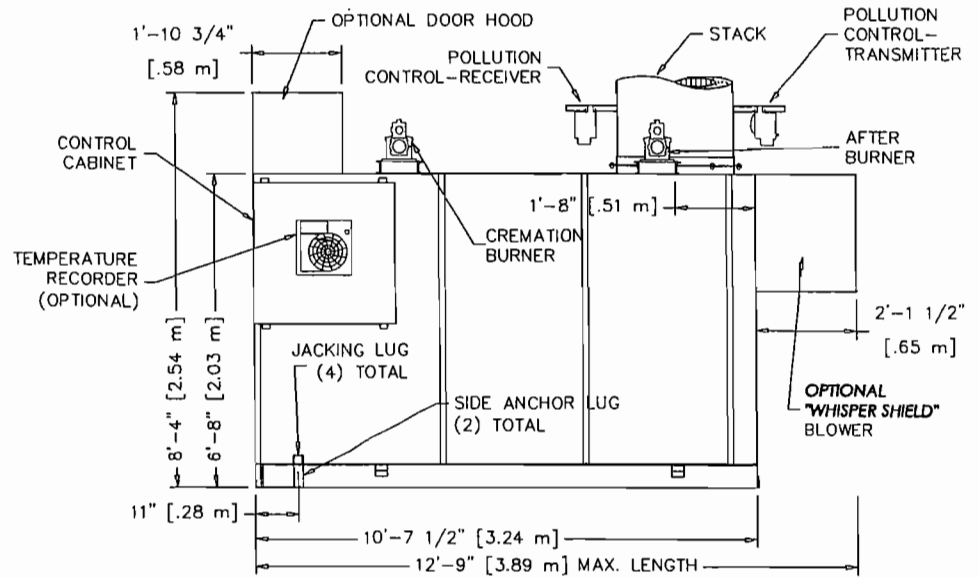
SPECIFICATIONS- Model IEB Series 20

equipment are industrial quality and designed for incinerator use.

- 23. Ultraviolet Flame Detection..... Ultraviolet flame detection has proven to be the most reliable means of flame safety. The system is completely sealed in a quartz capsule to eliminate problems, caused by moisture and dust created in the cremation process, which effect flame rod detectors.
- 24. Operating Panel Indicating Lights
 - A. Safe Run Included
 - B. Door Closed..... Included
 - C. Pollution Alarm Included
 - D. Afterburner On (Secondary Burner) Included
 - E. Cremation Burner On Included
 - F. Low Fire Cremation Burner On Included
 - G. Afterburner (Secondary Burner) Reset..... Included
 - H. Cremation Burner Reset..... Included
 - I. Hearth Air Included
 - J. Throat Air Off..... Included
- 25. Automatic Timer Functions
 - A. Master Cycle Included
 - B. Afterburner (Secondary Burner) Included
 - C. Cremation Burner Included
 - D. Low Fire Cremation Burner Included
 - E. Hearth Air Included
 - F. Throat Air..... Included
 - G. Pollution Monitoring Included
 - H. Afterburner (Secondary Burner) Prepurge Included
 - I. Cremation Burner Prepurge Included
 - J. Cool Down Included
- 26. Exterior Finish
 - A. Primer 2 coats rust inhibiting
 - B. Finish..... 2 coats textured finish
- 27. Start-Up and Training..... Startup of cremation equipment and training of operators to properly operate and maintain the equipment is performed on-site under actual operating conditions. Included is a comprehensive owner's manual, with details on the equipment, its components and proper operation.
- 28. Environmental Submittals Complete technical portion of state environmental permits. Engineering calculations, technical data, existing stack test results and equipment blueprints provided.



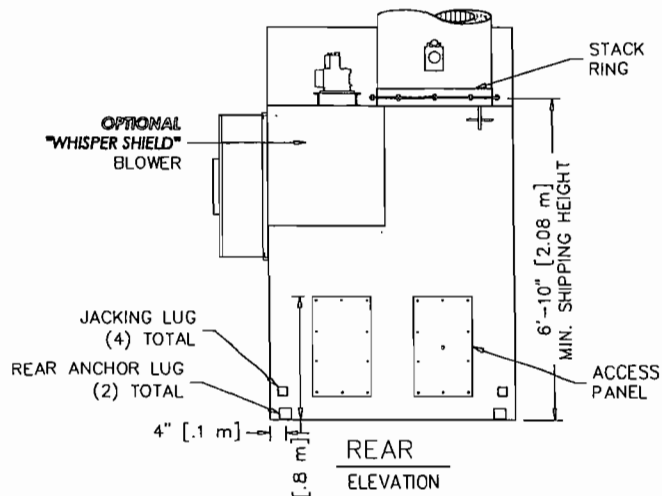
FRONT
ELEVATION



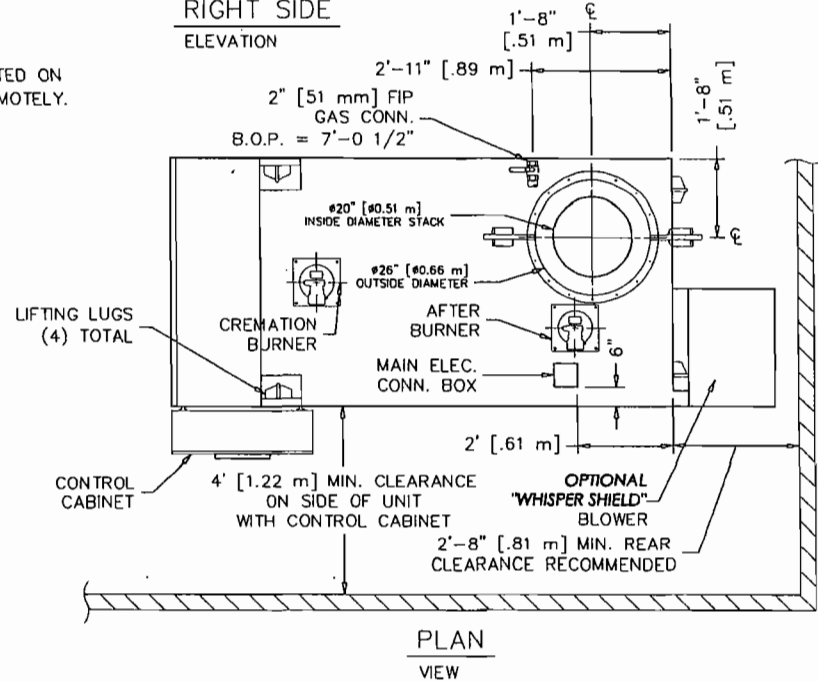
RIGHT SIDE
ELEVATION

NOTES:

- 1) CONTROL CABINET CAN BE MOUNTED ON THE LEFT OR RIGHT SIDE, OR REMOTELY.
- 2) CHAMBER WIDTH IS 39" [0.99m].



REAR
ELEVATION



PLAN
VIEW

Matthews
CREMATION DIVISION

2045 Sprint Boulevard
Apopka, Florida 32703
USA

IEB SERIES 20

PLAN & ELEVATIONS INCL: CLEARANCES,
REQUIREMENTS & RECOMMENDATIONS

DATE:	08-03-09	SCALE:	1/4" = 1'
DRAWN:	JG/CR	PLOT SCALE:	1:48
APRVD:		SHEET:	1 OF 2
DWG FILE:	IEB-20-MarketingPlanElevS1		
DWG #:	0000903		

CREMATOR CLEARANCES

RECOMMENDED MINIMUM

TOP: ②	2 FEET [610 mm]	6 INCHES [152 mm]
CABINET SIDE:	4 FEET [1.22 m]	4 FEET [1.22 m]
OTHER SIDE:	2 FEET [610 mm]	6 INCHES [152 mm]
FRONT:	9 FEET [2.74 m]	8 FEET [2.44 m]
REAR:	3 FEET [0.91 m]	32 INCHES [812 mm]
STACK:	9 INCHES [229 mm]	9 INCHES [229 mm]

- FOR CLEARANCES OTHER THAN THOSE SHOWN, OR FOR SPECIAL REQUIREMENTS, CONSULT YOUR MCD REP.
- FROM HIGHEST POINT ON UNIT.
- CONTROL CABINET MOUNTS ON UNIT'S LEFT OR RIGHT SIDES, OR REMOTELY. (SEE PLAN VIEW, SHEET 1).
- REAR OF UNIT REFERS TO THE "BACK PLATE", RATHER THAN THE BACK OF THE "WHISPER SHIELD" (SEE PLAN VIEW, SHEET 1).

CREMATOR REQUIREMENTS

FUEL: A PRESSURE REGULATOR ADJUSTABLE TO 11" [279 mm] W.C. FOR NATURAL GAS, OR 11" [279 mm] W.C. FOR LP GAS.

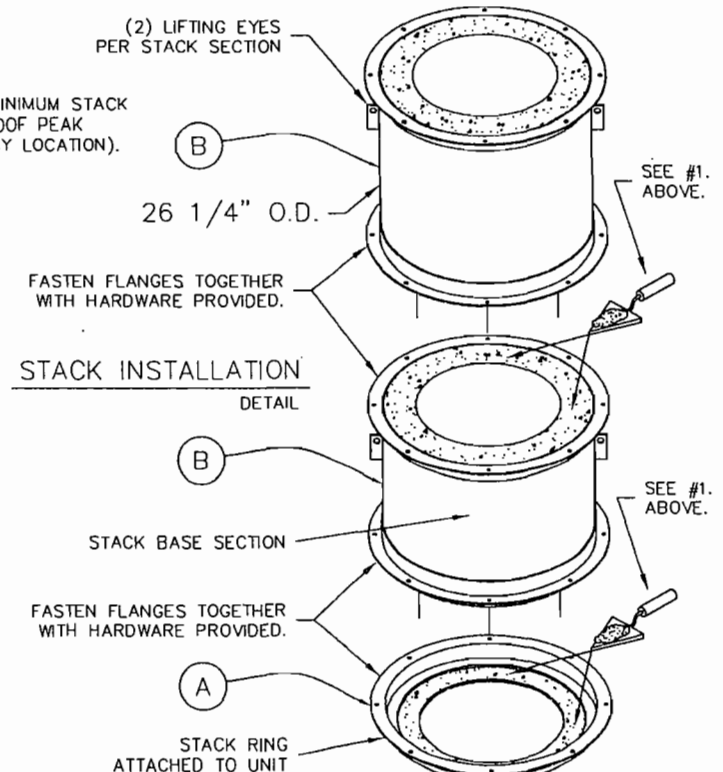
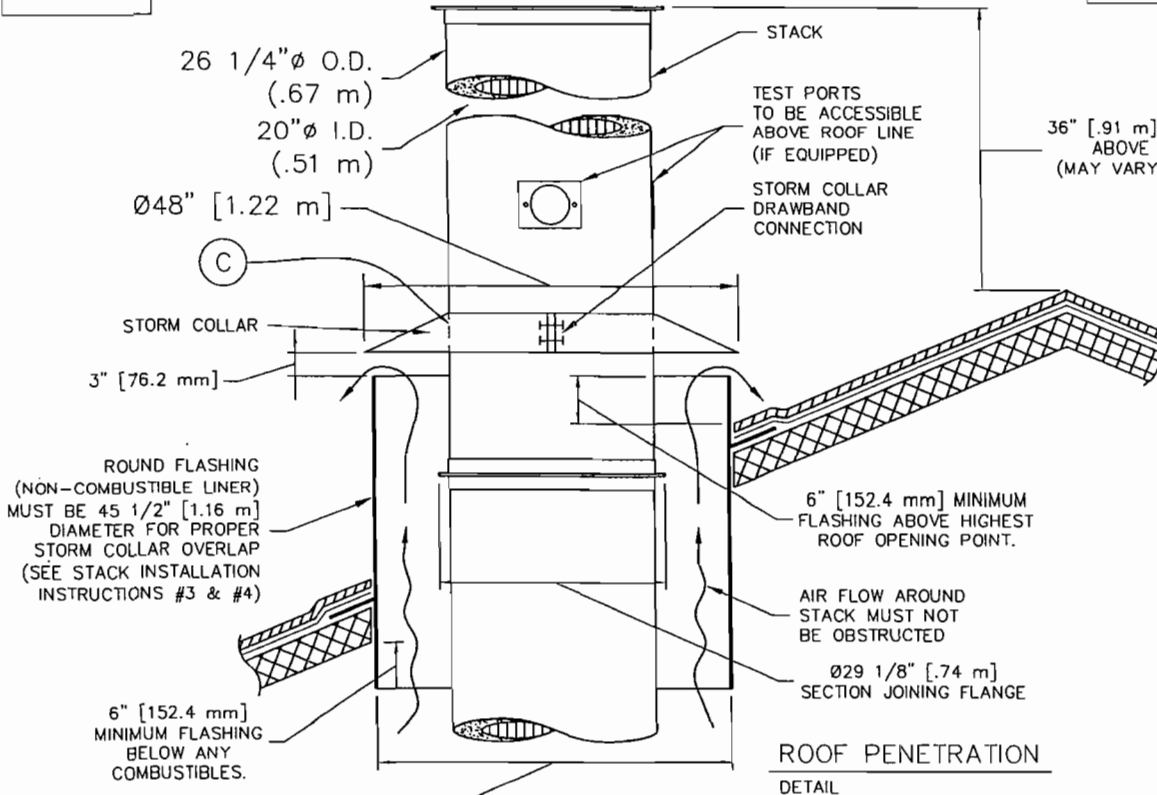
CAPACITY: RANGES FROM 2.0 TO 3.0 MILLION BTU/HR [2.1 TO 3.1 MILLION KILOJOULES/HR] DEPENDING UPON AMOUNT OF BURNERS.

ELECTRICAL: 230 VOLT, 3 ϕ , (40A BREAKER) AND 115v (10A BREAKER), OR 230 VOLT, 1 ϕ , (70A BREAKER) AND 115v (10A BREAKER) 50/60 HERTZ

AIR: LOUVER NEAR THE REAR OF THE UNIT CAPABLE OF PASSING 2,500 CU FT/MIN [70.8 CU M/MIN] OF FREE AIR (36" X 36") [914 mm X 914 mm].

STACK INSTALLATION INSTRUCTIONS

- APPLY A 1/2" THICK MORTAR JOINT TO EXPOSED REFRACTORY SURFACE IN STACK RING. LOWER THE BASE STACK SECTION (B) ONTO STACK RING (A) AND FASTEN WITH HARDWARE PROVIDED (NO MORE THAN (2) STACK SECTIONS SHALL BE LIFTED TOGETHER). REPEAT PROCESS FOR REMAINING STACK SECTIONS. IF SECTIONS OF VARYING LENGTHS ARE SUPPLIED, ASSEMBLE AS TO AVOID FLANGES & LIFTING EYES INTERFERING WITH RAIN COLLAR LOCATION.
- INSTALL STORM COLLAR ON STACK, 3" [72 mm] ABOVE NON-COMBUSTIBLE LINER (FLASHING), ALLOWING FOR PROPER VENTILATION (SEE DETAIL).
- APPLY A 1/4" [6 mm] BEAD OF HIGH-TEMPERATURE SILICON SEALANT (PROVIDED BY MCD) TO THE JOINT BETWEEN THE STORM COLLAR (C) AND THE STACK (B).
- STORM COLLAR IS FURNISHED BY MCD. THE NON-COMBUSTIBLE LINER (FLASHING) TO BE PROVIDED BY THE OTHERS.
- IF FIFTY PERCENT OF THE STACK LENGTH IS ABOVE THE ROOF, GUY WIRES MAY BE REQUIRED. CONSULT WITH YOUR MCD REP.
- RAIN CAP NOT REQUIRED.



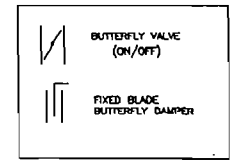
2045 Sprint Boulevard
Apopka, Florida 32703
USA

IEB SERIES 20

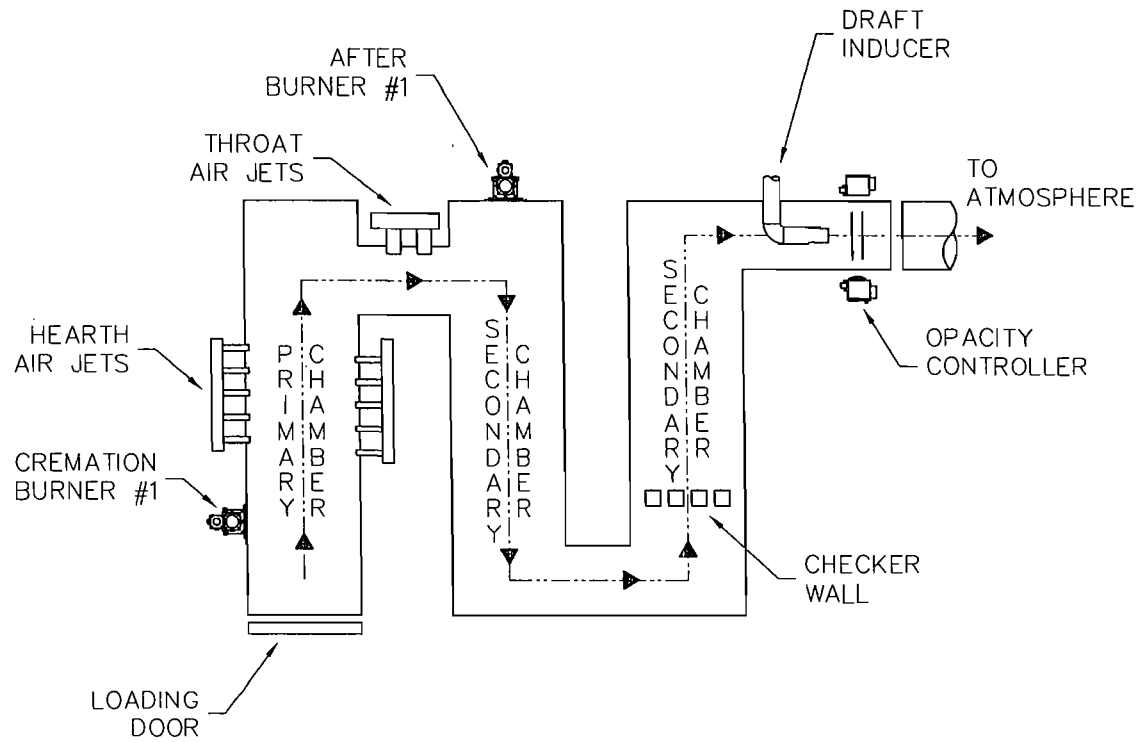
STACK DETAILS, CLEARANCES &
INSTALLATION INSTRUCTIONS.
REFRACTORY STACK DETAIL

DATE:	12-09-10	SCALE:	1/2"=1'
DRAWN:	JG	PLOT SCALE:	1:24
APRVD:		SHEET:	2 OF: 2
DWG FILE:	IEB-20-MarketingStackRefS2R1		
DWG #:	000901		

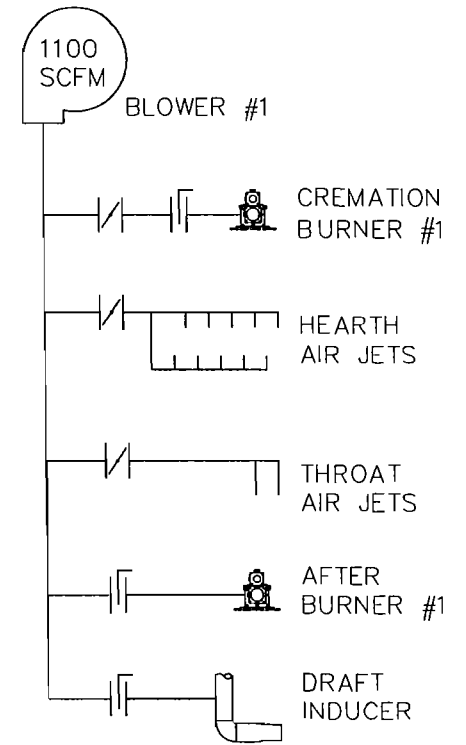
LEGEND OF SYMBOLS




FLOW DIAGRAM



AIR SCHEMATIC




Matthews
 CREMATION DIVISION
 2045 Sprint Boulevard
 Apopka, Florida 32703
 USA

IEB SERIES 20
 FLOW DIAGRAM
 & AIR SCHEMATIC

DATE:	08-05-05	SCALE:	1/4"=1'
DRAWN:	JG/CR	PLOT SCALE:	1:48
APRVD:		SHEET:	1 OF 1
DWG FILE:	IEB-20-FlowDiaAirSchem		
DWG #:	0000904		

Calculation Of Emissions

Potential to Emit

Matthews Cremation Division (MCD)
(formerly Industrial Equipment and Engineering Company (IEE))
Crematory Incinerator Model IEB Series 20

Total Incinerator Burn Capacity 150 lb/hr of remains (type 4) and associated containers (type 0)
Flue gas flow rate = 1175 dscfm 12 Hours/Day X 6 Days/Week X 52 Weeks/Year
(100 % Excess Air) = 3744 Hours/Year

Total Emission Rate = Incinerator Burn Rate X Emission Factor

Sulfur Dioxide (SO₂)

$$\frac{150 \text{ lb/hr X } 2.5 \text{ lb/ton X } 1 \text{ ton}}{2000 \text{ lbs}} = 0.188 \text{ lb/hr}$$

$$= 0.351 \text{ TPY}$$

$$\frac{0.1875 \text{ lb/hr X } 4.54\text{E}+05 \text{ mg/lb X } 1 \text{ ppmv}}{1175 \text{ dscfm X } 60 \text{ min/hr X } 0.0283 \text{ m}^3/\text{ft}^3 \text{ X } 2.61 \text{ mg/m}^3} = 16.35 \text{ ppmv}$$

Nitrogen Oxide (NO_x - as Nitrogen Dioxide)

$$\frac{150 \text{ lb/hr X } 3 \text{ lb/ton X } 1 \text{ ton}}{2000 \text{ lbs}} = 0.225 \text{ lb/hr}$$

$$= 0.4212 \text{ TPY}$$

$$\frac{0.225 \text{ lb/hr X } 4.54\text{E}+05 \text{ mg/lb X } 1 \text{ ppmv}}{1175 \text{ dscfm X } 60 \text{ min/hr X } 0.0283 \text{ m}^3/\text{ft}^3 \text{ X } 1.88 \text{ mg/m}^3} = 27.53 \text{ ppmv}$$

Hydrocarbons (TOC/VOC - methane)

$$\frac{150 \text{ lb/hr X } 3 \text{ lb/ton X } 1 \text{ ton}}{2000 \text{ lbs}} = 0.225 \text{ lb/hr}$$

$$= 0.4212 \text{ TPY}$$

$$\frac{0.225 \text{ lb/hr X } 4.54\text{E}+05 \text{ mg/lb X } 1 \text{ ppmv}}{1175 \text{ dscfm X } 60 \text{ min/hr X } 0.0283 \text{ m}^3/\text{ft}^3 \text{ X } 0.65 \text{ mg/m}^3} = 78.77 \text{ ppmv}$$

Lead (Pb) (6.62E-05 lbs/cremation)

$$\frac{150 \text{ lb/hr X } 0.0000662 \text{ lb Pb}}{100 \text{ lb}} = 1\text{E}-04 \text{ lb/hr}$$

$$= 0.0002 \text{ TPY}$$

Particulates (PM & PM₁₀) (Actual Levels lower as shown by test results)

$$\frac{150 \text{ lb/hr X } 7 \text{ lb/ton X } 1 \text{ ton}}{2000 \text{ lbs}} = 0.525 \text{ lb/hr}$$

$$= 0.9828 \text{ TPY}$$

$$\frac{0.525 \text{ lb/hr X } 7.00\text{E}+03 \text{ gr/lb X}}{1175 \text{ dscfm X } 60 \text{ min/hr}} = 0.05 \text{ gr/dscf}$$

Carbon Monoxide (CO) (Actual Levels lower as shown by test results)

$$\frac{150 \text{ lb/hr X } 10 \text{ lb/ton X } 1 \text{ ton}}{2000 \text{ lbs}} = 0.75 \text{ lb/hr}$$

$$= 1.404 \text{ TPY}$$

$$\frac{0.75 \text{ lb/hr X } 4.54\text{E}+05 \text{ mg/lb X } 1 \text{ ppmv}}{1175 \text{ dscfm X } 60 \text{ min/hr X } 0.0283 \text{ m}^3/\text{ft}^3 \text{ X } 1.14 \text{ mg/m}^3} = 151.31 \text{ ppmv}$$

Notes:

1. Incinerator Emissions based on EPA emissions from Table 2.1-12 of AP-42 (5th Edition)
2. All conversion factors from AP-42 Appendix A.

CREMATOR MASS BALANCE
Matthews Cremation
IEB-20

THESE CALCULATIONS HAVE BEEN PREPARED TO EVALUATE THE COMBUSTION PROCESS IN THIS UNIT.

THE INCINERATOR INSTITUTE OF AMERICA HAS PUBLISHED THE FOLLOWING SPECIFICATIONS COVERING AVERAGE WASTES.

WASTE TYPE	TYPE 0	TYPE 4
BTU PER POUND	8500	1000
POUND ASH PER POUND WASTE	0.05	0.05
POUND MOISTURE PER POUND WASTE	0.1	0.85
POUND COMBUSTIBLES PER POUND WASTE	0.85	0.1
HOURLY CONSUMPTION OF WASTE (LBS)	10	140

1. MASS OF PRODUCTS OF COMBUSTION FROM CONTAINER

A. COMBUSTION AIR

$$\frac{8500 \text{ BTU/LB}}{100 \text{ BTU/CF OF AIR}^*} \times 0.075 \text{ LB/CF OF AIR} = 6.38 \text{ LB/LB BURNED}$$

B. COMBUSTIBLES AND WATER VAPOR FROM CHART ABOVE = 0.95 LB/LB BURNED

C. TOTAL FLUE PRODUCT MASS PER LB BURNED = 7.33 LB/LB BURNED

2. MASS OF PRODUCTS OF COMBUSTION FROM BODY

A. COMBUSTION AIR

$$\frac{1000 \text{ BTU/LB}}{100 \text{ BTU/CF OF AIR}^*} \times 0.075 \text{ LB/CF OF AIR} = 0.75 \text{ LB/LB BURNED}$$

B. COMBUSTIBLES AND WATER VAPOR FROM CHART ABOVE = 0.95 LB/LB BURNED

C. TOTAL FLUE PRODUCT MASS PER LB BURNED = 1.70 LB/LB BURNED

SPECIFICATIONS	
PRIMARY BURNER FUEL CONSUMPTION (MMBTU/HR)	0.5
SECONDARY BURNER FUEL CONSUMPTION (MMBTU/HR)	0.8
ADDITIONAL SECONDARY AIR SUPPLIED (CFM)	200
SEC. CHAMBER OPERATING TEMPERATURE (°F)	1800
SECONDARY CHAMBER VOLUME (CU. FT)	55
SEC. CHAMB. CROSS-SECTIONAL AREA (SQ. FT)	2.44
FLAME PORT AREA (SQ. FT)	2.95
MIXING BAFFLES AREA (SQ. FT)	1.36

*AIR AT STANDARD CONDITIONS

3. TOTAL FLUE PRODUCTS

A. MAXIMUM PRIMARY BURNER GAS USAGE

$$500000 \text{ BTU/HR} \times 4.8\text{E-}05 \text{ LBS/BTU} = 24 \text{ LBS/HR}$$

B. COMBUSTION AIR FOR PRIMARY BURNER

$$\frac{500000 \text{ BTU/HR}}{100 \text{ BTU/CF AIR}} \times 1 \text{ Burner} \times 0.075 \text{ LB/CF AIR} = 375 \text{ LBS/HR}$$

C. MAXIMUM SECONDARY BURNER GAS USAGE

$$800000 \text{ BTU/HR} \times 4.8\text{E-}05 \text{ LBS/BTU} = 38 \text{ LBS/HOUR}$$

D. COMBUSTION AIR FOR SECONDARY BURNER

$$\frac{800000 \text{ BTU/HR}}{100 \text{ BTU/CF AIR}} \times \frac{1}{\text{Burner}} \times 0.075 \text{ LB/CF AIR} = 600 \text{ LBS/HOUR}$$

E. PRODUCTS FROM TYPE 0 WASTE (CONTAINER)

$$7.33 \text{ LBS/LB BURNED} \times 10 \text{ LB/HR BURN RATE} = 73 \text{ LBS/HOUR}$$

F. PRODUCTS FROM TYPE 4 WASTE (TISSUE)

$$1.70 \text{ LBS/LB WASTE} \times 140 \text{ LB/HR BURN RATE} = 238 \text{ LBS/HOUR}$$

G. ADDITIONAL SECONDARY CHAMBER COMBUSTION AIR (THROAT AIR)

$$12000 \text{ CF/HR}^* \times 0.075 \text{ LB/CF AIR} = 900 \text{ LBS/HOUR}$$

H. TOTAL FLUE PRODUCTS

$$= \underline{\underline{2249 \text{ LBS/HOUR}}}$$

2. VELOCITY AND TIME CALCULATIONS

A. SCFM CALCULATION

(PRODUCTS ASSUMED TO HAVE DENSITY CLOSE TO AIR)

$$2249 \text{ LBS/HR} \times \frac{13.35 \text{ STD. CU. FT/LB}}{60 \text{ MIN/HR}} = 500 \text{ SCFM}$$

B. TOTAL PRODUCTS ACFM @ 1800 °F

$$\frac{2260 \text{ °RANKINE}}{530 \text{ °RANKINE}} \times 500.3 \text{ CFM} = 2133 \text{ ACFM}$$

C. RETENTION TIME

$$\frac{55 \text{ CU. FT}}{2133 \text{ ACFM}} \times \frac{60 \text{ SECONDS}}{1 \text{ MINUTE}} = 1.55 \text{ SECONDS}$$

D. VELOCITY IN FLAME PORT

$$\frac{2133 \text{ ACFM}}{2.95 \text{ SQ. FT}} \times \frac{1 \text{ MINUTE}}{60 \text{ SECONDS}} = 12.1 \text{ FEET/SECOND}$$

E. VELOCITY AT MIXING BAFFLES

$$\frac{2133 \text{ ACFM}}{1.36 \text{ SQ. FT}} \times \frac{1 \text{ MINUTE}}{60 \text{ SECONDS}} = 26.1 \text{ FEET/SECOND}$$

F. VELOCITY IN SECONDARY CHAMBER

$$\frac{2133 \text{ ACFM}}{2.44 \text{ SQ. FT}} \times \frac{1 \text{ MINUTE}}{60 \text{ SECONDS}} = 14.6 \text{ FEET/SECOND}$$

SANDERS ENGINEERING & ANALYTICAL SERVICES, INC.

PARTICULATE AND VISIBLE EMISSIONS
TEST REPORT

FOR

MATTHEWS INTERNATIONAL

*Cremator
Lincoln, Alabama*



July 13, 2010

2255 SCHILLINGER RD. N.
SEMMES, ALABAMA 36575-7463
(251) 633-4120
FAX: (251) 633-2285
E-MAIL: sanders@sandersengineering.com

1. INTRODUCTION

Sanders Engineering & Analytical Services, Inc. (SEAS) performed particulate and visible emissions testing July 13, 2010 for Matthews International on the Cremator located at the Lincoln, Alabama facility. The testing was performed in accordance with the applicable U.S. EPA procedures specified at 40 CFR, Part 60, Appendix A, Methods 1, 2, 3, 4, 5, and 9. Further discussions of the test methods are included later in the report.

The purpose of the testing was to demonstrate compliance with the rules and regulations of the U. S. Environmental Protection Agency, and to meet the necessary requirements contained in the permit to operate issued by the Alabama Department of Environmental Management. The tests were conducted by Mr. Isaac Smith, Mr. Brett Horton, and Mr. Anil Raju of Sanders Engineering & Analytical Services, Inc., and were coordinated with Mr. Marco Salgado of Matthews International. Mr. Jimmy Bull of the Alabama Department of Environmental Management was present to observe the testing.

The results of the testing prove the unit to be in compliance with the particulate and visible emissions limitations contained in the permit to operate issued by the Alabama Department of Environmental Management.

**TABLE I. PARTICULATE EMISSIONS TEST RESULTS
MATTHEWS INTERNATIONAL
CREMATOR
LINCOLN, ALABAMA**

Title of Run		<u>RUN 1</u>	<u>RUN 2</u>	<u>RUN 3</u>
Date	Month/Day/Year	7/13/2010	7/13/2010	7/13/2010
Sampling Time -Start	Military	0810	0935	1055
Sampling Time -Stop	Military	0910	1035	1155
Number of Ports	dimensionless	2	2	2
Number of Points per Port	dimensionless	12	12	12
Stack Static Pressure	Inches Water	-0.10	-0.10	-0.10
Barometric Pressure	Inches Mercury	30.05	30.05	30.05
Standard Orifice Pressure $\Delta H @$	Inches Water	2.080	2.080	2.080
Meter Correction Factor	dimensionless	1.051	1.051	1.051
Oxygen Concentration	Mole Percent O2	8.0	8.0	8.0
Carbon Dioxide Concentration	Mole Percent CO2	8.0	7.5	7.5
Volume of Gas Metered	Actual Cubic Feet	33.565	39.535	35.110
Volume of Water Collected	Milliliters	137.5	161.1	136.4
Sampling Time	Minutes	60	60	60
Nozzle Diameter	Inches	0.556	0.556	0.556
Weight of Solids Collected	Milligrams	26.2	25.1	80.4
Area of Stack	Square Feet	2.182	2.182	2.182
Avg. Sqr. Root Velocity Pressure	Inches Water	0.1808	0.2449	0.2207
Average Orifice Pressure (ΔH)	Inches Water	1.3	1.8	1.5
Average Stack Temperature	Degrees F	785	1,196	1,232
Average Meter Temperature	Degrees F	85	91	93

Calculations

		<u>RUN 1</u>	<u>RUN 2</u>	<u>RUN 3</u>	<u>AVERAGE</u>
Standard Temperature (° F) =	68				
Standard Pressure (inches of Hg) =	29.92				
Volume of Gas Sampled	Standard Dry Cubic Feet	34.430	40.205	35.521	36.719
Molecular Wt. of Stack Gas (dry)	LB/LB-MOLE	29.60	29.52	29.52	29.55
Water vapor in Stack Gas	Percent	15.8	15.9	15.3	15.7
Average Stack Gas Velocity	Feet per second	15.9	24.8	22.6	21.1
Stack Gas Flow Rate	Actual Cubic Feet Per Minute	2,076	3,248	2,954	2,759
Stack Gas Flow Rate	Standard Wet Cubic Feet Per Minute	884	1,039	925	950
Stack Gas Flow Rate	Standard Dry Cubic Feet Per Minute	744	874	784	801
Particulate Concentration	Grains per Standard Dry Cubic Foot	0.012	0.010	0.035	0.019
Particulate Concentration	Grains per Actual Cubic Foot	0.004	0.003	0.009	0.005
Particulate Emission Rate	Pounds per Hour	0.07	0.07	0.23	0.13
Isokinetic Rate	Percent	99.8	99.2	97.7	98.9
Post Test Meter Correction Check	dimensionless	1.07	1.08	1.10	1.08
Percent Difference	Allowed 5% Average	1.8	2.8	4.5	3.0

EPA
VISIBLE EMISSION OBSERVATION FORM 1

Method Used (Circle One)
 Method 9 203A 203B Other: _____

Company Name
 Matthews International
 Facility Name
 Street Address
 City Lincoln State AL Zip

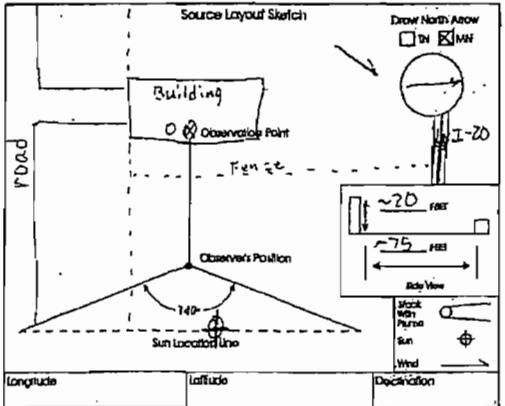
Process Incineration Unit # Operating Mode Full
 Control Equipment Operating Mode

Describe Emission Point
 Round stack on East side of building's roof
 Height of Emis. Pt. Start ~20ft End same Height of Emis. Pt. Rel. to Observer Start ~20ft End same
 Distance to Emis. Pt. Start ~75ft End same Direction to Emis. Pt. (Degrees) Start 280° End same

Vertical Angle to Obs. Pt. Start ~18° End same Direction to Obs. Pt. (Degrees) Start 280° End same
 Distance and Direction to Observation Point from Emission Point
 Start same point End same

Describe Emissions
 Start None End same
 Emission Color NA White Droplet Plume
 Start NA End same Attached Detached None

Describe Plume Background
 Start SKY End same
 Background Color Start Blue/White End same Sky Condition Start Broken End same
 Wind Speed Start 5-10mph End same Wind Direction Start SW End same
 Ambient Temp. Start 87° End 87° Wet Bulb Temp. RH Percent 60%



Additional Information

Form Number Page of
 Continued on VEO Form Number

Observation Date					Time Zone					Start Time				End Time			
7-13-10					Central					8:10				9:10			
Sec	0	15	30	45	Sec	0	16	30	45	Min	0	16	30	45			
1	0	0	0	0	1	0	0	0	0								
2	0	0	0	0	2	0	0	0	0								
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7	0	0	0	0	7	0	0	0	0								
8	0	0	0	0	8	0	0	0	0								
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28	0	0	0	0	28	0	0	0	0								
29	0	0	0	0	29	0	0	0	0								
30	0	0	0	0	30	0	0	0	0								

Observer Name (Print) Brett Harton
 Observer Signature [Signature] Date 7-13-10
 Organization Sanders Engineering
 Certified by Whitlow Enterprises Date 4-7-10

VEOF1.1

EPA
VISIBLE EMISSION OBSERVATION FORM 1

Method Used (Circle One) 2024 2030 Other _____

Form Number _____ Page _____ of _____
Continued on VEO Form Number _____

Company Name
Matthew's International
Factory Name _____
Street Address _____
City Lincoln State AL Zip _____

Observation Date 7-13-10 Time Zone Central Start Time 4:35 End Time 6:35

Process Incineration Unit # _____ Operating Mode Full
Control Equipment _____ Operating Mode _____

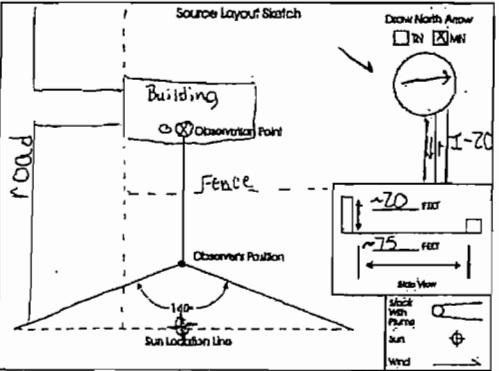
Min	Sec				Min	Sec			
	0	15	30	45		0	15	30	45
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2	0	0	0	0	2	0	0	0	0
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7	0	0	0	0	7	0	0	0	0
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28	0	0	0	0	28	0	0	0	0
29	0	0	0	0	29	0	0	0	0
30	0	0	0	0	30	0	0	0	0

Describe Emission Point
Round stack on East side of Building's roof
Height of Emiss. Pt. Start ~20 ft End same Height of Emiss. Pt. Rel. to Observer Start ~20 ft End same
Distance to Emiss. Pt. Start ~20 ft End same Direction to Emiss. Pt. (Degrees) Start 280° End same

Vertical Angle to Obs. Pt. Start ~18° End same Direction to Obs. Pt. (Degrees) Start 280° End same
Distance and Direction to Observation Point from Emission Point Start SAME POINT End same

Describe Emissions
Start None End same
Emission Color _____ Water Droplet Plume _____
Start NA End same Attached Detached None

Describe Plume Background
Start SKY End same
Background Color Blue/white Sky Conditions Start BROKEN End _____
Wind Speed Start 5-10 mph End same Wind Direction Start SW End same
Ambient Temp. Start 87° End same Wet Bulb Temp. _____ RH Percent 50%



Longitude _____ Latitude _____ Direction _____

Observer's Name (Print) Brett Horton
Observer's Signature Brett Horton Date 7-13-10
Organization Sanders Engineering
Certified By Whitlow Enterprises Date 4-7-10

VEOF1.1

EPA
VISIBLE EMISSION OBSERVATION FORM 1

Main Use (Circle One)
(Mandatory) 203A 203B Other: _____

Company Name
Matthews International
Factory Name
Street Address
City Lincoln State AL Zip _____

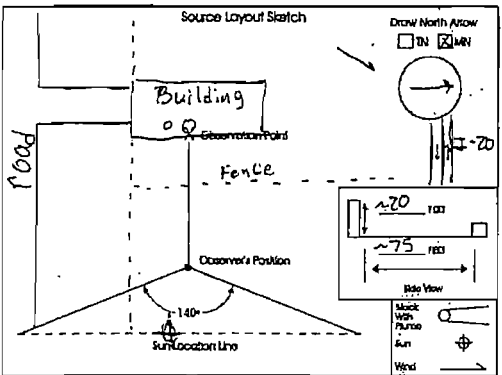
Process Incineration Unit # _____ Operating Mode Full
Control Equipment _____ Operating Mode _____

Describe Emission Point
Round stack on East side of buildings roof
Height of Emiss. Pt. Start ~20 ft End same Height of Emiss. Pt. Rel. to Observer Start ~20 ft End same
Distance to Emiss. Pt. Start ~75 ft End same Direction to Emiss. Pt. (Degrees) Start 270° End same

Vertical Angle to Obs. Pt. Start ~18° End same Direction to Obs. Pt. (Degrees) Start 270° End same
Distance and Direction to Observation Point from Emission Point Start same point End same

Describe Emissions
Start None End same
Emission Color Start NA End same Attached Detached Name

Describe Plume Background
Start sky End same
Background Color Start blue/white End same Sky Conditions Start broken End same
Wind Speed Start 5-10 mph End same Wind Direction Start SW End same
Ambient Temp. Start 90°F End 92°F Wet Bulb Temp. RH Percent 50%



Longitude _____ Latitude _____ Declination _____

Additional Information

Form Number: _____ Page _____ of _____
Continued on VEO Form Number _____

Observation Date		Time Zone				Start Time		End Time			
7-13-10		Central				10:55		11:55			
Min	Sec	0	15	30	45	Min	Sec	0	15	30	45
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3	0	0	0	0	0	3	0	0	0	0	0
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28	0	0	0	0	0	28	0	0	0	0	0
29	0	0	0	0	0	29	0	0	0	0	0
30	0	0	0	0	0	30	0	0	0	0	0

Observer's Name (Print) Brett Horton
Observer's Signature Brett Horton Date 7-13-10
Organization Sanders Engineering
Checked by Whitlow Enterprises Date 4-7-10

VEOF1.1

Christine Miller, DVM



One Zoo Boulevard
12400 SW 152nd Street
Miami, FL 33177-1499

www.zoomiami.org



Dept. of Environmental Protection
Receipts
P.O. Box 3070
Tallahassee, FL 32315-3070

