MARYLAND DEPARTMENT OF THE ENVIRONMENT

AIR AND RADIATION ADMINISTRATION
APPLICATION FOR A PERMIT TO CONSTRUCT

SUPPLEMENT A TO
DOCKET #09-20

COMPANY: Vaughn Greene Funeral Services, PA

LOCATION: 4905 York Road
Baltimore MD 21212

APPLICATION: Installation of a Matthews Environmental Solutions Power-Pak II Plus human crematory.

ITEM	DESCRIPTION
1	Notice of Application and Informational Meeting
2	Supplemental Technical Information – process flow diagram, technical equipment specifications, emissions calculations, and air toxics screen model compliance demonstration.

DEPARTMENT OF THE ENVIRONMENT
AIR AND RADIATION ADMINISTRATION

NOTICE OF APPLICATION AND INFORMATIONAL MEETING

The Maryland Department of the Environment, Air and Radiation Administration (ARA) received a permit-to-construct application from Vaughn Greene Funeral Services, PA on June 8, 2020 for the installation of a Matthews Environmental Solutions Power-Pak II Plus human crematory. The proposed installation will be located at 4905 York Road, Baltimore, Maryland 21212.

The application and other supporting documents are available for public inspection on the Department's website at the following link:

https://mde.maryland.gov/programs/Permits/AirManagementPermits/Pages/index.aspx

Pursuant to the Environment Article, Sections 1-601 and 1-603, Annotated Code of Maryland, a Virtual Informational Meeting and an In-Person Informational Meeting have been scheduled so that citizens can discuss the application and the permit review process with the applicant and the Department.

VIRTUAL INFORMATIONAL MEETING

The Virtual Informational Meeting has been scheduled for Monday, November 2, 2020 at 7:00 p.m. In order to view or participate in the Virtual Informational Meeting, a participant must register using the following link:

https://attendee.gotowebinar.com/register/8405841571143437071

Once registered, directions to participate online or by phone will be electronically forwarded to the email provided.

Phone-only participants will not have the ability to ask questions or comment during the meeting; however, questions and comments may be sent to Ms. Shannon Heafey via e-mail at shannon.heafey@maryland.gov or by phone at 410-537-4433. Questions and comments must be received by Friday, October 30, 2020 in order to be read during the Virtual Informational Meeting.

IN-PERSON INFORMATIONAL MEETING

The In-Person Informational Meeting has been scheduled for Monday, November 9, 2020 at 7:00 p.m. at the chapel at Vaughn Greene Funeral Home, 4905 York Road, Baltimore, Maryland 21212. Due to the COVID-19 pandemic and the need to maintain social distancing, attendance at the In-Person Informational Meeting is extremely limited. For the safety of all, participants are strongly encouraged to participate in the Virtual Informational Meeting in lieu of attending the In-Person Informational Meeting.

Participants must register in advance in order to attend the In-Person Informational Meeting. Masks and social distancing will be required for all participants. A participant who fails to register in advance, wear a mask, and practice social distancing will not be allowed to attend the In-Person Informational Meeting.

To attend the In-Person Informational Meeting, please call Ms. Shannon Heafey at 410-537-4433 or send an email to shannon.heafey@maryland.gov and provide your name, telephone number, and email address. Ms. Heafey will confirm, using the contact information that you provide, that you are registered to attend the In-Person Informational Meeting.

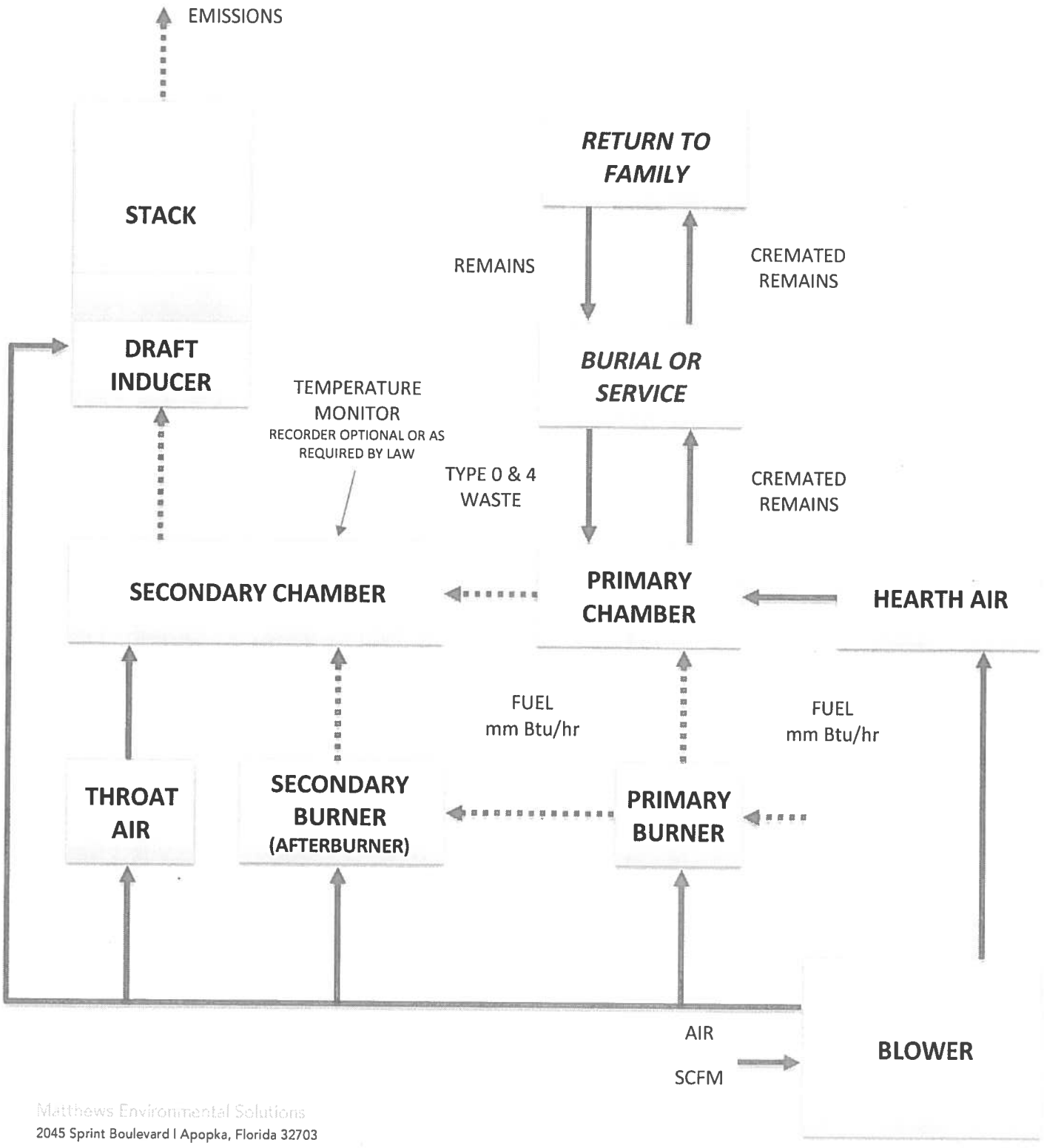
The Department will provide an interpreter for deaf and hearing-impaired persons provided that a request is made for such service at least ten (10) days prior to the In-Person Informational Meeting.

Further information may be obtained by calling Ms. Shannon Heafey at 410-537-4433.

George S. Aburn, Jr., Director
Air and Radiation Administration

Matthews
ENVIRONMENTAL SOLUTIONS

Cremator Process Flow Diagram



Matthews Environmental Solutions
2045 Sprint Boulevard | Apopka, Florida 32703
O: 407-886-5533 | F: 407-886-5990 | www.matthewsenvironmentalsolutions.com

Rev 07.27.18

SPECIFICATIONS- Model Power-Pak II Plus

1. Equipment Type	Model Power-Pak II Plus
A. Model No.	IE43-PPII Plus
B. Underwriters Laboratories Listing and File No.	87E8; MH14647
2. Dimensions	
A. Footprint	12' – 9 ½ " x 5' - 9" (3.9 m x 1.8 m)
B. Maximum Length	14' – 10 ½ " (4.53 m)
C. Maximum Width	6' -10" (2.08 m)
D. Maximum Height	9' (2.74 m)
E. Chamber Loading Opening	30 ¾ " H x 43 ½ " W (781 mm x 1105 mm)
3. Weight	28,000 lbs. (12,700 kg)
4. Utility/Air Requirements	
A. Gross Gas Input, Natural or LP Gas	3,000,000 BTU/hr. (3,165,168 kJ/h)
Running Gas Pressure, LP or Natural Gas	11 inches (279.4 mm) water column or greater
B. Electrical Supply	230 volt, 3Ø or 1Ø, 50/60 hz (others available)
C. Air Supply	2,500 cfm (70.8 standard m^3/min)
5. Incineration Capacity	175 lbs./hr. (79 kg/h)
6. Typical Loading Capacity of Waste Types	750 lbs. (340.2 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	4 1/2" (110 mm) insulating firebrick or castable
B. Outer Wall	12 gauge (3 mm) sheet, Stainless Steel, welded seams (unlined stack available)
10. Draft Nozzle Construction	Schedule 40 Stainless Steel pipe with 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

SPECIFICATIONS- Model Power-Pak II Plus

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
    - 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 ..... 3,100° F. (1704° 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 ..... 70 cubic feet (2.12 m^3)
    - B. Secondary Chamber ..... 96 cubic feet (2.72 m^3)

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 ..... 32° F. - 1,800° F. (0° C - 982° C)
    - B. Secondary Chamber ..... 1,400° F. - 1,800° F. (760°C - 982°C) (as required by Env. agency)

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.

SPECIFICATIONS- Model Power-Pak II Plus

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
    - K. Cremation Burner/Door Interlock ..... Available upon Env. Agency requirements

21. Burner Description ..... The nozzle mix burners used on this cremation equipment are industrial quality and designed for incinerator use.

22. 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.

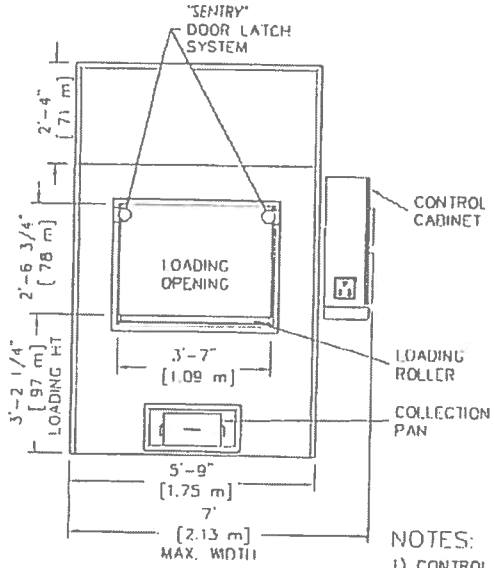
23. Operating Panel indicators
    - A. Safe Run ..... Included
    - B. Door Closed ..... Included
    - C. Pollution Alarm ..... Included
    - D. Afterburner On (Secondary Burner) ..... Included
    - E. Cremation Burner On ..... Included
    - F. Low Fire Cremation Burner On ..... Included
    - G. Afterburner (Secondary Burner) Reset ..... Included
    - H. Cremation Burner Reset ..... Included
    - I. Hearth Air ..... Included
    - J. Throat Air Off ..... Included

24. 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

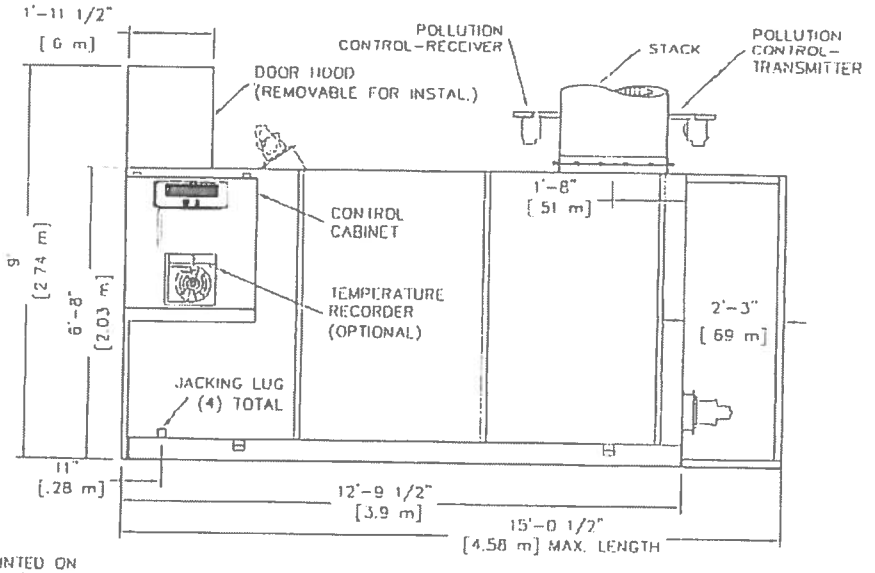
25. Exterior Finish
    - A. Primer ..... 2 coats rust inhibiting
    - B. Finish ..... 2 coats textured finish

SPECIFICATIONS- Model Power-Pak II Plus

26. 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.
27. Environmental Submittals	Complete technical portion of state environmental permits. Engineering calculations, technical data, existing stack test results and equipment blueprints provided.

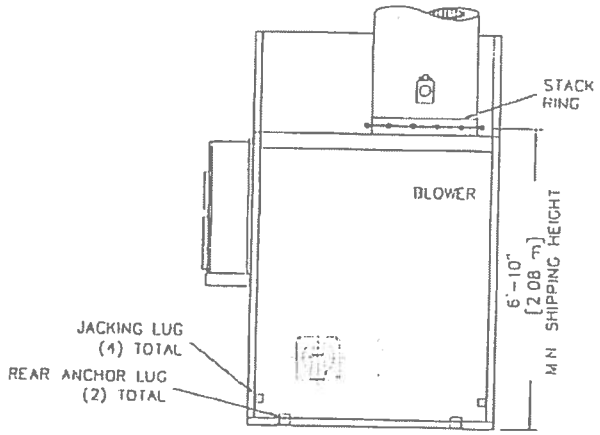


FRONT ELEVATION

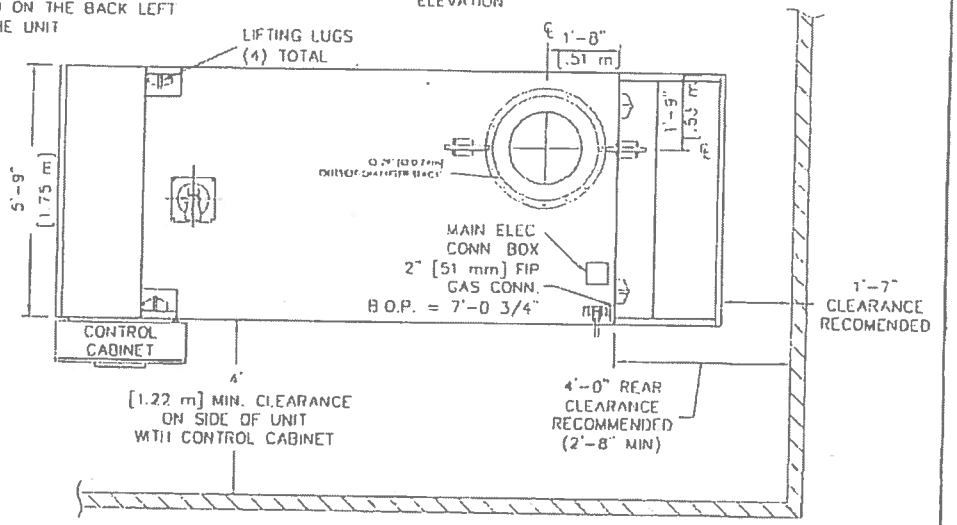


RIGHT SIDE ELEVATION

NOTES:
1) CONTROL CABINET CAN BE MOUNTED ON THE LEFT OR RIGHT SIDE, OR REMOTELY.
2) CHAMBER WIDTH IS 43" [1.09m].
3) STACK CAN BE LOCATED ON THE BACK LEFT OR BACK RIGHT SIDE OF THE UNIT



REAR ELEVATION



PLAN VIEW

Matthews
ENVIRONMENTAL SOLUTIONS
2045 Sprint Boulevard
Apopka, Florida 32703
USA

POWER-PAK II PLUS

PLAN & ELEVATIONS INCL: CLEARANCES, REQUIREMENTS & RECOMMENDATIONS

DRAWN BY: JG	DATE: 02.26.2015	REVISION		
APPROVED BY: -	DATE: -			
SCALE 1/4" = 1'-0"	SHEET: OF:			
DWG FILE:				
DWG NUMBER: 09-003				

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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:	6 INCHES	[152 mm]	6 INCHES	[152 mm]

1. FOR CLEARANCES OTHER THAN THOSE SHOWN, OR FOR SPECIAL REQUIREMENTS, CONSULT YOUR MCD REP
2. FROM HIGHEST POINT ON UNIT
3. CONTROL CABINET MOUNTS ON UNIT'S LEFT OR RIGHT SIDES, OR REMOTELY. (SEE PLAN VIEW, SHEET 1).
4. 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 AND LP GAS.

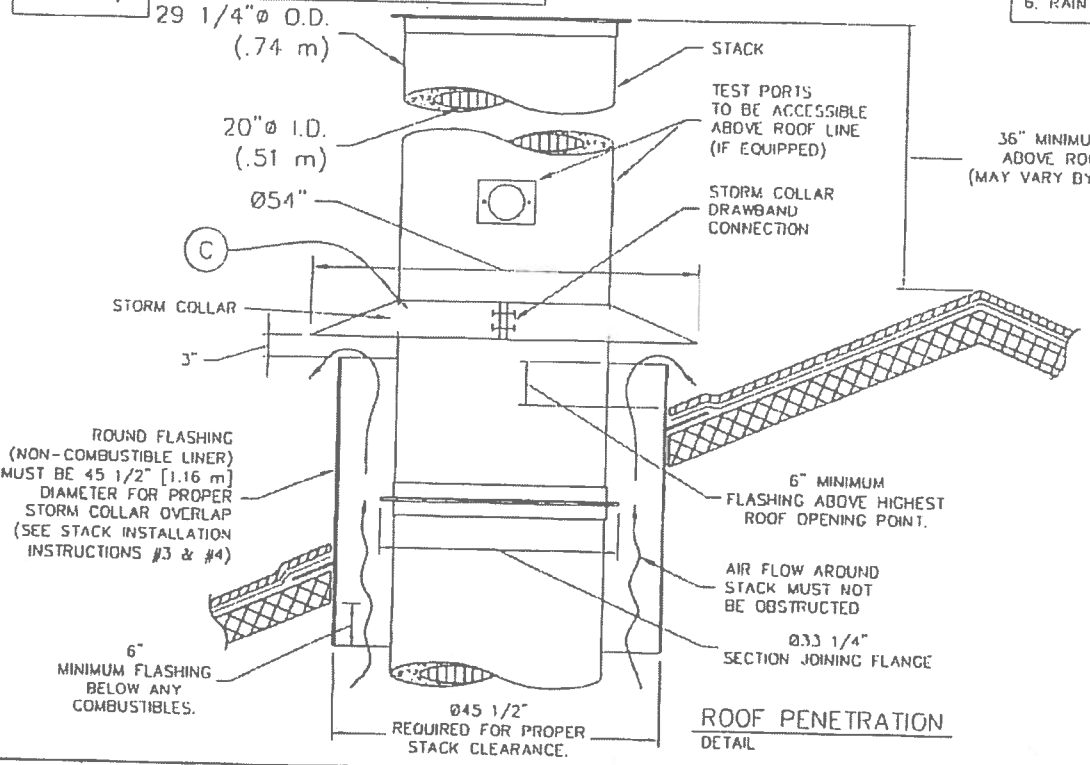
CAPACITY: 3.0 MILLION BTU/HR [3.1 MILLION KILOJOULES/HR].

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

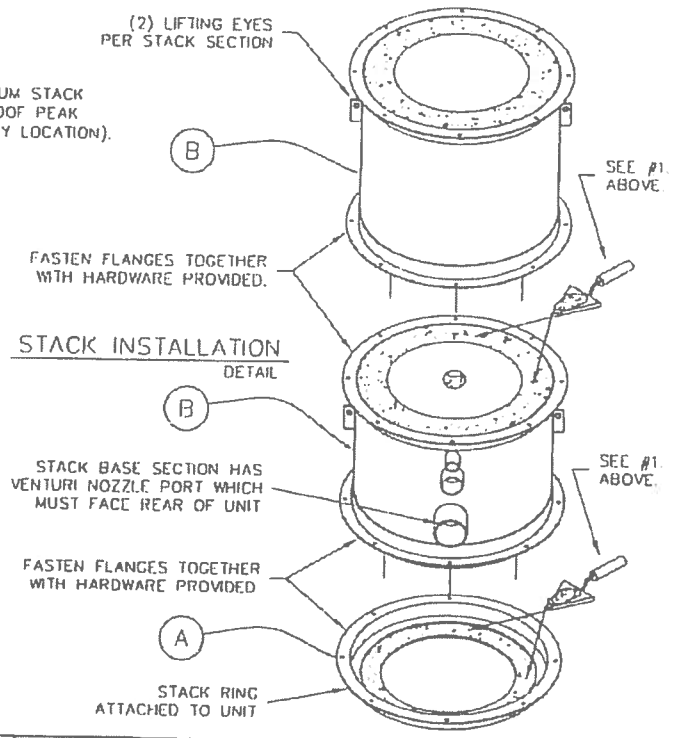
AIR: LOUVER NEAR THE REAR OF THE UNIT CAPABLE OF PASSING 2,500 CU FT/MIN [70.8 CU M/MIN] OF FREE AIR (36" X 36") [914 mm X 914 mm].

STACK INSTALLATION INSTRUCTIONS

1. 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.
2. INSTALL STORM COLLAR ON STACK, 3" [76 mm] ABOVE NON-COMBUSTIBLE LINER (FLASHING), ALLOWING FOR PROPER VENTILATION (SEE DETAIL).
3. 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 (D).
4. STORM COLLAR IS FURNISHED BY MCD. THE NON-COMBUSTIBLE LINER (FLASHING) TO BE PROVIDED BY THE OTHERS.
5. IF FIFTY PERCENT OF THE STACK LENGTH IS ABOVE THE ROOF, GUY WIRES MAY BE REQUIRED. CONSULT WITH YOUR MCD REP.
6. RAIN CAP NOT REQUIRED.



ROOF PENETRATION
DETAIL



STACK INSTALLATION
DETAIL

Matthews
ENVIRONMENTAL SOLUTIONS
2045 Sprint Boulevard
Apopka, Florida 32703
USA

POWER-PAK II PLUS

STACK DETAILS, CLEARANCES & INSTALLATION INSTRUCTIONS. REFRACTORY STACK DETAIL

DRAWN BY:	JG	DATE:	03.14.2014	REVISION:
APPROVED BY:	-	DATE:	-	
SCALE:	1/2" = 1'-0"	SHEET:	OF:	
DWG FILE:				
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Calculation Of Emissions

Estimated Emission Calculation

Matthews Environmental Solutions
(previously Matthews Cremation Division)
Crematory Incinerator Model IE43-PPII Plus

Total Incenerator Burn Capacity 175 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

Sulfer Dioxide (SO_2)

$$\frac{175 \text{ lb/hr} \times 2.17 \text{ lb/ton} \times \frac{1 \text{ ton}}{2000 \text{ lbs}}}{} = 0.190 \text{ lb/hr} = 0.355446 \text{ TPY}$$

$$\frac{0.189875 \text{ lb/hr} \times 4.54E{+}05 \text{ mg/lb} \times 1 \text{ ppmv}}{1175 \text{ dscfm} \times 60 \text{ min/hr} \times 0.0283 \text{ m}^3/\text{f}^3 \times 2.61 \text{ mg/m}^3} = 16.55 \text{ ppmv}$$

Nitrogen Oxide (NOx - as Nitrogen Dioxide)

$$\frac{175 \text{ lb/hr} \times 3.56 \text{ lb/ton} \times \frac{1 \text{ ton}}{2000 \text{ lbs}}}{} = 0.3115 \text{ lb/hr} = 0.583128 \text{ TPY}$$

$$\frac{0.3115 \text{ lb/hr} \times 4.54E{+}05 \text{ mg/lb} \times 1 \text{ ppmv}}{1175 \text{ dscfm} \times 60 \text{ min/hr} \times 0.028 \text{ m}^3/\text{f}^3 \times 1.88 \text{ mg/m}^3} = 38.11 \text{ ppmv}$$

Particulates (PM & PM_{10})

$$\frac{175 \text{ lb/hr} \times 4.67 \text{ lb/ton} \times \frac{1 \text{ ton}}{2000 \text{ lbs}}}{} = 0.408625 \text{ lb/hr} = 0.764946 \text{ TPY}$$

$$\frac{0.408625 \text{ lb/hr} \times 7.00E{+}03 \text{ gr/lb}}{1175 \text{ dscfm} \times 60 \text{ min/hr}} = 0.04 \text{ gr/dscf}$$

Carbon Monoxide (CO)

$$\frac{175 \text{ lb/hr} \times 2.95 \text{ lb/ton} \times \frac{1 \text{ ton}}{2000 \text{ lbs}}}{} = 0.258125 \text{ lb/hr} = 0.48321 \text{ TPY}$$

$$\frac{0.258125 \text{ lb/hr} \times 4.54E{+}05 \text{ mg/lb} \times 1 \text{ ppmv}}{1175 \text{ dscfm} \times 60 \text{ min/hr} \times 0.028 \text{ m}^3/\text{f}^3 \times 1.14 \text{ mg/m}^3} = 52.08 \text{ ppmv}$$

Hydrocarbons (TOC/VOC - methane)

$$\frac{175 \text{ lb/hr} \times 2.99E{-}01 \text{ lb/ton} \times \frac{1 \text{ ton}}{2000 \text{ lbs}}}{} = 0.026163 \text{ lb/hr} = 0.048976 \text{ TPY}$$

$$\frac{0.0261625 \text{ lb/hr} \times 4.54E{+}05 \text{ mg/lb} \times 1 \text{ ppmv}}{1175 \text{ dscfm} \times 60 \text{ min/hr} \times 0.0283 \text{ m}^3/\text{f}^3 \times 0.65 \text{ mg/m}^3} = 9.16 \text{ ppmv}$$

Notes:
1. Incinerator Emissions based on EPA emissions from Table 2.3-1 and 2.3-2 of AP-42 (5th Edition)
2. All conversion factors from AP-42 Appendix A.

CREMATOR MASS BALANCE

Matthews Environmental Solutions

PPII Plus

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	165

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)	1
SECONDARY BURNER FUEL CONSUMPTION (MMBTU/HR)	1.2
ADDITIONAL SECONDARY AIR SUPPLIED (CFM)	200
SEC. CHAMBER OPERATING TEMPERATURE (°F)	1600
SECONDARY CHAMBER VOLUME (CU. FT)	96
SEC. CHAMB. CROSS-SECTIONAL AREA (SQ. FT)	2.76
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

1000000 BTU/HR x 4.8E-05 LBS/BTU = 48 LBS/HR

B. COMBUSTION AIR FOR PRIMARY BURNER

$$\frac{1000000 \text{ BTU/HR}}{100 \text{ BTU/CF AIR}} \times \frac{1}{\text{Burner}} \times 0.075 \text{ LB/CF AIR} = 750 \text{ LBS/HR}$$

C. MAXIMUM SECONDARY BURNER GAS USAGE

1200000 BTU/HR x 4.8E-05 LBS/BTU = 58 LBS/HOUR

D. COMBUSTION AIR FOR SECONDARY BURNER

$$\frac{1200000 \text{ BTU/HR}}{100 \text{ BTU/CF AIR}} \times \frac{1}{\text{Burner}} \times 0.075 \text{ LB/CF AIR} = 900 \text{ LBS/HOUR}$$

E. PRODUCTS FROM TYPE 0 WASTE (CONTAINER)

7.33 LBS/LB BURNED x 10 LB/HR BURN RATE = 73 LBS/HOUR

F. PRODUCTS FROM TYPE 4 WASTE (TISSUE)

1.70 LBS/LB WASTE x 165 LB/HR BURN RATE = 281 LBS/HOUR

G. ADDITIONAL SECONDARY CHAMBER COMBUSTION AIR (THROAT AIR)

12000 CF/HR* x 0.075 LB/CF AIR = 900 LBS/HOUR

H. TOTAL FLUE PRODUCTS = 3009 LBS/HOUR

2. VELOCITY AND TIME CALCULATIONS

A. SCFM CALCULATION (PRODUCTS ASSUMED TO HAVE DENSITY CLOSE TO AIR)

$$3009 \text{ LBS/HR} \times \frac{13.35 \text{ STD. CU FT/LB}}{60 \text{ MIN/HR}} = 670 \text{ SCFM}$$

B. TOTAL PRODUCTS ACFM @ 1600 °F

$$\frac{2060 \text{ °RANKINE}}{530 \text{ °RANKINE}} \times 669.6 \text{ CFM} = 2603 \text{ ACFM}$$

C. RETENTION TIME

$$\frac{96 \text{ CU. FT}}{2603 \text{ ACFM}} \times \frac{60 \text{ SECONDS}}{1 \text{ MINUTE}} = 2.21 \text{ SECONDS}$$

Vaughn Greene Funeral Home — Facility Name
Vaughn Greene Funeral Home — Your Name
21-Feb-20 — Date

HUMAN (number)	Animal (lbs)		Equivalent
1		Cremations per Hour	1.0
4		Cremations per 8-hour	4.0
3000		Cremations per year	3000.0

77.56 — Screen3 maximum concentration (1 lb/hr emission rate)
Toxytool 2015

CAS	POLLUTANT	Emission Factor (EPA FIRE) (Pounds)	Emission Factor (as number) (Pounds)	MDE Screening Level 1-HOUR (ug/m3)	MDE Screening Level 8-HOUR (ug/m3)	MDE Screening Level Annual (ug/m3)	Screen3 Concentration 1-hour (ug/m3)	Screen3 Concentration 8-hour (ug/m3)	Screen3 Concentration Annual (ug/m3)	Screen3 Concentration as % of MDE Screening Level 1-hour	Screen3 Concentration as % of MDE Screening Level 8-hour	Screen3 Concentration as % of MDE Screening Level Annual
83329	Acenaphthene	1.11E-07	1.11E-07		2.03E+01	8.00E-02	8.61E-06	3.01E-06	2.36E-07		0.00	0.00
208968	Acenaphthylene	1.22E-07	1.22E-07		2.46E+01		9.46E-06	3.31E-06	2.59E-07		0.00	
120127	Anthracene	3.24E-07	3.24E-07		2.00E+01		2.51E-05	8.80E-06	6.88E-07		0.00	
7440360	Antimony	< 3.020E-5	3.02E-05		5.00E+00		2.34E-03	8.20E-04	6.42E-05		0.02	
7440382	Arsenic	< 3.000E-5	3.00E-05		1.00E-01	2.00E-04	2.33E-03	8.14E-04	6.37E-05		0.81	31.87
7440393	Barium	2.40E-05	2.40E-05		5.00E+00		1.86E-03	6.52E-04	5.10E-05		0.01	
56553	Benzo (a) anthracene	< 9.760E-9	9.76E-09				7.57E-07	2.65E-07	2.07E-08			
50328	Benzo (a) pyrene	< 2.910E-8	2.91E-08				2.26E-06	7.90E-07	6.18E-08			
205992	Benzo (b) fluoranthene	< 1.590E-8	1.59E-08				1.23E-06	4.32E-07	3.38E-08			
191242	Benzo (g,h,i) perylene	< 2.910E-8	2.91E-08		2.00E+01		2.26E-06	7.90E-07	6.18E-08		0.00	
207089	Benzo (k) fluoranthene	< 1.420E-8	1.42E-08				1.10E-06	3.85E-07	3.02E-08			
7440417	Beryllium	1.37E-06	1.37E-06		5.00E-04	4.00E-04	1.06E-04	3.72E-05	2.91E-06		7.44	0.73
7440439	Cadmium	1.11E-05	1.11E-05		2.00E-02	6.00E-04	8.61E-04	3.01E-04	2.36E-05		1.51	3.93
7440473	Chromium	2.99E-05	2.99E-05		5.00E+00		2.32E-03	8.12E-04	6.35E-05		0.02	
18540299	Chromium (VI)	1.35E-05	1.35E-05		1.00E-01	8.00E-05	1.05E-03	3.66E-04	2.87E-05		0.37	35.86
218019	Chrysene	< 5.400E-8	5.40E-08				4.19E-06	1.47E-06	1.15E-07			
7440484	Cobalt	< 1.750E-6	1.75E-06		2.00E-01		1.36E-04	4.75E-05	3.72E-06		0.02	
7440508	Copper	2.74E-05	2.74E-05		2.00E+00		2.13E-03	7.44E-04	5.82E-05		0.04	
53703	Dibenzo(a,h) anthracene	< 1.270E-8	1.27E-08				9.85E-07	3.45E-07	2.70E-08			
206440	Fluoranthene	2.05E-07	2.05E-07		8.20E+01		1.59E-05	5.56E-06	4.36E-07		0.00	
86737	Fluorene	4.17E-07	4.17E-07		2.00E+01		3.23E-05	1.13E-05	8.86E-07		0.00	
7647010	Hydrogen chloride	7.20E-02	7.20E-02	2.98E+01	1.65E+02	7.00E-01	5.58E+00	1.95E+00	1.53E-01	18.72	1.18	21.86
7664393	Hydrogen fluoride	6.55E-04	6.55E-04	1.64E+01	4.09E+00		5.08E-02	1.78E-02	1.39E-03	0.31	0.43	
193395	Indeno(1,2,3-cd)pyrene	< 1.540E-8	1.54E-08				1.19E-06	4.18E-07	3.27E-08			
7439921	Lead	6.62E-05	6.62E-05		5.00E-01		5.13E-03	1.80E-03	1.41E-04		0.36	
7439976	Mercury	3.29E-03	3.29E-03	3.00E-01	1.00E-01		2.55E-01	8.93E-02	6.99E-03	85.06	89.31	
7439987	Molybdenum	< 1.670E-5	1.67E-05		5.00E+00		1.30E-03	4.53E-04	3.55E-05		0.01	
7440020	Nickel	3.82E-05	3.82E-05		1.00E+00		2.96E-03	1.04E-03	8.12E-05		0.10	
85018	Phenanthrene	2.29E-06	2.29E-06		9.80E+00		1.78E-04	6.22E-05	4.87E-06		0.00	
129000	Pyrene	1.62E-07	1.62E-07		2.00E+01		1.26E-05	4.40E-06	3.44E-07		0.00	
7782492	Selenium	< 4.360E-5	4.36E-05		2.00E+00		3.38E-03	1.18E-03	9.26E-05		0.06	
7440224	Silver	7.30E-06	7.30E-06		1.00E-01		5.66E-04	1.98E-04	1.55E-05		0.20	
7440280	Thallium	< 8.520E-5	8.52E-05		2.00E-01		6.61E-03	2.31E-03	1.81E-04		1.16	
7440622	Vanadium	5.79E-05	5.79E-05		5.00E-01		4.49E-03	1.57E-03	1.23E-04		0.31	
7440666	Zinc	3.53E-04	3.53E-04	1.00E+03	5.00E+02		2.74E-02	9.58E-03	7.50E-04	0.00	0.00	
	PM, filterable	8.50E-02	8.50E-02				6.59E+00	2.31E+00	1.81E-01			
	Polycyclic aromatic hydrocarbons (PAH)	3.76E-06	3.76E-06				2.92E-04	1.02E-04	7.99E-06			
1746016	Total Dioxins & Furans - TEQ balanced		1.41E-09		8.20E-04	3.00E-08	1.09E-07	3.82E-08	2.99E-09		0.00	9.97

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 13043 ***

Vaughn Greene

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	POINT
EMISSION RATE (G/S)	=	0.126000
STACK HEIGHT (M)	=	12.1900
STK INSIDE DIAM (M)	=	0.5080
STK EXIT VELOCITY (M/S)	=	6.0960
STK GAS EXIT TEMP (K)	=	866.0000
AMBIENT AIR TEMP (K)	=	293.0000
RECEPTOR HEIGHT (M)	=	0.0000
URBAN/RURAL OPTION	=	URBAN
BUILDING HEIGHT (M)	=	10.8000
MIN HORIZ BLDG DIM (M)	=	17.8600
MAX HORIZ BLDG DIM (M)	=	32.0000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = 2.552 M**4/S**3; MOM. FLUX = 0.811 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
32.	0.000	0	0.0	0.0	0.0	0.00	0.00	0.00	NA
100.	35.47	6	3.5	3.7	10000.0	14.70	10.79	10.40	SS
200.	18.31	4	1.5	1.6	480.0	27.38	30.79	27.20	SS
300.	16.19	6	1.0	1.1	10000.0	33.08	31.18	20.59	SS
400.	15.80	6	1.0	1.1	10000.0	33.08	40.85	25.90	SS
500.	13.73	6	1.0	1.1	10000.0	33.08	50.21	30.79	SS
600.	11.64	6	1.0	1.1	10000.0	33.08	59.27	35.34	SS
700.	9.893	6	1.0	1.1	10000.0	33.08	68.06	39.60	SS
800.	8.486	6	1.0	1.1	10000.0	33.08	76.59	43.61	SS
900.	7.362	6	1.0	1.1	10000.0	33.08	84.89	47.40	SS
1000.	6.458	6	1.0	1.1	10000.0	33.08	92.97	51.01	SS
MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 32. M:									
33.	77.56	6	3.0	3.2	10000.0	12.73	3.71	6.49	SS

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
* SUMMARY OF TERRAIN HEIGHTS ENTERED FOR *
* SIMPLE ELEVATED TERRAIN PROCEDURE *
****

TERRAIN HT (M)	DISTANCE RANGE (M) MINIMUM	MAXIMUM
0.	32.	1000.

****
*** REGULATORY (Default) ***
PERFORMING CAVITY CALCULATIONS
WITH ORIGINAL SCREEN CAVITY MODEL
(BRODE, 1988)
****

*** CAVITY CALCULATION - 1 ***			*** CAVITY CALCULATION - 2 ***		
CONC (UG/M**3)	=	87.47	CONC (UG/M**3)	=	0.000
CRIT WS @10M (M/S)	=	5.34	CRIT WS @10M (M/S)	=	99.99
CRIT WS @ HS (M/S)	=	5.56	CRIT WS @ HS (M/S)	=	99.99
DILUTION WS (M/S)	=	2.78	DILUTION WS (M/S)	=	99.99
CAVITY HT (M)	=	12.81	CAVITY HT (M)	=	11.17
CAVITY LENGTH (M)	=	27.37	CAVITY LENGTH (M)	=	22.11
ALONGWIND DIM (M)	=	17.86	ALONGWIND DIM (M)	=	32.00

CAVITY CONC NOT CALCULATED FOR CRIT WS > 20.0 M/S. CONC SET = 0.0

****
END OF CAVITY CALCULATIONS
****

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)	
SIMPLE TERRAIN	77.56	33.	0.	
BLDG. CAVITY-1	87.47	27.	--	(DIST = CAVITY LENGTH)
BLDG. CAVITY-2	0.000	22.	--	(DIST = CAVITY LENGTH)

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
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