STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

AC 29-161703

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SOUTHWEST DISTRICT
4520 OAK FAIR BLVD.
TAMPA, FLORIDA 33610-7347
813-623-5561
Suncom—552-7612

D. E. R.

MAR - 6 1989

SOUTHWEST DISTRICT
TAMPA

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Crematory [X] New[1] [ ] Existing[1]

APPLICATION TYPE: [X] Construction [ ] Operation [ ] Modification

COMPANY NAME: Fero Funeral Home COUNTY: Marion

Identify the specific emission point source(s) addressed in this application (i.e. Lime Industrial Equipment & Engineering 150 lb/hr Crematory Model IE-43 Power-Pak

SOURCE LOCATION: Street US 41 North City Dunnellon

UTM: East 17-359.0 North 3221.1

Latitude 29 ° 06' 41"N Longitude 82 ° 26' 57"W

APPLICANT NAME AND TITLE: Mr. Orlando J. Fero, Jr., Owner

APPLICANT ADDRESS: P.O. Box 266, Beverly Hills, Florida 32665

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Fero Funeral Home

I certify that the statements made in this application for a construction permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: Orlando J. Fero Jr.

Mr. Orlando J. Fero, Jr., Owner
Name and Title (Please Type)

Date: 2/22/89 Telephone No. (904) 746-4551

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that

See Florida Administrative Code Rule 17-2.100(57) and (104)

the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities, and if applicable, pollution sources.

Signed Thomas E. Brumagin

Mr. Thomas E. Brumagin, P.E.
Name (Please Type)

Central Florida Testing Laboratories, Inc.
Company Name (Please Type)

1400 Starkey Road, Largo, FL 34641
Mailing Address (Please Type)

Florida Registration No. 31063 Date: 2/14/89 Telephone No. (813) 581-7019

SECTION II: GENERAL PROJECT INFORMATION

A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

This project consists of constructing a Industrial Equipment & Engineering Model IE-43 150 lb/hr cremation unit with afterburner at Fero's new funeral home on a two acre site in Dunnellon in the southwest portion of Marion County, Florida. This facility will comply with all FDER Rules and Regulations.

B. Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction April 1989 Completion of Construction September 1989

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

Industrial Equipment & Engineering	$ 49,000.00
Model IE-43 Cremation Unit with afterburner	

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

None

E. Requested permitted equipment operating time: hrs/day 10 ; days/wk 6 ; wks/yr 52 ;

if power plant, hrs/yr 3120; if seasonal, describe: _____

F. If this is a new source or major modification, answer the following questions. (Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? No

   a. If yes, has "offset" been applied? _____

   b. If yes, has "Lowest Achievable Emission Rate" been applied? _____

   c. If yes, list non-attainment pollutants. _____

2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. No

3. Does the State "Prevention of Significant Deterioriation" (PSD) requirement apply to this source? If yes, see Sections VI and VII. No

4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? No

5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? No

H. Do "Reasonably Available Control Technology" (RACT) requirements apply to this source? No

   a. If yes, for what pollutants? _____

   b. If yes, in addition to the information required in this form, any information requested in Rule 17-2.650 must be submitted.

Attach all supportive information related to any answer of "Yes". Attach any justification for any answer of "No" that might be considered questionable.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Container with human body	Ash	1.5	150	A

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): 150 lb/hr container & human body

2. Product Weight (lbs/hr): 2.3 lb/hr pathological remains

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary)

Name of Contaminant	Emission[1]		Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission Opacity	Potential[4] Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/yr	T/yr	
Particulate	0.61	0.95	Visible Emissions	up to 20%	0.61	0.95	H
Sulfur Oxides	0.001	0.001		opacity 3 min.hr	0.001	0.001	
Carbon Monoxide	0.05	0.078			0.05	0.078	
Hydrocarbons	0.0085	0.013			0.0085	0.013	
Nitrogen Oxide	0.43	0.67			0.43	0.67	

[1]See Section V, Item 2.

[2]Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input)

[3]Calculated from operating rate and applicable standard.

[4]Emission, if source operated without control (See Section V, Item 3).

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
Industrial Equipment & Engineering Co.	Smoke	99%	Sub-micron	Design & Test Data
Crematory Unit Model IE-43 Power Pak				

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
LP Gas	12.0 gal/hr	16.4 gal/hr	1.5(10^6) Btu/hr

*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, other--lbs/hr.

Fuel Analysis:

Percent Sulfur: Neg. Percent Ash: Neg.

Density: 4.25 lbs/gal Typical Percent Nitrogen: Neg.

Heat Capacity: 21,591 BTU/lb 91,690 BTU/gal

Other Fuel Contaminants (which may cause air pollution):

F. If applicable, indicate the percent of fuel used for space heating.

Annual Average None Maximum

G. Indicate liquid or solid wastes generated and method of disposal.

No solid or liquid wastes generated in this process. Pathological ash remains returned to family members for internment or to be disposed of.

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: 20 ft. Stack Diameter: 1,625 ft.

Gas Flow Rate: 1605 ACFM 563 DSCFM Gas Exit Temperature: 800 - 1000 °F.

Water Vapor Content: 10 % Velocity: 12.9 FPS

SECTION IV: INCINERATOR INFORMATION

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated		50 lb/hr			100 lb/hr		
Uncontrolled (lbs/hr)							

Description of Waste: Pathological Ash

Total Weight Incinerated (lbs/hr): 150 Design Capacity (lbs/hr): 150

Approximate Number of Hours of Operation per day 10 day/wk 6 wks/yr. 52

Manufacturer: Industrial Equipment & Engineering Company

Date Constructed: Not Available Model No.: IE-43 Power Pak

	Volume $(ft)^3$	Heat Release (BTU/hr)	Fuel Type	Fuel BTU/hr	Temperature (°F)
Primary Chamber	44.4	0.4 M	LPG	375,000	1600
Secondary Chamber	64.4	1.2 M	LPG	725,000	1600

Stack Height: 20.0 ft. Stack Diamter: 19.5 inches Stack Temp. 800 - 1000

Gas Flow Rate: 1605 ACFM 563 DSCFM* Velocity: 12.9 FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [X] Afterburner

[ ] Other (specify)

Brief description of operating characteristics of control devices: Human remains are placed into the primary chamber. The secondary chamber is then preheated to a minimum or 1600°F before combustion is initiated in the primary chamber. The afterburner maintains a minimum temperature of 1600°F in the secondary chamber to insure combustion of all gaseous materials entering the chamber.

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

Pathological ash remains returned to family members for disposal or internment.

NOTE: Items 2, 3, 4, 6, 7, 8, and 10 in Section V must be included where applicable.

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]

2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.

3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).

4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.)

5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency).

6. An 8 1/2" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.

7. An 8 1/2" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).

8. An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation.

10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?

[ ] Yes [ ] No

Contaminant	Rate or Concentration

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy)

[ ] Yes [ ] No

Contaminant	Rate or Concentration

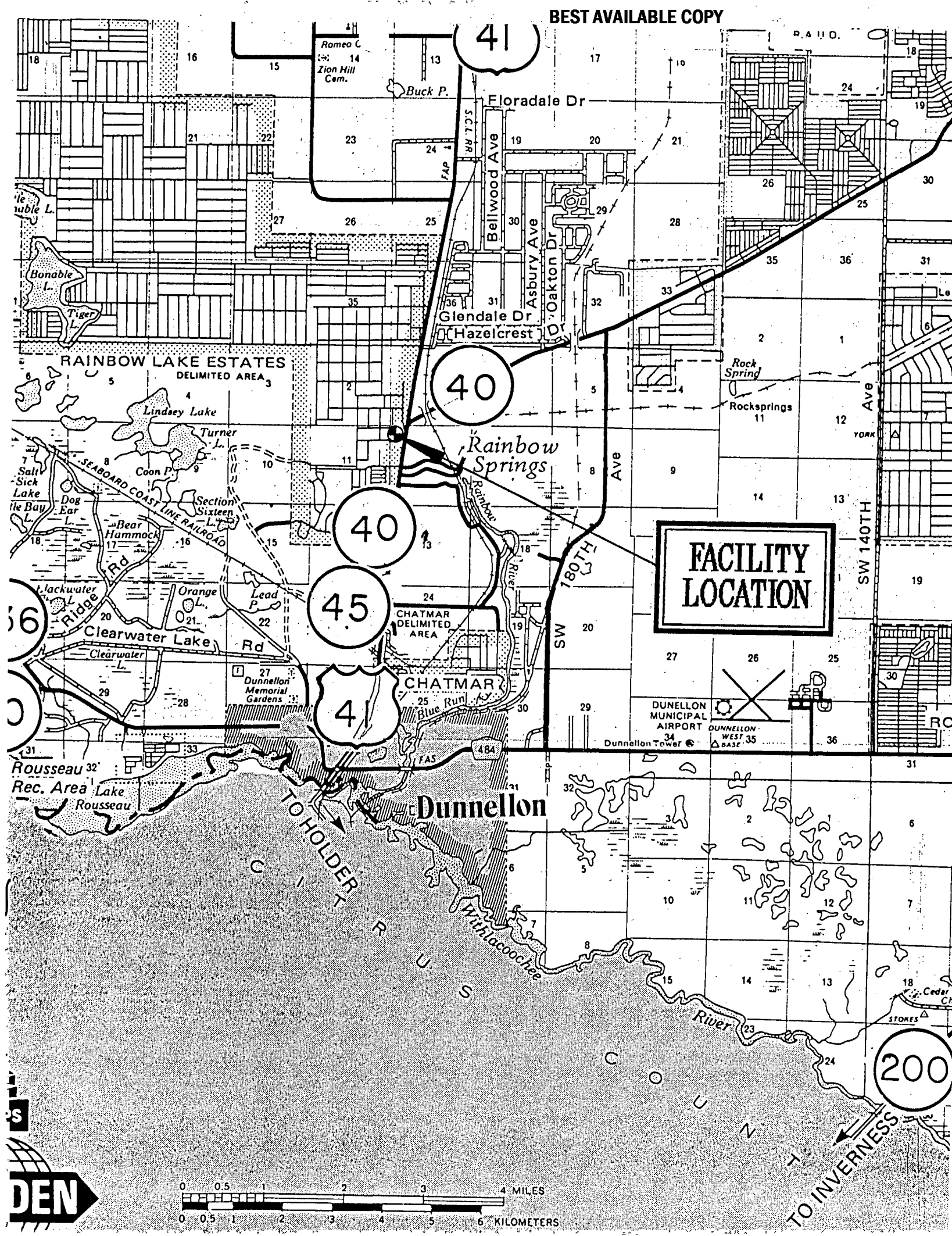
C. What emission levels do you propose as best available control technology?

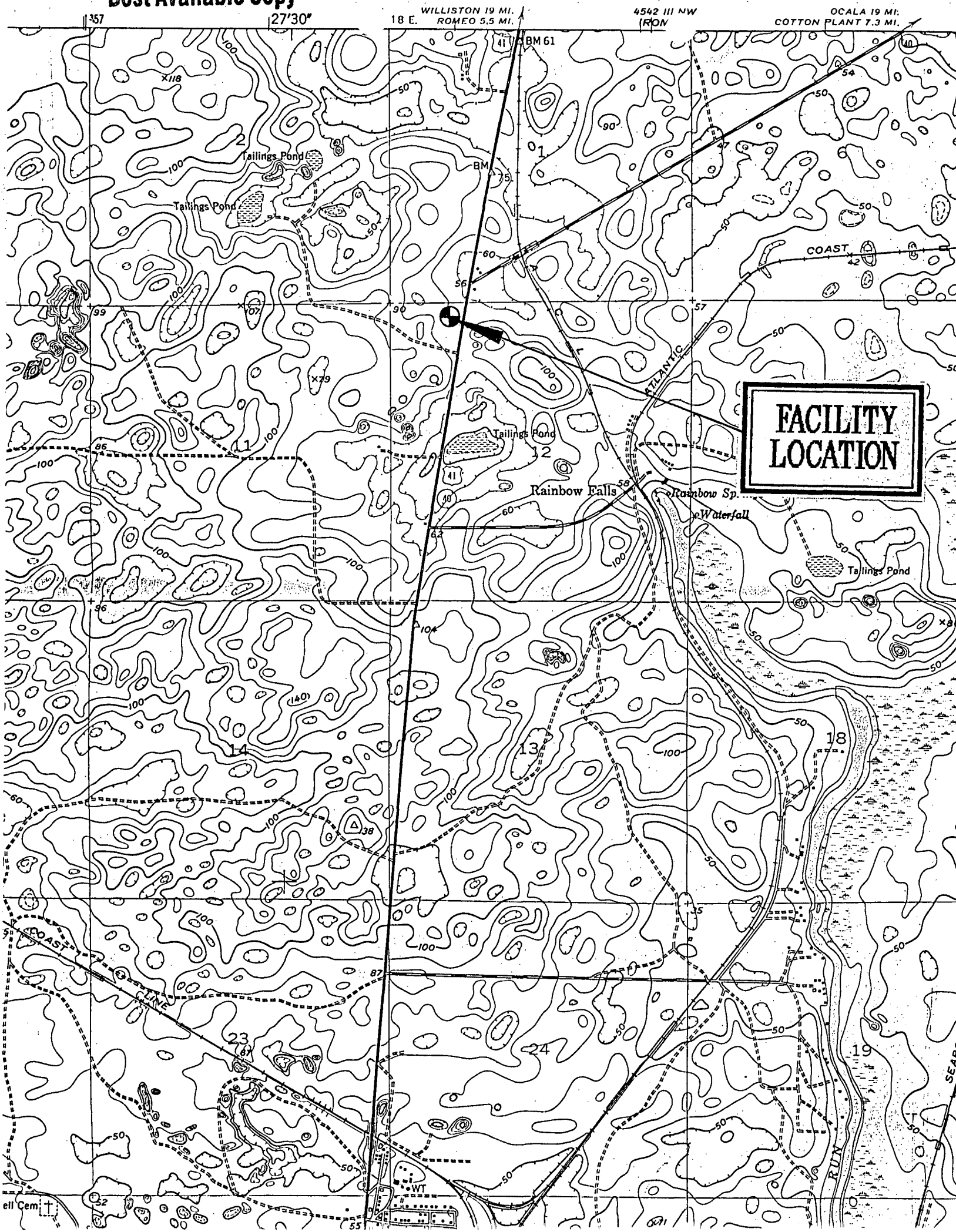
Contaminant	Rate or Concentration

D. Describe the existing control and treatment technology (if any).

1. Control Device/System:
2. Operating Principles:
3. Efficiency:*
4. Capital Costs:

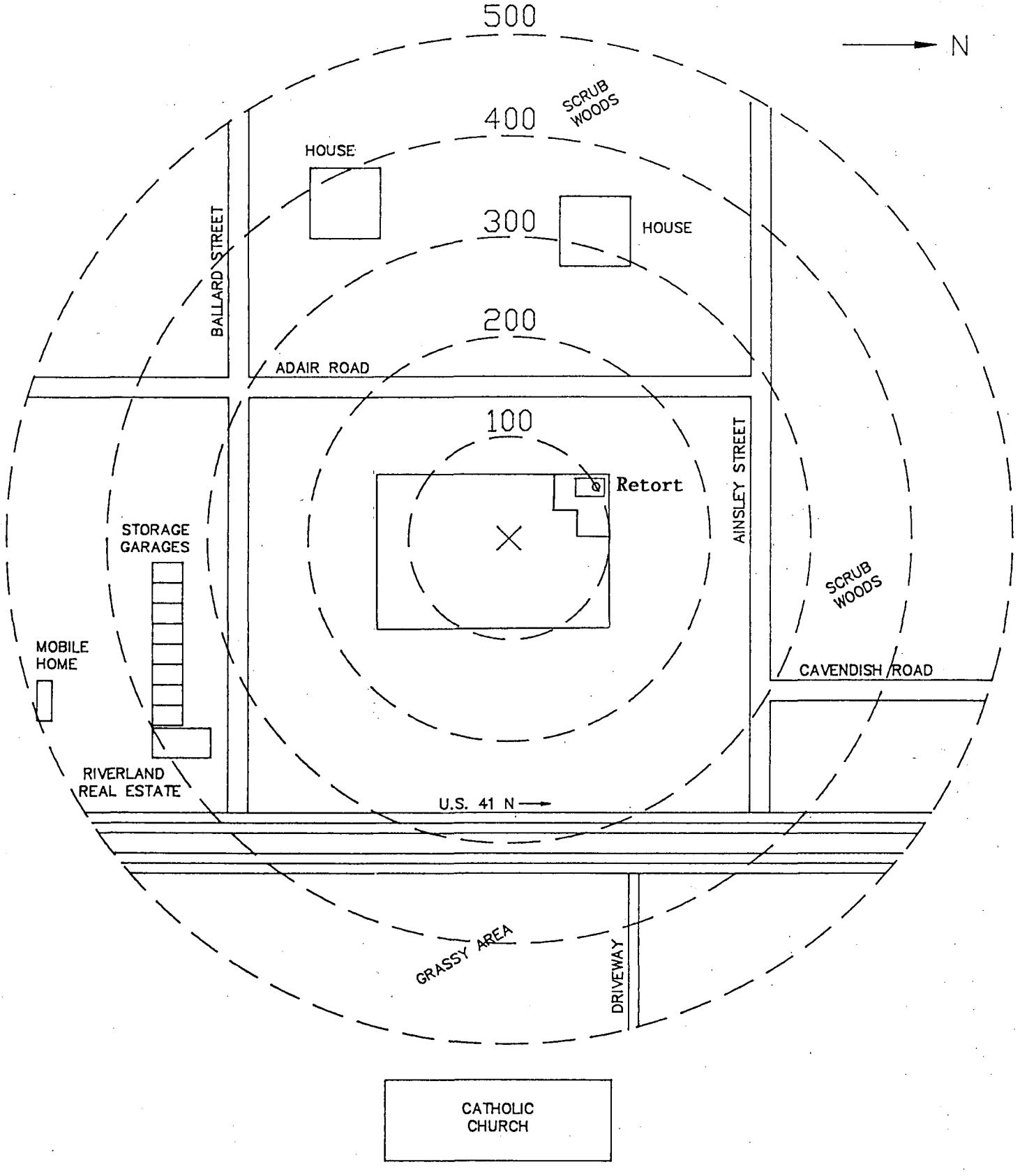
*Explain method of determining





NEW FUNERAL HOME LOCATION
FERO FUNERAL HOME
U.S. 41 N.
DUNNELLON, FL 32630

P.O. BOX 266
BEVERLY HILLS, FL 32665

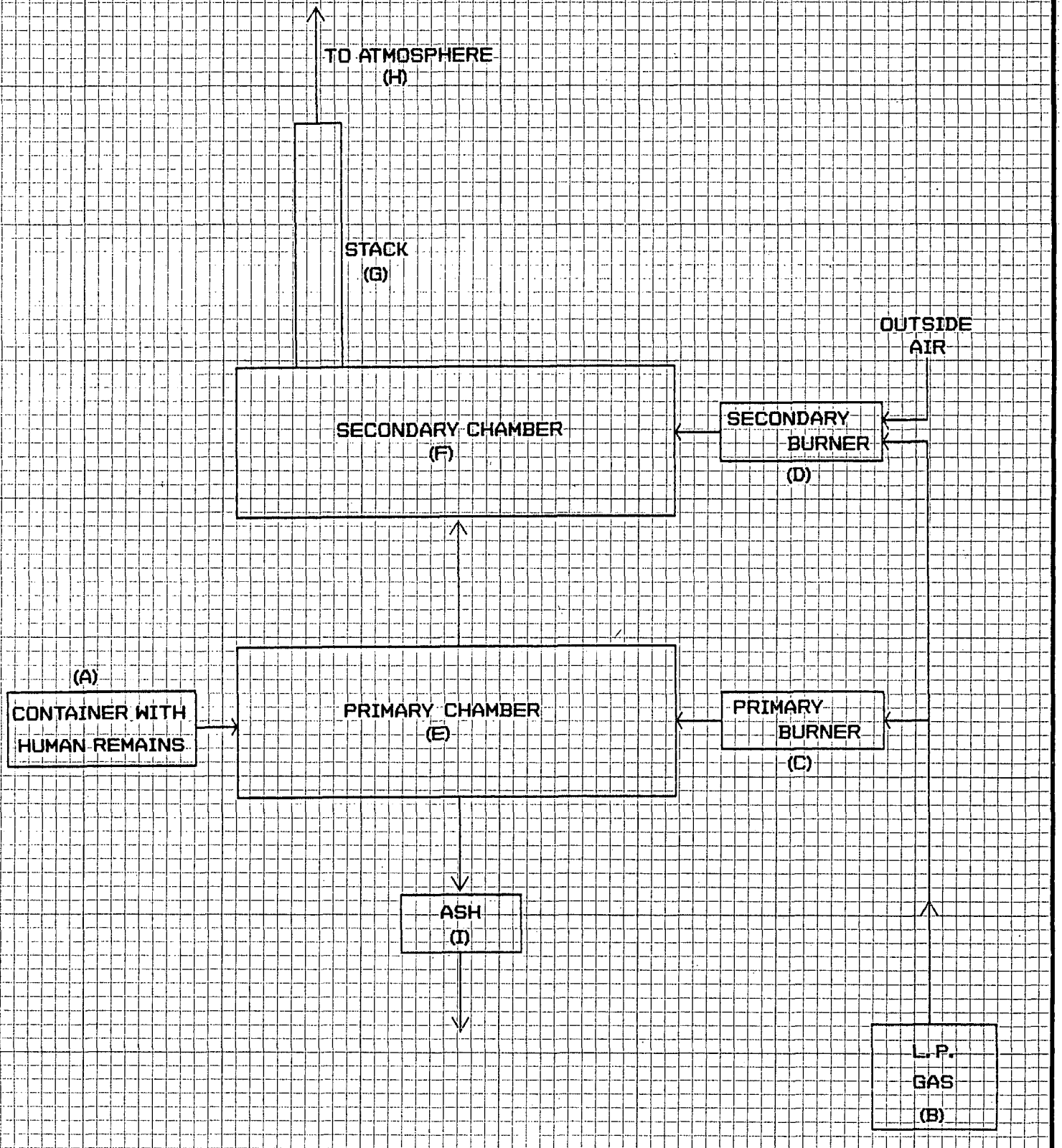


TESTED • APPROVED
CFTL
CENTRAL FLORIDA TESTING LABORATORIES

FERO FUNERAL HOME

Cremation Retort With Afterburner

Flow Diagram



FERO FUNERAL HOME

Industrial Equipment & Engineering Company

Cremation Unit Model No. IE-43

Calculation of Emisdsions

Fuel Consumption

$$\text{Maximum } Qf_{max} = \frac{1.5(10^6)\text{Btu/hr}}{91690\ \text{Btu/gal}} = 16.4\ \text{gal/hr}$$

$$\text{Average } Qf_{avg} = \frac{1.1(10^6)\text{Btu/hr}}{91630\ \text{Btu/gal}} = 12.0\ \text{gal/hr}$$

Total Emissions

$$E_T = E^1_{incinerator} + E^2_{fuel}$$

Particulate Emissions

$$E_p = [150\ \text{lb/hr}(8\ \text{lb/ton})]/2000\ \text{lb/ton} + [16.4\ \text{gal/hr}(0.44\ \text{lb}/10^3\text{gal})]$$

$$E_p = 0.61\ \text{lb/hr}$$

Sulfur Dioxide Emissions

$$E_{SO_2} = [\text{neg.} + (16.4\ \text{gal/hr})(0.014\ \text{lb}/10^3\text{gal})]$$

$$E_{SO_2} = 2.3(10^{-4})\ \text{lb/hr}$$

Carbon Monoxide Emissions

$$E_{CO} = [\text{neg.} + (16.4\ \text{gal/hr})(3.1\ \text{lb}/10^3\text{gal})]$$

$$E_{CO} = 0.05\ \text{lb/hr}$$

Hydrocarbon Emissions

$$E_{HC} = [\text{neg.} + (16.4\ \text{gal/hr})(0.52\ \text{lb}/10^3\text{gal})]$$

$$E_{HC} = 8.5(10^{-3})\ \text{lb/hr}$$

Nitrogen Oxide Emissions

$$E_{NOx} = \frac{(150\ \text{lb/hr})(3\ \text{lb/ton})}{2000\ \text{lb/ton}} + (16.4\ \text{gal/hr})(12.4\ \text{lb}/10^3\text{gal})$$

$$E_{NOx} = 0.43\ \text{lb/hr}$$

Notes:

1) Pathological incinerator emissions based on emissions factors from Table 2.1-1 of AP-42.

2) Fuel Emissions based on emission factors for Liquid Propane Gas combustion from Table 1.5-1 of AP-42.

POWER-PAK

CREMATION CALCULATIONS

There are two distinct phases in the cremation process. For purposes of calculation, a standard wood casket was taken as an example. Combustion of most of the casket is the initial phase, and with little or no supplemental gas fuel. A pyrolysis of the wood takes place in which the products given off need an afterburner chamber for complete combustion. (About 60% of the fuel value in the casket is generated in the primary chamber.)

There is a transition period as the casket is burned away and the body is exposed. The body cremation phase requires supplemental fuel to effect destruction. An afterburner chamber is required to oxidize the mists, fumes and smoke created in the primary cremation chamber.

Insofar as retention time is concerned, it is the initial phase in combustion with the afterburner reactions required at the same time upon which combustion volume depends.

The Incinerator Institute of America has published the following specifications covering average wastes:

WASTE	TYPE 0	TYPE 4
B.T.U. per pound	8500	1000
Pounds ash per lb.	.05	.05
Pounds moisture per lb.	.10	.85
Pounds net combustible per lb.	.85	.10

Flue Products: Type 0 waste

a. Combustion Air

$$\frac{\text{8500 B.T.U. per lb.}}{\text{100 B.T.U. per cu. ft. air x (200\%) x .075}} = 12.75 \text{ lb. per lb.}$$

b. Combustibles

(From chart above) 0.85 lb. per lb.

c. Water Vapor (volume conversion only)

$$0.10 \text{ lb.} \times \frac{\text{28.9 mol. wt. air}}{\text{18.0 mol. wt. water}} = 0.16 \text{ lb. per lb.}$$

TOTAL FLUE PRODUCTS: TYPE 0 WASTE 13.76 lb. per lb. waste

Flue Products: Type 4 waste

a. Combustion Air

$$\frac{1000 \text{ B.T.U. per lb.}}{100 \text{ B.T.U. per cu. ft. air}} \times (200\%) \times .075 = 1.50 \text{ lb. per lb.}$$

b. Combustibles

(From chart above) 0.10 lb. per lb.

c. Water Vapor

0.85 lb. x 1.6 = 1.36 lb. per lb.

d. Auxiliary Fuel

$$\frac{3000 \text{ B.T.U. per lb. waste}}{1000 \text{ B.T.U. per cu. ft.}} \times 0.045 \text{ lb. per cu. ft. air} = 0.135 \text{ lb. per lb.}$$

e. Combustion Air for Auxiliary Fuel

3 cu. ft. per cu. ft. gas x 10 cu. ft. air per cu. ft. air x .075 lb. per cu. ft. air = 2.25 lb. per lb.

TOTAL FLUE PRODUCTS: TYPE 4 WASTE 5.345 lb. per lb. waste

Flue Products: Afterburner

a. Natural Gas Fuel

700 cu. ft. per hr. x 0.045 lb. cu. ft. gas = 31.5 lb.

b. Combustion Air

$$\frac{700{,}000 \text{ B.T.U. per hr.}}{100 \text{ B.T.U. per cu. ft. air}} \times (200\%) \times .075 = 1050.0 \text{ lb. per hr.}$$

TOTAL FLUE PRODUCTS: AFTERBURNER 1081.5 lb. per hr.

Combined Flue Products:

	1ST HOUR	2ND HOUR
a. Type 0 Waste		
13.76 lb. x 75 lb./hr.	1032 lb./hr.	344 lb./hr. (25#/hr.)
b. Type 4 Waste		
5.34 lb. x 75 lb./hr.	401 lb./hr.	401 lb./hr.
c. Afterburner @ 700,000 B.T.U.	1081.5 lb./hr.	1081.5 lb./hr.
TOTAL POUNDS PER HOUR	2514 lb./hr.	1786 lb./hr.

1ST HOUR

$$\frac{2514 \times 13.35 \text{ std. cu. ft./lb.}}{3600 \text{ sec./hr.}} \times \frac{1600 + 460}{460 + 70} = \text{CU. FT./SEC.}$$

$$9.32 \times 3.88 = 36.22 \text{ cu. ft./sec.}$$

$$\frac{64.37 \text{ cu. ft. in Afterchamber}}{36.22 \text{ cu. ft./sec. Products of Combustion}} = \text{RETENTION TIME}$$

= 1.77 Seconds Retention Time at 1600 Degrees F.

2ND HOUR

$$\frac{1786 \times 13.35 \text{ std. cu. ft./lb.}}{3600 \text{ sec./hr.}} \times \frac{1600 + 460}{460 + 70} = \text{CU. FT./SEC.}$$

$$6.623 \times 3.88 = 25.73 \text{ cu. ft./sec.}$$

$$\frac{64.37 \text{ cu. ft. in Afterchamber}}{25.73 \text{ cu. ft./sec. Products of Combustion}} = \text{RETENTION TIME}$$

= 2.5 Seconds Retention Time at 1600 Degrees F.

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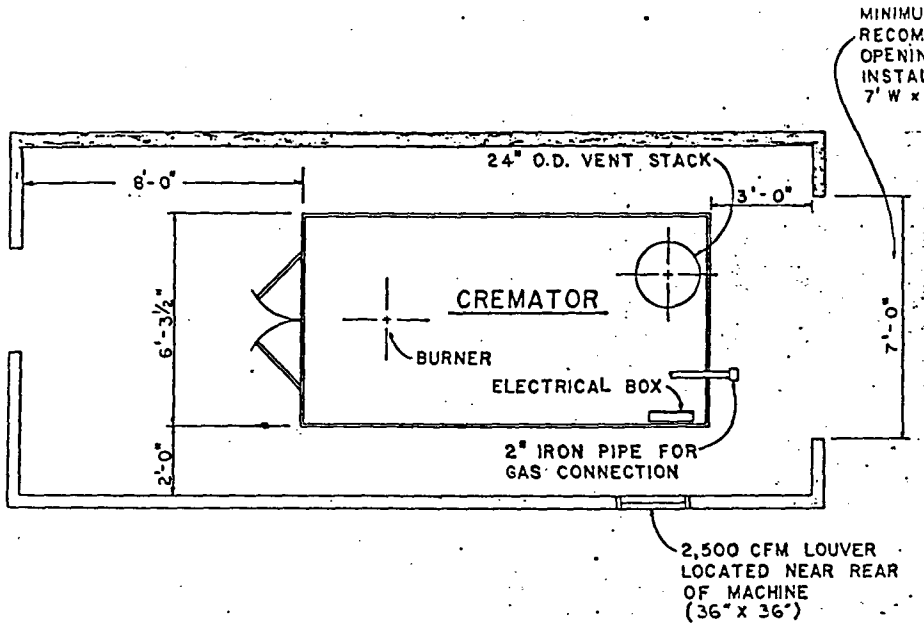
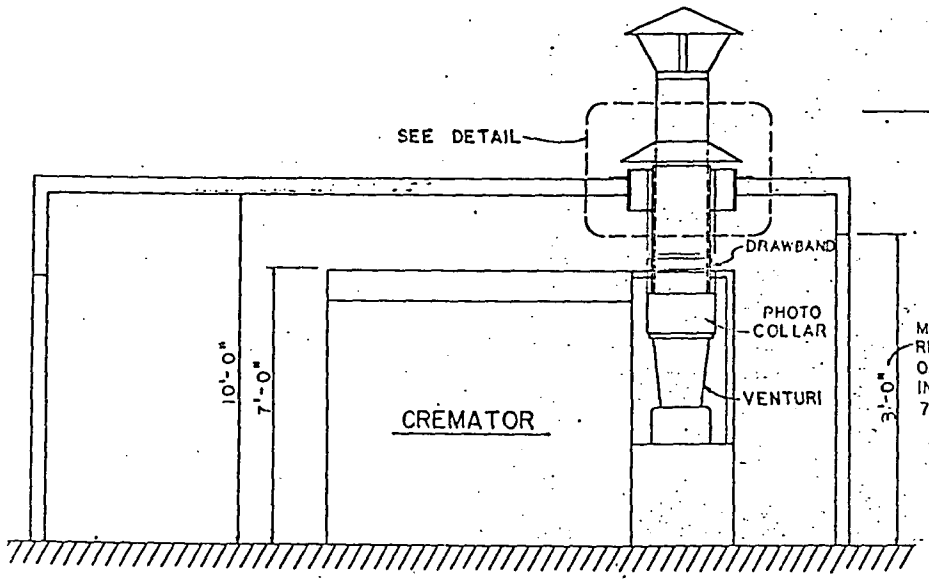
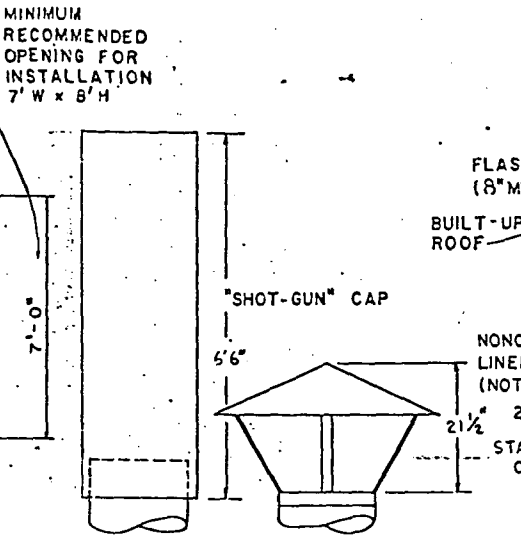


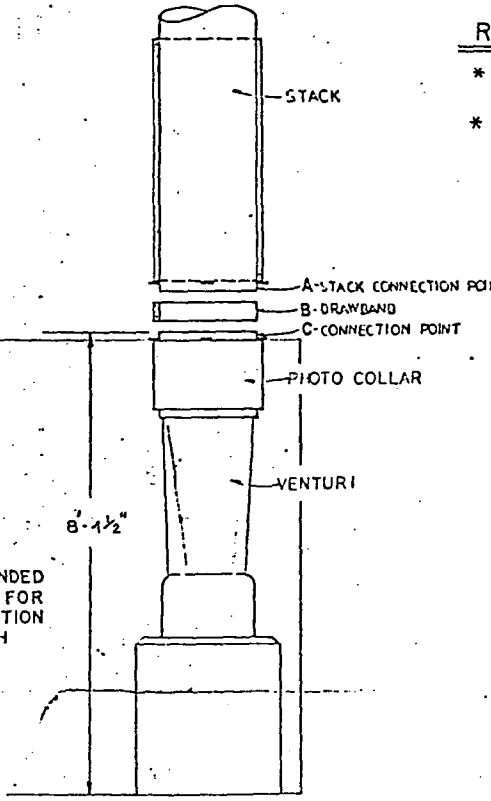
PLAN VIEW

(MINIMUM CLEARANCES)

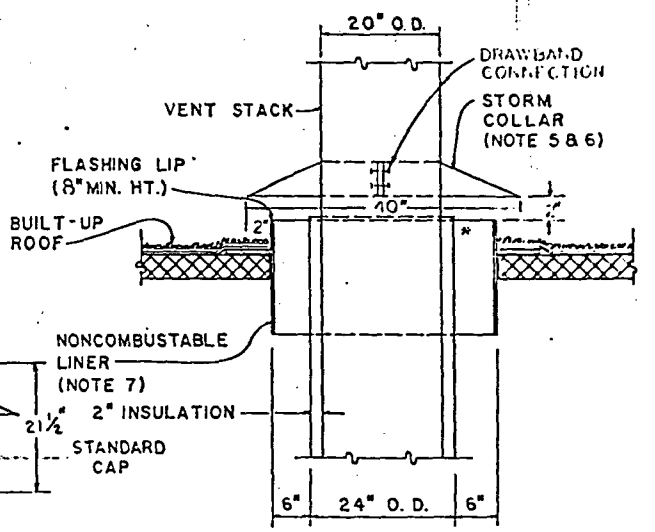


SECTION





STACK ASSEMBLY DETAIL



ROOF PENETRATION DETAIL

* INSULATION MUST EXTEND 4" ABOVE ROOF FOR PROTECTION OF ROOFING MATERIALS.

* ROOF OPENING MUST BE 36" FOR PROPER STACK CLEARANCE.

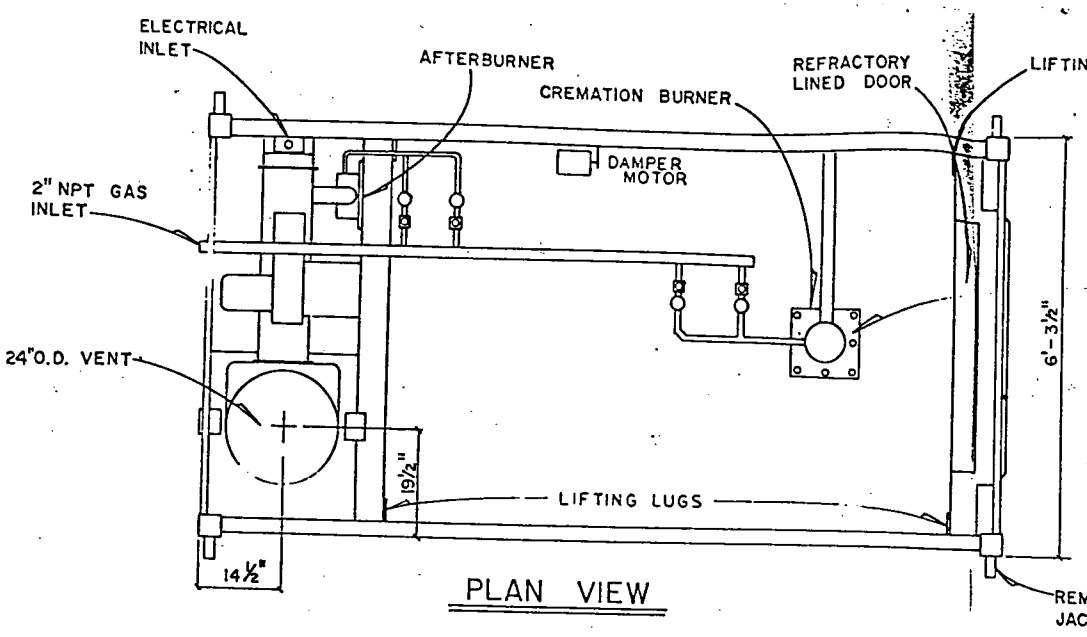
STACK ASSEMBLY INSTRUCTIONS

1. PLACE DRAWBAND (B) ONTO PHOTO LIGHT COLLAR (CONNECTION POINT (C). IT WILL REST ON THE SUPPORT TABS ON PHOTO COLLAR.
2. LOWER VENT STACK DOWN UNTIL THE LIP (A) WITH SUPPORT TABS RESTS ON TOP OF DRAWBAND (B).
3. TIGHTEN DRAWBAND BOLTS EVENLY UNTIL IT FORMS A TIGHT CONNECTION BETWEEN VENT STACK AND PHOTO COLLAR.
4. IF 50% OF THE STACK LENGTH IS ABOVE THE ROOF, GUY WIRES SHOULD BE CONSIDERED. APPLY A 1/4" BEAD OF HI-TEMP SILICON (PROVIDED BY IEE) TO INSIDE OF STORM COLLAR SURFACE THAT WILL TOUCH THE STACK.
5. PLACE STORM COLLAR WITH DRAWBAND CONNECTION ON UNINSULATED PORTION OF STACK ABOVE THE STACK INSULATION AND FLASHED ROOF DECK. YOU MUST ALLOW A 2" SPACING FOR PROPER VENTILATION AS SHOWN IN PENETRATION DETAIL ABOVE.
6. STORM COLLAR FURNISHED BY IEE CO.
7. FLASHING (NON-COMBUSTIBLE LINER) PROVIDED BY CUSTOMER.

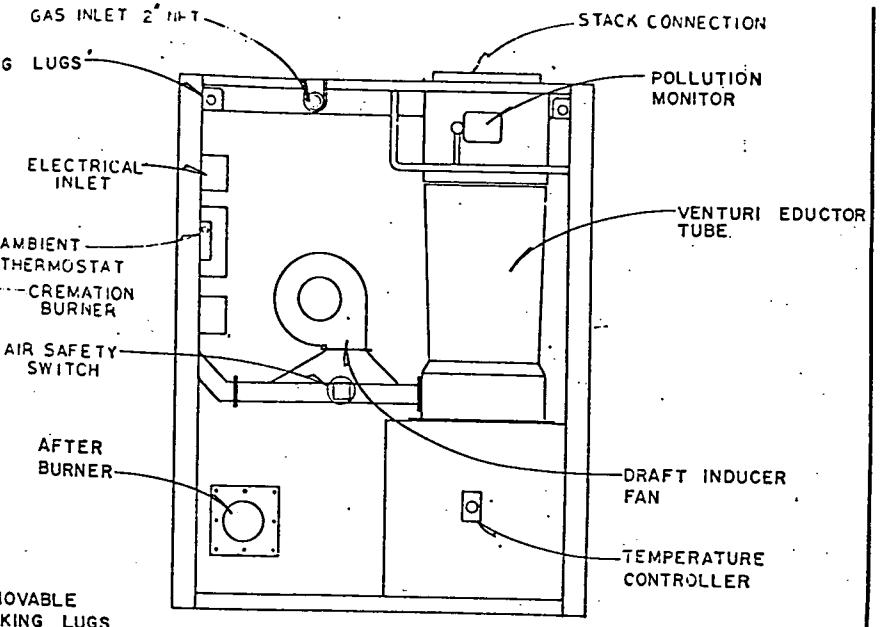
INDUSTRIAL EQUIPMENT & ENGINEERING COMPANY

CREMATOR MODEL IE-43

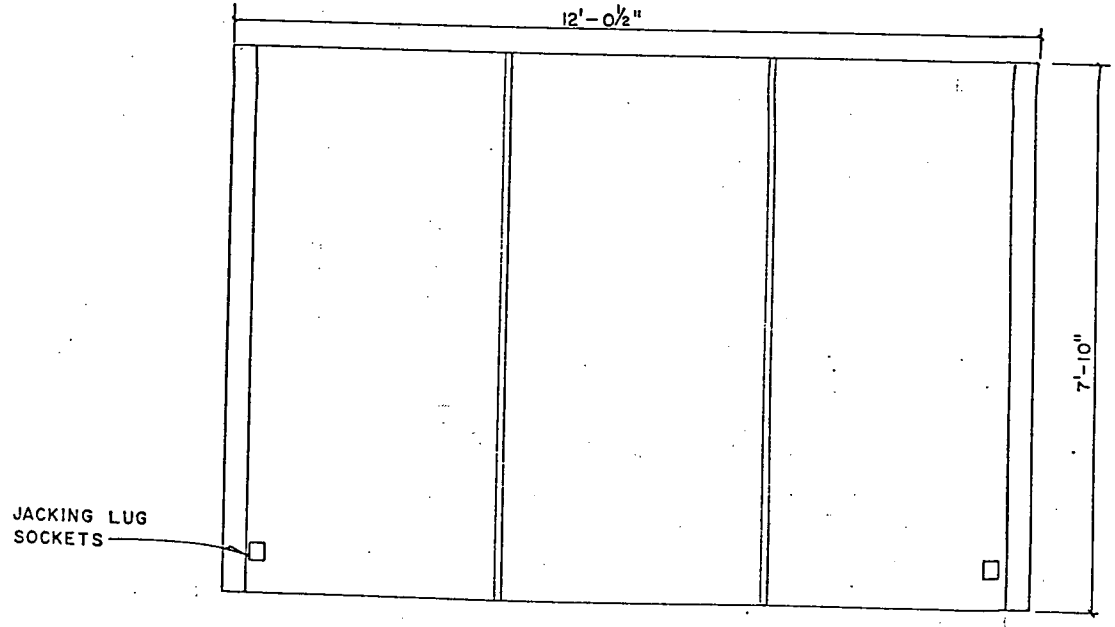
BUILDING LAYOUT



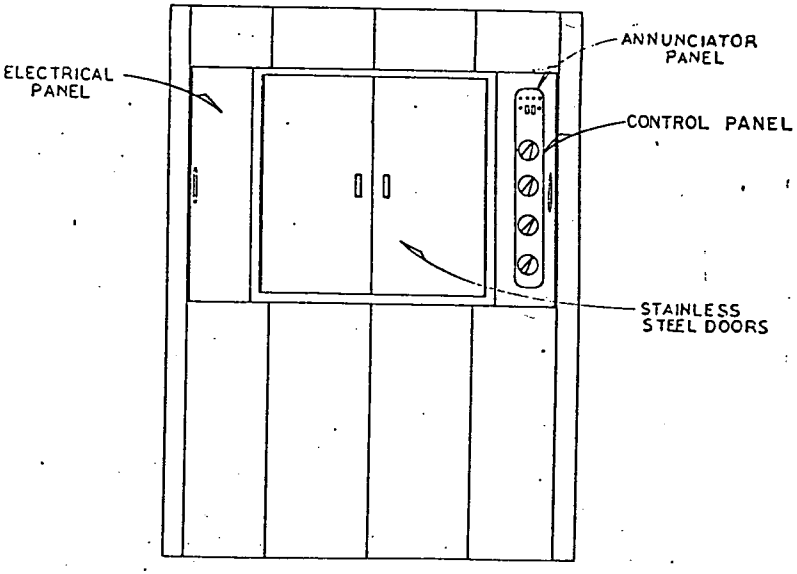
PLAN VIEW



REAR ELEVATION



SIDE ELEVATION



FRONT ELEVATION

NOTES

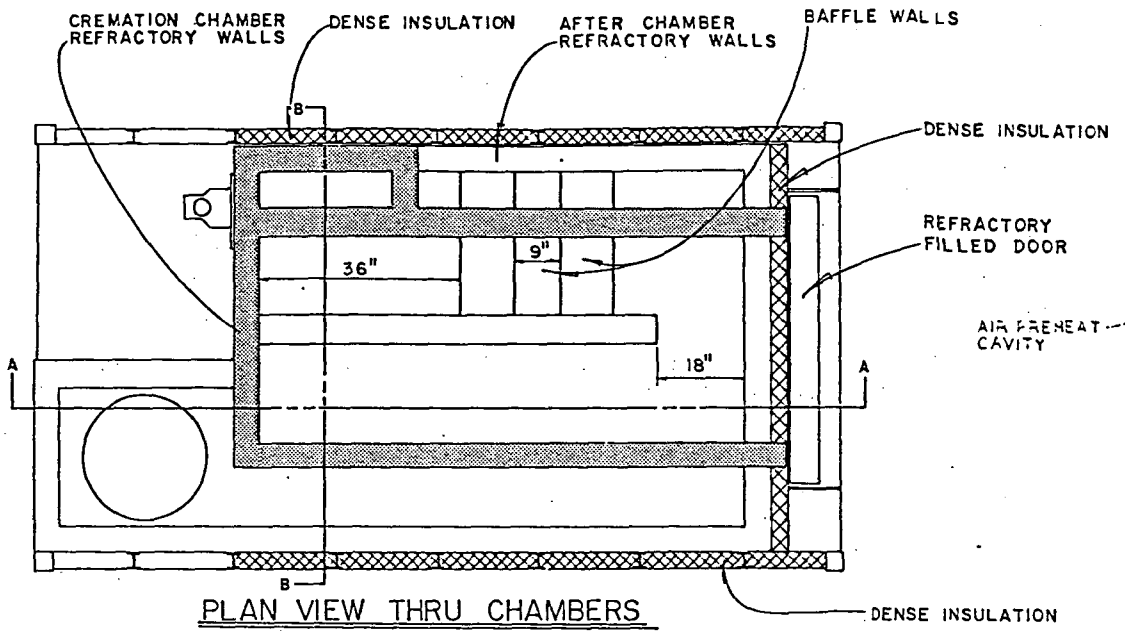
1. FUEL INPUT – NATURAL GAS 1500 CU. FT/HR. 7" W.C. PRESSURE.
   L.P. GAS 1,500,000 BTU/HR 11" WC PRESSURE.
2. ELECTRICAL – 220 VOLTS 3 PHASE 60 HZ. FROM 30 AMP BREAKER, OR 220 VOLTS, 1 PHASE, 60 HZ. FROM 60 AMP BREAKER
   110 VOLTS 1 PHASE 60 HZ. FROM 15 AMP BREAKER
3. AIR – LOCATE LOUVERS IN BUILDING NEAR REAR OF MACHINE CAPABLE OF PASSING 2,500 CFM OF FREE AIR APPROX (3' x 3' SQUARE)

INDUSTRIAL EQUIPMENT & ENGINEERING COMPANY

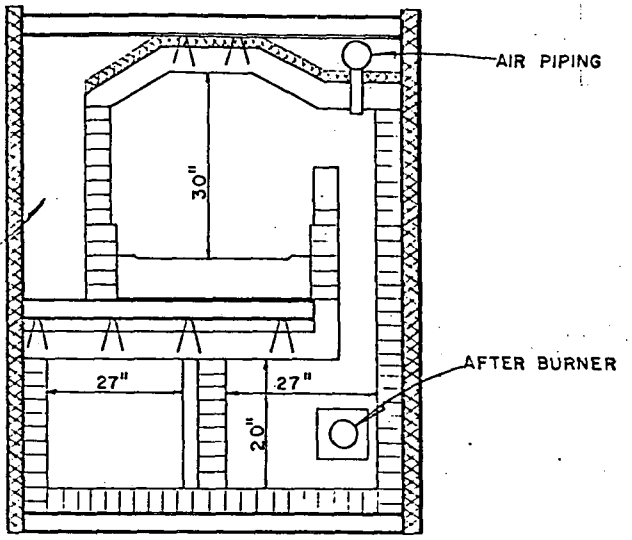
CREMATOR MODEL IE-43

ELEVATION & PLAN VIEW

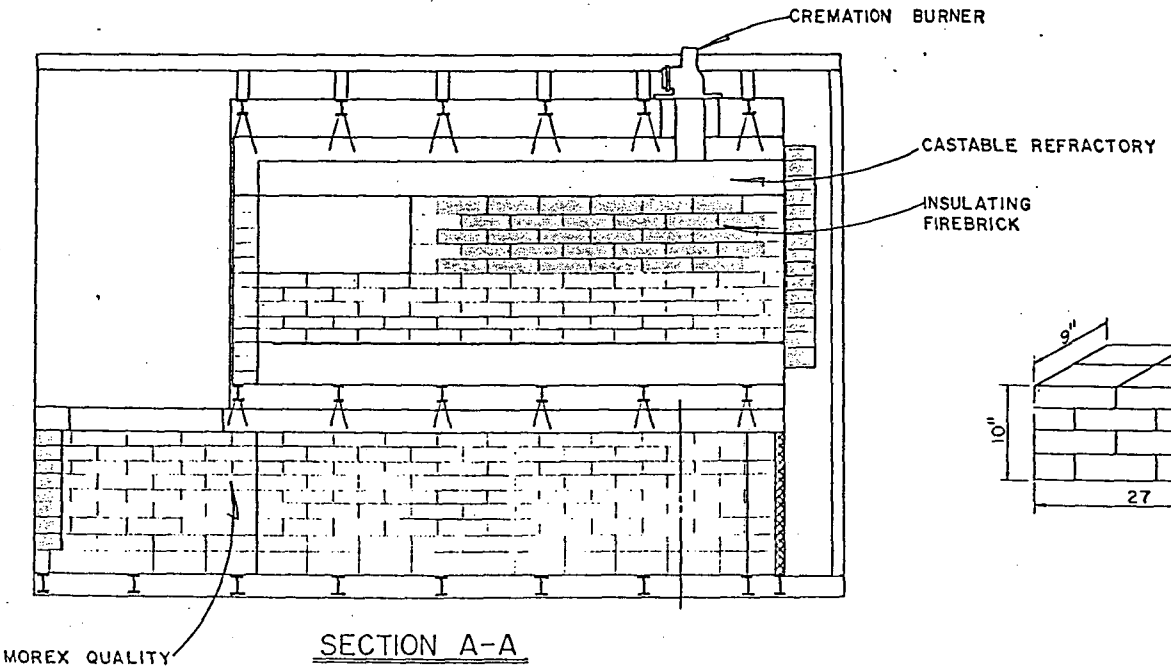
J. MERRITT



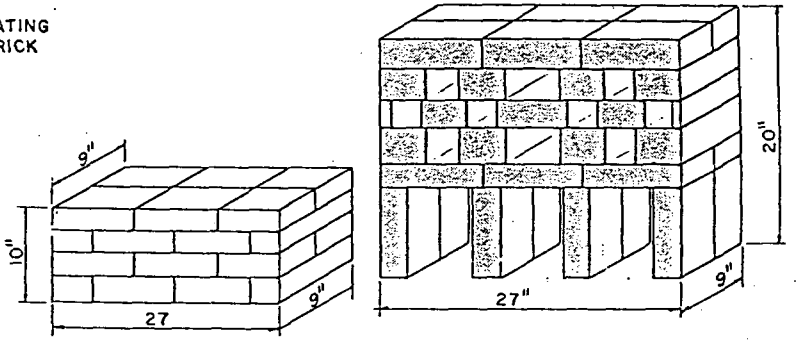
PLAN VIEW THRU CHAMBERS



SECTION B-B

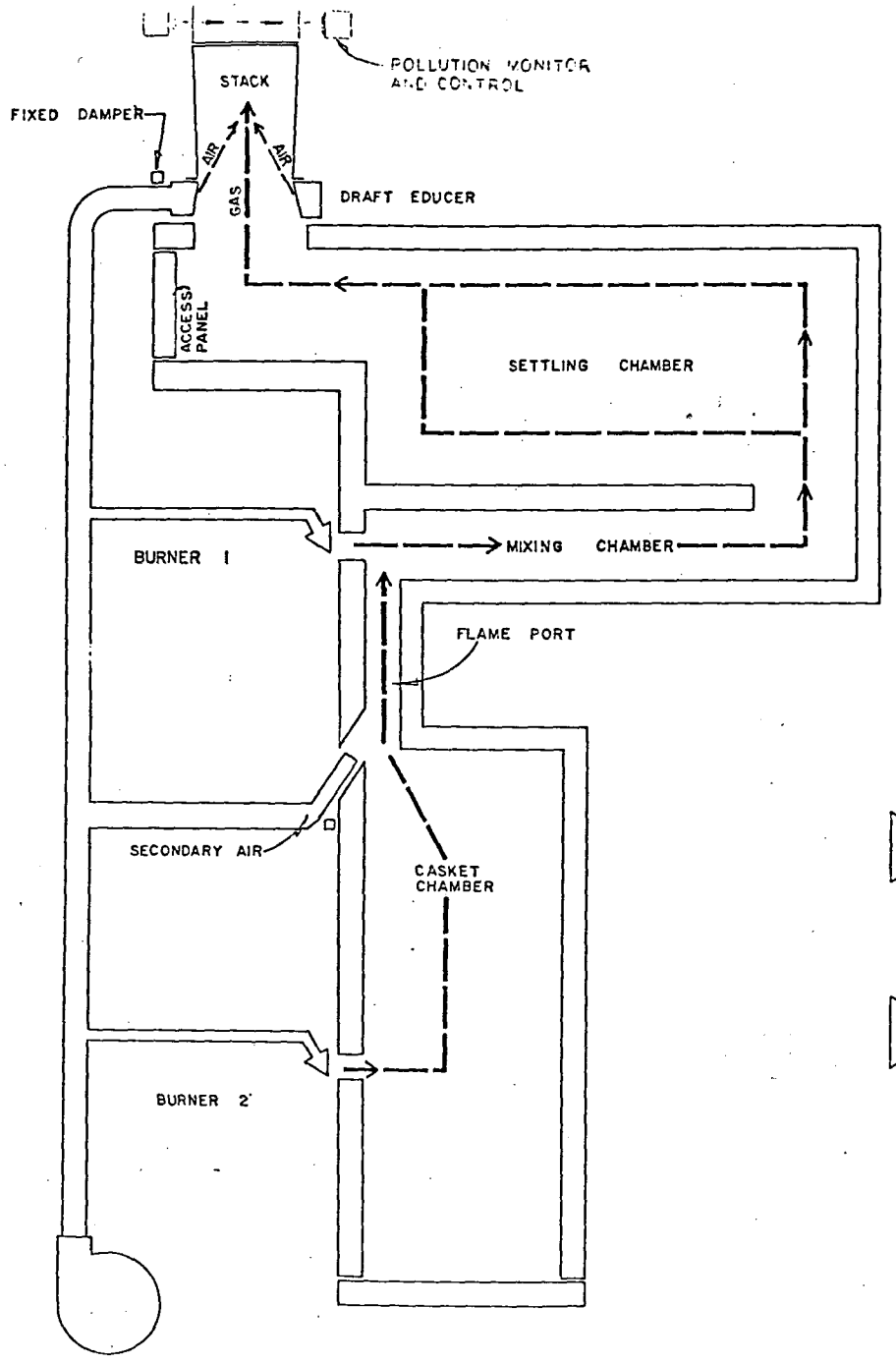


SECTION A-A

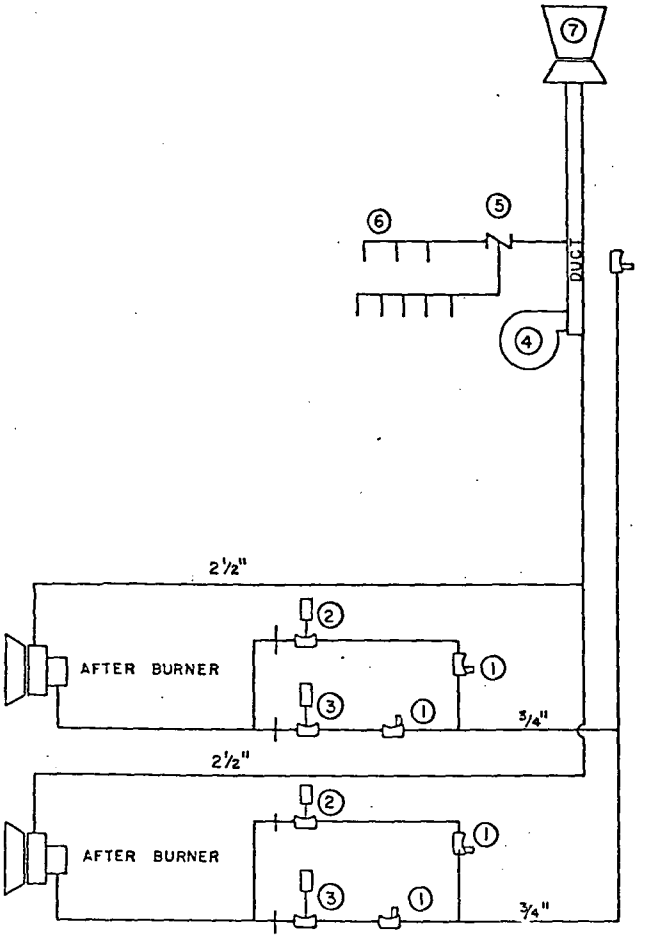


DETAIL OF BAFFLES

INDUSTRIAL EQUIPMENT & ENGINEERING COMPANY 2501 JOHN YOUNG PARKWAY	CREMATOR MODEL IE-43 SECTION VIEWS	
	DRAWN BY J. MERRITT	
	CHKD D. BAIRD	



FLOW SCHEMATIC



GAS & AIR PIPING SCHEMATIC

LEGEND

1. GAS COCK
2. SOLENOID PILOT
3. SOLENOID MAIN
4. BLOWER
5. BY PASS DAMPER
6. AIR NOZZLES
7. EDUCER

INDUSTRIAL EQUIPMENT & ENGINEERING COMPANY

CREMATOR MODEL IE-43

FLOW DIAGRAM

J. MERRITT