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Albuquerque Pet Memorial Service, Inc.

Construction Permit No. 1158-M1 Modification Application

Revised July 29, 2019

Prepared for:

Albuquerque Pet Memorial Service, Inc.
132 Mountain Park Place, NW, Suite A
Albuquerque, NM 87114

Prepared by:

Alliant Environmental, LLC
7804 Pan American Fwy. NE, Suite 5
Albuquerque, NM 87109

July 29, 2019

Ms. Carina G. Munoz-Dyer
Albuquerque Environmental Health Department
Air Quality Program
1 Civic Plaza, Room 3047
Albuquerque, NM 87102

Subject: **Permit Revision Application Construction Permit No. 1158-M1: Response to AQP's Letter Issuing 2nd Administrative Incomplete Determination**

Dear Ms. Munoz-Dyer:

Albuquerque Pet Memorial Service, Inc. (APMS) is submitting the attached documents per your letter request dated May 28, 2019 requesting further information pertaining to APMS's Air Quality Permit modification application for Permit No. 1158-M1 to install two additional animal crematories in addition to the two existing, operational, and authorized crematories.

Enclosed please find a completely revised application including revised emission calculations based on updated manufacturer information, a revised air quality permit application long form, and a revised air dispersion modeling report and modeling files to address the discrepancy between the background data used in the initial model submitted and the current background data that must be used.

In addition, the Air Quality Program provided a National Elevation Data (NED) file that was to be used instead of the NED data file downloaded from the United States Geological Survey (USGS) and submitted to the Air Quality Program with the initial air dispersion model. Addressing these two points from the May 28, 2019 letter request provides all identified additional information requests.

Two (2) data CD's, one including all application electronic files and one including an electronic copy of the modeling report and all modeling files, are included on the last two pages of the hard copy application.

Sincerely,
Albuquerque Pet Memorial Service, Inc.

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ACRONYMS AND ABBREVIATIONS

AAQS	Ambient Air Quality Standards
AEHD	Albuquerque Environmental Health Department
AQP	Air Quality Program
EPA	Environmental Protection Agency
°F	Degrees Fahrenheit
ft	feet
GLC_{max}	Maximum Ground Level Concentration
HAP	Hazardous Air Pollutant
lb/hr	Pounds per hour
MMBtu/hr	Million British thermal units per hour
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NMAC	New Mexico Administrative Code
NSPS	New Source Performance Standards
$PM/PM_{10}/PM_{2.5}$	Particulate Matter & Particulate Matter < 10 or 2.5 microns
PSD	Prevention of Significant Deterioration
tpy	Tons per year
TSP	Total suspended particulates
ug	Micrograms
m^3	Cubic meter
VOC	Volatile Organic Compounds

1. Introduction

1.1 General Information

In accordance with New Mexico Administrative Code (NMAC) 20, Chapter 11, Part 41 of the Albuquerque Environmental Health Department (AEHD) Air Quality Program (AQP) Rules and Regulations, Albuquerque Pet Memorial Service, Inc. (APMS) is applying for a New Source Review (NSR) Construction Permit modification for proposed changes to existing Permit No. 1158-M1.

This document includes all required information pertaining to the project. This submittal includes a completed Long Form Application (Long Form) for air pollutant sources in Bernalillo County, a process flow diagram, a process description, an area map, a plot plan, emissions calculation data, 20 NMAC Chapter 11, Part 41 General Application Requirements, and permit application review fee.

Technical questions regarding the application may be referred to:

Mr. David Gifford, Owner and CEO
Albuquerque Pet Memorial Service, Inc.
132 Mountain Park Place, NW, Suite A
Albuquerque, NM 87114
(505) 231-2107
degiffd@aol.com

OR

Mr. Martin Schluep, Principal Consultant
Alliant Environmental, LLC
7804 Pan American Fwy. NE, Suite 5
Albuquerque, NM 87109
(505) 205-4819
mschluep@alliantenv.com

Certification by the applicant's official representative that the information in this application is accurate is included with the Application Long Form included in Appendix A. The completed AEHD AQP permit application checklist is also located in Appendix A to ensure that the required items have been included in this application.

2. Project and Process Description & Process Flow Diagrams

2.1 Overview

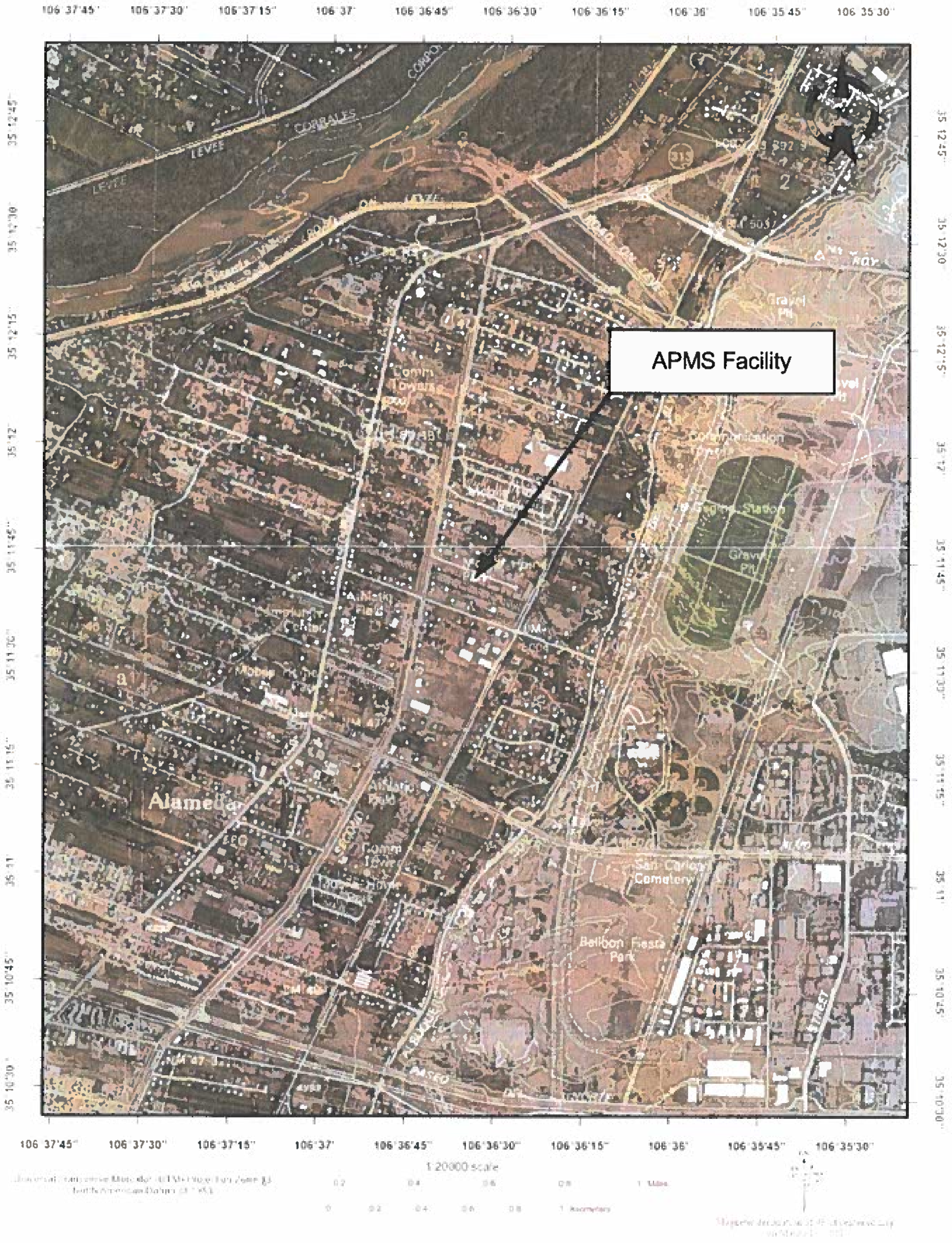
Main Revisions to initial Modification Application:

- Revised emission calculations based on latest unit specific technical data, including use of low-NO_x burners, provided by Hartwick Combustion Technologies, Inc. who is in the process of building the additional proposed units
- Revised Air Dispersion Model using the revised emission rates, the 1997 Bernalillo former meteorological station weather data instead of the 2001-2005 Albuquerque Airport data per the Air Quality Program's (AQP) request and using the National Elevation Data (NED) file provided by the Air Quality Program
- Added most current available pollutant background data to modeled concentrations of NO_2, SO_2, CO, and PM
- Revised the fence line of the property and used property borders instead per the AQP's request

APMS currently operates a Crawford C-1000 1.6 MMBtu/hr and a Hartwick Combustion Technologies (HCT) Magnus Apex 2.5 MMBtu/hr animal crematory. Due to increased business demand, APMS is proposing to add and operate an additional 2.15 MMBtu/hr APEX-300 and an additional 1.8 MMBtu/hr Magnus 500 animal crematory to the existing permitted facility.

The facility operates under Standard Industrial Classification (SIC) 7261, Funeral Service and Crematories, and North American Industrial Classification System (NAICS) Code 812220, Cemeteries and Crematories. APMS is located at 132 Mountain Park Place, NW, Suite A, Albuquerque, NM 87114. A site location map of the facility is shown in Figure 2.1. A facility plot plan is provided in Figure 2.2. The facility proposes to revise the permitted operating hours to 24 hours per day, 7 days per week, 52 weeks per year to assure the flexibility required upon high demand of APMS' services.

A process flow diagram of a the crematories operated and proposed can be seen in Figures 2-3.



ALLIANT ENVIRONMENTAL, LLC

Area Map

Albuquerque Pet Memorial Service, Inc.

Scale: 1:20,000

Drawn by: MRS

Date: 6/10/2019

Chk'd by:

Date:

Albuquerque Pet Memorial Service, Inc.
N 35° 11' 41.9" Latitude
W 106° 36' 34.4" Longitude

Project No.: 094-001

File Name: **APMS Area Map**

Figure: 2-1

ALLIANT ENVIRONMENTAL, LLC

Plot Plan

Albuquerque Pet Memorial Service, Inc.

Scale: 1:20,000

Drawn by: MRS

Date: 4/22/2019

Chk'd by:

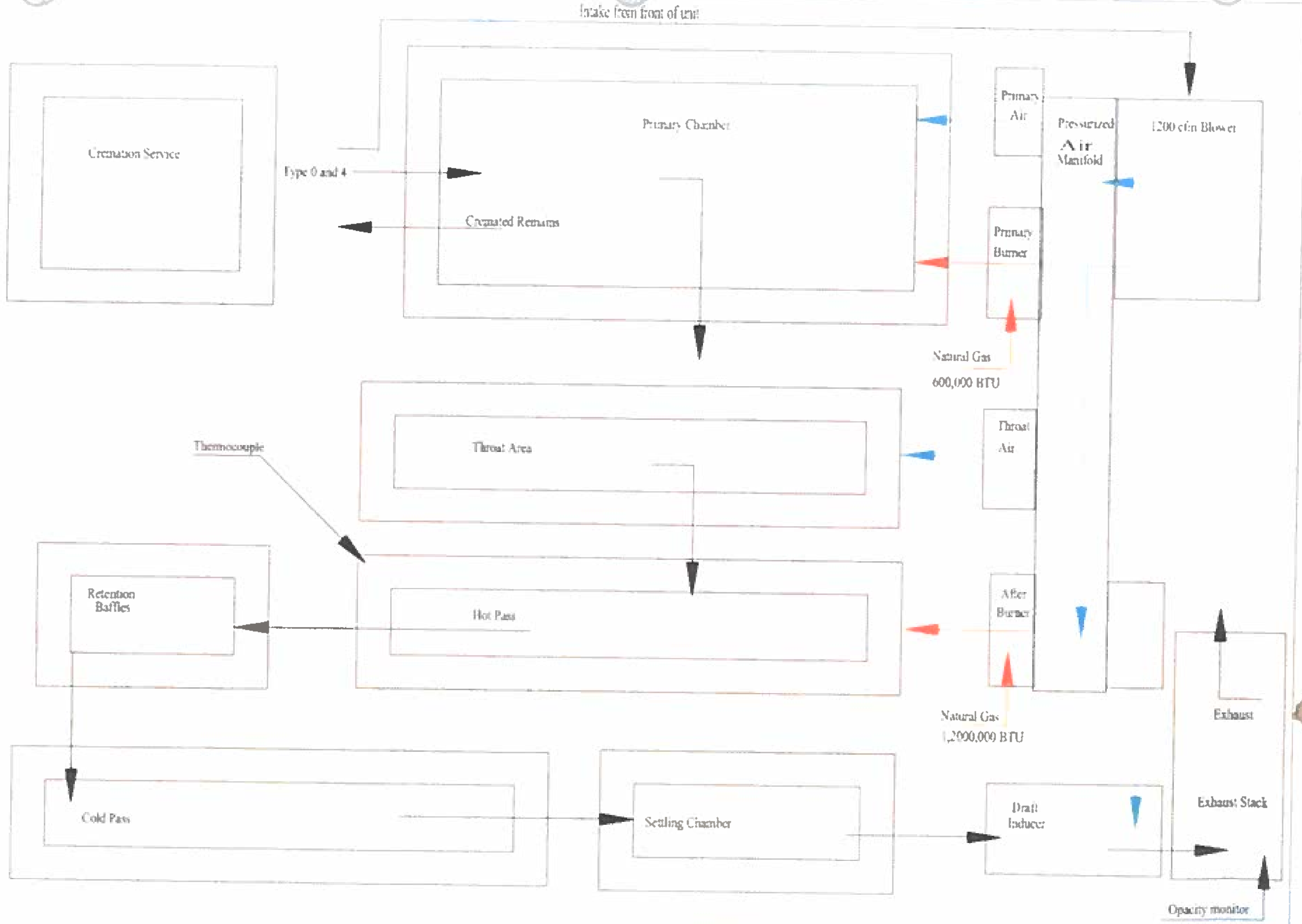
Date:

Albuquerque Pet Memorial Service, Inc.
N 35° 11' 41.9" Latitude
W 106° 36' 34.4" Longitude

Project No.: 094-001

File Name: **APMS Plot Plan_REV1**

Figure: 2-2



PH	2-D HCT MAGNUS-500 Process Flow Diagram
3/22/04	HCT, Inc.

3. Emission Estimates

This section describes the methods used to estimate emissions associated with this permitting action.

3.1 Natural Gas and Cremation Combustion Emissions

3.1.1 Crematories

The natural gas combustion emissions for NO_x, CO, SO_2, TSP, PM_{10}, $PM_{2.5}$ and VOC from the crematories were estimated using AP-42 Chapter 1.4 "External Combustion Sources - Natural Gas Combustion" emission factors listed in Table 1.4-1 and 1.4-2 (<100 MMBTU/HR heat input). The crematories' pre-set controlled capacities are 1.6 MMBTU/HR, 1.8 MMBtu/hr and 2.15 MMBTU/HR respectively. The uncontrolled rates are 1.6 MMBtu/hr, 3.0 MMBtu/hr, and 2.5 MMBtu/hr as presented in the controlled and uncontrolled emissions calculation.

The animal remains combustion or cremation emissions for NO_x, CO, SO_2, TSP, PM_{10}, $PM_{2.5}$ and VOC from the crematories were estimated using AP-42 Chapter 2.3 "Medical Waste Incineration" emission factors listed in Table 2.3-1 and 2.3-2. Stack testing has been conducted for the existing HCT Magnus Apex 250 lb/hr burn rate in 2006 per the Air Quality Program's request. Three stack test runs were performed and the highest Total Suspended Particulate (TSP) pounds per hour (lb/hr) emission rate was used to calculate PM_{10} and $PM_{2.5}$ emissions for all crematories. Since the stack test was performed on the larger of the two units, using the same stack test data on the two smaller units is conservative.

Emission factors from medical waste incineration from AP-42 Chapter 2.3 are commonly used to estimate criteria pollutant emissions for cremation, though the two processes, incineration and cremation, are not the same as explained below. Hazardous Air Pollutant (HAP) emission factors for cremation were obtained from EPA's web Factor Information and Retrieval database (webFIRE). The medical incineration HAP emission factors are applicable to infectious wastes only and are therefore not appropriate to use for HAP emission estimation from cremation.

The cremation process is not an instantaneous incineration process, such as the medical waste incineration, with any set maximum hourly burn rate. The initial heat comes from the burning of natural gas based on the crematory's maximum natural gas firing rate. Once the animal remains ignite, the natural gas firing rate is reduced to assure the temperature within the crematory does not overheat the equipment. Once the cremation process is complete, the cooldown phase begins. Therefore, to appropriately estimate short term criteria pollutant emission rates from the cremation process, the daily maximum weight cremated is applied to the emission factor for medical waste incineration based on the maximum hourly burn rate. The pounds per day (lb/day) rate is calculated as follows:

Lb/day = (Maximum Hourly Burn Rate (lb/hr)) x (Maximum number of daily cycles) x (hours/cycle)

For the Magnus 500 (250 lb/hr) unit, the equation is:

Lb/day = (250 lb/hr) x (4 cycles/day) x (4 hours/cycle) = 4,000 lb/day

Sample Calculation for Short Term (lb/hr) NO_2 from Cremation Process

AP-42, 2.3 Emission Factor for NO_2 = 3.56 lb/ton

Lb/hr NO_2 = (3.56 lb/ton) x (4,000 lb/day) / (2,000 lb/ton) / (24-hrs/day) = 0.30 lb/hr NO_2

Sample Calculation for Long Term (tpy) NO_2 from Cremation

NO_2 tpy = (0.30 lb/hr) x 8760 hours/year / 2000 lb/ton = 1.31 tpy TSP

Per EPA's AP-42 Chapter 2.3, Table 2.3-15, 65% of TSP is PM_{10} and 43.3% of TSP is $PM_{2.5}$. The emission rates for PM_{10} and $PM_{2.5}$ were calculated accordingly. Copies of the AP-42 emission factors used are attached.

Sample Calculations for Short Term (lb/hr) TSP, PM_{10} and $PM_{2.5}$ from Cremation of Animal Remains:

TSP lb/hr = 0.103 lb/hr from stack test data

Per AP-42 Chapter 2.3, Table 2-15, PM_{10} = 65% of TSP and $PM_{2.5}$ = 43.3% of TSP:

PM_{10} lb/hr = (0.103 lb/hr x 65% of TSP) x (1.10 "10% safety Factors for Stack Test Fluctuation) = 0.07 lb/hr PM_{10}

$PM_{2.5}$ lb/hr = (0.103 lb/hr x 43.3% of TSP) x (1.10 "10% safety Factors for Stack Test Fluctuation) = 0.05 lb/hr $PM_{2.5}$

Long Term (tpy) Sample Calculations for TSP, PM_{10} and $PM_{2.5}$ from Cremation of Carcasses:

TSP tpy = (0.103 TSP lb/hr) x 8760 hours/year / 2000 lb/ton = 0.45 tpy TSP

PM_{10} tpy = (0.07 PM_{10} lb/hr) x 8760 hours/year / 2000 lb/ton = 0.32 tpy PM_{10}

$PM_{2.5}$ tpy = (0.05 PM_{10} lb/hr) x 8760 hours/year / 2000 lb/ton = 0.21 tpy $PM_{2.5}$

Short Term (lb/hr) Sample Emission Calculations from Natural Gas Combustion (1.6MMBTU/HR Crematory):

NO_x lb/hr = (AP-42 Chapter 1.4 Emission Factor for NO_x) x (Maximum Natural Gas Firing Rate of Crematory) / (Natural Gas Heating Rate) = lb/hr NO_x

NO_x lb/hr = (100 lb/MMFT^3) x (1.6 MMBtu/hr) / (1020 BTU/FT^3) = 0.16 lb/hr NO_x

The same equation is applied to CO, SO_2, and VOC using these pollutants' specific emission factors for natural gas combustion for sources less than 100 MMBTU/HR per AP-42 Chapter 1.4. The existing Magnus-500 and the two proposed units have low NO_x burners installed; therefore, the controlled low NO_x burner emission factor for NO_x is applied (50 lb/$MMFT^3$). Detailed emission calculations are shown in Appendix B.

Long Term (tpy) Sample Emission Calculations from Natural Gas Combustion (1.6MMBTU/HR Crematory):

Example for NO_x tpy = (0.16 lb/hr NO_x) x (8760 hours/yr) / (2000 lb/ton) = 0.69 tpy NO_x

The same equation is applied to PM_{10} and $PM_{2.5}$, NO_2, CO, SO_2, VOC and HAP annual emissions for cremation and natural gas combustion.

The emission rates from natural gas combustion are added to the emission rates calculated from cremation. Detailed emission calculations and supporting documentation are included in Appendix B.

4. Air Quality Impacts Analysis

APMS is required to demonstrate compliance with National and New Mexico Ambient Air Quality Standards (N/NMAAQS) for specified pollutants. Since combustion emissions will increase with this permit modification, a complete air quality impacts analysis was performed for NO_2, SO_2, CO, PM_{10}, and $PM_{2.5}$ and their associated averaging times.

The Air Quality Program's "Air Dispersion Modeling Guidelines for Air Quality Permitting" were followed for this modeling project.

The impact analysis demonstrates that all modeled pollutant concentrations are less than the respective N/NMAAQS at the APMS fence line or beyond. A detailed modeling report is provided in Appendix D.

5. Regulatory Applicability

5.1 Compliance with AEHD AQP NMAC Rules and Regulations

20.11.1 NMAC – General Provisions

20.11.1 NMAC adopts non-enforceable air quality goals for ambient air quality as well as the enforceable National Ambient Air Quality Standards (NAAQS) and New Mexico Ambient Air Quality Standards (NMAAQS). The NMAAQS, 20.2.3 NMAC, specify maximum allowable ambient concentrations of the criteria pollutants NO_2, CO SO_2, particulate matter (PM_{10}, and $PM_{2.5}$), total reduced sulfur, and H_2S.

Ambient impacts of process related criteria pollutants were evaluated using EPA's approved air dispersion model AERMOD. The summarized results of the impacts analysis and a detailed modeling report is provided in Appendix D.

20.11.2 NMAC – Permit Fees

APMS will pay the required fees on an annual basis, as required.

20.11.5 NMAC – Visible Air Contaminants

This regulation limits visible emissions from stationary sources. APMS will meet the requirements of this rule by operating its units as designed and per the manufacturer's manual(s).

20.11.8 NMAC – Ambient Air Quality Standards

The Federal and State ambient air quality standards will continue to be met for the APMS facility, as can be seen Appendix D.

20.11.20 NMAC – Fugitive Dust Control

This regulation requires the use of reasonable precautions to prevent particulate matter that is generated from becoming airborne. Emissions of particulate matter from the APMS facility are exclusively from the combustion of natural gas and animal remains. APMS will operate the crematories according to the manufacturer's manual(s) to continue to meet any applicable requirements of this rule.

20.11.41 NMAC – Construction Permit

The Albuquerque – Bernalillo County Air Quality Control Board Construction Permit regulation, 20.11.41 NMAC, requires a permit for any stationary source, new or modified, that has a pre-controlled emission rate exceeding 10 pounds per hour or 25 tons per year of any regulated air contaminant for which there are national or New Mexico Ambient Air Quality Standards (AAQS). Furthermore, under 20.11.41.2B.(6) NMAC - *...if the source is subject to an existing or new board regulation that includes an equipment emissions limitation, the source shall apply for and obtain a construction permit.* An emissions limitation under 20.11.68.200C NMAC is applicable. This permit application is being submitted to request a modification to the existing permit to reflect the modifications listed in Section 3.

20.11.41.13.E(1) NMAC – Application for Permit - Content

This permit modification application includes a completed permit application form provided by the AQP (see Appendix A).

20.11.41.13.E(2) NMAC – Application for Permit - Content

The name, street and post address of the applicant is provided on page 1-1, on the application form in Appendix A of this application, and on the public notice documents.

20.11.41.13.E(3) NMAC – Application for Permit - Content

The date this application was submitted to the AQP is provided on title page of this application and the signature page on the application form in Appendix A.

20.11.41.13.E(4) NMAC – Application for Permit - Content

This application text and Appendix B includes attachments, including emission calculations, computations, and all other analyses used to provide information to describe the potential emission rate and nature of all regulated air contaminants that the existing and proposed crematories emit, and the actual emissions that the source will emit under routine operations after construction. Emissions associated with malfunction, startup and shutdown, if any, are discussed below under 20.11.41.13.E(5). AERMOD air dispersion modeling was performed for all pollutants and a detailed modeling report is included in Appendix D of this application. A modeling protocol was submitted to the AQP on June 3, 2019 and approved by the AQP on June 17, 2019 with the following three comments:

1. Per the NMED modeling guidelines, the 1-hour SO_2 standard is a surrogate for the 3 hour SO_2, the 24-hour SO_2, and the annual SO_2 standards. In other words, if the modeling for the 1-hour SO_2 passes, then there is no need for modeling the 3hr, 24hr, and annual SO_2 standards.
2. Also please refer to Table 6A of the NMED Modeling Guidelines for the correct NAAQS values. For example, Table 1-2 of you protocol lists incorrect values for the $PM_{2.5}$ annual and PM_{10} 24-hour NAAQS.
3. The protocol does not discuss your plan for passing the 1-hour NO_2 standard. How will you change the model to get it to pass?

These comments were addressed in the modeling report located in Appendix D of this application.

20.11.41.13.E(5) NMAC – Application for Permit - Content

The following are the minimum elements that shall be included in the permit application before the department can determine whether the application is administratively complete and ready for technical review. It is not necessary to include an element if the department has issued a written waiver regarding the element and the waiver accompanies the application. However, the department shall not waive any federal requirements. The permit application shall include:

(5) an operational and maintenance strategy detailing:

(a) The steps the applicant will take if a malfunction occurs that may cause emission of a regulated air contaminant to exceed a limit that is included in the permit
If malfunction occurs on any equipment associated with the crematories, corrective action to eliminate excess emissions and prevent recurrence in the future will be undertaken as quickly as safety allows. Each unit is equipped with temperature sensors. If the burn temperature is too low, the natural gas burners will restart until the temperature reaches the design temperature range. If the burn temperature is too high, the natural gas feed to the burners goes to zero and the burners turn off. In addition, the crematories are equipped with a visual emissions (Particulate Matter) alarm system to minimize or eliminate excess visual emissions. If there is a power outage, the system automatically shuts down and will require manual intervention to restart. These measures prevent permitted emissions exceedances.

(b) The nature of emissions during startup or shutdown of the source and the source's air pollution equipment
Startup and shutdown emissions are lower than emissions during normal operating conditions and as permitted, since initially and at the end of a cremation, only pipeline grade natural gas is burned.

(c) The steps the applicant will take to minimize emissions during routine startup or shutdown
To minimize emissions during startup and shutdown, the trained operators of the crematories will operate and maintain the crematories (Units No. 1 through 4) according to the manufacturer's written instructions, or the operating procedures developed by APMS. The procedures dictate a sequence of operations designed to minimize emissions from the facility during such activities.

20.11.41.13.E(6) NMAC – Application for Permit - Content

A USGS aerial topo map downloaded from http://map-pass.mytopo.com is included on page 2-3 of this application.

20.11.41.13.E(7) NMAC – Application for Permit - Content

An aerial plot plan of the facility identifying each emission point (stack) is provided on page 2-4 of this application.

20.11.41.13.E(8) NMAC – Application for Permit - Content

A complete description of the facility, process and emission sources is discussed on previous pages of this application. A process flow diagram is provided on page 2-5 of this application.

20.11.41.13.E(9) NMAC – Application for Permit - Content

Stack UTM Coordinates:

Stack 1:	353,463.33m Easting; 3,895,858.78m Northing

Stack 2:	353,462.18m Easting; 3,895,855.74m Northing
Stack 3:	353,461.15m Easting; 3,895,853.15m Northing
Stack 4:	353,460.24m Easting; 3,895,850.54m Northing

There is no air pollution control equipment proposed at this facility. The only controls applied are pre-set Btu/hr for each unit and the use of low-NO$_x$ burners for the APEX 300 and Magnus 500 units. No other controls are applicable.

Manufacturer specification sheets for the proposed new units are attached in Appendix B. Operating manuals for review can be provided upon request.

20.11.41.13.E(10) NMAC – Application for Permit - Content

Stack testing on the existing Magnus crematory has been performed in 2006. No other emissions measurement methods are proposed. Daily logs of the animal remains weight cremated will be kept to keep records to prove compliance with the allowable emissions rates.

20.11.41.13.E(11) NMAC – Application for Permit - Content

The maximum operating schedule of the source is continuous operation or 8760 hours/year. Normal business hours are from 7AM to 7PM Monday through Sunday. Business demand may require around the clock operation at times, which is why this revision application based the emissions calculations on 8760 hours/year operation.

20.11.41.13.E(12) NMAC – Application for Permit - Content

No other relevant information should be applicable; however, if the AQP requires further information on anything applicable to this permit application, APMS will provide such information as available.

20.11.41.13.E(13) NMAC – Application for Permit - Content

Page 9 of 9 of the application form provided in Appendix A includes the signed certification of Mr. David Gifford, Owner and CEO of Albuquerque Pet Memorial Service, Inc. certifying to the accuracy of all information as represented in this application and attachments.

20.11.41.13.E(14) NMAC – Application for Permit - Content

A review fee check has previously been submitted to the AQP with the initial permit modification application.

20.11.41.13.E(15) NMAC – Application for Permit - Content

All public notice requirements have been fulfilled and proof is provided in Appendix C of this application.

20.11.49 NMAC – Excess Emissions

APMS will report any excess emissions, if any, as specified under 20.11.49 NMAC.

20.11.63 – New Source Performance Standards

This regulation incorporates the Federal New Source Performance Standards (NSPS) regulations under 40 CFR Part 60. No NSPS regulations are applicable to this facility.

20.11.64 – Emission Standards for Hazardous Air Pollutants

This regulation incorporates the Federal National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations under 40 CFR Part 61 and Part 63. No NESHAP regulations are applicable to this facility.

20.11.68 – Incinerators and Crematories Pursuant to 20.11.68.200C. NMAC, Crematories may be used solely for cremating human or animal remains, parts and tissues thereof, and other items normally associated with the cremation process. No person may release or discharge into the atmosphere from any crematory particulate matter in excess of 0.08 grains per standard cubic foot of dry exhaust gas corrected to 12 percent of carbon dioxide (CO_2) at standard conditions. APMS will comply with this emissions limit.

5.1 New Source Performance Standards (NSPS)

40 CFR Part 60, Subpart E – Standards of Performance for Incinerators

This regulation applies to incinerators with a capacity of 50 tons/day or greater. The crematories operated at APMS are much less than 50 tons/day capacity; therefore, this NSPS does not apply.

5.2 National Emission Standards for Hazardous Air Pollutants (NESHAPs)

National Emission Standards for Hazardous Air Pollutants (NESHAPs) are emissions standards for hazardous air pollutants (HAPs). APMS is a minor source for HAPs, but there are no applicable Subparts to equipment or processes under 40 CFR Part 61 and 63.

5.3 Non-attainment Review

Not Applicable. See Section 6.1

5.4 Prevention of Significant Deterioration (PSD)

Not Applicable. See Section 6.2

6. PSD & NNSR

6.1 Non-Attainment New Source Review (NNSR)

APMS is located in Bernalillo County, which has been designated as attainment for all National Ambient Air Quality Standards (NAAQS). As such, NNSR regulatory requirements are not applicable.

6.2 Prevention of Signification Deterioration (PSD)

APMS is not a major source; therefore PSD is not applicable.

7. Permit Application Review Fee

This permit modification application is being submitted to authorize the modifications listed in Section 3 to existing Construction Permit No. 1158-M1. The filled out permit application review fee checklist is provided in Appendix A. A review fee check was submitted with the initial permit modification application.

APPENDIX A

Authority to Construct Permit Application Forms and Permit Review Fee Checklist

Albuquerque Environmental Health Department - Air Quality Program
Please mail this application to **P.O. Box 1293, Albuquerque, NM 87103**
or hand deliver between 8:00am - 5:00pm Monday - Friday to:
3rd Floor, Suite 3023 - One Civic Plaza NW, Albuquerque, New Mexico 87103
(505) 768 – 1972 aqd@cabq.gov (505) 768 - 1977 (Fax)

Application for Air Pollutant Sources in Bernalillo County Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

Clearly handwrite or type **Corporate Information** **Submittal Date: 3/22/2019 (Original Submittal)**

1. Company Name Albuquerque Pet Memorial Service, Inc.
2. Street Address 132 Mountain Park Place, NW, Suite A and B Zip 87114
3. Company City Albuquerque 4. Company State NM 5. Company Phone (505) 550-4793 6. Company Fax (505) 897-7828
7. Company Mailing Address: 132 Mountain Park Place, NW, Suite A and B, Albuquerque, NM Zip 87114
8. Company Contact and Title Mr. David Gifford, Owner/CEO 9. Phone (505) 231-2107
10. E-mail degiffd@aol.com

Stationary Source (Facility) Information: **[Provide a plot plan (legal description/drawing of facility property) with overlay sketch of facility processes; Location of emission points; Pollutant type and distances to property boundaries]**

1. Facility Name Albuquerque Pet Memorial Service, Inc. 2. Street Address 132 Mountain Park Place, NW, Suite A and B
City Albuquerque 4. State NM 5. Facility Phone (505) 550-4793 6. Facility Fax (505) 897-7828
7. Facility Mailing Address (Local) 132 Mountain Park Place, NW, Suite A and B, Albuquerque, NM Zip 87114
8. Latitude - Longitude or UTM Coordinates of Facility UTME: 353,465.93 UTMN: 3,895,855.48
9. Facility Contact and Title Mr. David Gifford, Owner/CEO 10. Phone (505) 231-2107 11.E-mail degiffd@aol.com

General Operation Information (if any further information request does not pertain to your facility, write N/A on the line or in the box)

1. Facility Type (description of your facility operations) Crematory for Animal Remains
2. Standard Industrial Classification (SIC 4 digit #) 7261
3. North American Industry Classification System (NAICS Code #) 812220
4. Is facility currently operating in Bernalillo County. Yes If yes, date of original construction 4/1/1999
If no, planned startup is __/__/____
5. Is facility permanent Yes If no, give dates for requested temporary operation - from __/__/____ through __/__/____
6. Is facility process equipment new? There are two (2) existing crematories and there are two (2) additional crematories proposed. If no, give actual or estimated manufacture or installation dates in the Process Equipment Table.
7. Is application for a modification, expansion, or reconstruction (altering process, or adding, or replacing process equipment, etc.) to an existing facility which will result in a change in emissions Yes . If yes, give the manufacture date of modified, added, or replacement equipment in the Process Equipment Table modification date column, or the operation changes to existing process/equipment which cause an emission increase.
8. Is facility operation (circle one) [Continuous Intermittent [✓ Batch]]
9. Estimated % of production Jan-Mar 25 Apr-Jun 25 Jul-Sep 25 Oct-Dec 25

10. Current or requested operating times of facility 24 hrs/day 7 days/wk 4 wks/mo 12 mos/yr

11. Business hrs 07:00AM to 07:00PM

Will there be special or seasonal operating times other than shown above Yes If yes, explain Regular business hours are from 7AM to 7PM, but business demand may require around the clock operation at times, which is why this revision application based the emissions calculations on 8,760 hours/year operation.

13. Raw materials processed Animal Remains

14. Saleable item(s) produced Cremated remains to be returned to owners of pets.

15. Permitting Action Being Requested

☐ New Permit ☒ Permit Modification ☐ Technical Permit Revision ☐ Administrative Permit Revision

Current Permit #: 1158-M1__________ Current Permit #: __________ Current Permit #: __________

PROCESS EQUIPMENT TABLE

(Generator-Crusher-Screen-Conveyor-Boiler-Mixer-Spray Guns-Saws-Sander-Oven-Dryer-Furnace-Incinerator, etc.) Match the Process Equipment Units listed on this Table to the same numbered line if also listed on Emissions & Stack Table (page 6).

Process Equipment Unit	Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date	Size or Process Rate (Hp;kW;Btu;ft^3;lbs; tons;yd^3;etc.)	Fuel Type
Example 1. Generator	Unigen	B-2500	A56732195 C-222	7/96	7/97	N/A	250 Hp - HR. ~~YR.~~	Diesel
Example 2. Spray Gun	HVLP Systems	Spra –N-Stay 1100	k26-56-95	01/97	11/97	N/A	0.25 gal. - HR. ~~YR.~~	Electric Compressor
1. Pet Crematory 1	Crawford	C-1000	1000-H	January 1990	May 1, 1999	N/A	1.6 MMBtu/hr	Natl. Gas
2. Pet Crematory 2	Hartwick Combustion Technologies	HCT Magnus Apex 250	04010606	April 2005	May 1, 2005	N/A	2.5 MMBtu/hr	Natl. Gas
3. Pet Crematory 3	Hartwick Combustion Technologies	APEX 300	TBD	TBD	TBD	N/A	3.0 MMBtu/hr	Natl. Gas
4. Pet Crematory 4	Hartwick Combustion Technologies	HCT Magnus Apex 250	TBD	TBD	TBD	N/A	2.5 MMBtu/hr	Natl. Gas
5.							HR. YR.	
							HR. YR.	
7.							HR. YR.	
8.							HR. YR.	
9.							HR. YR.	
10.							HR. YR.	
11.							HR. YR.	
12.							HR. YR.	
13.							HR. YR.	
14.							HR. YR.	
15.							HR. YR.	

1. Basis for Equipment Size or Process Rate (Manufacturers data, Field Observation/Test, etc.) Manufacturer data
Submit information for each unit as an attachment

NOTE: Copy this table if additional space is needed (begin numbering with 16., 17., etc.)

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

TABLE EXEMPTED SOURCES AND EXEMPTED ACTIVITIES

(Generator-Crusher-Screen-Conveyor-Boiler-Mixer-Spray Guns-Saws-Sander-Oven-Dryer-Furnace-Incinerator, etc.) Match the Process Equipment Units listed on this Table to the same numbered line if also listed on Emissions & Stack Table (page 6).

Process Equipment Unit	Manufacturer	Model #	Serial #	Manufacture Date	Installation Date	Modification Date	Size or Process Rate (Hp;kW;Btu;ft^3;lbs; tons;yd^3;etc.)	Fuel Type
Example 1. Generator	Unigen	B-2500	A56732195C-222	7/96	7/97	N/A	250 Hp - HR. ~~YR.~~	Diesel
Example 2. Spray Gun	HVLP Systems	Spra –N-Stay 1100	k26-56-95	01/97	11/97	N/A	0.25 gal. - HR. ~~YR.~~	Electric Compressor
1. N/A							HR. YR.	
2.							HR. YR.	
3.							HR. YR.	
4.							HR. YR.	
5.							HR. YR.	
6.							HR. YR.	
7.							HR. YR.	
.							HR. YR.	
9.							HR. YR.	
10.							HR. YR.	
11.							HR. YR.	
12.							HR. YR.	
13.							HR. YR.	
14.							HR. YR.	
15.							HR. YR.	

1. Basis for Equipment Size or Process Rate (Manufacturers data, Field Observation/Test, etc.) ______________________
Submit information for each unit as an attachment

NOTE: Copy this table if additional space is needed (begin numbering with 16., 17., etc.)

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)
UNCONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES

(Process potential under physical/operational limitations during a 24 hr/day and 365 day/year = 8,760 hrs)

Process Equipment Unit*	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOCs)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	Method(s) used for Determination of Emissions (AP-42, Material balance, field tests, manufacturers data, etc.)
Example 1. Generator	1. 9.1 lbs/hr	27.7 lbs/hr	1.3 lbs/hr	0.5 lbs/hr	2.0 lbs/hr	AP-42
	1a. 39.9 tons/yr	121.3 tons/yr	5.7 tons/yr	2.2 tons/yr	8.8 tons/yr	
1. Pet Crematory 1	1. 0.28 lbs/hr	0.33 lbs/hr	0.02 lbs/hr	0.11 lbs/hr	0.103 lbs/hr	AP-42 Chapter 1.4 and 2.3; Stack Test data for PM
	1a. 1.22 tons/yr	1.47 tons/yr	0.10 tons/yr	0.48 tons/yr	0.45tons/yr	
2. Pet Crematory 2	2. 0.45 lbs/hr	0.54 lbs/hr	0.04 lbs/hr	0.18 lbs/hr	0.103 lbs/hr	AP-42 Chapter 1.4 and 2.3; Stack Test data for PM
	2a. 1.98 tons/yr	2.37 tons/yr	0.17 tons/yr	0.80 tons/yr	0.45tons/yr	
3. Pet Crematory 3	3. 0.39 lbs/hr	0.47 lbs/hr	0.03 lbs/hr	0.11 lbs/hr	0.103 lbs/hr	AP-42 Chapter 1.4 and 2.3; Stack Test data for PM
	3a. 1.73 tons/yr	2.07 tons/yr	0.14 tons/yr	0.48 tons/yr	0.45tons/yr	
4. Pet Crematory 4	4. 0.45 lbs/hr	0.54 lbs/hr	0.04 lbs/hr	0.18 lbs/hr	0.103 lbs/hr	AP-42 Chapter 1.4 and 2.3; Stack Test data for PM
	4a. 1.98 tons/yr	2.37 tons/yr	0.17 tons/yr	0.80 tons/yr	0.45tons/yr	
5.	5. lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	
	5a. tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	
6.	6. lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	
	6a. tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	
	7. lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	
	7a. tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	
8.	8. lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	
	8a. tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	
9.	9. lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	
	9a. tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	
10.	10. lbs/hr	lbs/hr	lbs/hr	lbs/hr	lbs/hr	
	10a. tons/yr	tons/yr	tons/yr	tons/yr	tons/yr	
Totals of Uncontrolled Emissions (1 - 10)	1.57 lbs/hr	1.88 lbs/hr	0.13 lbs/hr	0.58 lbs/hr	0.41 lbs/hr	
	6.91 tons/yr	8.28 tons/yr	0.58 tons/yr	2.56 tons/yr	1.80 tons/yr	

*** If any one (1) of these process units, or combination of units, has an uncontrolled emission greater than (>) 10 lbs/hr or 25 tons/yr for any of the above pollutants (based on 8760 hrs of operation), then a permit will be required. Complete this application along with additional checklist information requested on accompanying instruction sheet. Copy this Table if additional space is needed (begin numbering with 11., 12., etc.)**

*** If all of these process units, individually and in combination, have an uncontrolled emission less than or equal to (≤) 10 lbs/hr or 25 tons/yr for all of the above pollutants (based on 8760 hrs of operation), but > 1 ton/yr for any of the above pollutants - then a source registration is required.**

If your facility does not require a registration or permit, based on above emissions, complete the remainder of this application to determine if a registration or permit would be required for Toxic or Hazardous air pollutants used at your facility.

CONTROLLED EMISSIONS OF INDIVIDUAL AND COMBINED PROCESSES

(Based on current operations with emission controls OR requested operations with emission controls)

Process Equipment Units listed on this Table should match up to the same numbered line and Unit as listed on Uncontrolled Table (pg. 3)

Process Equipment Unit	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Nonmethane Hydrocarbons NMHC (VOCs)	Oxides of Sulfur (SOx)	Total Suspended Particulate Matter (TSP)	Control Method	% Efficiency
Example 1. Generator	**1. 9.1 lbs/hr**	**27.7 lbs/hr**	**1.3 lbs/hr**	**0.5 lbs/hr**	**2.0 lbs/hr**	**Operating Hours**	**N/A**
	1a. 18.2 tons/yr	**55.4 tons/yr**	**2.6 tons/yr**	**1.0 tons/yr**	**4.0 tons/yr**		
1. Pet Crematory 1	**1. 0.28 lbs/hr**	**0.33 lbs/hr**	**0.02 lbs/hr**	**0.11 lbs/hr**	**0.103 lbs/hr**	**8760 hrs/yr Control: Limit Maximum Daily Weight Cremated**	**Zero % efficiency**
	1a. 1.22 tons/yr	**1.47 tons/yr**	**0.10 tons/yr**	**0.48 tons/yr**	**0.45 tons/yr**		
2. Pet Crematory 2	**2. 0.39 lbs/hr**	**0.38 lbs/hr**	**0.03 lbs/hr**	**0.18 lbs/hr**	**0.103 lbs/hr**	**8760 hrs/yr and Stack test Data for PM** **Control: Limit Maximum Daily Weight Cremated**	**CO: 13%** **NOx: 29%** **VOC: 10%** **SOx: 0%** **TSP: 0%**
	2a. 1.73 tons/yr	**1.69 tons/yr**	**0.15 tons/yr**	**0.80 tons/yr**	**0.45 tons/yr**		
3. Pet Crematory 3	**3. 0.32 lbs/hr**	**0.28 lbs/hr**	**0.03 lbs/hr**	**0.11 lbs/hr**	**0.103 lbs/hr**	**8760 hrs/yr** **Control: Limit Maximum Daily Weight Cremated, limit MMBtu/hr**	**CO: 18%** **NOx: 40%** **VOC: 15%** **SOx: 21%** **TSP: 0%**
	3a. 1.42 tons/yr	**1.24 tons/yr**	**0.12 tons/yr**	**0.48 tons/yr**	**0.45 tons/yr**		
Pet Crematory 4	**4. 0.39 lbs/hr**	**0.38 lbs/hr**	**0.03 lbs/hr**	**0.18 lbs/hr**	**0.103 lbs/hr**	**8760 hrs/yr and Stack test Data for PM** **Control: Limit Maximum Daily Weight Cremated, limit MMBtu/hr**	**CO: 13%** **NOx: 29%** **VOC: 10%** **SOx: 0%** **TSP: 0%**
	4a. 1.73 tons/yr	**1.69 tons/yr**	**0.15 tons/yr**	**0.80 tons/yr**	**0.45 tons/yr**		
5.	**5. lbs/hr**	**lbs/hr**	**lbs/hr**	**lbs/hr**	**lbs/hr**		
	5a. tons/yr	**tons/yr**	**tons/yr**	**tons/yr**	**tons/yr**		
6.	**6. lbs/hr**	**lbs/hr**	**lbs/hr**	**lbs/hr**	**lbs/hr**		
	6a. tons/yr	**tons/yr**	**tons/yr**	**tons/yr**	**tons/yr**		
7.	**7. lbs/hr**	**lbs/hr**	**lbs/hr**	**lbs/hr**	**lbs/hr**		
	7a. tons/yr	**tons/yr**	**tons/yr**	**tons/yr**	**tons/yr**		
8.	**8. lbs/hr**	**lbs/hr**	**lbs/hr**	**lbs/hr**	**lbs/hr**		
	8a. tons/yr	**tons/yr**	**tons/yr**	**tons/yr**	**tons/yr**		
9.	**9. lbs/hr**	**lbs/hr**	**lbs/hr**	**lbs/hr**	**lbs/hr**		
	9a. tons/yr	**tons/yr**	**tons/yr**	**tons/yr**	**tons/yr**		
10.	**10. lbs/hr**	**lbs/hr**	**lbs/hr**	**lbs/hr**	**lbs/hr**		
	10a. tons/yr	**tons/yr**	**tons/yr**	**tons/yr**	**tons/yr**		
Totals of Uncontrolled Emissions (1 - 10)	**1.38 lbs/hr** **6.10 tons/yr**	**1.37 lbs/hr** **6.09 tons/yr**	**0.11 lbs/hr** **0.52 tons/yr**	**0.58 lbs/hr** **2.56 tons/yr**	**0.41 lbs/hr** **1.80 tons/yr**		

1. Basis for Control Equipment % Efficiency (Manufacturers data, Field Observation/Test, AP-42, etc.)_% control = % reduction in maximum daily weight cremated__

Submit information for each unit as an attachment N/A

2. Explain and give estimated amounts of any Fugitive Emission associated with facility processes _There are no fugitive emissions_________________

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

**TOXIC EMISSIONS

VOLATILE, HAZARDOUS, & VOLATILE HAZARDOUS AIR POLLUTANT EMISSION TABLE

Product Categories (Coatings, Solvents, Thinners, etc.)	Volatile Organic Compound (VOC), Hazardous Air Pollutant (HAP), or Volatile Hazardous Air Pollutant (VHAP) Primary To The Representative As Purchased Product	Chemical Abstract Service Number (CAS) Of VOC, HAP, Or VHAP From Representative As Purchased Product	VOC, HAP, Or VHAP Concentration Of Representative As Purchased Product (pounds/gallon, or %)	1. How were Concentrations Determined (CPDS, MSDS, etc.)	Total Product Purchases For Category	(-)	Quantity Of Product Recovered & Disposed For Category	(=)	Total Product Usage For Category
EXAMPLE 1. Surface Coatings	XYLENE	1330207	4.0 LBS./GAL	MSDS	lbs/yr 100 gal/yr	(-)	lbs/yr - 0 - gal/yr	(=)	lbs/yr 100 gal/yr
EXAMPLE 2. Cleaning Solvents	TOLUENE	108883	70%	PRODUCT LABEL	lbs/yr 200 gal/yr	(-)	lbs/yr 50 gal/yr	(=)	lbs/yr 150 gal/yr
I. N/A					lbs/yr gal/yr	(-)	lbs/yr gal/yr	(=)	lbs/yr gal/yr
II.					lbs/yr gal/yr	(-)	lbs/yr gal/yr	(=)	lbs/yr gal/yr
					lbs/yr gal/yr	(-)	lbs/yr gal/yr	(=)	lbs/yr gal/yr
IV.					lbs/yr gal/yr	(-)	lbs/yr gal/yr	(=)	lbs/yr gal/yr
V.					lbs/yr gal/yr	(-)	lbs/yr gal/yr	(=)	lbs/yr gal/yr
VI.					lbs/yr gal/yr	(-)	lbs/yr gal/yr	(=)	lbs/yr gal/yr
VII.					lbs/yr gal/yr	(-)	lbs/yr gal/yr	(=)	lbs/yr gal/yr
VIII.					lbs/yr gal/yr	(-)	lbs/yr gal/yr	(=)	lbs/yr gal/yr
IX.					lbs/yr gal/yr	(-)	lbs/yr gal/yr	(=)	lbs/yr gal/yr
X.					lbs/yr gal/yr	(-)	lbs/yr gal/yr	(=)	lbs/yr gal/yr
TOTAL >>>>>>>					lbs/yr gal/yr	(-)	lbs/yr gal/yr	(=)	lbs/yr gal/yr

1. Basis for percent (%) determinations (Certified Product Data Sheets, Material Safety Data Sheets, etc.). Submit, as an attachment, information on one (1) product from each Category listed above which best represents the average of all the products purchased in that Category. Copy this Table if additional space is needed (begin numbering with XI., XII., etc.)

****NOTE: A REGISTRATION IS REQUIRED, AT MINIMUM, FOR ANY AMOUNT OF HAP OR VHAP EMISSION.**
A PERMIT MAY BE REQUIRED FOR THESE EMISSIONS, DETERMINED ON A CASE-BY-CASE EVALUATION.

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

MATERIAL AND FUEL STORAGE TABLE

(Tanks, barrels, silos, stockpiles, etc.) Copy this table if additional space is needed (begin numbering with 6., 7., etc.)

Storage Equipment	Product Stored	Capacity (bbls - tons gal - acres,etc)	Above or Below Ground	Construction (welded, riveted) & Color	Install Date	Loading Rate	Offloading Rate	True Vapor Pressure	Control Equipment	Seal Type	% Eff.
Example 1. Tank	diesel fuel	5,000 gal.	Below	welded/ brown	3/93	3000gal HR. ~~YR.~~	500 gal. - HR. ~~YR.~~	N/A Psia	N/A	N/A	N/A
Example 2. Barrels	Solvent	55 gal Drum	Above - in storage room	welded - green	N/A	N/A HR. YR.	N/A HR. YR.	N/A Psia	N/A	N/A	N/A
1. N/A						HR. YR.	HR. YR.	Psia			
2.						HR. YR.	HR. YR.	Psia			
3.						HR. YR.	HR. YR.	Psia			
4.						HR. YR.	HR. YR.	Psia			

1. Basis for Loading/Offloading Rate (Manufacturers data, Field Observation/Test, etc.) Submit information for each unit as an attachment

2. Basis for Control Equipment % Efficiency (Manufacturers data, Field Observation/Test, AP-42, etc.) Submit information for each unit as an attachment

Application for Air Pollutant Sources in Bernalillo County
Source Registration (20.11.40 NMAC) and Construction Permits (20.11.41 NMAC)

STACK AND EMISSION MEASUREMENT TABLE

If any equipment from the Process Equipment Table (Page 2) is also listed in this Stack Table, use the same numbered line for the Process Equipment unit in both Tables to show the association between the Process Equipment and its Stack. Copy this table if additional space is needed (begin numbering with 6., 7., etc.).

Process Equipment	Pollutant (CO,NOx,TSP, Toluene,etc)	Control Equipment	Control Efficiency	Stack Height & Diameter in feet	Stack Temp.	Stack Velocity & Exit Direction	Emission Measurement Equipment Type	Range-Sensitivity-Accuracy-
Example 1. Generator	CO, NOx, TSP, SO_2, NMHC	N/A	N/A	18 ft. - H 0.8 ft. - D	225 °F	6,000 ft^3/min - V Exit - upward	N/A	N/A
Example 2. Spray Gun	TSP, xylene, toluene, MIBK	Paint Booth	99% for TSP	9 ft. - H 0.5 ft. -D	ambient	10,000 ft^3/min - V Exit - horizontal	N/A	N/A
1. Pet Crematory 1	NO_2, SO_2, CO, $PM_{2.5}$, PM_{10}	N/A	N/A	24 ft high 1.67 ft dia.	1100 °F	20 fps – V	N/A	N/A
2. Pet Crematory 2	NO_2, SO_2, CO, $PM_{2.5}$, PM_{10}	N/A	N/A	24 ft high 1.83 ft dia.	1100 °F	31.94 fps – V	N/A	N/A
3. Pet Crematory 3	NO_2, SO_2, CO, $PM_{2.5}$, PM_{10}	N/A	N/A	28 ft high 1.67 ft dia.	1100 °F	20 fps – V	N/A	N/A
4. Pet Crematory 4	NO_2, SO_2, CO, $PM_{2.5}$, PM_{10}	N/A	N/A	28 ft high 1.83 ft dia.	1100 °F	31.94 fps – V	N/A	N/A

1. Basis for Control Equipment % Efficiency (Manufacturers data, Field Observation/Test, AP-42, etc.) Submit information for each unit as an attachment

I, the undersigned, a responsible officer of the applicant company, certify that to the best of my knowledge, the information stated on this application, together with associated drawings, specifications, and other data, give a true and complete representation of the existing, modified existing, or planned new stationary source with respect to air pollution sources and control equipment. I also understand that any significant omissions, errors, or misrepresentations in these data will be cause for revocation of part or all of the resulting registration or permit.

Signed this 29th day of July, 2019

David Gifford
Print Name

Owner/CEO
Print Title

David Gifford
Signature

City of Albuquerque

Environmental Health Department
Air Quality Program

Permit Application Checklist

Any person seeking a permit under 20.11.41 NMAC, Authority-to-Construct Permits, shall do so by filing a written application with the Department. Prior to ruling a submitted application complete each application submitted shall contain the required items listed below. **This checklist must be returned with the application.**

Applications that are ruled incomplete because of missing information will delay any determination or the issuance of the permit. The Department reserves the right to request additional relevant information prior to ruling the application complete in accordance with 20.11.41 NMAC.

All applicants shall:

1. Fill out and submit the *Pre-permit Application Meeting Request* form
   a. Attach a copy to this application NA → Meeting waived

2. Attend the pre-permit application meeting
   a. Attach a copy of the completed *Pre-permit Application Meeting Checklist* to this application NA → Meeting waived

3. ☑ Provide public notice to the appropriate parties
   a. ☑ Attach a copy of the completed *Notice of Intent to Construct* form to this form
      i. Neighborhood Association(s): See attached copies of e-mail notifications sent
      ii. Coalition(s): See attached copies of e-mail notifications sent
   b. ☑ Attach a copy of the completed *Public Sign Notice Guideline* form

4. Fill out and submit the *Permit Application*. All applications shall:

   A. ☑ be made on a form provided by the Department. Additional text, tables, calculations or clarifying information may also be attached to the form.

   B. ☑ at the time of application, include documentary proof that all applicable permit application review fees have been paid as required by 20 NMAC 11.02. Please refer to the attached permit application worksheet.

   C. ☑ contain the applicant's name, address, and the names and addresses of all other owners or operators of the emission sources.

D. ☑ contain the name, address, and phone number of a person to contact regarding questions about the facility.

E. ☑ indicate the date the application was completed and submitted

F. ☑ contain the company name, which identifies this particular site.

G. ☑ contain a written description of the facility and/or modification including all operations affecting air emissions.

H. ☑ contain the maximum and standard operating schedules for the source after completion of construction or modification in terms of hours per day, days per week, and weeks per year.

I. ☑ provide sufficient information to describe the quantities and nature of any regulated air contaminant (including any amount of a hazardous air pollutant) that the source will emit during:

- ➢ Normal operation
- ➢ Maximum operation
- ➢ Abnormal emissions from malfunction, start-up and shutdown

J. ☑ include anticipated operational needs to allow for reasonable operational scenarios to avoid delays from needing additional permitting in the future.

K. ☑ contain a map, such as a 7.5-minute USGS topographic quadrangle, showing the exact location of the source; and include physical address of the proposed source.

L. ☑ contain an aerial photograph showing the proposed location of each process equipment unit involved in the proposed construction, modification, relocation, or technical revision of the source except for federal agencies or departments involved in national defense or national security as confirmed and agreed to by the department in writing.

M. ☑ contain the UTM zone and UTM coordinates.

N. ☑ include the four digit Standard Industrialized Code (SIC) and the North American Industrial Classification System (NAICS).

O. ☑ contain the types and **potential emission rate** amounts of any regulated air contaminants the new source or modification will emit. Complete appropriate sections of the application; attachments can be used to supplement the application, but not replace it.

P. ☑ contain the types and **controlled** amounts of any regulated air contaminants the new source or modification will emit. Complete appropriate sections of the application; attachments can be used to supplement the application, but not replace it.

Q. ☑ contain the basis or source for each emission rate (include the manufacturer's specification sheets, AP-42 Section sheets, test data, or other data when used as the source).

R. ☑ contain all calculations used to estimate **potential emission rate** and **controlled** emissions.

S. ☑ contain the basis for the estimated control efficiencies and sufficient engineering data for verification of the control equipment operation, including if necessary, design drawings, test reports, and factors which affect the normal operation (e.g. limits to normal operation).

T. ☑ contain fuel data for each existing and/or proposed piece of fuel burning equipment.

U. ☑ contain the anticipated maximum production capacity of the entire facility and the requested production capacity after construction and/or modification.

V. ☑ contain the stack and exhaust gas parameters for all existing and proposed emission stacks.

W. ☑ provide an ambient impact analysis using a atmospheric dispersion model approved by the US Environmental Protection Agency (EPA), and the Department to demonstrate compliance with the ambient air quality standards for the City of Albuquerque and Bernalillo County (See 20.11.01 NMAC). If you are modifying an existing source, the modeling must include the emissions of the entire source to demonstrate the impact the new or modified source(s) will have on existing plant emissions.

X. ☑ contain a preliminary operational plan defining the measures to be taken to mitigate source emissions during malfunction, startup, or shutdown.

Y. ☑ contain a process flow sheet, including a material balance, of all components of the facility that would be involved in routine operations. Indicate all emission points, including fugitive points.

Z. ☑ contain a full description, including all calculations and the basis for all control efficiencies presented, of the equipment to be used for air pollution control. This shall include a process flow sheet or, if the Department so requires, layout and assembly drawings, design plans, test reports and factors which affect the normal equipment operation, including control and/or process equipment operating limitations.

AA. ☑ contain description of the equipment or methods proposed by the applicant to be used for emission measurement.

BB. ☑ be signed under oath or affirmation by a corporate officer, authorized to bind the company into legal agreements, certifying to the best of his or her knowledge the truth of all information submitted.

City of Albuquerque

Environmental Health Department
Air Quality Program

Permit Application Review Fee Instructions

All source registration, authority-to-construct, and operating permit applications for stationary or portable sources shall be charged an application review fee according to the fee schedule in 20.11.2 NMAC. These filing fees are required for both new construction, reconstruction, and permit modifications applications. Qualified small businesses as defined in 20.11.2 NMAC may be eligible to pay one-half of the application review fees and 100% of all applicable federal program review fees.

Please fill out the permit application review fee checklist and submit with a check or money order payable to the "City of Albuquerque Fund 242" and either:

1. be delivered in person to the Albuquerque Environmental Health Department, 3rd floor, Suite 3023 or Suite 3027, Albuquerque-Bernalillo County Government Center, south building, One Civic Plaza NW, Albuquerque, NM or,

2. mailed to Attn: Air Quality Program, Albuquerque Environmental Health Department, P.O. Box 1293, Albuquerque, NM 87103.

The department will provide a receipt of payment to the applicant. The person delivering or filing a submittal shall attach a copy of the receipt of payment to the submittal as proof of payment Application review fees shall not be refunded without the written approval of the manager. If a refund is requested, a reasonable professional service fee to cover the costs of staff time involved in processing such requests shall be assessed. Please refer to 20.11.2 NMAC (effective January 10, 2011) for more detail concerning the "Fees" regulation as this checklist does not relieve the applicant from any applicable requirement of the regulation.

City of Albuquerque

Environmental Health Department
Air Quality Program

Permit Application Review Fee Checklist

Please completely fill out the information in each section. Incompleteness of this checklist may result in the Albuquerque Environmental Health Department not accepting the application review fees. If you should have any questions concerning this checklist, please call 768-1972.

I. COMPANY INFORMATION:

Company Name	Albuquerque Pet Memorial Services, Inc.		
Company Address	132 Mountain Park Place, NW, Albuquerque, NM 87114		
Facility Name	Albuquerque Pet Memorial Services, Inc.		
Facility Address	132 Mountain Park Place, NW, Albuquerque, NM 87114		
Contact Person	Mr. David Gifford		
Contact Person Phone Number	(505) 231-2107		
Are these application review fees for an existing permitted source located within the City of Albuquerque or Bernalillo County?		**Yes X**	**No**
If yes, what is the permit number associated with this modification?		**Permit #1158-M1**	
Is this application review fee for a Qualified Small Business as defined in 20.11.2 NMAC? (See Definition of Qualified Small Business on Page 4)		**Yes X**	**No**

II. STATIONARY SOURCE APPLICATION REVIEW FEES:

If the application is for a new stationary source facility, please check all that apply. If this application is for a modification to an existing permit please see Section III.

Check All That Apply	**Stationary Sources**	**Review Fee**	**Program Element**
	Air Quality Notifications		
	AQN New Application	$562.00	2801
	AQN Technical Amendment	$307.00	2802
	AQN Transfer of a Prior Authorization	$307.00	2803
	Not Applicable	*See Sections Below*	
	Stationary Source Review Fees (Not Based on Proposed Allowable Emission Rate)		
	Source Registration required by 20.11.40 NMAC	$ 573.00	2401
	A Stationary Source that requires a permit pursuant to 20.11.41 NMAC or other board regulations and are not subject to the below proposed allowable emission rates	$ 1,146.00	2301
	Not Applicable	*See Sections Below*	
	Stationary Source Review Fees (Based on the Proposed Allowable Emission Rate for the single highest fee pollutant)		
	Proposed Allowable Emission Rate Equal to or greater than 1 tpy and less than 5 tpy	$ 859.00	2302
	Proposed Allowable Emission Rate Equal to or greater than 5 tpy and less than 25 tpy	$ 1,719.00	2303
	Proposed Allowable Emission Rate Equal to or greater than 25 tpy and less than 50 tpy	$ 3,438.00	2304
	Proposed Allowable Emission Rate Equal to or greater than 50 tpy and less than 75 tpy	$ 5,157.00	2305
	Proposed Allowable Emission Rate Equal to or greater than 75 tpy and less than 100 tpy	$ 6,876.00	2306
	Proposed Allowable Emission Rate Equal to or greater than 100 tpy	$8,594.00	2307
	Not Applicable	*See Section Above*	

	Federal Program Review Fees (In addition to the Stationary Source Application Review Fees above)		
	40 CFR 60 - "New Source Performance Standards" (NSPS)	$ 1,146.00	2308
	40 CFR 61 - "Emission Standards for Hazardous Air Pollutants (NESHAPs)	$ 1,146.00	2309
	40 CFR 63 - (NESHAPs) Promulgated Standards	$ 1,146.00	2310
	40 CFR 63 - (NESHAPs) Case-by-Case MACT Review	$ 11,459.00	2311
	20.11.61 NMAC, Prevention of Significant Deterioration (PSD) Permit	$ 5,730.00	2312
	20.11.60 NMAC, Non-Attainment Area Permit	$ 5,730.00	2313
	Not Applicable	*Not Applicable*	

III. MODIFICATION TO EXISTING PERMIT APPLICATION REVIEW FEES:

If the permit application is for a modification to an existing permit, please check all that apply. If this application is for a new stationary source facility, please see Section II.

Check All That Apply	Modifications	Review Fee	Program Element
	Modification Application Review Fees (Not Based on Proposed Allowable Emission Rate)		
	Proposed modification to an existing stationary source that requires a permit pursuant to 20.11.41 NMAC or other board regulations and are not subject to the below proposed allowable emission rates	$ 1,146.00	2321
	Not Applicable	*See Sections Below*	
	Modification Application Review Fees (Based on the Proposed Allowable Emission Rate for the single highest fee pollutant)		
	Proposed Allowable Emission Rate Equal to or greater than 1 tpy and less than 5 tpy	$ 859.00	2322
X	Proposed Allowable Emission Rate Equal to or greater than 5 tpy and less than 25 tpy	$ 1,719.00	2323
	Proposed Allowable Emission Rate Equal to or greater than 25 tpy and less than 50 tpy	$ 3,438.00	2324
	Proposed Allowable Emission Rate Equal to or greater than 50 tpy and less than 75 tpy	$ 5,157.00	2325
	Proposed Allowable Emission Rate Equal to or greater than 75 tpy and less than 100 tpy	$ 6,876.00	2326
	Proposed Allowable Emission Rate Equal to or greater than 100 tpy	$ 8,594.00	2327
	Not Applicable	*See Section Above*	
	Major Modifications Review Fees (In addition to the Modification Application Review Fees above)		
	20.11.60 NMAC, Permitting in Non-Attainment Areas	$ 5,730.00	2333
	20.11.61 NMAC, Prevention of Significant Deterioration	$ 5,730.00	2334
X	*Not Applicable*	*Not Applicable*	
	Federal Program Review Fees (This section applies only if a Federal Program Review is triggered by the proposed modification) (These fees are in addition to the Modification and Major Modification Application Review Fees above)		
	40 CFR 60 - "New Source Performance Standards" (NSPS)	$ 1,146.00	2328
	40 CFR 61 - "Emission Standards for Hazardous Air Pollutants (NESHAPs)	$ 1,146.00	2329
	40 CFR 63 - (NESHAPs) Promulgated Standards	$ 1,146.00	2330
	40 CFR 63 - (NESHAPs) Case-by-Case MACT Review	$11,459.00	2331
	20.11.61 NMAC, Prevention of Significant Deterioration (PSD) Permit	$ 5,730.00	2332
	20.11.60 NMAC, Non-Attainment Area Permit	$ 5,730.00	2333
X	*Not Applicable*	*Not Applicable*	

IV. ADMINISTRATIVE AND TECHNICAL REVISION APPLICATION REVIEW FEES:

If the permit application is for an administrative or technical revision of an existing permit issued pursuant to 20.11.41 NMAC, please check one that applies.

Check One	Revision Type	Review Fee	Program Element
	Administrative Revisions	$ 250.00	2340
	Technical Revisions	$ 500.00	2341
X	*Not Applicable*	*See Sections II, III or V*	

V. PORTABLE STATIONARY SOURCE RELOCATION FEES:

If the permit application is for a portable stationary source relocation of an existing permit, please check one that applies.

Check One	Portable Stationary Source Relocation Type	Review Fee	Program Element
	No New Air Dispersion Modeling Required	$ 500.00	2501
	New Air Dispersion Modeling Required	$ 750.00	2502
	Not Applicable	*See Sections II, III or V*	

VI. Please submit a check or money order in the amount shown for the total application review fee.

Section Totals	Review Fee Amount
Section II Total	$ 0.00
Section III Total	$ 1,719.00
Section IV Total	$ 0.00
Section V Total	$ 0.00
Total Application Review Fee	**$ 1,719.00**

I, the undersigned, a responsible official of the applicant company, certify that to the best of my knowledge, the information stated on this checklist, give a true and complete representation of the permit application review fees which are being submitted. I also understand that an incorrect submittal of permit application reviews may cause an incompleteness determination of the submitted permit application and that the balance of the appropriate permit application review fees shall be paid in full prior to further processing of the application.

Signed this 29th **day of** July **20**19

David Gifford — **Print Name**

Owner/CEO — **Print Title**

Signature

Definition of Qualified Small Business as defined in 20.11.2 NMAC:

"Qualified small business" means a business that meets all of the following requirements:

(1) a business that has 100 or fewer employees;
(2) a small business concern as defined by the federal Small Business Act;
(3) a source that emits less than 50 tons per year of any individual regulated air pollutant, or less than 75 tons per year of all regulated air pollutants combined; and
(4) a source that is not a major source or major stationary source.

Note: Beginning January 1, 2011, and every January 1 thereafter, an increase based on the consumer price index shall be added to the application review fees. The application review fees established in Subsection A through D of 20.11.2.18 NMAC shall be adjusted by an amount equal to the increase in the consumer price index for the immediately-preceding year. Application review fee adjustments equal to or greater than fifty cents ($0.50) shall be rounded up to the next highest whole dollar. Application review fee adjustments totaling less than fifty cents ($0.50) shall be rounded down to the next lowest whole dollar. The department shall post the application review fees on the city of Albuquerque environmental health department air quality program website.

APPENDIX B

Emission Calculations and Supporting Documentation

Unit No.	Rated Process Rate (lb/hr)	Controlled Emission Rates															
		SO2		NOx		CO		VOC		TSP		PM10		PM2.5		Total HAP	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
1	150	0.11	0.48	0.33	1.47	0.28	1.22	0.02	0.10	0.10	0.45	0.09	0.37	0.06	0.27	1.23	0.23
2	250	0.18	0.80	0.38	1.69	0.39	1.73	0.03	0.15	0.10	0.45	0.09	0.38	0.06	0.27	1.23	0.23
3	150	0.11	0.48	0.28	1.24	0.32	1.42	0.03	0.12	0.10	0.45	0.09	0.39	0.07	0.29	1.23	0.23
4	250	0.18	0.80	0.38	1.69	0.39	1.73	0.03	0.15	0.10	0.45	0.09	0.38	0.06	0.27	1.23	0.23
TOTAL		**0.58**	**2.55**	**1.39**	**6.08**	**1.39**	**6.10**	**0.12**	**0.52**	**0.41**	**1.80**	**0.35**	**1.53**	**0.25**	**1.10**	**4.90**	**0.93**

Note:
Unit Nos. 1 and 2 are existing units, Unit Nos. 3 and 4 are proposed additional units.

Unit No.	Rated Process Rate (lb/hr)	Uncontrolled Emission Rates															
		SO2		NOx		CO		VOC		TSP		PM10		PM2.5		Total HAP	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
1	150	0.11	0.48	0.33	1.47	0.28	1.22	0.02	0.10	0.103	0.45	0.09	0.37	0.06	0.27	1.23	0.23
2	250	0.18	0.80	0.54	2.37	0.45	1.98	0.04	0.17	0.103	0.45	0.09	0.40	0.07	0.30	1.23	0.24
3	150	0.11	0.48	0.47	2.07	0.39	1.73	0.03	0.14	0.103	0.45	0.10	0.42	0.07	0.31	1.23	0.24
4	250	0.18	0.80	0.54	2.37	0.45	1.98	0.04	0.17	0.103	0.45	0.09	0.40	0.07	0.30	1.23	0.24
TOTAL		**0.58**	**2.56**	**1.89**	**8.28**	**1.58**	**6.91**	**0.13**	**0.58**	**0.41**	**1.80**	**0.37**	**1.60**	**0.27**	**1.17**	**4.91**	**0.94**

CONTROLLED EMISSION CALCULATIONS FOR EACH 1.6 MMBTU/HR CRAWFORD CREMATOR'

UNIT No. 1

Basis:	
Maximum Natural Gas Firing Rate (MMBTU/hr	1.6
Maximum Daily Weight Cremated (lbs/day	2,400
Maximum Hourly Burn Rate (lb/hr	150
Typical Annual Operating Days (day/yr	365

Constants:	
Natural Gas Heating Value (BTU/ft^3)	1020

Note: Maximum daily throughput = 16 cycles (approximately 1-hour per cycle = 1 hr/cycle x 16 cycles/day x 150 lb/hr = 2,400 lb/day)
The units capacity is 16 cycles only because a cooldown period must occur between cycles.

Calculated Values for Cremation	
Annual Cremating Hours (hr/yr	8760
Maximum Annual Weight Cremated (lbs/yr	876,000
Maximum Annual Daily Natural Gas Usage (MMft^3/day)	0.0251
Maximum Hourly Natural Gas Usage (MMft^3/hr)	0.0010
Maximum Annual Natural Gas Usage (MMft^3/yr)	9.1608 based on 8760 hrs/yr

Natural Gas Combustion Emission

Notes:
1. Emission factors from AP-42 for uncontrolled natural gas combustion in boilers < 100 MMBTU/hr.
AP-42 Chapter 1.4 (Tables 1.4-1 and 1.4-2)

Emissions from Natural Gas Combustior			
Pollutant	**Emission Factor (lb/MMft^3)**	**lb/hr**	**tpy**
PM2.5/PM10	7.6	0.01	0.052
NOx	100	0.16	0.69
CO	84	0.13	0.58
SO2	0.6	0.001	0.004
VOC	5.5	0.01	0.04

Cremation Emission

Notes:
1. Emission factors from AP-42 for uncontrolled medical waste incineration. AP-42 Chapter 2.3 (Tables 2.3-1 and 2.3-2)
PM10 = 65% of TSP; PM2.5 = 43.3% of TSP (AP-42, 2.3, Table 2.3-15)
TSP factor = 4.67 lb/ton

2. PM10 and PM2.5 emissions were derived from actua
stack test data performed on the existing HCT Magnus Apex 250.
The highest of three stack tests' Total Suspended Particulates (TSP)
results (0.103 lb/hr) was taken and a 10% safety factor was added to take into account stack test fluctuation.
Since the Crawford and the proposed APEX units are smaller, the stack test data from the larger HCT Magnus is conservative for the smaller units.

Emissions from Cremation of Carcass (including case wrappings			
Pollutant	**Emission Factor (lb/ton)**	**lb/hr**	**tpy**
TSP	Stack Test	0.10	0.45
PM10	Stack Test	0.07	0.32
PM2.5	Stack Test	0.05	0.21
NOx	3.56	0.18	0.78
CO	2.95	0.15	0.65
SO2	2.17	0.11	0.48
VOC	0.299	0.015	0.07

Total Criteria Pollutant Emissions Unit No. 1

Total Criteria Pollutant Emission		
Pollutant	**lb/hr**	**tpy**
TSP	**0.10**	**0.45**
PM10	**0.09**	**0.37**
PM2.5	**0.06**	**0.27**
NOx	**0.33**	**1.47**
CO	**0.28**	**1.22**
SO2	**0.11**	**0.48**
VOC	**0.02**	**0.10**
TOTAL HAP	**1.23**	**0.23**

AP-42 Factors for Emission Rates from Table 1.4-3 and 1.4-4 (7/98)
HAP Unit No. 1

		Emission rate	
Hazardous Air Pollutants (HAP	**lb/MMScf**	**(lb/hr)**	**(tpy)**
2-Methylnaphthalene	2.40E-05	2.51E-08	1.10E-07
3-Methylchloranthrene	1.80E-06	1.88E-09	8.24E-09
7.12-Dimethylbenz(a)anthracene	1.60E-05	1.67E-08	7.33E-08
Acenaphthene	1.80E-06	1.88E-09	8.24E-09
Acenaphthylene	1.80E-06	1.88E-09	8.24E-09
Anthracene	2.40E-06	2.51E-09	1.10E-08
Benz(a)anthracene	1.80E-06	1.88E-09	8.24E-09
Benzene	2.10E-03	2.20E-06	9.62E-06
Benzo(a)pyrene	1.20E-06	1.25E-09	5.50E-09
Benzo(b)fluoranthene	1.80E-06	1.88E-09	8.24E-09
Benzo(g,h,i)perylene	1.20E-06	1.25E-09	5.50E-09
Benzo(k)fluoranthene	1.80E-06	1.88E-09	8.24E-09
Chrysene	1.80E-06	1.88E-09	8.24E-09
Dibenzo(a,h)anthracene	1.20E-06	1.25E-09	5.50E-09
Dichlorobenzene	1.20E-03	1.25E-06	5.50E-06
Fluoranthene	3.00E-06	3.14E-09	1.37E-08
Fluorene	2.80E-06	2.93E-09	1.28E-08
Formaldehyde	7.50E-02	7.84E-05	3.44E-04
Hexane	1.80E+00	1.88E-03	8.24E-03
Indeno(1,2,3-cd)pyrene	1.80E-06	1.88E-09	8.24E-09
Naphthalene	6.10E-04	6.38E-07	2.79E-06
Phenanathrene	1.70E-05	1.78E-08	7.79E-08
Pyrene	5.00E-06	5.23E-09	2.29E-08
Toluene	3.40E-03	3.56E-06	1.56E-05
Arsenic	2.00E-04	2.09E-07	9.16E-07
Beryllium	1.20E-05	1.25E-08	5.50E-08
Cadmium	1.10E-03	1.15E-06	5.04E-06
Chromium	1.40E-03	1.46E-06	6.41E-06
Cobalt	8.40E-05	8.78E-08	3.85E-07
Manganese	3.80E-04	3.97E-07	1.74E-06
Mercury	2.60E-04	2.72E-07	1.19E-06
Nickel	2.10E-03	2.20E-06	9.62E-06
Selenium	2.40E-05	2.51E-08	1.10E-07
	SUBTOTAL	0.0020	0.009

Cremation HAP Emissions
Emission factors from EPA's web Factor Information Retrieval (webFIRE) database

HAP Unit No. 1

		Emission rate	
Hazardous Air Pollutants (HAP	**lb/150lb**	**(lb/hr)**	**(tpy)**
Beryllium	1.37E-06	0.000022	4.00E-06
Cadmium	1.11E-05	0.00018	3.24E-05
Chromium	2.99E-05	0.00048	8.73E-05
Chromium VI	1.35E-05	0.00022	3.94E-05
Hydrogen Chloride (HCl)	7.20E-02	1.15	2.10E-01
Hydrogen Fluoride (HF)	6.55E-04	0.010	1.91E-03
Lead	6.62E-05	0.0011	1.93E-04
Mercury	3.29E-03	0.053	9.61E-03
Nickel	3.82E-05	0.0006	1.12E-04
Zinc	3.53E-04	0.006	1.03E-03
	SUBTOTAL	1.22	0.22
	TOTAL HAP	**1.23**	**0.23**

CONTROLLED EMISSION CALCULATIONS FOR EACH 2.15 MMBTU/HR APEX 300 TRI-CHAMBER CREMATORY

UNIT No. 3

Basis:	
Maximum Natural Gas Firing Rate (MMBTU/hr)	2.15
Maximum Daily Weight Cremated (lbs/day)	2,400
Maximum Hourly Burn Rate (lb/hr)	150
Typical Annual Operating Days (day/yr)	365

Constants:	
Natural Gas Heating Value (BTU/ft^3)	1020

Note: Maximum daily throughput = 16 cycles (approximately 1-hour per cycle = 1 hr/cycle x 16 cycles/day x 150 lb/hr = 2,400 lb/day)
The units capacity is 16 cycles only because a cooldown period must occur between cycles.

Calculated Values for Cremation:		
Annual Cremating Hours (hr/yr)	8760	
Maximum Annual Weight Cremated (lbs/yr)	876,000	
Maximum Annual Daily Natural Gas Usage (MMft^3/day)	0.0337	
Maximum Hourly Natural Gas Usage (MMft^3/hr)	0.0014	
Maximum Annual Natural Gas Usage (MMft^3/yr)	12.3098	based on 8760 hrs/yr

Natural Gas Combustion Emissions

Notes:
1. Emission factors from AP-42 for controlled natural gas combustion in boilers < 100 MMBTU/hr.
AP-42 Chapter 1.4 (Tables 1.4-1 and 1.4-2)
This unit is equipped with low NOx burners.

Emissions from Natural Gas Combustion			
Pollutant	Emission Factor (lb/MMft^3)	lb/hr	tpy
PM2.5/PM10	7.6	0.02	0.070
NOx	50	0.11	0.46
CO	84	0.18	0.78
SO2	0.6	0.001	0.006
VOC	5.5	0.01	0.05

Cremation Emissions

Notes:
1. Emission factors from AP-42 for uncontrolled medical waste incineration. AP-42 Chapter 2.3 (Tables 2.3-1 and 2.3-2)
PM10 = 65% of TSP; PM2.5 = 43.3% of TSP (AP-42, 2.3, Table 2.3-15)
TSP factor = 4.67 lb/ton

2. PM10 and PM2.5 emissions were derived from actual stack test data performed on the existing HCT Magnus Apex 250.
The highest of three stack tests' Total Suspended Particulates (TSP) results (0.103 lb/hr) was taken and a 10% safety factor was added to take into account stack test fluctuation.
Since the Crawford and the proposed APEX units are smaller, the stack test data from the larger HCT Magnus is conservative for the smaller units.

3. Maximum controlled and pre-set MMBtu/hr = 2.15 MMBtu/hr

Emissions from Cremation of Carcass (including case wrappings)			
Pollutant	Emission Factor (lb/ton)	lb/hr	tpy
TSP	Stack Test	0.10	0.45
PM10	Stack Test	0.07	0.32
PM2.5	Stack Test	0.05	0.21
NOx	3.56	0.18	0.78
CO	2.95	0.15	0.65
SO2	2.17	0.11	0.48
VOC	0.299	0.015	0.07

Total Criteria Pollutant Emissions Unit No. 3

Total Criteria Pollutant Emissions		
Pollutant	lb/hr	tpy
TSP	0.10	0.45
PM10	0.09	0.39
PM2.5	0.07	0.29
NOx	0.28	1.24
CO	0.32	1.42
SO2	0.11	0.48
VOC	0.03	0.12
TOTAL HAP	1.23	0.23

AP-42 Factors for Emission Rates from Table 1.4-3 and 1.4-4 (7/98)
HAP Units No. 3

		Emission rate	
Hazardous Air Pollutants (HAP)	lb/MMScf	(lb/hr)	(tpy)
2-Methylnaphthalene	2.40E-05	3.37E-08	1.48E-07
3-Methylchloranthrene	1.80E-06	2.53E-09	1.11E-08
7,12-Dimethylbenz(a)anthracene	1.60E-05	2.25E-08	9.85E-08
Acenaphthene	1.80E-06	2.53E-09	1.11E-08
Acenaphthylene	1.80E-06	2.53E-09	1.11E-08
Anthracene	2.40E-06	3.37E-09	1.48E-08
Benz(a)anthracene	1.80E-06	2.53E-09	1.11E-08
Benzene	2.10E-03	2.95E-06	1.29E-05
Benzo(a)pyrene	1.20E-06	1.69E-09	7.39E-09
Benzo(b)fluoranthene	1.80E-06	2.53E-09	1.11E-08
Benzo(g,h,i)perylene	1.20E-06	1.69E-09	7.39E-09
Benzo(k)fluoranthene	1.80E-06	2.53E-09	1.11E-08
Chrysene	1.80E-06	2.53E-09	1.11E-08
Dibenzo(a,h)anthracene	1.20E-06	1.69E-09	7.39E-09
Dichlorobenzene	1.20E-03	1.69E-06	7.39E-06
Fluoranthene	3.00E-06	4.22E-09	1.85E-08
Fluorene	2.80E-06	3.93E-09	1.72E-08
Formaldehyde	7.50E-02	1.05E-04	4.62E-04
Hexane	1.80E+00	2.53E-03	1.11E-02
Indeno(1,2,3-cd)pyrene	1.80E-06	2.53E-09	1.11E-08
Naphthalene	6.10E-04	8.57E-07	3.75E-06
Phenanathrene	1.70E-05	2.39E-08	1.05E-07
Pyrene	5.00E-06	7.03E-09	3.08E-08
Toluene	3.40E-03	4.78E-06	2.09E-05
Arsenic	2.00E-04	2.81E-07	1.23E-06
Beryllium	1.20E-05	1.69E-08	7.39E-08
Cadmium	1.10E-03	1.55E-06	6.77E-06
Chromium	1.40E-03	1.97E-06	8.62E-06
Cobalt	8.40E-05	1.18E-07	5.17E-07
Manganese	3.80E-04	5.34E-07	2.34E-06
Mercury	2.60E-04	3.65E-07	1.60E-06
Nickel	2.10E-03	2.95E-06	1.29E-05
Selenium	2.40E-05	3.37E-08	1.48E-07
	SUBTOTAL	0.0027	0.012

Cremation HAP Emissions
Emission factors from EPA's web Factor Information Retrieval (webFIRE) database

HAP Unit No. 3

		Emission rate	
Hazardous Air Pollutants (HAP)	lb/150lb	(lb/hr)	(tpy)
Beryllium	1.37E-06	0.000022	4.00E-06
Cadmium	1.11E-05	0.00018	3.24E-05
Chromium	2.99E-05	0.00048	8.73E-05
Chromium VI	1.35E-05	0.00022	3.94E-05
Hydrogen Chloride (HCl)	7.20E-02	1.15	2.10E-01
Hydrogen Fluoride (HF)	6.55E-04	0.010	1.91E-03
Lead	6.62E-05	0.0011	1.93E-04
Mercury	3.29E-03	0.053	9.61E-03
Nickel	3.82E-05	0.0006	1.12E-04
Zinc	3.53E-04	0.006	1.03E-03
	SUBTOTAL	1.22	0.22
	TOTAL HAP	1.23	0.23

CONTROLLED EMISSION CALCULATIONS FOR EACH 1.8 MMBTU/HR MAGNUS 500 EQUINE CREMATORY

UNITS Nos. 2 and 4

Basis:

Maximum Natural Gas Firing Rate (MMBTU/hr)	1.8
Maximum Daily Weight Cremated (lbs/day)	4,000
Maximum Hourly Burn Rate (lb/hr)	250
Typical Annual Operating Days (day/yr)	365

Constants:

Natural Gas Heating Value (BTU/ft^3)	1020

Note: Maximum daily throughput = 4 cycles (approximately 4-hours per cycle = 4 hrs/cycle x 4 cycles x 250 lb/hr = 4,000 lb/day)
The units capacity is 4 cycles only because a cooldown period must occur between cycles.

Calculated Values for Cremation:

Annual Cremating Hours (hr/yr)	8760	
Maximum Annual Weight Cremated (lbs/yr)	1,460,000	
Maximum Annual Daily Natural Gas Usage (MMft^3/day)	0.0282	
Maximum Hourly Natural Gas Usage (MMft^3/hr)	0.0012	
Maximum Annual Natural Gas Usage (MMft^3/yr)	10.3059	based on 8760 hrs/yr

Natural Gas Combustion Emissions

Notes:

1. Emission factors from AP-42 for uncontrolled natural gas combustion in boilers < 100 MMBTU/hr.
AP-42 Chapter 1.4 (Tables 1.4-1 and 1.4-2)
2 These units are equipped with Low NOx burners

Emissions from Natural Gas Combustion

Pollutant	Emission Factor (lb/MMft^3)	lb/hr	tpy
PM2.5/PM10	7.6	0.0134	0.06
NOx	50	0.09	0.39
CO	84	0.15	0.65
SO2	0.6	0.001	0.005
VOC	5.5	0.01	0.04

Cremation Emissions

Notes:

1. Emission factors from AP-42 for uncontrolled medical waste incineration. AP-42 Chapter 2.3 (Tables 2.3-1 and 2.3-2)
PM10 = 65% of TSP; PM2.5 = 43.3% of TSP (AP-42, 2.3, Table 2.3-15)
TSP factor = 4.67 lb/ton

2. PM10 and PM2.5 emissions were derived from actual stack test data performed on the existing HCT Magnus Apex 250.
The highest of three stack tests' Total Suspended Particulates (TSP) results (0.103 lb/hr) was taken and a 10% safety factor was added to take into account stack test fluctuation.

3. Maximum controlled and pre-set MMBtu/hr = 1.8 MMBtu/hr

Emissions from Cremation of Carcass (including case wrappings)

Pollutant	Emission Factor (lb/ton)	lb/hr	tpy
TSP	Stack Test	0.10	0.45
PM10	Stack Test	0.07	0.32
PM2.5	Stack Test	0.05	0.21
NOx	3.56	0.30	1.30
CO	2.95	0.25	1.08
SO2	2.17	0.18	0.79
VOC	0.299	0.02	0.11

Total Criteria Pollutant Emissions Unit No. 2 and 4

Total Criteria Pollutant Emissions

Pollutant	lb/hr	tpy
TSP	**0.10**	**0.45**
PM10	**0.09**	**0.38**
PM2.5	**0.06**	**0.27**
NOx	**0.38**	**1.69**
CO	**0.39**	**1.73**
SO2	**0.18**	**0.80**
VOC	**0.03**	**0.15**
TOTAL HAP	**1.23**	**0.23**

AP-42 Factors for Emission Rates from Table 1.4-3 and 1.4-4 (7/98)
HAP Units No. 2 and 4

		Emission rate	
Hazardous Air Pollutants (HAP)	**lb/MMScf**	**(lb/hr)**	**(tpy)**
2-Methylnaphthalene	2.40E-05	2.82E-08	1.24E-07
3-Methylchloranthrene	1.80E-06	2.12E-09	9.28E-09
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.88E-08	8.24E-08
Acenaphthene	1.80E-06	2.12E-09	9.28E-09
Acenaphthylene	1.80E-06	2.12E-09	9.28E-09
Anthracene	2.40E-06	2.82E-09	1.24E-08
Benz(a)anthracene	1.80E-06	2.12E-09	9.28E-09
Benzene	2.10E-03	2.47E-06	1.08E-05
Benzo(a)pyrene	1.20E-06	1.41E-09	6.18E-09
Benzo(b)fluoranthene	1.80E-06	2.12E-09	9.28E-09
Benzo(g,h,i)perylene	1.20E-06	1.41E-09	6.18E-09
Benzo(k)fluoranthene	1.80E-06	2.12E-09	9.28E-09
Chrysene	1.80E-06	2.12E-09	9.28E-09
Dibenzo(a,h)anthracene	1.20E-06	1.41E-09	6.18E-09
Dichlorobenzene	1.20E-03	1.41E-06	6.18E-06
Fluoranthene	3.00E-06	3.53E-09	1.55E-08
Fluorene	2.80E-06	3.29E-09	1.44E-08
Formaldehyde	7.50E-02	8.82E-05	3.86E-04
Hexane	1.80E+00	2.12E-03	9.28E-03
Indeno(1,2,3-cd)pyrene	1.80E-06	2.12E-09	9.28E-09
Naphthalene	6.10E-04	7.18E-07	3.14E-06
Phenanathrene	1.70E-05	2.00E-08	8.76E-08
Pyrene	5.00E-06	5.88E-09	2.58E-08
Toluene	3.40E-03	4.00E-06	1.75E-05
Arsenic	2.00E-04	2.35E-07	1.03E-06
Beryllium	1.20E-05	1.41E-08	6.18E-08
Cadmium	1.10E-03	1.29E-06	5.67E-06
Chromium	1.40E-03	1.65E-06	7.21E-06
Cobalt	8.40E-05	9.88E-08	4.33E-07
Manganese	3.80E-04	4.47E-07	1.96E-06
Mercury	2.60E-04	3.06E-07	1.34E-06
Nickel	2.10E-03	2.47E-06	1.08E-05
Selenium	2.40E-05	2.82E-08	1.24E-07
	TOTAL	**0.002**	**0.010**

Cremation HAP Emissions
Emission factors from EPA's web Factor Information Retrieval (webFIRE) database
HAP Units No. 2 and 4

		Emission rate	
Hazardous Air Pollutants (HAP)	**lb/250lb**	**(lb/hr)**	**(tpy)**
Beryllium	1.37E-06	0.000022	4.00E-06
Cadmium	1.11E-05	0.00018	3.24E-05
Chromium	2.99E-05	0.00048	8.73E-05
Chromium VI	1.35E-05	0.00022	3.94E-05
Hydrogen Chloride (HCl)	7.20E-02	1.15	2.10E-01
Hydrogen Fluoride (HF)	6.55E-04	0.010	1.91E-03
Lead	6.62E-05	0.0011	1.93E-04
Mercury	3.29E-03	0.053	9.61E-03
Nickel	3.82E-05	0.0006	1.12E-04
Zinc	3.53E-04	0.006	1.03E-03
	SUBTOTAL	1.22	0.22
	TOTAL HAP	**1.23**	**0.23**

CONTROLLED EMISSION CALCULATIONS FOR EACH 1.6 MMBTU/HR CRAWFORD CREMATORY

UNIT No. 1

Basis:

Maximum Natural Gas Firing Rate (MMBTU/hr)	1.6
Maximum Daily Weight Cremated (lbs/day)	2,400
Maximum Hourly Burn Rate (lb/hr)	150
Typical Annual Operating Days (day/yr	365

Constants:

Natural Gas Heating Value (BTU/ft^3)	1020

Note: Maximum daily throughput = 16 cycles (approximately 1-hour per cycle = 1 hr/cycle x 16 cycles/day x 150 lb/hr = 2,400 lb/day)
The units capacity is 16 cycles only because a cooldown period must occur between cycles.

Calculated Values for Cremation:

Annual Cremating Hours (hr/yr)	8760
Maximum Annual Weight Cremated (lbs/yr)	876,000
Maximum Annual Daily Natural Gas Usage (MMft^3/day	0.0251
Maximum Hourly Natural Gas Usage (MMft^3/hr)	0.0010
Maximum Annual Natural Gas Usage (MMft^3/yr)	9.1608 based on 8760 hrs/yr

Natural Gas Combustion Emissions

Notes:
1. Emission factors from AP-42 for uncontrolled natural gas combustion in boilers < 100 MMBTU/hr.
AP-42 Chapter 1.4 (Tables 1.4-1 and 1.4-2)

Emissions from Natural Gas Combustion

Pollutant	Emission Factor (lb/MMft^3)	lb/hr	tpy
PM2.5/PM10	7.6	0.01	0.052
NOx	100	0.16	0.69
CO	84	0.13	0.58
SO2	0.6	0.001	0.004
VOC	5.5	0.01	0.04

Cremation Emissions

Emissions from Cremation of Carcass (including case wrappings)

Pollutant	Emission Factor (lb/ton)	lb/hr	tpy
TSP	Stack Test	0.10	0.45
PM10	Stack Test	0.07	0.32
PM2.5	Stack Test	0.05	0.21
NOx	3.56	0.18	0.78
CO	2.95	0.15	0.65
SO2	2.17	0.11	0.48
VOC	0.299	0.015	0.07

Notes:
1. Emission factors from AP-42 for uncontrolled medical waste incineration. AP-42 Chapter 2.3 (Tables 2.3-1 and 2.3-2)
PM10 = 65% of TSP: PM2.5 = 43.3% of TSP (AP-42, 2.3, Table 2.3-15)
TSP factor = 4.67 lb/ton

2. PM10 and PM2.5 emissions were derived from actual stack test data performed on the existing HCT Magnus Apex 250.
The highest of three stack tests' Total Suspended Particulates (TSP) results (0.103 lb/hr) was taken and a 10% safety factor was added to take into account stack test fluctuation.
Since the Crawford and the proposed APEX units are smaller, the stack test data from the larger HCT Magnus is conservative for the smaller units.

Total Criteria Pollutant Emissions Unit No. 1

Total Criteria Pollutant Emissions

Pollutant	lb/hr	tpy
TSP	0.10	0.45
PM10	0.09	0.37
PM2.5	0.06	0.27
NOx	0.33	1.47
CO	0.28	1.22
SO2	0.11	0.48
VOC	0.02	0.10
TOTAL HAP	1.23	0.23

AP-42 Factors for Emission Rates from Table 1.4-3 and 1.4-4 (7/98)
HAP Unit No. 1

		Emission rate	
Hazardous Air Pollutants (HAP)	lb/MMScf	(lb/hr)	(tpy)
2-Methylnaphthalene	2.40E-05	2.51E-08	1.10E-07
3-Methylchloranthrene	1.80E-06	1.88E-09	8.24E-09
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.67E-08	7.33E-08
Acenaphthene	1.80E-06	1.88E-09	8.24E-09
Acenaphthylene	1.80E-06	1.88E-09	8.24E-09
Anthracene	2.40E-06	2.51E-09	1.10E-08
Benz(a)anthracene	1.80E-06	1.88E-09	8.24E-09
Benzene	2.10E-03	2.20E-06	9.62E-06
Benzo(a)pyrene	1.20E-06	1.25E-09	5.50E-09
Benzo(b)fluoranthene	1.80E-06	1.88E-09	8.24E-09
Benzo(g,h,i)perylene	1.20E-06	1.25E-09	5.50E-09
Benzo(k)fluoranthene	1.80E-06	1.88E-09	8.24E-09
Chrysene	1.80E-06	1.88E-09	8.24E-09
Dibenzo(a,h)anthracene	1.20E-06	1.25E-09	5.50E-09
Dichlorobenzene	1.20E-03	1.25E-06	5.50E-06
Fluoranthene	3.00E-06	3.14E-09	1.37E-08
Fluorene	2.80E-06	2.93E-09	1.28E-08
Formaldehyde	7.50E-02	7.84E-05	3.44E-04
Hexane	1.80E+00	1.88E-03	8.24E-03
Indeno(1,2,3-cd)pyrene	1.80E-06	1.88E-09	8.24E-09
Naphthalene	6.10E-04	6.38E-07	2.79E-06
Phenanathrene	1.70E-05	1.78E-08	7.79E-08
Pyrene	5.00E-06	5.23E-09	2.29E-08
Toluene	3.40E-03	3.56E-06	1.56E-05
Arsenic	2.00E-04	2.09E-07	9.16E-07
Beryllium	1.20E-05	1.25E-08	5.50E-08
Cadmium	1.10E-03	1.15E-06	5.04E-06
Chromium	1.40E-03	1.46E-06	6.41E-06
Cobalt	8.40E-05	8.78E-08	3.85E-07
Manganese	3.80E-04	3.97E-07	1.74E-06
Mercury	2.60E-04	2.72E-07	1.19E-06
Nickel	2.10E-03	2.20E-06	9.62E-06
Selenium	2.40E-05	2.51E-08	1.10E-07
	SUBTOTAL	0.0020	0.009

Cremation HAP Emissions
Emission factors from EPA's web Factor Information Retrieval (webFIRE) database

HAP Unit No. 1

		Emission rate	
Hazardous Air Pollutants (HAP)	lb/150lb	(lb/hr)	(tpy)
Beryllium	1.37E-06	0.000022	4.00E-06
Cadmium	1.11E-05	0.00018	3.24E-05
Chromium	2.99E-05	0.00048	8.73E-05
Chromium VI	1.35E-05	0.00022	3.94E-05
Hydrogen Chloride (HCl)	7.20E-02	1.15	2.10E-01
Hydrogen Fluoride (HF)	6.55E-04	0.010	1.91E-03
Lead	6.62E-05	0.0011	1.93E-04
Mercury	3.29E-03	0.053	9.61E-03
Nickel	3.82E-05	0.0006	1.12E-04
Zinc	3.53E-04	0.006	1.03E-03
	SUBTOTAL	1.22	0.22
	TOTAL HAP	1.23	0.23

CONTROLLED EMISSION CALCULATIONS FOR EACH 2.15 MMBTU/HR APEX 300 TRI-CHAMBER CREMATORY

UNIT No. 3

Basis:	
Maximum Natural Gas Firing Rate (MMBTU/hr)	3.0
Maximum Daily Weight Cremated (lbs/day)	2,400
Maximum Hourly Burn Rate (lb/hr)	150
Typical Annual Operating Days (day/yr	365

Constants:	
Natural Gas Heating Value (BTU/ft^3)	1020

Note: Maximum daily throughput = 16 cycles (approximately 1-hour per cycle = 1 hr/cycle x 16 cycles/day x 150 lb/hr = 2,400 lb/day)
The units capacity is 16 cycles only because a cooldown period must occur between cycles.

Calculated Values for Cremation:		
Annual Cremating Hours (hr/yr)	8760	
Maximum Annual Weight Cremated (lbs/yr)	876,000	
Maximum Annual Daily Natural Gas Usage (MMft^3/day)	0.0471	
Maximum Hourly Natural Gas Usage (MMft^3/hr)	0.0020	
Maximum Annual Natural Gas Usage (MMft^3/yr)	17.1765	based on 8760 hrs/yr

Natural Gas Combustion Emissions

Notes:
1. Emission factors from AP-42 for controlled natural gas combustion in boilers < 100 MMBTU/hr.
AP-42 Chapter 1.4 (Tables 1.4-1 and 1.4-2)
This unit is equipped with low NOx burners.

Emissions from Natural Gas Combustion

Pollutant	Emission Factor (lb/MMft^3)	lb/hr	tpy
PM2.5/PM10	7.6	0.02	0.098
NOx	100	0.29	1.29
CO	84	0.25	1.08
SO2	0.6	0.002	0.008
VOC	5.5	0.02	0.07

Cremation Emissions

Notes:
1. Emission factors from AP-42 for uncontrolled medical waste incineration. AP-42 Chapter 2.3 (Tables 2.3-1 and 2.3-2)
PM10 = 65% of TSP; PM2.5 = 43.3% of TSP (AP-42. 2.3, Table 2.3-15)
TSP factor = 4.67 lb/ton

2. PM10 and PM2.5 emissions were derived from actual stack test data performed on the existing HCT Magnus Apex 250.
The highest of three stack tests' Total Suspended Particulates (TSP) results (0.103 lb/hr) was taken and a 10% safety factor was added to take into account stack test fluctuation.
Since the Crawford and the proposed APEX units are smaller, the stack test data from the larger HCT Magnus is conservative for the smaller units.

Emissions from Cremation of Carcass (including case wrappings)

Pollutant	Emission Factor (lb/ton)	lb/hr	tpy
TSP	Stack Test	0.10	0.45
PM10	Stack Test	0.07	0.32
PM2.5	Stack Test	0.05	0.21
NOx	3.56	0.18	0.78
CO	2.95	0.15	0.65
SO2	2.17	0.11	0.48
VOC	0.299	0.015	0.07

Total Criteria Pollutant Emissions Unit No. 3

Total Criteria Pollutant Emissions

Pollutant	lb/hr	tpy
TSP	0.10	0.45
PM10	0.10	0.42
PM2.5	0.07	0.31
NOx	0.47	2.07
CO	0.39	1.73
SO2	0.11	0.48
VOC	0.03	0.14
TOTAL HAP	1.23	0.24

AP-42 Factors for Emission Rates from Table 1.4-3 and 1.4-4 (7/98)
HAP Units No. 3

		Emission rate	
Hazardous Air Pollutants (HAP)	lb/MMScf	(lb/hr)	(tpy)
2-Methylnaphthalene	2.40E-05	4.71E-08	2.06E-07
3-Methylchloranthrene	1.80E-06	3.53E-09	1.55E-08
7,12-Dimethylbenz(a)anthracene	1.60E-05	3.14E-08	1.37E-07
Acenaphthene	1.80E-06	3.53E-09	1.55E-08
Acenaphthylene	1.80E-06	3.53E-09	1.55E-08
Anthracene	2.40E-06	4.71E-09	2.06E-08
Benz(a)anthracene	1.80E-06	3.53E-09	1.55E-08
Benzene	2.10E-03	4.12E-06	1.80E-05
Benzo(a)pyrene	1.20E-06	2.35E-09	1.03E-08
Benzo(b)fluoranthene	1.80E-06	3.53E-09	1.55E-08
Benzo(g,h,i)perylene	1.20E-06	2.35E-09	1.03E-08
Benzo(k)fluoranthene	1.80E-06	3.53E-09	1.55E-08
Chrysene	1.80E-06	3.53E-09	1.55E-08
Dibenzo(a,h)anthracene	1.20E-06	2.35E-09	1.03E-08
Dichlorobenzene	1.20E-03	2.35E-06	1.03E-05
Fluoranthene	3.00E-06	5.88E-09	2.58E-08
Fluorene	2.80E-06	5.49E-09	2.40E-08
Formaldehyde	7.50E-02	1.47E-04	6.44E-04
Hexane	1.80E+00	3.53E-03	1.55E-02
Indeno(1,2,3-cd)pyrene	1.80E-06	3.53E-09	1.55E-08
Naphthalene	6.10E-04	1.20E-06	5.24E-06
Phenanathrene	1.70E-05	3.33E-08	1.46E-07
Pyrene	5.00E-06	9.80E-09	4.29E-08
Toluene	3.40E-03	6.67E-06	2.92E-05
Arsenic	2.00E-04	3.92E-07	1.72E-06
Beryllium	1.20E-05	2.35E-08	1.03E-07
Cadmium	1.10E-03	2.16E-06	9.45E-06
Chromium	1.40E-03	2.75E-06	1.20E-05
Cobalt	8.40E-05	1.65E-07	7.21E-07
Manganese	3.80E-04	7.45E-07	3.26E-06
Mercury	2.60E-04	5.10E-07	2.23E-06
Nickel	2.10E-03	4.12E-06	1.80E-05
Selenium	2.40E-05	4.71E-08	2.06E-07
	SUBTOTAL	0.0037	0.016

Cremation HAP Emissions
Emission factors from EPA's web Factor Information Retrieval (webFIRE) database

HAP Unit No. 3

		Emission rate	
Hazardous Air Pollutants (HAP)	lb/150lb	(lb/hr)	(tpy)
Beryllium	1.37E-06	0.000022	4.00E-06
Cadmium	1.11E-05	0.00018	3.24E-05
Chromium	2.99E-05	0.00048	8.73E-05
Chromium VI	1.35E-05	0.00022	3.94E-05
Hydrogen Chloride (HCl)	7.20E-02	1.15	2.10E-01
Hydrogen Fluoride (HF)	6.55E-04	0.010	1.91E-03
Lead	6.62E-05	0.0011	1.93E-04
Mercury	3.29E-03	0.053	9.61E-03
Nickel	3.82E-05	0.0006	1.12E-04
Zinc	3.53E-04	0.006	1.03E-03
	SUBTOTAL	1.22	0.22
	TOTAL HAP	1.23	0.24

CONTROLLED EMISSION CALCULATIONS FOR EACH 1.8 MMBTU/HR MAGNUS 500 EQUINE CREMATORY

UNITS Nos. 2 and 4

Basis:

Maximum Natural Gas Firing Rate (MMBTU/hr)	2.5
Maximum Daily Weight Cremated (lbs/day)	4,000
Maximum Hourly Burn Rate (lb/hr)	250
Typical Annual Operating Days (day/yr)	365

Constants:

Natural Gas Heating Value (BTU/ft^3)	1020

Note: Maximum daily throughput = 4 cycles (approximately 4-hours per cycle = 4 hrs/cycle x 4 cycles x 250 lb/hr = 4,000 lb/day)
The units capacity is 4 cycles only because a cooldown period must occur between cycles.

Calculated Values for Cremation:

Annual Cremating Hours (hr/yr)	8760	
Maximum Annual Weight Cremated (lbs/yr)	1,460,000	
Maximum Annual Daily Natural Gas Usage (MMft^3/day)	0.0392	
Maximum Hourly Natural Gas Usage (MMft^3/hr)	0.0016	
Maximum Annual Natural Gas Usage (MMft^3/yr)	14.3137	based on 8760 hrs/yr

Natural Gas Combustion Emissions

Notes:
1. Emission factors from AP-42 for uncontrolled natural gas combustion in boilers < 100 MMBTU/hr.
AP-42 Chapter 1.4 (Tables 1.4-1 and 1.4-2)
2. These units are equipped with Low NOx burners

Emissions from Natural Gas Combustion			
Pollutant	Emission Factor (lb/MMft^3)	lb/hr	tpy
PM2.5/PM10	7.6	0.0186	0.08
NOx	100	0.25	1.07
CO	84	0.21	0.90
SO2	0.6	0.001	0.006
VOC	5.5	0.01	0.06

Cremation Emissions

Notes:
1. Emission factors from AP-42 for uncontrolled medical waste incineration. AP-42 Chapter 2.3 (Tables 2.3-1 and 2.3-2)
PM10 = 65% of TSP; PM2.5 = 43.3% of TSP (AP-42, 2.3, Table 2.3-15)
TSP factor = 4.67 lb/ton

2. PM10 and PM2.5 emissions were derived from actual stack test data performed on the existing HCT Magnus Apex 250.
The highest of three stack tests' Total Suspended Particulates (TSP) results (0.103 lb/hr) was taken and a 10% safety factor was added to take into account stack test fluctuation.

Emissions from Cremation of Carcass (including case wrappings)			
Pollutant	Emission Factor (lb/ton)	lb/hr	tpy
TSP	Stack Test	0.10	0.45
PM10	Stack Test	0.07	0.32
PM2.5	Stack Test	0.05	0.21
NOx	3.56	0.30	1.30
CO	2.95	0.25	1.08
SO2	2.17	0.18	0.79
VOC	0.299	0.02	0.11

Total Criteria Pollutant Emissions Unit No. 2 and 4

Total Criteria Pollutant Emissions		
Pollutant	lb/hr	tpy
TSP	0.10	0.45
PM10	0.09	0.40
PM2.5	0.07	0.30
NOx	0.54	2.37
CO	0.45	1.98
SO2	0.18	0.80
VOC	0.04	0.17
TOTAL HAP	1.23	0.24

AP-42 Factors for Emission Rates from Table 1.4-3 and 1.4-4 (7/98)
HAP Units No. 2 and 4

		Emission rate	
Hazardous Air Pollutants (HAP)	lb/MMScf	(lb/hr)	(tpy)
2-Methylnaphthalene	2.40E-05	3.92E-08	1.72E-07
3-Methylchloranthrene	1.80E-06	2.94E-09	1.29E-08
7,12-Dimethylbenz(a)anthracene	1.60E-05	2.61E-08	1.15E-07
Acenaphthene	1.80E-06	2.94E-09	1.29E-08
Acenaphthylene	1.80E-06	2.94E-09	1.29E-08
Anthracene	2.40E-06	3.92E-09	1.72E-08
Benz(a)anthracene	1.80E-06	2.94E-09	1.29E-08
Benzene	2.10E-03	3.43E-06	1.50E-05
Benzo(a)pyrene	1.20E-06	1.96E-09	8.59E-09
Benzo(b)fluoranthene	1.80E-06	2.94E-09	1.29E-08
Benzo(g,h,i)perylene	1.20E-06	1.96E-09	8.59E-09
Benzo(k)fluoranthene	1.80E-06	2.94E-09	1.29E-08
Chrysene	1.80E-06	2.94E-09	1.29E-08
Dibenzo(a,h)anthracene	1.20E-06	1.96E-09	8.59E-09
Dichlorobenzene	1.20E-03	1.96E-06	8.59E-06
Fluoranthene	3.00E-06	4.90E-09	2.15E-08
Fluorene	2.80E-06	4.58E-09	2.00E-08
Formaldehyde	7.50E-02	1.23E-04	5.37E-04
Hexane	1.80E+00	2.94E-03	1.29E-02
Indeno(1,2,3-cd)pyrene	1.80E-06	2.94E-09	1.29E-08
Naphthalene	6.10E-04	9.97E-07	4.37E-06
Phenanathrene	1.70E-05	2.78E-08	1.22E-07
Pyrene	5.00E-06	8.17E-09	3.58E-08
Toluene	3.40E-03	5.56E-06	2.43E-05
Arsenic	2.00E-04	3.27E-07	1.43E-06
Beryllium	1.20E-05	1.96E-08	8.59E-08
Cadmium	1.10E-03	1.80E-06	7.87E-06
Chromium	1.40E-03	2.29E-06	1.00E-05
Cobalt	8.40E-05	1.37E-07	6.01E-07
Manganese	3.80E-04	6.21E-07	2.72E-06
Mercury	2.60E-04	4.25E-07	1.86E-06
Nickel	2.10E-03	3.43E-06	1.50E-05
Selenium	2.40E-05	3.92E-08	1.72E-07
	TOTAL	0.003	0.014

Cremation HAP Emissions
Emission factors from EPA's web Factor Information Retrieval (webFIRE) database
HAP Units No. 2 and 4

		Emission rate	
Hazardous Air Pollutants (HAP)	lb/250lb	(lb/hr)	(tpy)
Beryllium	1.37E-06	0.000022	4.00E-06
Cadmium	1.11E-05	0.00018	3.24E-05
Chromium	2.99E-05	0.00048	8.73E-05
Chromium VI	1.35E-05	0.00022	3.94E-05
Hydrogen Chloride (HCl)	7.20E-02	1.15	2.10E-01
Hydrogen Fluoride (HF)	6.55E-04	0.010	1.91E-03
Lead	6.62E-05	0.0011	1.93E-04
Mercury	3.29E-03	0.053	9.61E-03
Nickel	3.82E-05	0.0006	1.12E-04
Zinc	3.53E-04	0.006	1.03E-03
	SUBTOTAL	1.22	0.22
	TOTAL HAP	1.23	0.24

1.4 Natural Gas Combustion

1.4.1 General[1-2]

Natural gas is one of the major combustion fuels used throughout the country. It is mainly used to generate industrial and utility electric power, produce industrial process steam and heat, and heat residential and commercial space. Natural gas consists of a high percentage of methane (generally above 85 percent) and varying amounts of ethane, propane, butane, and inerts (typically nitrogen, carbon dioxide, and helium). The average gross heating value of natural gas is approximately 1,020 British thermal units per standard cubic foot (Btu/scf), usually varying from 950 to 1,050 Btu/scf.

1.4.2 Firing Practices[3-5]

There are three major types of boilers used for natural gas combustion in commercial, industrial, and utility applications: watertube, firetube, and cast iron. Watertube boilers are designed to pass water through the inside of heat transfer tubes while the outside of the tubes is heated by direct contact with the hot combustion gases and through radiant heat transfer. The watertube design is the most common in utility and large industrial boilers. Watertube boilers are used for a variety of applications, ranging from providing large amounts of process steam, to providing hot water or steam for space heating, to generating high-temperature, high-pressure steam for producing electricity. Furthermore, watertube boilers can be distinguished either as field erected units or packaged units.

Field erected boilers are boilers that are constructed on site and comprise the larger sized watertube boilers. Generally, boilers with heat input levels greater than 100 MMBtu/hr, are field erected. Field erected units usually have multiple burners and, given the customized nature of their construction, also have greater operational flexibility and NO_x control options. Field erected units can also be further categorized as wall-fired or tangential-fired. Wall-fired units are characterized by multiple individual burners located on a single wall or on opposing walls of the furnace while tangential units have several rows of air and fuel nozzles located in each of the four corners of the boiler.

Package units are constructed off-site and shipped to the location where they are needed. While the heat input levels of packaged units may range up to 250 MMBtu/hr, the physical size of these units are constrained by shipping considerations and generally have heat input levels less than 100 MMBtu/hr. Packaged units are always wall-fired units with one or more individual burners. Given the size limitations imposed on packaged boilers, they have limited operational flexibility and cannot feasibly incorporate some NO_x control options.

Firetube boilers are designed such that the hot combustion gases flow through tubes, which heat the water circulating outside of the tubes. These boilers are used primarily for space heating systems, industrial process steam, and portable power boilers. Firetube boilers are almost exclusively packaged units. The two major types of firetube units are Scotch Marine boilers and the older firebox boilers. In cast iron boilers, as in firetube boilers, the hot gases are contained inside the tubes and the water being heated circulates outside the tubes. However, the units are constructed of cast iron rather than steel. Virtually all cast iron boilers are constructed as package boilers. These boilers are used to produce either low-pressure steam or hot water, and are most commonly used in small commercial applications.

Natural gas is also combusted in residential boilers and furnaces. Residential boilers and furnaces generally resemble firetube boilers with flue gas traveling through several channels or tubes with water or air circulated outside the channels or tubes.

1.4.3 Emissions[3-4]

The emissions from natural gas-fired boilers and furnaces include nitrogen oxides (NO_x), carbon monoxide (CO), and carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), volatile organic compounds (VOCs), trace amounts of sulfur dioxide (SO_2), and particulate matter (PM).

Nitrogen Oxides -

Nitrogen oxides formation occurs by three fundamentally different mechanisms. The principal mechanism of NO_x formation in natural gas combustion is thermal NO_x. The thermal NO_x mechanism occurs through the thermal dissociation and subsequent reaction of nitrogen (N_2) and oxygen (O_2) molecules in the combustion air. Most NO_x formed through the thermal NO_x mechanism occurs in the high temperature flame zone near the burners. The formation of thermal NO_x is affected by three furnace-zone factors: (1) oxygen concentration, (2) peak temperature, and (3) time of exposure at peak temperature. As these three factors increase, NO_x emission levels increase. The emission trends due to changes in these factors are fairly consistent for all types of natural gas-fired boilers and furnaces. Emission levels vary considerably with the type and size of combustor and with operating conditions (e.g., combustion air temperature, volumetric heat release rate, load, and excess oxygen level).

The second mechanism of NO_x formation, called prompt NO_x, occurs through early reactions of nitrogen molecules in the combustion air and hydrocarbon radicals from the fuel. Prompt NO_x reactions occur within the flame and are usually negligible when compared to the amount of NO_x formed through the thermal NO_x mechanism. However, prompt NO_x levels may become significant with ultra-low-NO_x burners.

The third mechanism of NO_x formation, called fuel NO_x, stems from the evolution and reaction of fuel-bound nitrogen compounds with oxygen. Due to the characteristically low fuel nitrogen content of natural gas, NO_x formation through the fuel NO_x mechanism is insignificant.

Carbon Monoxide -

The rate of CO emissions from boilers depends on the efficiency of natural gas combustion. Improperly tuned boilers and boilers operating at off-design levels decrease combustion efficiency resulting in increased CO emissions. In some cases, the addition of NO_x control systems such as low NO_x burners and flue gas recirculation (FGR) may also reduce combustion efficiency, resulting in higher CO emissions relative to uncontrolled boilers.

Volatile Organic Compounds -

The rate of VOC emissions from boilers and furnaces also depends on combustion efficiency. VOC emissions are minimized by combustion practices that promote high combustion temperatures, long residence times at those temperatures, and turbulent mixing of fuel and combustion air. Trace amounts of VOC species in the natural gas fuel (e.g., formaldehyde and benzene) may also contribute to VOC emissions if they are not completely combusted in the boiler.

Sulfur Oxides -

Emissions of SO_2 from natural gas-fired boilers are low because pipeline quality natural gas typically has sulfur levels of 2,000 grains per million cubic feet. However, sulfur-containing odorants are added to natural gas for detecting leaks, leading to small amounts of SO_2 emissions. Boilers combusting unprocessed natural gas may have higher SO_2 emissions due to higher levels of sulfur in the natural gas. For these units, a sulfur mass balance should be used to determine SO_2 emissions.

Particulate Matter -

Because natural gas is a gaseous fuel, filterable PM emissions are typically low. Particulate matter from natural gas combustion has been estimated to be less than 1 micrometer in size and has filterable and condensable fractions. Particulate matter in natural gas combustion are usually larger molecular weight hydrocarbons that are not fully combusted. Increased PM emissions may result from poor air/fuel mixing or maintenance problems.

Greenhouse Gases -[6-9]

CO_2, CH_4, and N_2O emissions are all produced during natural gas combustion. In properly tuned boilers, nearly all of the fuel carbon (99.9 percent) in natural gas is converted to CO_2 during the combustion process. This conversion is relatively independent of boiler or combustor type. Fuel carbon not converted to CO_2 results in CH_4, CO, and/or VOC emissions and is due to incomplete combustion. Even in boilers operating with poor combustion efficiency, the amount of CH_4, CO, and VOC produced is insignificant compared to CO_2 levels.

Formation of N_2O during the combustion process is affected by two furnace-zone factors. N_2O emissions are minimized when combustion temperatures are kept high (above 1475°F) and excess oxygen is kept to a minimum (less than 1 percent).

Methane emissions are highest during low-temperature combustion or incomplete combustion, such as the start-up or shut-down cycle for boilers. Typically, conditions that favor formation of N_2O also favor emissions of methane.

1.4.4 Controls[4,10]

NO_x Controls -

Currently, the two most prevalent combustion control techniques used to reduce NO_x emissions from natural gas-fired boilers are flue gas recirculation (FGR) and low NO_x burners. In an FGR system, a portion of the flue gas is recycled from the stack to the burner windbox. Upon entering the windbox, the recirculated gas is mixed with combustion air prior to being fed to the burner. The recycled flue gas consists of combustion products which act as inerts during combustion of the fuel/air mixture. The FGR system reduces NO_x emissions by two mechanisms. Primarily, the recirculated gas acts as a dilutent to reduce combustion temperatures, thus suppressing the thermal NO_x mechanism. To a lesser extent, FGR also reduces NO_x formation by lowering the oxygen concentration in the primary flame zone. The amount of recirculated flue gas is a key operating parameter influencing NO_x emission rates for these systems. An FGR system is normally used in combination with specially designed low NO_x burners capable of sustaining a stable flame with the increased inert gas flow resulting from the use of FGR. When low NO_x burners and FGR are used in combination, these techniques are capable of reducing NO_x emissions by 60 to 90 percent.

Low NO_x burners reduce NO_x by accomplishing the combustion process in stages. Staging partially delays the combustion process, resulting in a cooler flame which suppresses thermal NO_x formation. The two most common types of low NO_x burners being applied to natural gas-fired boilers are staged air burners and staged fuel burners. NO_x emission reductions of 40 to 85 percent (relative to uncontrolled emission levels) have been observed with low NO_x burners.

Other combustion control techniques used to reduce NO_x emissions include staged combustion and gas reburning. In staged combustion (e.g., burners-out-of-service and overfire air), the degree of staging is a key operating parameter influencing NO_x emission rates. Gas reburning is similar to the use of overfire in the use of combustion staging. However, gas reburning injects additional amounts of natural gas in the upper furnace, just before the overfire air ports, to provide increased reduction of NO_x to NO_2.

Two postcombustion technologies that may be applied to natural gas-fired boilers to reduce NO_x emissions are selective noncatalytic reduction (SNCR) and selective catalytic reduction (SCR). The SNCR system injects ammonia (NH_3) or urea into combustion flue gases (in a specific temperature zone) to reduce NO_x emission. The Alternative Control Techniques (ACT) document for NO_x emissions from utility boilers, maximum SNCR performance was estimated to range from 25 to 40 percent for natural gas-fired boilers.[12] Performance data available from several natural gas fired utility boilers with SNCR show a 24 percent reduction in NO_x for applications on wall-fired boilers and a 13 percent reduction in NO_x for applications on tangential-fired boilers.[11] In many situations, a boiler may have an SNCR system installed to trim NO_x emissions to meet permitted levels. In these cases, the SNCR system may not be operated to achieve maximum NO_x reduction. The SCR system involves injecting NH_3 into the flue gas in the presence of a catalyst to reduce NO_x emissions. No data were available on SCR performance on natural gas fired boilers at the time of this publication. However, the ACT Document for utility boilers estimates NO_x reduction efficiencies for SCR control ranging from 80 to 90 percent.[12]

Emission factors for natural gas combustion in boilers and furnaces are presented in Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4.[11] Tables in this section present emission factors on a volume basis (lb/10^6 scf). To convert to an energy basis (lb/MMBtu), divide by a heating value of 1,020 MMBtu/10^6 scf. For the purposes of developing emission factors, natural gas combustors have been organized into three general categories: large wall-fired boilers with greater than 100 MMBtu/hr of heat input, boilers and residential furnaces with less than 100 MMBtu/hr of heat input, and tangential-fired boilers. Boilers within these categories share the same general design and operating characteristics and hence have similar emission characteristics when combusting natural gas.

Emission factors are rated from A to E to provide the user with an indication of how "good" the factor is, with "A" being excellent and "E" being poor. The criteria that are used to determine a rating for an emission factor can be found in the Emission Factor Documentation for AP-42 Section 1.4 and in the introduction to the AP-42 document.

1.4.5 Updates Since the Fifth Edition

The Fifth Edition was released in January 1995. Revisions to this section are summarized below. For further detail, consult the Emission Factor Documentation for this section. These and other documents can be found on the Emission Factor and Inventory Group (EFIG) home page (http://www.epa.gov/ttn/chief).

Supplement D, March 1998

- Text was revised concerning Firing Practices, Emissions, and Controls.

- All emission factors were updated based on 482 data points taken from 151 source tests. Many new emission factors have been added for speciated organic compounds, including hazardous air pollutants.

July 1998 - minor changes

- Footnote D was added to table 1.4-3 to explain why the sum of individual HAP may exceed VOC or TOC, the web address was updated, and the references were reordered.

Table 1.4-1. EMISSION FACTORS FOR NITROGEN OXIDES (NO_x) AND CARBON MONOXIDE (CO) FROM NATURAL GAS COMBUSTION[a]

Combustor Type (MMBtu/hr Heat Input) [SCC]	NO_x[b]		CO	
	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
Large Wall-Fired Boilers (>100) [1-01-006-01, 1-02-006-01, 1-03-006-01]				
Uncontrolled (Pre-NSPS)[c]	280	A	84	B
Uncontrolled (Post-NSPS)[c]	190	A	84	B
Controlled - Low NO_x burners	140	A	84	B
Controlled - Flue gas recirculation	100	D	84	B
Small Boilers (<100) [1-01-006-02, 1-02-006-02, 1-03-006-02, 1-03-006-03]				
Uncontrolled	100	B	84	B
Controlled - Low NO_x burners	50	D	84	B
Controlled - Low NO_x burners/Flue gas recirculation	32	C	84	B
Tangential-Fired Boilers (All Sizes) [1-01-006-04]				
Uncontrolled	170	A	24	C
Controlled - Flue gas recirculation	76	D	98	D
Residential Furnaces (<0.3) [No SCC]				
Uncontrolled	94	B	40	B

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. Emission factors are based on an average natural gas higher heating value of 1,020 Btu/scf. To convert from $lb/10^6$ scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. SCC = Source Classification Code. ND = no data. NA = not applicable.

[b] Expressed as NO_2. For large and small wall fired boilers with SNCR control, apply a 24 percent reduction to the appropriate NO_x emission factor. For tangential-fired boilers with SNCR control, apply a 13 percent reduction to the appropriate NO_x emission factor.

[c] NSPS=New Source Performance Standard as defined in 40 CFR 60 Subparts D and Db. Post-NSPS units are boilers with greater than 250 MMBtu/hr of heat input that commenced construction modification, or reconstruction after August 17, 1971, and units with heat input capacities between 100 and 250 MMBtu/hr that commenced construction modification, or reconstruction after June 19, 1984.

TABLE 1.4-2. EMISSION FACTORS FOR CRITERIA POLLUTANTS AND GREENHOUSE GASES FROM NATURAL GAS COMBUSTION[a]

Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
CO_2[b]	120,000	A
Lead	0.0005	D
N_2O (Uncontrolled)	2.2	E
N_2O (Controlled-low-NO_X burner)	0.64	E
PM (Total)[c]	7.6	D
PM (Condensable)[c]	5.7	D
PM (Filterable)[c]	1.9	B
SO_2[d]	0.6	A
TOC	11	B
Methane	2.3	B
VOC	5.5	C

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[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $lb/10^6$ scf to 1b/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. TOC = Total Organic Compounds. VOC = Volatile Organic Compounds.

[b] Based on approximately 100% conversion of fuel carbon to CO_2. $CO_2[lb/10^6 \text{ scf}] = (3.67)\,(CON)\,(C)(D)$, where CON = fractional conversion of fuel carbon to CO_2, C = carbon content of fuel by weight (0.76), and D = density of fuel, 4.2×10^4 $lb/10^6$ scf.

[c] All PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors presented here may be used to estimate PM_{10}, $PM_{2.5}$ or PM_1 emissions. Total PM is the sum of the filterable PM and condensible PM. Condensible PM is the particulate matter collected using EPA Method 202 (or equivalent). Filterable PM is the particulate matter collected on, or prior to, the filter of an EPA Method 5 (or equivalent) sampling train.

[d] Based on 100% conversion of fuel sulfur to SO_2.
Assumes sulfur content is natural gas of 2,000 grains/10^6 scf. The SO_2 emission factor in this table can be converted to other natural gas sulfur contents by multiplying the SO_2 emission factor by the ratio of the site-specific sulfur content (grains/10^6 scf) to 2,000 grains/10^6 scf.

TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION[a]

CAS No.	Pollutant	Emission Factor (lb/10^6 scf)	Emission Factor Rating
91-57-6	2-Methylnaphthalene[b, c]	2.4E-05	D
56-49-5	3-Methylcholanthrene[b, c]	<1.8E-06	E
	7,12-Dimethylbenz(a)anthracene[b,c]	<1.6E-05	E
83-32-9	Acenaphthene[b,c]	<1.8E-06	E
203-96-8	Acenaphthylene[b,c]	<1.8E-06	E
120-12-7	Anthracene[b,c]	<2.4E-06	E
56-55-3	Benz(a)anthracene[b,c]	<1.8E-06	E
71-43-2	Benzene[b]	2.1E-03	B
50-32-8	Benzo(a)pyrene[b,c]	<1.2E-06	E
205-99-2	Benzo(b)fluoranthene[b,c]	<1.8E-06	E
191-24-2	Benzo(g,h,i)perylene[b,c]	<1.2E-06	E
207-08-9	Benzo(k)fluoranthene[b,c]	<1.8E-06	E
106-97-8	Butane	2.1E+00	E
218-01-9	Chrysene[b,c]	<1.8E-06	E
53-70-3	Dibenzo(a,h)anthracene[b,c]	<1.2E-06	E
25321-22-6	Dichlorobenzene[b]	1.2E-03	E
74-84-0	Ethane	3.1E+00	E
206-44-0	Fluoranthene[b,c]	3.0E-06	E
86-73-7	Fluorene[b,c]	2.8E-06	E
50-00-0	Formaldehyde[b]	7.5E-02	B
110-54-3	Hexane[b]	1.8E+00	E
193-39-5	Indeno(1,2,3-cd)pyrene[b,c]	<1.8E-06	E
91-20-3	Naphthalene[b]	6.1E-04	E
109-66-0	Pentane	2.6E+00	E
85-01-8	Phenanathrene[b,c]	1.7E-05	D
74-98-6	Propane	1.6E+00	E

TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION (Continued)

CAS No.	Pollutant	Emission Factor (lb/10^6 scf)	Emission Factor Rating
129-00-0	Pyrene[b, c]	5.0E-06	E
108-88-3	Toluene[b]	3.4E-03	C

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from lb/10^6 scf to kg/10^6 m^3, multiply by 16. To convert from lb/10^6 scf to lb/MMBtu, divide by 1,020. Emission Factors preceeded with a less-than symbol are based on method detection limits.

[b] Hazardous Air Pollutant (HAP) as defined by Section 112(b) of the Clean Air Act.

[c] HAP because it is Polycyclic Organic Matter (POM). POM is a HAP as defined by Section 112(b) of the Clean Air Act.

[d] The sum of individual organic compounds may exceed the VOC and TOC emission factors due to differences in test methods and the availability of test data for each pollutant.

TABLE 1.4-4. EMISSION FACTORS FOR METALS FROM NATURAL GAS COMBUSTION[a]

CAS No.	Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
7440-38-2	Arsenic[b]	2.0E-04	E
7440-39-3	Barium	4.4E-03	D
7440-41-7	Beryllium[b]	<1.2E-05	E
7440-43-9	Cadmium[b]	1.1E-03	D
7440-47-3	Chromium[b]	1.4E-03	D
7440-48-4	Cobalt[b]	8.4E-05	D
7440-50-8	Copper	8.5E-04	C
7439-96-5	Manganese[b]	3.8E-04	D
7439-97-6	Mercury[b]	2.6E-04	D
7439-98-7	Molybdenum	1.1E-03	D
7440-02-0	Nickel[b]	2.1E-03	C
7782-49-2	Selenium[b]	<2.4E-05	E
7440-62-2	Vanadium	2.3E-03	D
7440-66-6	Zinc	2.9E-02	E

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. Emission factors preceeded by a less-than symbol are based on method detection limits. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $lb/10^6$ scf to lb/MMBtu, divide by 1,020.

[b] Hazardous Air Pollutant as defined by Section 112(b) of the Clean Air Act.

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12. *Alternate Control Techniques Document -* NO_x *Emissions from Utility Boilers*, EPA-453/R-94-023, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 1994.

2.3 Medical Waste Incineration

Medical waste incineration involves the burning of wastes produced by hospitals, veterinary facilities, and medical research facilities. These wastes include both infectious ("red bag") medical wastes as well as non-infectious, general housekeeping wastes. The emission factors presented here represent emissions when both types of these wastes are combusted rather than just infectious wastes.

Three main types of incinerators are used: controlled air, excess air, and rotary kiln. Of the incinerators identified in this study, the majority (>95 percent) are controlled air units. A small percentage (<2 percent) are excess air. Less than 1 percent were identified as rotary kiln. The rotary kiln units tend to be larger, and typically are equipped with air pollution control devices. Approximately 2 percent of the total population identified in this study were found to be equipped with air pollution control devices.

2.3.1 Process Description[1-6]

Types of incineration described in this section include:

- Controlled air,
- Excess air, and
- Rotary kiln.

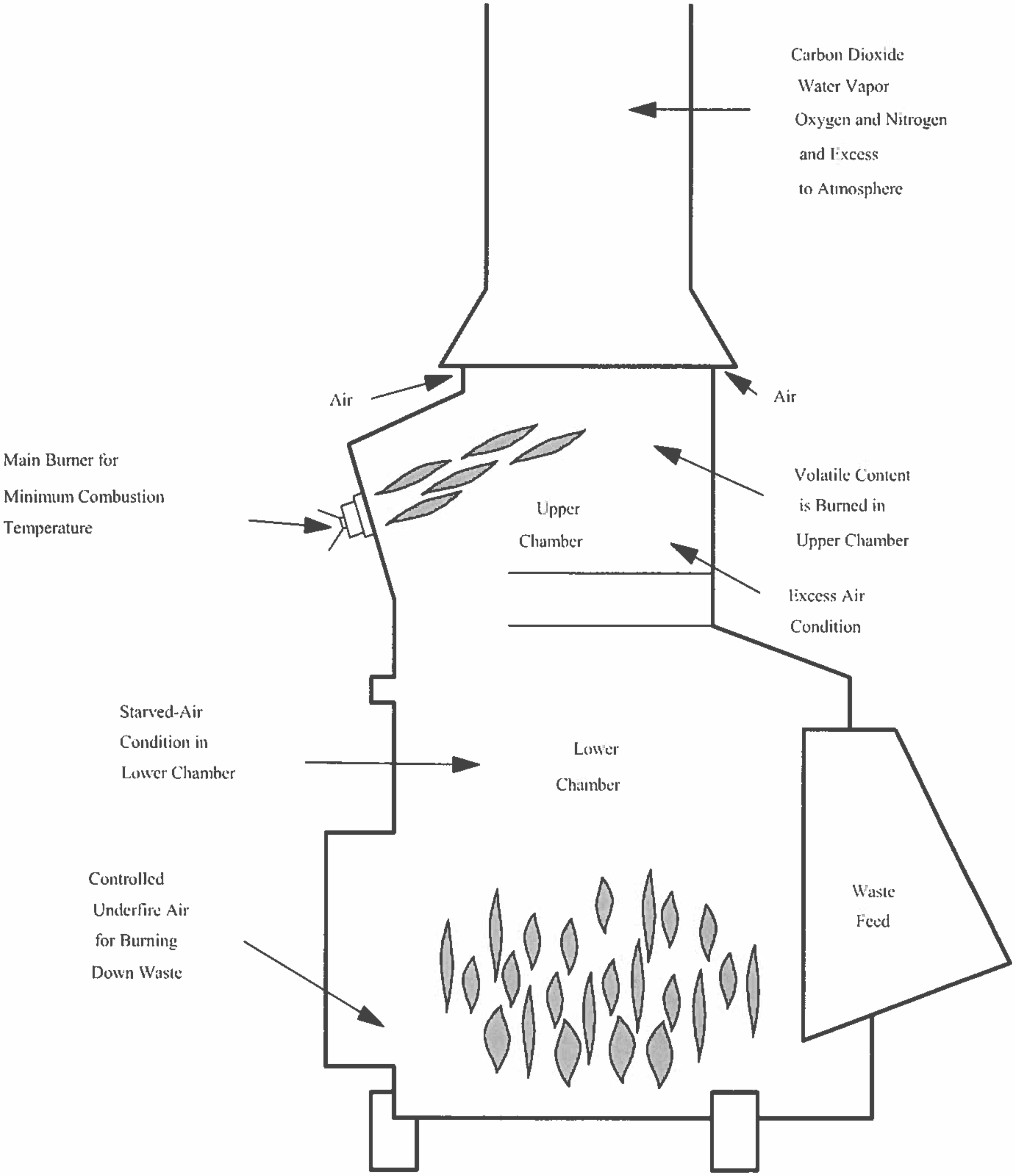
2.3.1.1 Controlled-Air Incinerators -

Controlled-air incineration is the most widely used medical waste incinerator (MWI) technology, and now dominates the market for new systems at hospitals and similar medical facilities. This technology is also known as starved-air incineration, two-stage incineration, or modular combustion. Figure 2.3-1 presents a typical schematic diagram of a controlled air unit.

Combustion of waste in controlled air incinerators occurs in two stages. In the first stage, waste is fed into the primary, or lower, combustion chamber, which is operated with less than the stoichiometric amount of air required for combustion. Combustion air enters the primary chamber from beneath the incinerator hearth (below the burning bed of waste). This air is called primary or underfire air. In the primary (starved-air) chamber, the low air-to-fuel ratio dries and facilitates volatilization of the waste, and most of the residual carbon in the ash burns. At these conditions, combustion gas temperatures are relatively low (760 to 980EC [1,400 to 1,800EF]).

In the second stage, excess air is added to the volatile gases formed in the primary chamber to complete combustion. Secondary chamber temperatures are higher than primary chamber temperatures--typically 980 to 1,095EC (1,800 to 2,000EF). Depending on the heating value and moisture content of the waste, additional heat may be needed. This can be provided by auxiliary burners located at the entrance to the secondary (upper) chamber to maintain desired temperatures.

Waste feed capacities for controlled air incinerators range from about 0.6 to 50 kg/min (75 to 6,500 lb/hr) (at an assumed fuel heating value of 19,700 kJ/kg [8,500 Btu/lb]). Waste feed and ash removal can be manual or automatic, depending on the unit size and options purchased. Throughput capacities for lower heating value wastes may be higher, since feed capacities are limited by primary



chamber heat release rates. Heat release rates for controlled air incinerators typically range from about 430,000 to 710,000 kJ/hr-m^3 (15,000 to 25,000 Btu/hr-ft^3).

Figure 2.3-1. Controlled Air Incinerator

Because of the low air addition rates in the primary chamber, and corresponding low flue gas velocities (and turbulence), the amount of solids entrained in the gases leaving the primary chamber is low. Therefore, the majority of controlled air incinerators do not have add-on gas cleaning devices.

2.3.1.2 Excess Air Incinerators -

Excess air incinerators are typically small modular units. They are also referred to as batch incinerators, multiple chamber incinerators, or "retort" incinerators. Excess air incinerators are typically a compact cube with a series of internal chambers and baffles. Although they can be operated continuously, they are usually operated in a batch mode.

Figure 2.3-2 presents a schematic for an excess air unit. Typically, waste is manually fed into the combustion chamber. The charging door is then closed, and an afterburner is ignited to bring the secondary chamber to a target temperature (typically 870 to 980°C [1600 to 1800°F]). When the target temperature is reached, the primary chamber burner ignites. The waste is dried, ignited, and combusted by heat provided by the primary chamber burner, as well as by radiant heat from the chamber walls. Moisture and volatile components in the waste are vaporized, and pass (along with combustion gases) out of the primary chamber and through a flame port which connects the primary chamber to the secondary or mixing chamber. Secondary air is added through the flame port and is mixed with the volatile components in the secondary chamber. Burners are also installed in the secondary chamber to maintain adequate temperatures for combustion of volatile gases. Gases exiting the secondary chamber are directed to the incinerator stack or to an air pollution control device. When the waste is consumed, the primary burner shuts off. Typically, the afterburner shuts off after a set time. Once the chamber cools, ash is manually removed from the primary chamber floor and a new charge of waste can be added.

Incinerators designed to burn general hospital waste operate at excess air levels of up to 300 percent. If only pathological wastes are combusted, excess air levels near 100 percent are more common. The lower excess air helps maintain higher chamber temperature when burning high- moisture waste. Waste feed capacities for excess air incinerators are usually 3.8 kg/min (500 lb/hr) or less.

2.3.1.3 Rotary Kiln Incinerators -

Rotary kiln incinerators, like the other types, are designed with a primary chamber, where waste is heated and volatilized, and a secondary chamber, where combustion of the volatile fraction is completed. The primary chamber consists of a slightly inclined, rotating kiln in which waste materials migrate from the feed end to the ash discharge end. The waste throughput rate is controlled by adjusting the rate of kiln rotation and the angle of inclination. Combustion air enters the primary chamber through a port. An auxiliary burner is generally used to start combustion and maintain desired combustion temperatures. Both the primary and secondary chambers are usually lined with acid-resistant refractory brick, as shown in the schematic drawing, Figure 2.3-3.

Volatiles and combustion gases pass from the primary chamber to the secondary chamber. The secondary chamber operates at excess air. Combustion of the volatiles is completed in the secondary chamber. Due to the turbulent motion of the waste in the primary chamber, solids burnout rates and particulate entrainment in the flue gas are higher for rotary kiln incinerators than for other incinerator designs. As a result, rotary kiln incinerators generally have add-on gas cleaning devices.

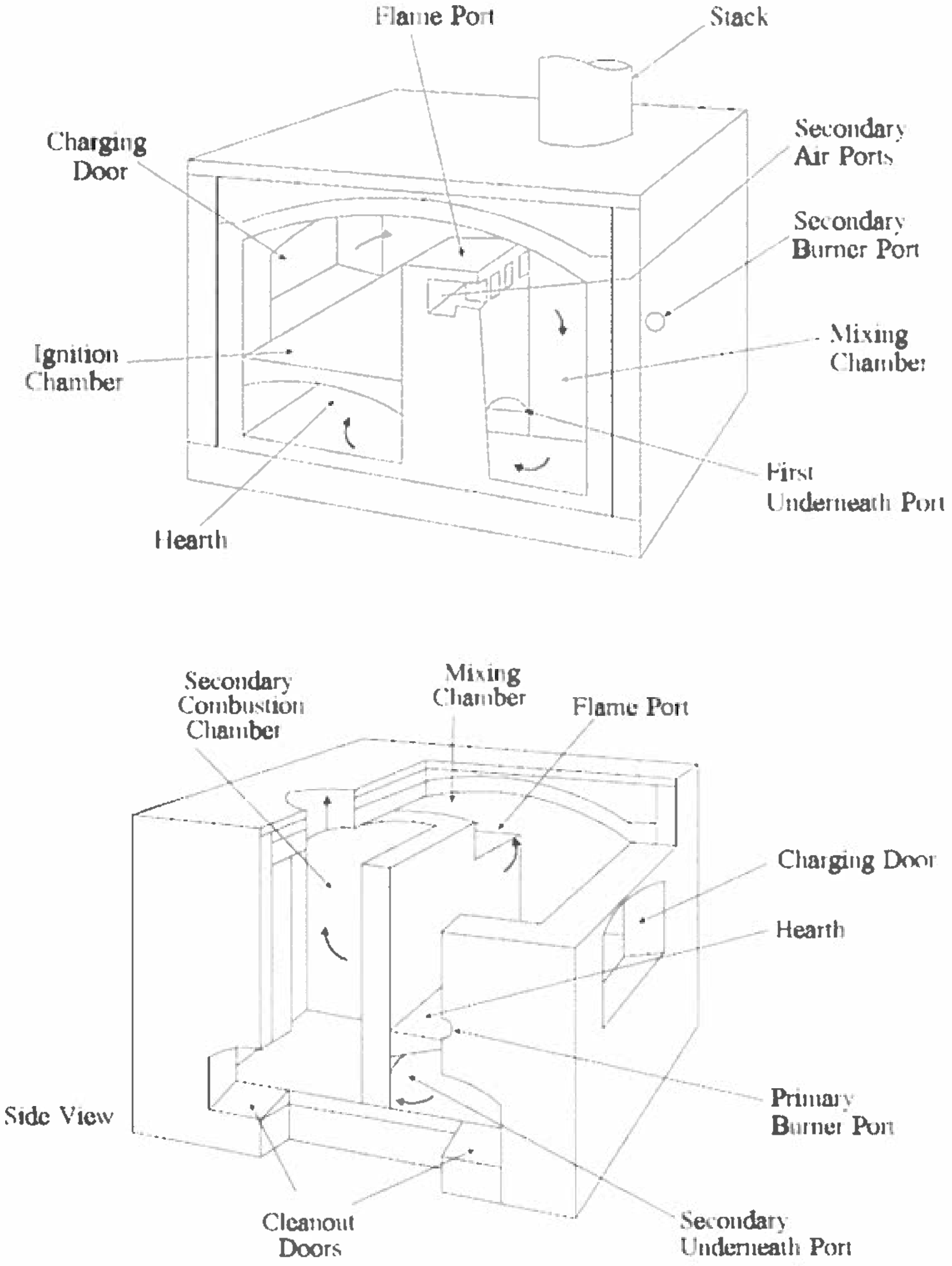


Figure 2.3-2. Excess Air Incinerator

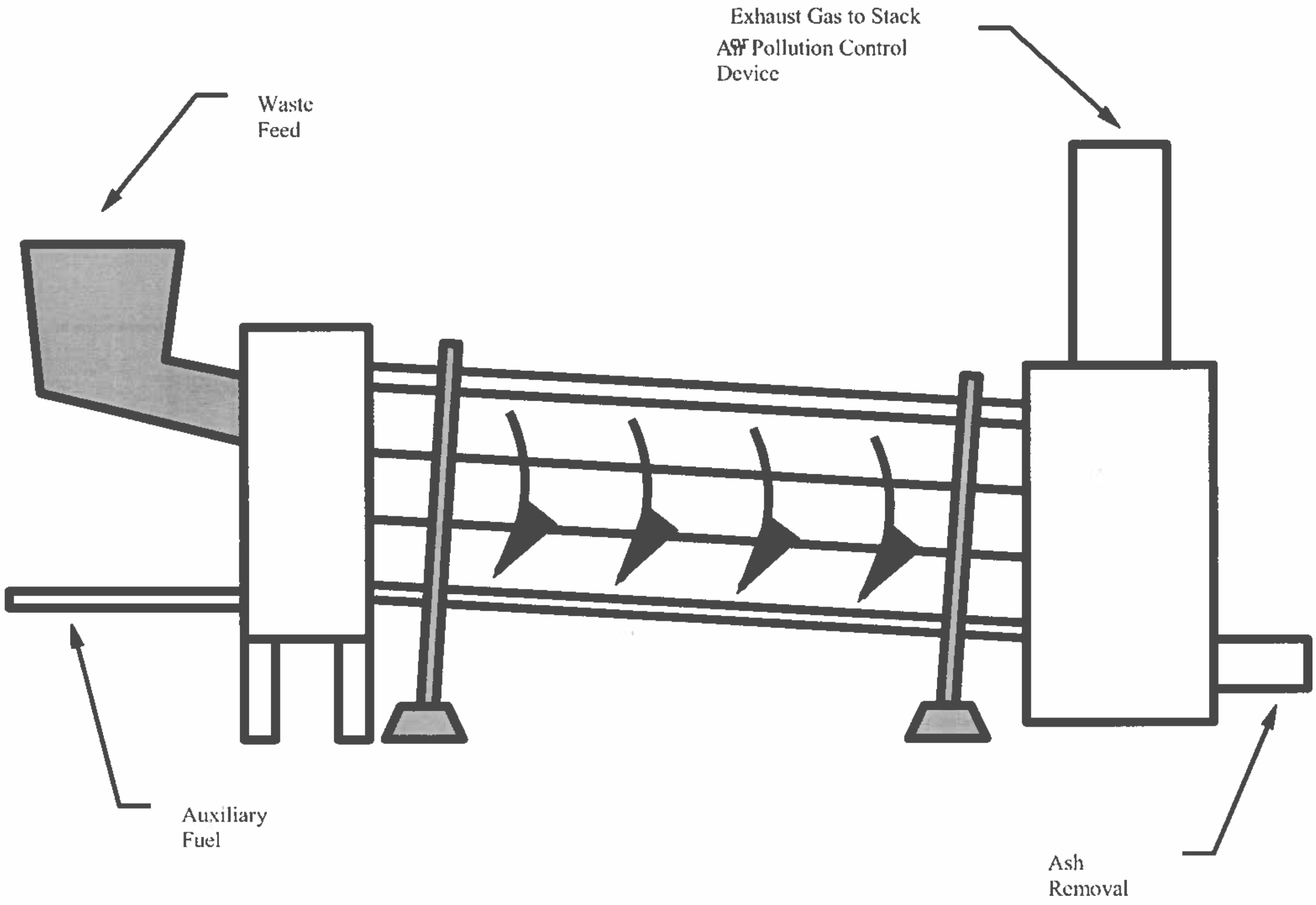


Figure 2.3-3. Rotary Kiln Incinerator

2.3.2 Emissions And Controls[2,4,7-43]

Medical waste incinerators can emit significant quantities of pollutants to the atmosphere. These pollutants include: (1) particulate matter (PM), (2) metals, (3) acid gases, (4) oxides of nitrogen (NO_x), (5) carbon monoxide (CO), (6) organics, and (7) various other materials present in medical wastes, such as pathogens, cytotoxins, and radioactive diagnostic materials.

Particulate matter is emitted as a result of incomplete combustion of organics (i. e., soot) and by the entrainment of noncombustible ash due to the turbulent movement of combustion gases. Particulate matter may exit as a solid or an aerosol, and may contain heavy metals, acids, and/or trace organics.

Uncontrolled particulate emission rates vary widely, depending on the type of incinerator, composition of the waste, and the operating practices employed. Entrainment of PM in the incinerator exhaust is primarily a function of the gas velocity within the combustion chamber containing the solid waste. Controlled air incinerators have the lowest turbulence and, consequently, the lowest PM emissions; rotary kiln incinerators have highly turbulent combustion, and thus have the highest PM emissions.

The type and amount of trace metals in the flue gas are directly related to the metals contained in the waste. Metal emissions are affected by the level of PM control and the flue gas temperature. Most metals (except mercury) exhibit fine-particle enrichment and are removed by maximizing small particle collection. Mercury, due to its high vapor pressure, does not show significant particle enrichment, and removal is not a function of small particle collection in gas streams at temperatures greater than 150EC (300EF).

Acid gas concentrations of hydrogen chloride (HCl) and sulfur dioxide (SO_2) in MWI flue gases are directly related to the chlorine and sulfur content of the waste. Most of the chlorine, which is chemically bound within the waste in the form of polyvinyl chloride (PVC) and other chlorinated compounds, will be converted to HCl. Sulfur is also chemically bound within the materials making up medical waste and is oxidized during combustion to form SO_2.

Oxides of nitrogen (NO_x) represent a mixture of mainly nitric oxide (NO) and nitrogen dioxide (NO_2). They are formed during combustion by: (1) oxidation of nitrogen chemically bound in the waste, and (2) reaction between molecular nitrogen and oxygen in the combustion air. The formation of NO_x is dependent on the quantity of fuel-bound nitrogen compounds, flame temperature, and air/fuel ratio.

Carbon monoxide is a product of incomplete combustion. Its presence can be related to insufficient oxygen, combustion (residence) time, temperature, and turbulence (fuel/air mixing) in the combustion zone.

Failure to achieve complete combustion of organic materials evolved from the waste can result in emissions of a variety of organic compounds. The products of incomplete combustion (PICs) range from low molecular weight hydrocarbon (e. g., methane or ethane) to high molecular weight compounds (e. g., polychlorinated dibenzo-p-dioxins and dibenzofurans [CDD/CDF]). In general, combustion conditions required for control of CO (i. e., adequate oxygen, temperature, residence time, and turbulence) will also minimize emissions of most organics.

Emissions of CDDs/CDFs from MWIs may occur as either a vapor or as a fine particulate. Many factors are believed to be involved in the formation of CDDs/CDFs and many theories exist concerning the formation of these compounds. In brief, the best supported theories involve four mechanisms of formation.[2] The first theory states that trace quantities of CDDs/CDFs present in the refuse feed are carried over, unburned, to the exhaust. The second theory involves formation of CDDs/CDFs from chlorinated precursors with similar structures. Conversion of precursor material to CDDs/CDFs can potentially occur either in the combustor at relatively high temperatures or at lower temperatures such as are present in wet scrubbing systems. The third theory involves synthesis of CDDs/CDFs compounds from a variety of organics and a chlorine donor. The fourth mechanism involves catalyzed reactions on fly ash particles at low temperatures.

To date, most MWIs have operated without add-on air pollution control devices (APCDs). A small percentage (approximately 2 percent) of MWIs do use APCDs. The most frequently used control devices are wet scrubbers and fabric filters (FFs). Fabric filters provide mainly PM control. Other PM control technologies include venturi scrubbers and electrostatic precipitators (ESPs). In addition to wet scrubbing, dry sorbent injection (DSI) and spray dryer (SD) absorbers have also been used for acid gas control.

Wet scrubbers use gas-liquid absorption to transfer pollutants from a gas to a liquid stream. Scrubber design and the type of liquid solution used largely determine contaminant removal efficiencies. With plain water, removal efficiencies for acid gases could be as high as 70 percent for HCl and 30 percent for SO_2. Addition of an alkaline reagent to the scrubber liquor for acid neutralization has been shown to result in removal efficiencies of 93 to 96 percent.

Wet scrubbers are generally classified according to the energy required to overcome the pressure drop through the system. Low-energy scrubbers (spray towers) are primarily used for acid gas control only, and are usually circular in cross section. The liquid is sprayed down the tower through the rising gas. Acid gases are absorbed/neutralized by the scrubbing liquid. Low-energy scrubbers mainly remove particles larger than 5-10 micrometers (Φm) in diameter.

Medium-energy scrubbers can be used for particulate matter and/or acid gas control. Medium energy devices rely mostly on impingement to facilitate removal of PM. This can be accomplished through a variety of configurations, such as packed columns, baffle plates, and liquid impingement scrubbers.

Venturi scrubbers are high-energy systems that are used primarily for PM control. A typical venturi scrubber consists of a converging and a diverging section connected by a throat section. A liquid (usually water) is introduced into the gas stream upstream of the throat. The flue gas impinges on the liquid stream in the converging section. As the gas passes through the throat, the shearing action atomizes the liquid into fine droplets. The gas then decelerates through the diverging section, resulting in further contact between particles and liquid droplets. The droplets are then removed from the gas stream by a cyclone, demister, or swirl vanes.

A fabric filtration system (baghouse) consists of a number of filtering elements (bags) along with a bag cleaning system contained in a main shell structure with dust hoppers. Particulate-laden gas passes through the bags so that the particles are retained on the upstream side of the fabric, thus cleaning the gas. A FF is typically divided into several compartments or sections. In a FF, both the collection efficiency and the pressure drop across the bag surface increase as the dust layer on the bag builds up. Since the system cannot continue to operate with an increasing pressure drop, the bags are cleaned periodically. The cleaning processes include reverse flow with bag collapse, pulse jet cleaning, and mechanical shaking. When reverse flow and mechanical shaking are used, the particulate matter is collected on the inside of the bag; particulate matter is collected on the outside of the bag in pulse jet systems. Generally, reverse flow FFs operate with lower gas flow per unit area of bag surface (air-to-cloth ratio) than pulse jet systems and, thus, are larger and more costly for a given gas flow-rate or application. Fabric filters can achieve very high (>99.9 percent) PM removal efficiencies. These systems are also very effective in controlling fine particulate matter, which results in good control of metals and organics entrained on fine particulate.

Particulate collection in an ESP occurs in 3 steps: (1) suspended particles are given an electrical charge; (2) the charged particles migrate to a collecting electrode of opposite polarity; and (3) the collected PM is dislodged from the collecting electrodes and collected in hoppers for disposal.

Charging of the particles is usually caused by ions produced in a high voltage corona. The electric fields and the corona necessary for particle charging are provided by converting alternating current to direct current using high voltage transformers and rectifiers. Removal of the collected particulate matter is accomplished mechanically by rapping or vibrating the collecting electrode plates. ESPs have been used in many applications due to their high reliability and efficiency in controlling total PM emissions. Except for very large and carefully designed ESPs, however, they are less efficient than FFs at control of fine particulates and metals.

Dry sorbent injection (DSI) is another method for controlling acid gases. In the DSI process, a dry alkaline material is injected into the flue gas into a dry venturi within the ducting or into the duct ahead of a particulate control device. The alkaline material reacts with and neutralizes acids in the flue gas. Fabric filters are employed downstream of DSI to: (1) control the PM generated by the incinerator, (2) capture the DSI reaction products and unreacted sorbent, and (3) increase sorbent/acid gas contact time, thus enhancing acid gas removal efficiency and sorbent utilization. Fabric filters are commonly used with DSI because they provide high sorbent/acid gas contact. Fabric filters are less sensitive to PM loading changes or combustion upsets than other PM control devices since they operate with nearly constant efficiency. A potential disadvantage of ESPs used in conjunction with DSI is that the sorbent increases the electrical resistivity of the PM being collected. This phenomenon makes the PM more difficult to charge and, therefore, to collect. High resistivity can be compensated for by flue gas conditioning or by increasing the plate area and size of the ESP.

The major factors affecting DSI performance are flue gas temperature, acid gas dew point (temperature at which the acid gases condense), and sorbent-to-acid gas ratio. DSI performance improves as the difference between flue gas and acid dew point temperatures decreases and the sorbent-to-acid gas ratio increases. Acid gas removal efficiency with DSI also depends on sorbent type and the extent of sorbent mixing with the flue gas. Sorbents that have been successfully applied include hydrated lime ($Ca[OH]_2$), sodium hydroxide ($NaOH$), and sodium bicarbonate ($NaHCO_3$). For hydrated lime, DSI can achieve 80 to 95 percent of HCl removal and 40 to 70 percent removal of SO_2 under proper operating conditions.

The primary advantage of DSI compared to wet scrubbers is the relative simplicity of the sorbent preparation, handling, and injection systems as well as the easier handling and disposal of dry solid process wastes. The primary disadvantages are its lower sorbent utilization rate and correspondingly higher sorbent and waste disposal rates.

In the spray drying process, lime slurry is injected into the SD through either a rotary atomizer or dual-fluid nozzles. The water in the slurry evaporates to cool the flue gas, and the lime reacts with acid gases to form calcium salts that can be removed by a PM control device. The SD is designed to provide sufficient contact and residence time to produce a dry product before leaving the SD adsorber vessel. The residence time in the adsorber vessel is typically 10 to 15 seconds. The particulates leaving the SD (fly ash, calcium salts, and unreacted hydrated lime) are collected by an FF or ESP.

Emission factors and emission factor ratings for controlled air incinerators are presented in Tables 2.3-1, 2.3-2, 2.3-3, 2.3-4, 2.3-5, 2.3-6, 2.3-7, 2.3-8, 2.3-9, 2.3-10, 2.3-11, 2.3-12, 2.3-13, 2.13-14, and 2.3-15. For emissions controlled with wet scrubbers, emission factors are presented separately for low-, medium-, and high-energy wet scrubbers. Particle size distribution data for controlled air incinerators are presented in Table 2.3-15 for uncontrolled emissions and controlled emissions following a medium-energy wet scrubber/FF and a low-energy wet scrubber. Emission factors and emission factor ratings for rotary kiln incinerators are presented in Tables 2.3-16, 2.3-17, and 2.3-18. Emissions data are not available for pathogens because there is not an accepted methodology for measurement of these emissions. Refer to References 8, 9, 11, 12, and 19 for more information.

Table 2.3-1 (English And Metric Units). EMISSION FACTORS FOR NITROGEN OXIDES (NO$_x$), CARBON MONOXIDE (CO), AND SULFUR DIOXIDE (SO$_2$) FOR CONTROLLED AIR MEDICAL WASTE INCINERATORS[a]

Rating (A-E) Follows Each Factor

Control Level[b]	NO$_x$[c]			CO[c]			SO$_2$[c]		
	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING
Uncontrolled	3.56 E+00	1.78 E+00	A	2.95 E+00	1.48 E+00	A	2.17 E+00	1.09 E+00	B
Low Energy Scrubber/FF									
Medium Energy Scrubber/FF							3.75 E-01	1.88 E-01	E
FF							8.45 E-01	4.22 E-01	E
Low Energy Scrubber							2.09 E+00	1.04 E+00	E
High Energy Scrubber							2.57 E-02	1.29 E-02	E
DSI/FF							3.83 E-01	1.92 E-01	E
DSI/Carbon Injection/FF							7.14 E-01	3.57 E-01	E
DSI/FF/Scrubber							1.51 E-02	7.57 E-03	E
DSI/ESP									

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05. Blanks indicate no data.

[b] FF = Fabric Filter
DSI = Dry Sorbent Injection
ESP = Electrostatic Precipitator

[c] NO$_x$ and CO emission factors for uncontrolled facilities are applicable for all add-on control devices shown.

Table 2.3-2 (English And Metric Units). EMISSION FACTORS FOR TOTAL PARTICULATE MATTER, LEAD, AND TOTAL ORGANIC COMPOUNDS (TOC) FOR CONTROLLED AIR MEDICAL WASTE INCINERATORS[a]

Rating (A-E) Follows Each Factor

Control Level[b]	Total Particulate Matter			Lead[c]			TOC		
	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING
Uncontrolled	4.67 E+00	2.33 E+00	B	7.28 E-02	3.64 E-02	B	2.99 E-01	1.50 E-01	B
Low Energy Scrubber/FF	9.09 E-01	4.55 E-01	E						
Medium Energy Scrubber/FF	1.61 E-01	8.03 E-02	E	1.60 E-03	7.99 E-04	E			
FF	1.75 E-01	8.76 E-02	E	9.92 E-05	4.96 E-05	E	6.86 E-02	3.43 E-01	E
Low Energy Scrubber	2.90 E+00	1.45 E+00	E	7.94 E-02	3.97 E-02	E	1.40 E-01	7.01 E-02	E
High Energy Scrubber	1.48 E+00	7.41 E-01	E	6.98 E-02	3.49 E-02	E	1.40 E-01	7.01 E-02	E
DSI/FF	3.37 E-01	1.69 E-01	E	6.25 E-05	3.12 E-05*	E	4.71 E-02	2.35 E-02	E
DSI/Carbon Injection/FF	7.23 E-02	3.61 E-02	E	9.27 E-05	4.64 E-05	E			
DSI/FF/Scrubber	2.68 E+00	1.34 E+00	E	5.17 E-05	2.58 E-05	E			
DSI/ESP	7.34 E-01	3.67 E-01	E	4.70 E-03	2.35 E-03	E			

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05. Blanks indicate no data.

[b] FF = Fabric Filter

DSI = Dry Sorbent Injection

ESP = Electrostatic Precipitator

[c] Hazardous air pollutants listed in the *Clean Air Act*.

*Conversion corrected 10/30/17

Table 2.3-3 (English And Metric Units). EMISSION FACTORS FOR HYDROGEN CHLORIDE (HCl) AND POLYCHLORINATED BIPHENYLS (PCBs) FOR CONTROLLED AIR MEDICAL WASTE INCINERATORS[a]

Rating (A-E) Follows Each Factor

Control Level[b]	HCl[c]			Total PCBs[c]		
	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING
Uncontrolled	3.35 E+01	1.68 E+01	C	4.65 E-05	2.33 E-05	E
Low Energy Scrubber/FF	1.90 E+00	9.48 E-01	E			
Medium Energy Scrubber/FF	2.82 E+00	1.41 E+00	E			
FF	5.65 E+00	2.82 E+00	E			
Low Energy Scrubber	1.00 E+00	5.01 E-01	E			
High Energy Scrubber	1.39 E-01	6.97 E-02	E			
DSI/FF	1.27 E+01	6.37 E+00	D			
DSI/Carbon Injection/FF	9.01 E-01	4.50 E-01	E			
DSI/FF/Scrubber	9.43 E-02	4.71 E-02	E			
DSI/ESP	4.98 E-01	2.49 E-01	E			

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05. Blanks indicate no data.

[b] FF = Fabric Filter
DSI = Dry Sorbent Injection
ESP = Electrostatic Precipitator

[c] Hazardous air pollutants listed in the *Clean Air Act*.

Table 2.3-4 (English And Metric Units). EMISSION FACTORS FOR ALUMINUM, ANTIMONY, AND ARSENIC CONTROLLED AIR MEDICAL WASTE INCINERATORS[a]

Rating (A-E) Follows Each Factor

	Aluminum			Antimony[c]			Arsenic[c]		
Control Level[b]	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING
Uncontrolled	1.05 E-02	5.24 E-03	E	1.28 E-02	6.39 E-03	D	2.42 E-04	1.21 E-04	B
Low Energy Scrubber/FF									
Medium Energy Scrubber/FF				3.09 E-04	1.55 E-04	E	3.27 E-05	1.53 E-02	E
FF							3.95 E-08	1.97 E-08	E
Low Energy Scrubber							1.42 E-04	7.12 E-05	E
High Energy Scrubber				4.08 E-04	2.04 E-04	E	3.27 E-05	1.64 E-05	E
DSI/FF	3.03 E-03	1.51 E-03	E	2.10 E-04	1.05 E-04	E	1.19 E-05	5.93 E-06	E
DSI/Carbon Injection/FF	2.99 E-03	1.50 E-03	E	1.51 E-04	7.53 E-05	E	1.46 E-05	7.32 E-06	E
DSI/FF/Scrubber									
DSI/ESP							5.01 E-05	2.51 E-05	E

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05. Blanks indicate no data.

[b] FF = Fabric Filter
DSI = Dry Sorbent Injection
ESP = Electrostatic Precipitator

[c] Hazardous air pollutants listed in the *Clean Air Act*.

Table 2.3-5 (English And Metric Units). EMISSION FACTORS FOR BARIUM, BERYLLIUM, AND CADMIUM FOR CONTROLLED AIR MEDICAL WASTE INCINERATORS[a]

Rating (A-E) Follows Each Factor

Control Level[b]	Barium			Beryllium[c]			Cadmium[c]		
	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING
Uncontrolled	3.24 E-03	1.62 E-03	D	6.25 E-06	3.12 E-06	D	5.48 E-03	2.74 E-03	B
Low Energy Scrubber/FF									
Medium Energy Scrubber/FF	2.07 E-04	1.03 E-04	E				1.78 E-04	8.89 E-05	E
FF									
Low Energy Scrubber							6.97 E-03	3.49 E-03	E
High Energy Scrubber							7.43 E-02	3.72 E-02	E
DSI/FF	7.39 E-05	3.70 E-05	E				2.46 E-05	1.23 E-05	E
DSI/Carbon Injection/FF	7.39 E-05	3.69 E-05	E	3.84 E-06	1.92 E-06	E	9.99 E-05	4.99 E-05	E
DSI/FF/Scrubber							1.30 E-05	6.48 E-06	E
DSI/ESP							5.93 E-04	2.97 E-04	E

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05. Blanks indicate no data.

[b] FF = Fabric Filter
DSI = Dry Sorbent Injection
ESP = Electrostatic Precipitator

[c] Hazardous air pollutants listed in the *Clean Air Act*.

Table 2.3-6 (English And English Units). EMISSION FACTORS FOR CHROMIUM, COPPER, AND IRON FOR CONTROLLED AIR MEDICAL WASTE INCINERATORS[a]

Rating (A-E) Follows Each Factor

Control Level[b]	Chromium[c]			Copper			Iron		
	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING
Uncontrolled	7.75 E-04	3.88 E-04	B	1.25 E-02	6.24 E-03	E	1.44 E-02	7.22 E-03	C
Low Energy Scrubber/FF									
Medium Energy Scrubber/FF	2.58 E-04	1.29 E-04	E						
FF	2.15 E-06	1.07 E-06	E						
Low Energy Scrubber	4.13 E-04	2.07 E-04	E				9.47 E-03	4.73E -03	E
High Energy Scrubber	1.03 E-03	5.15 E-04	E						
DSI/FF	3.06 E-04	1.53 E-04	E	1.25 E-03	6.25 E-04	E			
DSI/Carbon Injection/FF	1.92 E-04	9.58 E-05	E	2.75 E-04	1.37 E-04	E			
DSI/FF/Scrubber	3.96 E-05	1.98 E-05	E						
DSI/ESP	6.58 E-04	3.29 E-04	E						

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05. Blanks indicate no data.

[b] FF = Fabric Filter
DSI = Dry Sorbent Injection
ESP = Electrostatic Precipitator

[c] Hazardous air pollutants listed in the *Clean Air Act*.

Table 2.3-7 (English and Metric Units). EMISSION FACTORS FOR MANGANESE, MERCURY, AND NICKEL FOR CONTROLLED AIR MEDICAL WASTE INCINERATORS[a]

Rating (A-E) Follows Each Factor

Control Level[b]	Manganese[c]			Mercury[c]			Nickel[c]		
	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING
Uncontrolled	5.67 E-04	2.84 E-04	C	1.07 E-01	5.37 E-02	C	5.90 E-04	2.95 E-04	B
Low Energy Scrubber/FF									
Medium Energy Scrubber/FF				3.07 E-02	1.53 E-02	E	5.30 E-04	2.65 E-04	E
FF									
Low Energy Scrubber	4.66 E-04	2.33 E-04	E	1.55 E-02	7.75 E-03	E	3.28 E-04	1.64 E-02	E
High Energy Scrubber	6.12 E-04	3.06 E-04	E	1.73 E-02	8.65 E-03	E	2.54 E-03	1.27 E-03	E
DSI/FF				1.11 E-01	5.55 E-02	E	4.54 E-04	2.27 E-04	E
DSI/Carbon Injection/FF				9.74 E-03	4.87 E-03	E	2.84 E-04	1.42 E-04	E
DSI/FF/Scrubber				3.56 E-04	1.78 E-04	E			
DSI/ESP				1.81 E-02	9.05 E-03	E	4.84 E-04	2.42 E-04	E

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05. Blanks indicate no data.

[b] FF = Fabric Filter
DSI = Dry Sorbent Injection
ESP = Electrostatic Precipitator

[c] Hazardous air pollutants listed in the *Clean Air Act*.

Table 2.3-8 (English And Metric Units). EMISSION FACTORS FOR SILVER AND THALLIUM FOR CONTROLLED AIR MEDICAL WASTE INCINERATORSa

Rating (A-E) Follows Each Factor

Control Level[b]	Silver			Thallium		
	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING
Uncontrolled	2.26 E-04	1.13 E-04	D	1.10 E-03	5.51 E-04	D
Low Energy Scrubber/FF						
Medium Energy Scrubber/FF	1.71 E-04	8.57 E-05	E			
FF						
Low Energy Scrubber						
High Energy Scrubber	4.33 E-04	2.17 E-04	E			
DSI/FF	6.65 E-05	3.32 E-05	E			
DSI/Carbon Injection/FF	7.19 E-05	3.59 E-05	E			
DSI/FF/Scrubber						
DSI/ESP						

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05. Blanks indicate no data.

[b] FF = Fabric Filter

DSI = Dry Sorbent Injection

ESP = Electrostatic Precipitator

Table 2.3-9 (English And Metric Units). EMISSION FACTORS FOR SULFUR TRIOXIDE (SO_3) AND HYDROGEN BROMIDE (HBr) FOR CONTROLLED AIR MEDICAL WASTE INCINERATORS[a]

Rating (A-E) Follows Each Factor

Control Level[b]	SO_3			HBr		
	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING
Uncontrolled				4.33 E-02	2.16 E-02	D
Low Energy Scrubber/FF						
Medium Energy Scrubber/FF				5.24 E-02	2.62 E-02	E
FF						
Low Energy Scrubber						
High Energy Scrubber						
DSI/FF						
DSI/Carbon Injection/FF				4.42 E-03	2.21 E-03	E
DSI/FF/Scrubber	9.07 E-03	4.53 E-03	E			
DSI/ESP						

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05. Blanks indicate no data.

[b] FF = Fabric Filter
DSI = Dry Sorbent Injection
ESP = Electrostatic Precipitator

Table 2.3-10 (English And Metric Units). EMISSION FACTORS FOR HYDROGEN FLUORIDE AND CHLORINE FOR CONTROLLED AIR MEDICAL WASTE INCINERATORS[a]

Rating (A-E) Follows Each Factor

Control Level[b]	Hydrogen Fluoride[c]			Chlorine[c]		
	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING
Uncontrolled	1.49 E-01	7.43 E-02	D	1.05 E-01	5.23 E-02	E
Low Energy Scrubber/FF						
Medium Energy Scrubber/FF						
FF						
Low Energy Scrubber						
High Energy Scrubber						
DSI/FF						
DSI/Carbon Injection/FF	1.33 E-02	6.66 E-03	E			
DSI/FF/Scrubber						
DSI/ESP						

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05. Blanks indicate no data.

[b] FF = Fabric Filter
DSI = Dry Sorbent Injection
ESP = Electrostatic Precipitator

[c] Hazardous air pollutants listed in the *Clean Air Act*.

Table 2.3-11 (English And Metric Units). CHLORINATED DIBENZO-P-DIOXIN EMISSION FACTORS FOR CONTROLLED AIR MEDICAL WASTE INCINERATORS[a]

Rating (A-E) Follows Each Factor

Congener[b]	Uncontrolled			Fabric Filter			Wet Scrubber			DSI/FF[c]		
	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING
TCDD												
2,3,7,8-	5.47 E-08	2.73 E-08	E	6.72 E-09	3.36 E-09	E	1.29 E-10	6.45 E-11	E	5.61 E-10	2.81 E-10	E
Total	1.00 E-06	5.01 E-07	B	1.23 E-07	6.17 E-08	E	2.67 E-08	1.34 E-08	E	6.50 E-09	3.25 E-09	E
PeCDD												
1,2,3,7,8-							6.08 E-10	3.04 E-10	E			
Total							5.53 E-10	2.77 E-10	E			
HxCDD												
1,2,3,6,7,8-	3.78 E-10	1.89 E-10	E				1.84 E-09	9.05 E-10	E			
1,2,3,7,8,9-	1.21 E-09	6.07 E-10	E				2.28 E-09	1.14 E-09	E			
1,2,3,4,7,8-							9.22 E-10	4.61 E-10	E			
Total							5.77 E-10	2.89 E-10	E			
HpCDD												
1,2,3,4,6,7,8-	5.23 E-09	2.62 E-09	E				6.94 E-09	3.47 E-09	E			
Total							1.98 E-09	9.91 E-10	E			
OCDD - total	2.21 E-08	1.11 E-08	E									
Total CDD	2.13 E-05	1.07 E-05	B	2.68 E-06	1.34 E-06	E	1.84 E-06	9.18 E-07	E	3.44 E-07	1.72 E-07	E

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05. Blanks indicate no data.

[b] Hazardous air pollutants listed in *Clean Air Act*.

[c] FF = Fabric Filter
DSI = Dry Sorbent Injection

Table 2.3-12 (English And Metric Units). CHLORINATED DIBENZO-P-DIOXIN EMISSION FACTORS FOR CONTROLLED AIR MEDICAL WASTE INCINERATORS[a]

Rating (A-E) Follows Each Factor

Congener[b]	DSI/Carbon Injection/FF[c]			DSI/ESP[d]		
	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING
TCDD						
2,3,7,8-	8.23 E-10	4.11 E-10	E	1.73 E-10	8.65 E-11	E
Total						
PeCDD						
1,2,3,7,8-						
Total						
HxCDD						
1,2,3,6,7,8-						
1,2,3,7,8,9-						
1,2,3,4,7,8-						
Total						
HpCDD						
2,3,4,6,7,8-						
1,2,3,4,6,7,8-						
Total						
OCDD - Total						
Total CDD	5.38 E-08	2.69 E-08	E			

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05. Blanks indicate no data.

[b] Hazardous air pollutants listed in the *Clean Air Act*.

[c] FF = Fabric Filter
DSI = Dry Sorbent Injection

[d] ESP = Electrostatic Precipitator

Table 2.3-13 (English And Metric Units). CHLORINATED DIBENZOFURAN EMISSION FACTORS FOR CONTROLLED AIR MEDICAL WASTE INCINERATORS[a]

Rating (A-E) Follows Each Factor

Congener[b]	Uncontrolled			Fabric Filter			Wet Scrubber			DSI/FF[c]		
	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING
TCDF												
2,3,7,8-	2.40 E-07	1.20 E-07	E	3.85 E-08	1.97 E-08	E	1.26 E-08	6.30 E-09	E	4.93 E-09	2.47 E-09	E
Total	7.21 E-06	3.61 E-06	B	1.28 E-06	6.39 E-07	E	4.45 E-07	2.22 E-07	E	1.39 E-07	6.96 E-08	E
PeCDF												
1,2,3,7,8-	7.56 E-10	3.78 E-10	E				1.04 E-09	5.22 E-10	E			
2,3,4,7,8-	2.07 E-09	1.04 E-09	E				3.07 E-09	1.53 E-09	E			
Total							6.18 E-09	3.09 E-09	E			
HxCDF												
1,2,3,4,7,8-	7.55 E-09	3.77 E-09	E				8.96 E-09	4.48 E-09	E			
1,2,3,6,7,8-	2.53 E-09	1.26 E-09	E				3.53 E-09	1.76 E-09	E			
2,3,4,6,7,8-	7.18 E-09	3.59 E-09	E				9.59 E-09	4.80 E-09	E			
1,2,3,7,8,9-							3.51 E-10	1.76 E-10	E			
Total							5.10 E-09	2.55 E-09	E			
HpCDF												
1,2,3,4,6,7,8-	1.76 E-08	8.78 E-09	E				1.79 E-08	8.97 E-09	E			
1,2,3,4,7,8,9-	2.72 E-09	1.36 E-09	E				3.50 E-09	1.75 E-09	E			
Total							1.91 E-09	9.56 E-10	E			
OCDF - Total	7.42 E-08	3.71 E-08	E				4.91 E-10	2.45 E-10	E			
Total CDF	7.15 E-05	3.58 E-05	B	8.50 E-06	4.25 E-06	E	4.92 E-06	2.46 E-06	E	1.47 E-06	7.37 E-07	E

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05. Blanks indicate no data.

[b] Hazardous air pollutants listed in the *Clean Air Act*.

[c] FF = Fabric Filter
DSI = Dry Sorbent Injection

[d] ESP = Electrostatic Precipitator

Table 2.3-14 (English And Metric Units). CHLORINATED DIBENZOFURANS EMISSION FACTORS FOR CONTROLLED AIR MEDICAL WASTE INCINERATORS[a]

Rating (A-E) Follows Each Factor

Congener[b]	DSI/Carbon Injection/FF[c]			DSI/ESP[d]		
	lb/ton	kg/Mg	EMISSION FACTOR RATING	lb/ton	kg/Mg	EMISSION FACTOR RATING
TCDF						
2,3,7,8-	7.31 E-10	3.65 E-10	E	1.73 E-09	8.66 E-10	E
Total	1.01 E-08	5.07 E-09	E			
PeCDF						
1,2,3,7,8-						
2,3,4,7,8-						
Total						
HxCDF						
1,2,3,4,7,8-						
1,2,3,6,7,8-						
2,3,4,6,7,8-						
1,2,3,7,8,9-						
Total						
HpCDF						
1,2,3,4,6,7,8-						
1,2,3,4,7,8,9-						
Total						
OCDF - Total						
Total CDF	9.47 E-08	4.74 E-08	E			

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05. Blanks indicate no data.

[b] Hazardous air pollutants listed in the *Clean Air Act*.

[c] FF = Fabric Filter
DSI = Dry Sorbent Injection

[d] ESP = Electrostatic Precipitator

Table 2.3-15. PARTICLE SIZE DISTRIBUTION FOR CONTROLLED AIR MEDICAL WASTE INCINERATOR PARTICULATE MATTER EMISSIONS[a]

EMISSION FACTOR RATING: E

Cut Diameter (μm)	Uncontrolled Cumulative Mass % Less Than Stated Size	Scrubber Cumulative Mass % Less Than Stated Size
0.625	31.1	0.1
1.0	35.4	0.2
2.5	43.3	2.7
5.0	52.0	28.1
10.0	65.0	71.9

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05

Table 2.3-16 (English And Metric Units). ROTARY KILN MEDICAL WASTE INCINERATOR EMISSION FACTORS FOR CRITERIA POLLUTANTS AND ACID GASES[a]

EMISSION FACTOR RATING: E

Pollutant	Uncontrolled		SD/Fabric Filter[b]		SD/Carbon Injection/FF[c]		High Energy Scrubber	
	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg
Carbon monoxide	3.82 E-01	1.91 E-01	3.89 E-02	1.94 E-02	4.99 E-02	2.50 E-02	5.99 E-02	3.00 E-02
Nitrogen oxides	4.63 E+00	2.31 E+00	5.25 E+00	2.63 E+00	4.91 E+00	2.45 E+00	4.08 E+00	2.04 E+00
Sulfur dioxide	1.09 E+00	5.43 E-01	6.47 E-01	3.24 E-01	3.00 E-01	1.50 E-01		
PM	3.45 E+01	1.73 E+01	3.09 E-01	1.54 E-01	7.56 E-02	3.78 E-02	8.53 E-01	4.27 E-01
TOC	6.66 E-02	3.33 E-02	4.11 E-02	2.05 E-02	5.05 E-02	2.53 E-02	2.17 E-02	1.08 E-02
HCl[d]	4.42 E+01	2.21 E+01	2.68 E-01	1.34 E-01	3.57 E-01	1.79 E-01	2.94 E+01	1.47 E+01
HF[d]	9.31 E-02	4.65 E-02	2.99 E-02	1.50 E-02				
HBr	1.05 E+00	5.25 E-01	6.01 E-02	3.00 E-02	1.90 E-02	9.48 E-03		
H_2SO_4							2.98 E+00	1.49 E+00

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05. Blanks indicate no data.

[b] SD = Spray Dryer

[c] FF = Fabric Filter

[d] Hazardous air pollutant listed in the *Clean Air Act*.

Table 2.3-17 (English And Metric Units). ROTARY KILN MEDICAL WASTE INCINERATOR EMISSION FACTORS FOR METALS[a]

EMISSION FACTOR RATING: E

Pollutant	Uncontrolled		SD/Fabric Filter[b]		SD/Carbon Injection/FF[c]	
	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg
Aluminum	6.13 E-01	3.06 E-01	4.18 E-03	2.09 E-03	2.62 E-03	1.31 E-03
Antimony[d]	1.99 E-02	9.96 E-03	2.13 E-04	1.15 E-04	1.41 E-04	7.04 E-05
Arsenic[d]	3.32 E-04	1.66 E-04				
Barium	8.93 E-02	4.46 E-02	2.71 E-04	1.35 E-04	1.25 E-04	6.25 E-05
Beryllium[d]	4.81 E-05	2.41 E-05	5.81 E-06	2.91 E-06		
Cadmium[d]	1.51 E-02	7.53 E-03	5.36 E-05	2.68 E-05	2.42 E-05	1.21 E-05
Chromium[d]	4.43 E-03	2.21 E-03	9.85 E-05	4.92 E-05	7.73 E-05	3.86 E-05
Copper	1.95 E-01	9.77 E-02	6.23 E-04	3.12 E-04	4.11 E-04	2.06 E-04
Lead[d]	1.24 E-01	6.19 E-02	1.89 E-04	9.47 E-05	7.38 E-05	3.69 E-05
Mercury[d]	8.68 E-02	4.34 E-02	6.65 E-02	3.33 E-02	7.86 E-03	3.93 E-03
Nickel[d]	3.53 E-03	1.77 E-03	8.69 E-05	4.34 E-05	3.58 E-05	1.79 E-05
Silver	1.30 E-04	6.51 E-05	9.23 E-05	4.61 E-05	8.05 E-05	4.03 E-05
Thallium	7.58 E-04	3.79 E-04				

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05. ND = no data. Blanks indicate no data.
[b] SD = Spray Dryer.
[c] FF = Fabric Filter.
[d] Hazardous air pollutant listed in the *Clean Air Act*.

Table 2.3-18 (English And Metric Units). ROTARY KILN MEDICAL WASTE INCINERATOR EMISSION FACTORS FOR DIOXINS AND FURANS[a]

EMISSION FACTOR RATING: E

Congener[d]	Uncontrolled		SD/Fabric Filter[b]		SD/Carbon Injection/FF[c]	
	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg
2,3,7,8-TCDD	6.61 E-10	3.30 E-10	4.52 E-10	2.26 E-10	6.42 E-11	3.21 E-11
Total TCDD	7.23 E-09	3.61 E-09	4.16 E-09	2.08 E-09	1.55 E-10	7.77 E-11
Total CDD	7.49 E-07	3.75 E-07	5.79 E-08	2.90 E-08	2.01 E-08	1.01 E-08
2,3,7,8-TCDF	1.67 E-08	8.37 E-09	1.68 E-08	8.42 E-09	4.96 E-10	2.48 E-10
Total TCDF	2.55 E-07	1.27 E-07	1.92 E-07	9.58 E-08	1.15 E-08	5.74 E-09
Total CDF	5.20 E-06	2.60 E-06	7.91 E-07	3.96 E-07	7.57 E-08	3.78 E-08

[a] References 7-43. Source Classification Codes 5-01-005-05, 5-02-005-05.
[b] SD = Spray Dryer.
[c] FF = Fabric Filter.
[d] Hazardous air pollutants listed in the *Clean Air Act*.

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Level 1	Industrial Processes		
Level 2	Photo Equip/Health Care/Labs/Air Condit/SwimPools		
Level 3	Health Care - Crematoriums		
Level 4	Crematory Stack		
POLLUTANT	Beryllium	NEI 7440417	CAS 7440-41-7
Primary Control	UNCONTROLLED		
Emission Factor	1.370E-6 Lb per Each Body Burned		
Quality	U Emissions Factors Applicability		
References	Emissions Testing of a Propane Fired Incinerator at a Crematorium. October 29, 1992. (Confidential Report No. ERC-39)		
AP 42 Section			
Formula			
Notes			

SCC	31502101		
Level 1	Industrial Processes		
Level 2	Photo Equip/Health Care/Labs/Air Condit/SwimPools		
Level 3	Health Care - Crematoriums		
Level 4	Crematory Stack		
POLLUTANT	Cadmium	NEI 7440439	CAS 7440-43-9
Primary Control	UNCONTROLLED		
Emission Factor	1.110E-5 Lb per Each Body Burned		
Quality	U Emissions Factors Applicability		
References	Emissions Testing of a Propane Fired Incinerator at a Crematorium. October 29, 1992. (Confidential Report No. ERC-39)		
AP 42 Section			
Formula			
Notes			

SCC	31502101		
Level 1	Industrial Processes		
Level 2	Photo Equip/Health Care/Labs/Air Condit/SwimPools		
Level 3	Health Care - Crematoriums		
Level 4	Crematory Stack		
POLLUTANT	Chromium	NEI 7440473	

CAS 7440-47-3 ⓘ

Primary Control ⓘ	UNCONTROLLED
Emission Factor ⓘ	2.990E-5 Lb per Each Body Burned
Quality ⓘ	U Emissions Factors Applicability
References	Emissions Testing of a Propane Fired Incinerator at a Crematorium. October 29, 1992. (Confidential Report No. ERC-39)
AP 42 Section	
Formula	
Notes	

SCC ⓘ	31502101		
Level 1 ⓘ	Industrial Processes		
Level 2 ⓘ	Photo Equip/Health Care/Labs/Air Condit/SwimPools		
Level 3 ⓘ	Health Care - Crematoriums		
Level 4 ⓘ	Crematory Stack		
POLLUTANT ⓘ	Chromium (VI)	NEI 18540299 ⓘ	CAS 18540-29-9 ⓘ

Primary Control ⓘ	UNCONTROLLED
Emission Factor ⓘ	1.350E-5 Lb per Each Body Burned
Quality ⓘ	U Emissions Factors Applicability
References	Emissions Testing of a Propane Fired Incinerator at a Crematorium. October 29, 1992. (Confidential Report No. ERC-39)
AP 42 Section	
Formula	
Notes	

SCC ⓘ	31502101		
Level 1 ⓘ	Industrial Processes		
Level 2 ⓘ	Photo Equip/Health Care/Labs/Air Condit/SwimPools		
Level 3 ⓘ	Health Care - Crematoriums		
Level 4 ⓘ	Crematory Stack		
POLLUTANT ⓘ	Hydrogen chloride	NEI 7647010 ⓘ	CAS 7647-01-0 ⓘ

Primary Control ⓘ	UNCONTROLLED
Emission Factor ⓘ	7.200E-2 Lb per Each Body Burned
Quality ⓘ	Emissions Factors Applicability
References	Emissions Testing of a Propane Fired Incinerator at a Crematorium. October 29, 1992. (Confidential Report No. ERC-39)
AP 42 Section	

Formula
Notes

SCC	31502101		
Level 1	Industrial Processes		
Level 2	Photo Equip/Health Care/Labs/Air Condit/SwimPools		
Level 3	Health Care - Crematoriums		
Level 4	Crematory Stack		
POLLUTANT	Hydrogen fluoride	NEI 7664393	CAS 7664-39-3
Primary Control	UNCONTROLLED		
Emission Factor	6.550E-4 Lb per Each Body Burned		
Quality	U Emissions Factors Applicability		
References	Emissions Testing of a Propane Fired Incinerator at a Crematorium. October 29, 1992. (Confidential Report No. ERC-39)		
AP 42 Section			
Formula			
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SCC	31502101		
Level 1	Industrial Processes		
Level 2	Photo Equip/Health Care/Labs/Air Condit/SwimPools		
Level 3	Health Care - Crematoriums		
Level 4	Crematory Stack		
POLLUTANT	Lead	NEI 7439921	CAS 7439-92-1
Primary Control	UNCONTROLLED		
Emission Factor	6.620E-5 Lb per Each Body Burned		
Quality	U Emissions Factors Applicability		
References	Emissions Testing of a Propane Fired Incinerator at a Crematorium. October 29, 1992. (Confidential Report No. ERC-39)		
AP 42 Section			
Formula			
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SCC	31502101
Level 1	Industrial Processes
Level 2	Photo Equip/Health Care/Labs/Air Condit/SwimPools
Level 3	Health Care - Crematoriums
Level 4	Crematory Stack

POLLUTANT	Mercury	NEI 7439976	CAS 7439-97-6
Primary Control	UNCONTROLLED		
Emission Factor	3.290E-3 Lb per Each Body Burned		
Quality	U Emissions Factors Applicability		
References	Emissions Testing of a Propane Fired Incinerator at a Crematorium. October 29, 1992. (Confidential Report No. ERC-39)		
AP 42 Section			
Formula			
Notes			

SCC	31502101
Level 1	Industrial Processes
Level 2	Photo Equip/Health Care/Labs/Air Condit/SwimPools
Level 3	Health Care - Crematoriums
Level 4	Crematory Stack

POLLUTANT	Nickel	NEI 7440020	CAS 7440-02-0
Primary Control	UNCONTROLLED		
Emission Factor	3.820E-5 Lb per Each Body Burned		
Quality	U Emissions Factors Applicability		
References	Emissions Testing of a Propane Fired Incinerator at a Crematorium. October 29, 1992. (Confidential Report No. ERC-39)		
AP 42 Section			
Formula			
Notes			

SCC	31502101
Level 1	Industrial Processes
Level 2	Photo Equip/Health Care/Labs/Air Condit/SwimPools
Level 3	Health Care - Crematoriums
Level 4	Crematory Stack

POLLUTANT	Zinc	NEI	CAS 7440-66-6
Primary Control	UNCONTROLLED		
Emission Factor	3.530E-4 Lb per Each Body Burned		
Quality	Emissions Factors Applicability		
References	Emissions Testing of a Propane Fired Incinerator at a Crematorium. October 29, 1992. (Confidential Report No. ERC-39)		

Kramer & Associates, Inc. TSP

Location Albuquerque Pet M | Run No: 3

Time	Gas Meter Reading	ΔP Pitot Reading	Orifice ΔH Actual	Dry Gas Meter Temperature		Stack Temp
				Inlet	Outlet	
min	cubic ft	in H2O	in H2O	deg F	deg F	deg F
0	171.900	0.08	0.60	86	86	964
5		0.09	0.63	85	91	1129
10		0.09	0.60	85	95	1141
15		0.09	0.60	85	99	1156
20		0.09	0.60	85	101	1140
25		0.09	0.63	88	102	1100
30		0.08	0.60	89	96	1105
35		0.09	0.63	89	101	1133
40		0.09	0.63	89	104	1128
45		0.09	0.63	88	106	1101
50		0.08	0.55	90	107	1103
55		0.08	0.55	90	107	1092
60						
60	220.07					
Ave.	48.17	0.29	0.60	87.42	99.58	1107.67

Calculations Summary

Crematory

Vmstd = 17.647*Vm*Y*(Pbar+ΔH/13.6)Tmave

Vmstd = 38.35 Ft3

Vol H2O Collected = 0.04707*ml H2O

Vm = 5.69 Ft3

% Moisture in Stack = Vw/(Vw+vmstd)

% H2O = 12.91 **Saturation, % 157335.62**

Fd = 0.87

Dry Mole Wt. = 0.44*CO2+0.32*O2+0.28*N2

DMWt = 28.99

Wet Mole Wt = Fd*DMWt+Bwo/100*18

WMWT = 27.57

Ave Velocity=85.49*Cp*SqrtΔP*Sqrt(Ts/DMWT/Ps)

Vsa = 31.94 fps

Ave Stack Flow=1058.82*Vsa*Fd*Area*Ps/Ts

Qsa = 1020.45

Iso Ratio=17.316*Vmstd*Tsa/Vsa/Fd/Ps/Dn/Dn/Time

Iso = 99.81 %

gr/DSCF T 0.0154*Mg TSP/Vmstd

TSP= 0.012 gr/DSCF **0.073 at 12%CO2**

Lb/Hr TSP= 0.0001428*60*Qsa*gr/DSCF

TSP= 0.103 lb/hr

Permit Allowables= 0.08 gr/DSCF @ 12%CO2; and 0.29 lb/hr

HARTWICK COMBUSTION TECHNOLOGIES, INC.
New Equipment, Service, Supplies, and Solutions

APEX 300 Tri-Chamber Pet Cremation System

- Model # APEX 300 TCP
- Power Supply: 220/ 3Phase 40amps
- Forced Air/ Forced Draft: 1200 CFM
- Number of Burners:4 total: 3 Primary, 1 Secondary
- Total maximum uncontrolled BTU rating: 3,000,000 BTU's
- Total Maximum controlled BTU configuration all burners: 2,150,000
- After Burner controlled BTU configuration: 800,000
- Primary Burners controlled BTU configuration 3 total: 450,000 each
- Operation Cycle: 1 Hr.
- Operation Cycle Time/capacity: 150lb. per hour
- Temperature Control: Yes (3)
- Exhaust Stack Height: 28' from ground
- Average Exhaust Temperature: 1,100° F
- Average Stack Gas Velocity: 20 F/S
- Maximum Annual Throughput: 5840 Cycles
- Maximum Monthly Throughput: 480 Cycles
- Maximum Daily Throughput: 16 Cycles

- Maximum controlled fuel consumption p/h: 2,150 CFH
- Average fuel consumption p/h: 447 CFH
- Control Equipment Includes:
    - Type K Thermocouple (3)
    - After Chamber
    - Pollution Monitoring System with Alarm Relay
    - Low Nox Burners (4)
    - Loop Monitor Controller (3)
    - Programable Logic Controller (1)

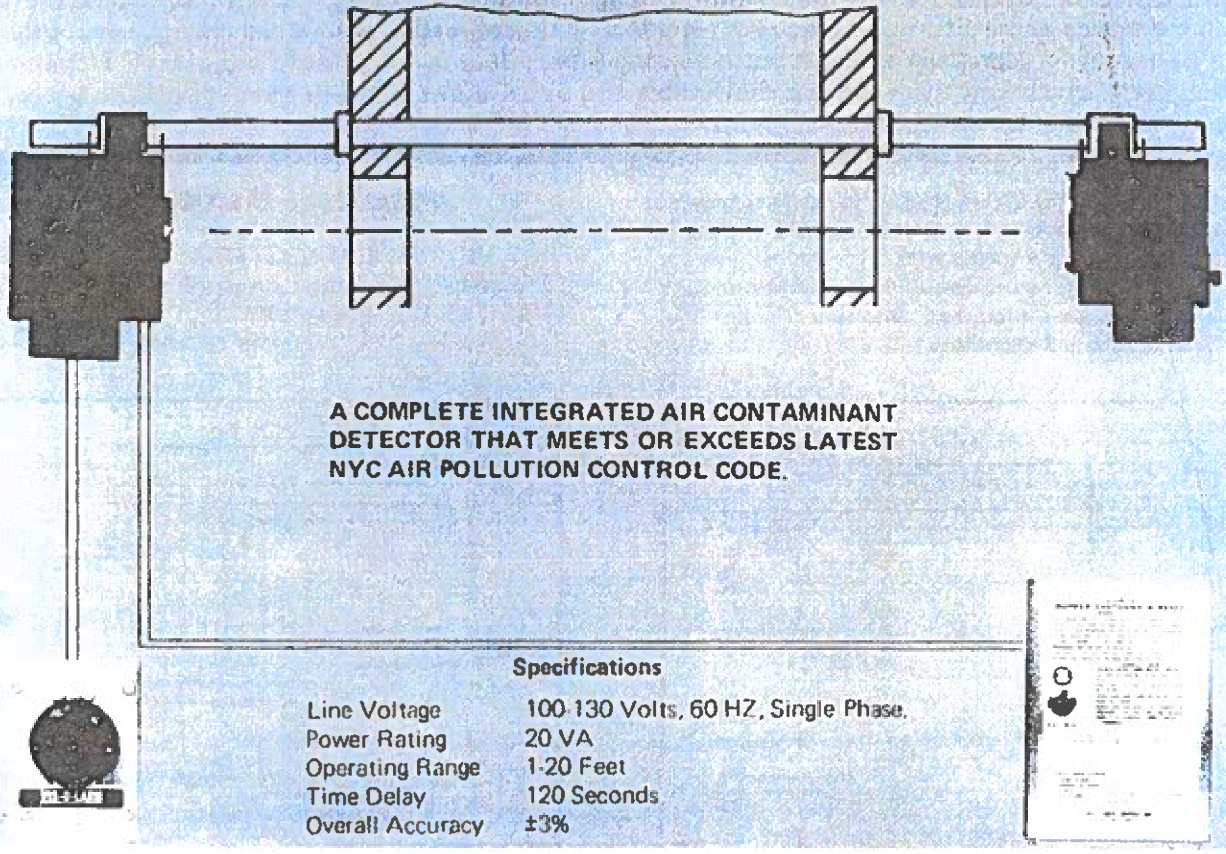
HARTWICK COMBUSTION TECHNOLOGIES, INC.
New Equipment, Service, Supplies, and Solutions

Magnus 500 Equine Cremation System

- Model # HCT Magnus 500
- Power Supply: 220/ 3Phase 40 amps
- Forced Air/ Forced Draft: 1200 CFM
- Number of Burners:3 total: 2 Primary, 1 Secondary
- Total maximum uncontrolled BTU rating: 2,500,000 BTU's
- Total maximum controlled BTU configuration all burners: 1,800,000
- After Burner controlled BTU configuration: 800,000
- Primary Burner controlled BTU configuration: 500,000
- Secondary Burner controlled BTU configuration: 500,000
- Operation Cycle: 4Hrs.
- Operation Cycle Time/capacity: 250 lb. per hour
- Temperature Control: Yes (3)
- Exhaust Stack Height: 28' from ground
- Average Exhaust Temperature: 1,100° F
- Average Stack Gas Velocity: 31.94 F/S
- Maximum Annual Throughput: 1440 Cycles
- Maximum Monthly Throughput: 120 Cycles
- Maximum Daily Throughput: 4 Cycles

- Maximum controlled fuel consumption p/h: 1,800 CFH
- Average fuel consumption p/h: 418 CFH
- Control Equipment Includes:
    - Type K Thermocouple (3)
    - After Chamber
    - Pollution Monitoring System with Alarm Relay
    - Low Nox Burners (3)
    - Loop Monitor Controllers (3)
    - Programable Logic Controller (1)

HEAT-TIMER MODEL MLS-A
SMOKE ALARM SYSTEM



A COMPLETE INTEGRATED AIR CONTAMINANT DETECTOR THAT MEETS OR EXCEEDS LATEST NYC AIR POLLUTION CONTROL CODE.

Specifications

Line Voltage	100-130 Volts, 60 HZ, Single Phase.
Power Rating	20 VA
Operating Range	1-20 Feet
Time Delay	120 Seconds
Overall Accuracy	±3%

LIMITED WARRANTY

Heat-Timer Corporation warrants its products to be free from defects in material and workmanship, under normal use, for a period of one year from the date of installation, its obligation under this warranty being limited to repair or replacing any product returned to the factory, transportation charges prepaid, and which upon its examination shall disclose to its satisfaction to have been thus defective. This warranty shall not apply to any equipment or parts which have been subject to misuse, negligence or accident, improper installation, power failures, fire, flood or lightning. Heat-Timer Corp. assumes no liability for indirect or consequential damages of any kind. This warranty is in lieu of all other warranties expressed or implied.

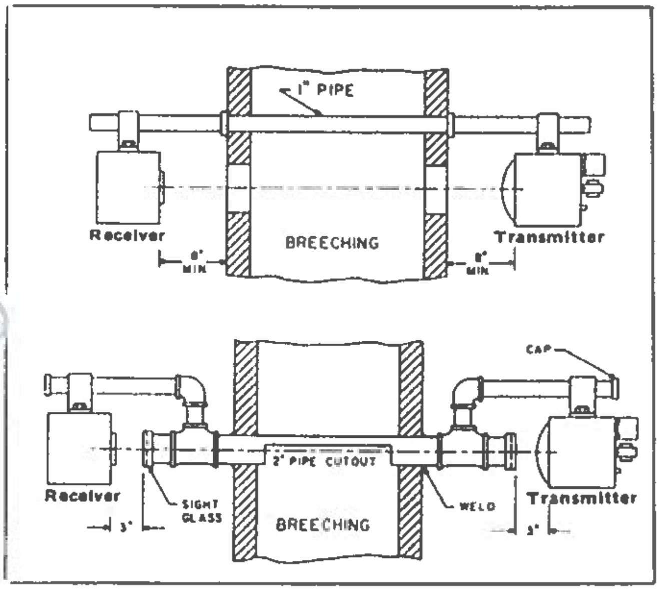
HEAT-TIMER CORPORATION
10 DWIGHT PLACE, FAIRFIELD, N.J. 07006 • (201) 575-4004
HEAT-TIMER SERVICE Corp.
48 WEST 21st ST., N.Y., N.Y. 10010 • (212) 924-4297

IMPROVES BOILER EFFICIENCY

APPLICATION

The Model MLS-A Smoke Alarm is used for detection and instant warning of smoke or other air contaminants in flues of heating boilers utilizing oil, gas or coal. It consists of a Transmitter Unit, a Receiving Unit, a Burner Shutdown and Reset Control and a Visualarm. When smoke density or air contaminants exceed a predetermined limit the alarm circuits are energized and if the condition persists for a period of two minutes, automatic burner shutdown will take place and a flashing warning light will lock in. Burner can be reactivated and warning signals can be cancelled by manually depressing the reset button on the Burner Shutdown & Reset Control box. This also restarts the sensing cycle which will again activate the audible and visual warning signals and shut off the burner in two minutes if the excessive smoke or air contaminant condition has not been eliminated.

LOW COST; EASY INSTALLATION –Sturdy, well-engineered, compactly designed–the economically priced Model MLS-A SMOKE ALARM can be installed with a minimum of wiring and at low cost. A bracket on top of both Transmitter and Receiver Units facilitates mounting with any 1" pipe and provides for complete self-alignment.



SUITABLE FOR NATURAL-DRAFT OR FORCED-DRAFT INSTALLATIONS–Typical illustrations show ease of installation for both.

WIRING DIAGRAM

THIS UNIT IS SUITABLE FOR 115 VOLT, 60 CYCLE OPERATION. The basic wiring of the Model MLS-A SET SMOKE ALARM is shown below.

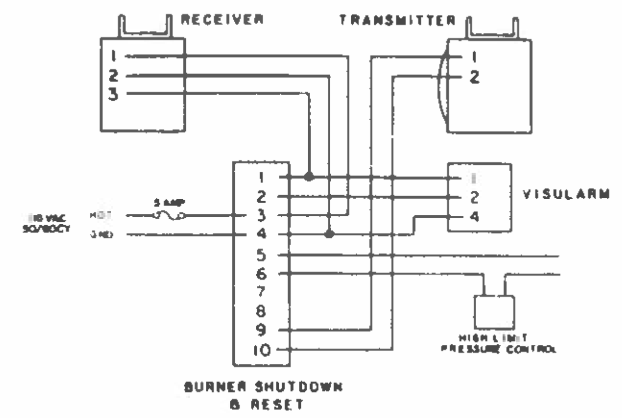


FIG. NO. 4

SMOKE ALARM INSTALLATION WITH BURNER SHUTDOWN & RESET, IF SMOKE PERSIST FOR APPROXIMATELY 120 SECONDS BURNER SHUTDOWN & RESET WILL OPERATE AND OPEN BURNER CIRCUIT.

ALL WIRING MUST CONFORM TO LOCAL AND NATIONAL CODES. If fuse to hot line is removed, burner will not operate. Provide a 5 amp fuse in hot line terminal.

MAINTENANCE

As dust and soot accumulate on the Transmitter and Receiver Units, the alarm will ring as if smoke were present in the breeching. To avoid false alarms, these units must be cleaned at regular intervals. This is the only scheduled service or maintenance this unit requires.

SMOKE ALARM ADUSTMENT

1. Set knob on TRANSMITTER UNIT fully CLOCKWISE.
2. Place filter in front of lense on TRANSMITTER UNIT.
3. Slowly rotate knob COUNTERCLOCKWISE until Alarm just sounds.
4. Remove filter from lens. This completes the adjustment. The Alarm will ring whenever smoke in the breeching exceeds a density of #1 Ringelmann.

ORDERING INFORMATION

For complete set consisting of
Transmitter, Receiver, Vis-U-Larm
& Burner Reset -- Order
"Complete MLS-A Set"

For individual components Order by part numbers:

Burner Reset	A925009
Vis-U-Larm	A925011
Receiver	A925008
Transmitter	A925010

APPENDIX C

Proof of Public Notice

Tim Keller, Mayor

Environmental Health Department

Air Quality Program

Interoffice Memorandum

Sandra K. Begay, Director

TO: MARTIN SCHLUEP, ALLIANT ENVIRONMENTAL, LLC

FROM: ELIZABETH POMO, PROGRAM SPECIALIST

SUBJECT: DETERMINATION OF NEIGHBORHOOD ASSOCIATIONS AND COALITIONS WITHIN 0.5 MILES OF 132 MOUNTAIN PARK PLACE NW, ALBUQUERQUE, NM 87114

DATE: 3/12/2019

DETERMINATION:

On 3/12/2019, I used the City of Albuquerque Zoning Advanced Map Viewer (http://sharepoint.cabq.gov/gis) to review which City of Albuquerque (COA) Neighborhood Associations (NAs) and Neighborhood Coalitions (NCs) are located within 0.5 miles of 132 Mountain Park Place NW, Albuquerque in Bernalillo County, NM.

I then used the City of Albuquerque Office of Neighborhood Coordination's Monthly Master NA List dated March 2019 to determine the contact information for each NA and NC located within 0.5 miles of 132 Mountain Park Place NW, Albuquerque in Bernalillo County, NM.

Duplicates have been deleted. They are as follows:

From http://sharepoint.cabq.gov/gis using the zoning advanced map viewer and the list of NAs and NCs from CABQ Office of Neighborhood Coordination:

COA Association or Coalition	Name	Email or Mailing Address
Alameda North Valley Association	Mark Rupert	mwr505@hotmail.com
Alameda North Valley Association	Steve Wentworth	anvanews@aol.com
District 4 Coalition of NA's	Daniel Regan	dlreganabq@gmail.com
District 4 Coalition of NA's	Michael Pridham	michael@drpridham.com
District 4 Coalition of NA's	NA Email	sect.dist4@gmail.com
North Edith Commercial Corridor Association	Christine Benavidez	christinebnvdz@aol.com
North Edith Commercial Corridor Association	Robert Warrick	rlwarric@centurylink.net
North Valley Coalition	Doyle Kimbrough	newmexmba@aol.com
North Valley Coalition	Peggy Norton	peggynorton@yahoo.com
North Valley Coalition	NA Email	nvcabq@gmail.com
Wildflower Area NA	Charles Bates	cefisher.67@gmail.com
Wildflower Area NA	Larry Caudill	ltcaudill@comcast.net

SUBJECT: Public Notice of Proposed Air Quality Construction Permit Application

Dear Neighborhood Association/Coalition Representative(s),

Why did I receive this public notice?
You are receiving this notice in accordance with New Mexico Administrative Code (NMAC) 20.11.41.13.B(1) which requires any applicant seeking an Air Quality Construction Permit pursuant to 20.11.41 NMAC to provide public notice by certified mail or electronic mail to the designated representative(s) of the recognized neighborhood associations and recognized coalitions that are within one-half mile of the exterior boundaries of the property on which the source is or is proposed to be located.

What is the Air Quality Permit application review process?
The City of Albuquerque, Environmental Health Department, Air Quality Program (Program) is responsible for the review and issuance of Air Quality Permits for any stationary source of air contaminants within Bernalillo County. Once the application is received, the Program reviews each application and rules it either complete or incomplete. Complete applications will then go through a 30-day public comment period. Within 90 days after the Program has ruled the application complete, the Program shall issue the permit, issue the permit subject to conditions, or deny the requested permit or permit modification. The Program shall hold a Public Information Hearing pursuant to 20.11.41.15 NMAC if the Director determines there is significant public interest and a significant air quality issue is involved.

What do I need to know about this proposed application?

Applicant Name	Albuquerque Pet Memorial Service, Inc.
Site or Facility Name	Albuquerque Pet Memorial Service, Inc.
Site or Facility Address	132 Mountain Park Place NW, Suite A, Albuquerque, NM 87114
New or Existing Source	EXISTING since 1999
Anticipated Date of Application Submittal	Initial submittal: March 25, 2019; revision submittal: July 29, 2019
Summary of Proposed Source to Be Permitted	Albuquerque Pet Memorial Service, Inc. (APMW) is proposing to install a 150 lb/hr and a 250 lb/hr animal crematory in addition to the two crematories currently authorized. APMS has been in business at this location since 1999.

What emission limits and operating schedule are being requested?
See attached Notice of Intent to Construct form for this information. This permit modification proposes the installation and operation of two additional animal crematories.

How do I get additional information regarding this proposed application?
For inquiries regarding the proposed source, contact:

- David Gifford – Owner and CEO of the facility
- Email: degiffd@aol.com
- Phone: (505) 231-2107

For inquiries regarding the air quality permitting process, contact:

- City of Albuquerque Environmental Health Department Air Quality Program
- aqd@cabq.gov
- (505) 768-1972

Notice of Intent to Construct

Under 20.11.41.13B NMAC, the owner/operator is required to *provide public notice by certified mail or electronic mail to the designated representative(s) of the recognized neighborhood associations and recognized coalitions that are with-in one-half mile of the exterior boundaries of the property on which the source is or is proposed to be located* if they propose to construct or establish a new facility or make modifications to an existing facility that is subject to 20.11.41 NMAC – Construction Permits. **A copy of this form must be included with the application.**

Applicant's Name and Address: Albuquerque Pet Memorial Service, Inc., 132 Mountain Park Place NW, Suite A, Albuquerque, NM 87114

Owner / Operator's Name and Address: Mr. David Gifford, 132 Mountain Park Place NW, Suite A, Albuquerque, NM 87114

Actual or Estimated Date the Application will be submitted to the Department: Initial submittal March 25, 2019

Exact Location of the Source or Proposed Source: Albuquerque Pet Memorial Service, Inc., 132 Mountain Park Place NW, Suite A, Albuquerque, NM 87114

Description of the Source: Animal/Pet Crematory

Nature of the Business: Cremation of animal remains.

Change for which the permit is requested:

- Addition of one 150 lb/hr and one 250 lb/hr animal crematory.
- Revise facility's emissions and accurately represent emissions based on potential of 8760 hours per year of operation.

Albuquerque Pet Memorial Service, Inc. has been operating at this location since 1999 and is proposing to expand operations due to increasing business demand.

Preliminary Estimate of the Maximum Quantities of each regulated air contaminant the source will emit:

Initial Construction Permit

	Pounds Per Hour (lbs/hr)	Tons Per Year (tpy)
CO	0.30	0.57
NOx	0.36	0.68
VOC	0.02	0.04
SO_2	0.002	0.004
PM10	0.31	0.59
PM2.5	0.21	0.38
HAP	NA	NA
H_2S	NA	NA

Net Changes In Emissions

	lbs/hr	tpy	Estimated Total TPY
CO	+1.09	+5.53	6.10
NOx	+1.03	+5.40	6.08
VOC	+0.10	+0.48	0.52
SO_2	+0.58	+2.55	2.55
PM10	+0.04	+0.94	1.53
PM2.5	+0.04	+0.72	1.10
HAP	+4.90	+093	0.93
H_2S	NA	NA	NA

Maximum Operating Schedule: 24 hours/day, 7 days/week, 52 weeks/year

Normal Operating Schedule: 12 hours/day, 7 days/week, 52 weeks/year

Ver.10/16 City of Albuquerque- Environmental Health Department
Air Quality Program- Permitting Section
Phone: (505) 768-1972 Email: aqd@cabq.gov

Current Contact Information for Comments and Inquires:
Name: David Gifford – Owner / CEO

Address: 132 Mountain Park Place NW, Suite A, Albuquerque, NM 87114

Phone Number: (505) 231-2107
E-Mail Address: degiffd@aol.com

If you have any comments about the construction or operation of the above facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to the address below:

Environmental Health Manager
Stationary Source Permitting
Albuquerque Environmental Health Department
Air Quality Program
PO Box 1293
Albuquerque, New Mexico 87103

(505) 768-1972

Other comments and questions may be submitted verbally.

Please refer to the company name and facility name, as used in this notice or send a copy of this notice along with your comments, since the Department may not have received the permit application at the time of this notice. Please include a legible mailing address with your comments. Once the Department has performed a preliminary review of the application and its air quality impacts, the Department's notice will be published in the legal section of the Albuquerque Journal and mailed to neighborhood associations and neighborhood coalitions near the facility location or near the facility proposed location.

Martin Schluep

To: Addressmwr505@hotmail.com; anvanews@aol.com
Cc: Tavarez, Isreal L.; Munoz-Dyer, Carina G.; degiffd
bject: Air Quality Permit No. 1158-M1 Revision Public Revised Notice
achments: Applicant Public Notice Cover Letter_7-29-19.pdf; NOI to Construct_APMS_7-29-19_REV2.pdf

Dear Neighborhood Association/Coalition Representative,

The City of Albuquerque Environmental Health Department Air Quality Program requires that all registered representatives of neighborhood associations and coalitions within one-half mile of a facility submitting an air quality permit application be notified prior to the submittal, under regulation 20.11.41.13 New Mexico Administrative Code (NMAC).

Alliant Environmental, LLC is sending this notification on behalf of Albuquerque Pet Memorial Service, Inc., regarding the proposed revision to Construction Permit #1158-M1. This facility is located at 132 Mountain Park Place NW, Suite A, Albuquerque, NM 87114.

This is a second notice due to technical data updates and revised emission rates to the proposed equipment by the manufacturer.
Please see the attached *Public Notice Cover Letter* and *Notice of Intent to Construct* form for more information.

Sincerely,

Martin R. Schluep
Alliant Environmental, LLC
7804 Pan American Fwy. NE, Suite 5
Albuquerque, NM 87109
(C) 505.205.4819
(F) 505.771.0793
www.alliantenv.com
acebook

Martin Schluep

To: rlwarric@centurylink.net
Cc: Tavarez, Isreal L.; Munoz-Dyer, Carina G.; degiffd
bject: Air Quality Permit No. 1158-M1 Revision Public Revised Notice
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Alliant Environmental, LLC
7804 Pan American Fwy. NE, Suite 5
Albuquerque, NM 87109
(C) 505.205.4819
(F) 505.771.0793
www.alliantenv.com
acebook

Martin Schluep

To:	dlreganabq@gmail.com; michael@drpridham.com; sect.dist4@gmail.com
Cc:	Tavarez, Isreal L.; Munoz-Dyer, Carina G.; degiffd
Subject:	Air Quality Permit No. 1158-M1 Revision Public Revised Notice

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Martin R. Schluep
Alliant Environmental, LLC
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Martin Schluep

To: christinebnvdz@aol.com; rlwarric@centurylink.netnewmexmba
Cc: Tavarez, Isreal L.; Munoz-Dyer, Carina G.; degiffd
bject: Air Quality Permit No. 1158-M1 Revision Public Revised Notice
achments: Applicant Public Notice Cover Letter_7-29-19.pdf; NOI to Construct_APMS_7-29-19_REV2.pdf

Dear Neighborhood Association/Coalition Representative,

The City of Albuquerque Environmental Health Department Air Quality Program requires that all registered representatives of neighborhood associations and coalitions within one-half mile of a facility submitting an air quality permit application be notified prior to the submittal, under regulation 20.11.41.13 New Mexico Administrative Code (NMAC).

Alliant Environmental, LLC is sending this notification on behalf of Albuquerque Pet Memorial Service, Inc., regarding the proposed revision to Construction Permit #1158-M1. This facility is located at 132 Mountain Park Place NW, Suite A, Albuquerque, NM 87114.

This is a second notice due to technical data updates and revised emission rates to the proposed equipment by the manufacturer.
Please see the attached *Public Notice Cover Letter* and *Notice of Intent to Construct* form for more information.

Sincerely,

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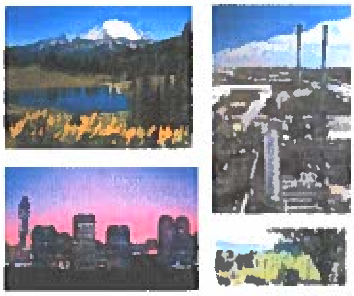
Pets

APPENDIX D

Air Quality Impacts Analysis



Albuquerque Pet Memorial Service, Inc.

Construction Permit No. 1158-M1 Modification Application

Air Dispersion Modeling Report_REV2

July 22, 2019

Prepared for:

Albuquerque Pet Memorial Service, Inc.
132 Mountain Park Place, NW, Suite A
Albuquerque, NM 87114

Prepared by:

Alliant Environmental, LLC
7804 Pan American Fwy. NE, Suite 5
Albuquerque, NM 87109

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Main Revisions to initial Modification Application:

- Revised emission calculations based on latest technical data, including use of low-NO_x burners, provided by Hartwick Combustion Technologies, Inc. who is in the process of building the additional proposed units
- Revised Air Dispersion Model using the revised emission rates, updated stack parameters, the 1997 Bernalillo former meteorological station weather data instead of the 2001-2005 Albuquerque Airport data per the Air Quality Program's (AQP) request and using the National Elevation Data (NED) file provided by the Air Quality Program
- Added most current available pollutant background data to modeled concentrations of NO_2, SO_2, CO, and PM
- Revised the fence line of the property and used property borders instead per the AQP's request

Albuquerque Pet Memorial Service, Inc. (APMS) is proposing to install and operate two additional animal crematories to their existing two crematories at their facility located at 132 Mountain Park Place, NW, Suite in Albuquerque, NM 87114.

Applicant and Consultant information:

Applicant: Mr. David Gifford, Owner and CEO
Albuquerque Pet Memorial Service, Inc.
132 Mountain Park Place, NW, Suite A
Albuquerque, NM 87114
(505) 550-4793
degiffd@aol.com

Air Dispersion Modeling Report Preparer Contact Information:

Alliant Environmental, LLC
Mr. Martin R. Schluep, Principal
7804 Pan American Fwy. NE, Suite 5
Albuquerque, NM 87109
Phone: (505) 205-4819
E-mail : mschluep@alliantenv.com

Facility/Process Description

APMS currently operates a Crawford C-1000 150 lb/hr burn rate and a Hartwick Combustion Technologies (HCT) Magnus Apex 250 lb/hr burn rate animal crematory. Due to increasing business demand, APMS is proposing to add and operate an additional 150 lb/hr and 250 lb/hr animal crematory to the existing permitted facility.

Location of Albuquerque Pet Memorial Service, Inc. Facility:

132 Mountain Park Place, NW, Suite A
Albuquerque, NM 87114

UTM Coordinates (NAD83): 353,465.93 m East, 3,895,855.48 m North, Zone 13
Elevation = 5,005 feet

An Aerial Map showing the location of the facility and a Plot Plan are provided in Attachment A.

Section 3
Modeling Requirements Description

The following pollutants and averaging periods were modeled and are included in this modeling analysis:

- 1-Hour and Annual NO_2
- 1-, 3-, 24-Hour and Annual SO_2
- 1-Hour and 8-Hour CO
- 24-Hour and Annual $PM_{2.5}$
- 24-Hour PM_{10}

The revised calculated hourly emission rates (lb/hr) for NO_x, SO_2, CO, PM_{10} and $PM_{2.5}$ as submitted in the revised permit modification application were applied in the AERMOD model. Both the modeled annual and hourly averaging times were based on the calculated lb/hr emission rates. No factors were applied to the annual modeled averaging time since the proposed annual emission rates (tpy) are based on 8,760 hrs/yr with no physical or operational hour limitation emission controls. Note that the revised permit modification emissions were based on technical specifications provided by Hartwick Combustion Technologies, Inc., the manufacturer who is in the process of building the additional proposed units. In addition, the proposed additional APEX model and the two Magnus models are or will be installed with low-NO_x burners.

According to Mr. Jeff Stonesifer from the AEHD AQP, there are no nearby neighboring sources that had to be included for any of the pollutants (February 14, 2019 e-mail from Mr. Stonesifer). The closest sources are captured by the background concentrations collected from nearby monitoring stations that were added to the maximum ground level concentrations modeled (GLC_{max}). The North Valley monitoring station's PM_{10} background data is considered the nearby background source for the APMS facility. All other background concentrations added are from the Del Norte High School monitoring station. These are the requested monitoring stations and background concentrations per Mr. Jeff Stonesifer (May 29, 2019 e-mail).

NM/NAAQS Design Values:

Per Mr. Jeff Stonesifer, the 1997 meteorological data file from the former Bernalillo monitoring station operated by the New Mexico Environment Department (NMED) must be used for this model because the meteorological data from this former monitoring station more accurately reflects the conditions at the site. The one-year (1997) meteorological data may be modeles as site-specific meteorological data.

The following modeled values were used to compare to the NM/NAAQS for each pollutant's design values:

1-Hour NO_2: High 8th High which is representative of 98th percentile per EPA's modeling guidance.
Annual NO_2: High 1st High
$PM_{2.5}$ and PM_{10} 24-Hour: The High 2nd High per EPA's modeling guidance
$PM_{2.5}$ Annual: High 1st High
SO_2 1-Hour: High 4th High per EPA's modeling guidance
SO_2 3-Hour and 24-Hour: High 1st High
SO_2 Annual: High 1st High
CO 1-Hour and 8-Hour: High 1st High

1-Hour and Annual NO_2 Modeling:

The Tier 2 fixed rate conversion technique was used for the 1-Hour and annual NO_2 modeling. The Ambient Ratio Method 2 (ARM2) default values within the model were used for both the 1-Hour and Annual conversion of NO_x to NO_2. The High 8th High modeled concentration for the

1-Hour and the High 1st High modeled concentration for the Annual averaging times exceeded the SIL; therefore, a complete modeling analysis, including background concentrations, was performed.

The seasonal hourly NO_2 background concentrations provided by the EHD AQP were applied in the AERMOD model for the 1-Hour standard. The seasonal background data applied was collected at the Del Norte monitoring station. The annual background concentration of 30.0 ug/m^3 was added to the High 1st High modeled annual concentration. The following background information, in parts per billion (PPB) were included in the model:

Table 1. Seasonal NO_2 Background Data Used

	Part Per Billion (PPB)			
Hour	**Winter**	**Spring**	**Summer**	**Fall**
1	38.3	25.3	15.6	34.9
2	36	25.7	14.7	31.7
3	36	24.5	14	30.8
4	36.4	26	14.1	31.3
5	36.7	27.5	17.4	30.8
6	37	34	20.9	30.7
7	38.7	37.6	24.7	33.7
8	41.3	38.2	25.8	34.3
9	42.5	32.5	18.2	35
10	38	25.5	14.5	29.2
11	32.9	15.2	12.9	25.1
12	25.6	10.1	10.6	18.8
13	19.6	9.4	9	15
14	18.6	8.4	8.4	13.4
15	17.8	7.9	9.3	12.9
16	19.8	8.1	10.3	14.9
17	25.7	9.1	10.8	20.2
18	38.8	10.3	10.3	37
19	42.2	20.5	11.5	42
20	41.5	28.3	16.4	41
21	41.1	25.5	18.1	39
22	40.6	29.9	16.4	37.4
23	39.9	31.3	18.6	37
24	38.5	30.8	17.9	37.7

1-Hour, 3-Hour, 24-Hour, and Annual SO_2 Modeling:

For the 1-Hour SO_2 averaging period, the High 4th High modeled concentration plus the background concentration of 13.10 $\mu g/m^3$ SO_2 was compared against the NM/NAAQS. The High 1st High concentrations modeled were compared against the NM/NAAQS for the 3-Hour, 24-Hour and Annual averaging times. There are no background concentrations being monitored for these averaging times, near this facility. Since the 1-Hour SO_2 NM/NAAQS was met, the 3-Hour, 24-Hour and Annual standards are also met.

1-Hour and 8-Hour CO Modeling:

The maximum predicted impacts (High 1st High) for the 1-Hour and 8-Hour averaging times for CO showed concentrations below their respective SIL; therefore, CO emissions from the facility are below the NM/NAAQS. No further analysis is required.

24-Hour and Annual $PM_{2.5}$ and PM_{10} Modeling:

For the 24-Hour averaging period for PM_{10} and $PM_{2.5}$, the High 2nd High concentration modeled was compared to the NM/NAAQS, including background concentrations. The following background concentrations, as provided by the EHD AQP, were added to the 24-Hour modeled concentrations of PM_{10} and $PM_{2.5}$:

PM_{10}: 31.0 ug/m^3 (North Valley monitoring station)

$PM_{2.5}$: 18.0 ug/m^3 (Del Norte monitoring station)

For the Annual averaging period for $PM_{2.5}$, the High 1st High concentration modeled was compared to the NM/NAAQS, including background concentrations. There is no Annual NM/NAAQS for PM_{10}. The following background concentrations were added to the annual modeled concentration of $PM_{2.5}$:

$PM_{2.5}$: 5.8 ug/m^3 (Del Norte monitoring station)

Table 2 provides a summary of all modeled pollutants' NM/NAAQS

Table 2. New Mexico/National Ambient Air Quality Standards and Background Data

Criteria Pollutant	Averaging Period	NAAQS ug/m^3	NMAAQS ug/m^3	Background Concentration ug/m^3	Monitoring Station
NO_2	Annual	99.66	94.02	30.0	Del Norte HS
	1-Hour	188.03	---	Seasonal	Del Norte HS
$PM_{2.5}$	Annual	12	---	5.8	Del Norte HS
	24-Hour	35	---	18.0	Del Norte HS
PM_{10}	24-Hour	150	150	31.0	North Valley
SO_2	Annual	80	52.4	0	N/A
	24-Hour	365	261.9	0	N/A
	3-Hour	1,309.3	---	0	N/A
	1-Hour	196.4	---	13.1	Del Norte HS
CO	8-Hour	10,303.6	9,960.1	1,489.0	Del Norte HS
	1-Hour	40,069.6	14,997.5	2,005.0	Del Norte HS

Model Used: AERMOD model (Providence/Oris Solutions Beeline-BEEST software Version 11.13) was used to run the modeling analysis.

Number of Model Runs: AERMOD- 2 modeling runs ("APMS_Model All_REV2") for all pollutants and averaging times except Annual NO_2, and ("APMS_Model All_REV2 _Annual NO2") for the Annual NO_2 standard.

Table 3 below shows the facility's emission stacks parameters used in the model. All four stacks were modeled as point sources.

Table 3. Table of Emissions and Stack (Source) Parameters

Stack	Source Description	Stack Height (ft.)	Stack Temp (°F)	Stack Velocity (ft/s)	Stack Dia. (ft.)	NO_x Hourly Emission Rate (lb/hr)	SO_2 Hourly Emission Rate (lb/hr)	CO Hourly Emission Rate (lb/hr)	PM_{10} Hourly Emission Rate (lb/hr)	$PM_{2.5}$ Hourly Emission Rate (lb/hr)
Stack 1	150 lb/hr Burn Rate Animal Crematory Exhaust Stack	24	1,100	20	1.67	**0.33**	**0.11**	**0.28**	**0.09**	**0.06**
Stack 2	250 lb/hr Burn Rate Animal Crematory Exhaust Stack	24	1,100	30.94	1.83	**0.38**	**0.18**	**0.39**	**0.09**	**0.06**
Stack 3	150 lb/hr Burn Rate Animal Crematory Exhaust Stack	28	1,100	20	1.67	**0.28**	**0.11**	**0.32**	**0.09**	**0.07**
Stack 4	250 lb/hr Burn Rate Animal Crematory Exhaust Stack	28	1,100	30.94	1.83	**0.38**	**0.18**	**0.39**	**0.09**	**0.06**

Stack UTM Coordinates:

Stack 1:	353,463.33m Easting; 3,895,858.78m Northing
Stack 2:	353,462.18m Easting; 3,895,855.74m Northing
Stack 3:	353,461.15m Easting; 3,895,853.15m Northing
Stack 4:	353,460.24m Easting; 3,895,850.54m Northing

Factors Used: None

Modeling Parameters: The AERMOD regulatory default parameters were included in assumptions made by the model. Building downwash caused by buildings at the facility was considered using the latest version of the Building Profile Input Program (BPIP) with the PRIME algorithms. Building tiers and coordinates are shown in Table 4 below.

Table 4. Building Tiers and Coordinates Used In BPIP PRIME

Tier	Tier Height (ft)	Easting (m)	Northing (m)
Building 1 Tier1	18	353,478.40	3,895,869.61
		353,476.63	3,895,864.91
		353,465.50	3,895,869.48
		353,467.20	3,895,874.16
Building 1 Tier2	14.25	353,476.63	3,895,864.91
		353,466.05	3,895,836.64
		353,454.71	3,895,841.45
		353,465.50	3,895,874.16
Building 2 Tier1	18	353,462.03	3,895,875.36
		353,448.37	3,895,841.48
		353,438.07	3,895,844.79
		353,451.44	3,895,879.36
Building 3 Tier1	10	353,506.66	3,895,851.96
		353,504.48	3,895,846.31
		353,490.13	3,895,851.92
		353,492.44	3,895,857.60
Building 3 Tier2	14.25	353,504.48	3,895,846.31
		353,498.42	3,895,829.54
		353,483.64	3,895,835.10
		353,490.11	3,895,851.93

Complex Terrain Data: Elevations of receptors and facility sources were obtained from 7.5-minute USGS topographical National Elevation Data (NED) files for the applicable region. Ms. Carina Munoz-Dyer from the AQP e-mailed APMS the following link (https://sflinks.cabq.gov/Sht4Wo5w6iY/) to the National Data Elevation (NED) file that had to be used in this model on May, 29, 2019. File name: NED_34972084.

Dispersion Coefficient: The selection of the appropriate dispersion coefficients used in the modeling analysis was based on the classification method defined by Auer (1978). This model considers the dispersion coefficients to be rural or urban depending on the land use within three kilometers (km) of the facility if greater than 50% meets certain land use or zoning classifications. Based on the site location (see aerial map), the rural dispersion was used.

Receptor Grid: For each pollutant, the Radius of Impact (ROI) around the facility was established using a Cartesian grid as shown in Table 5. The ROI values are shown in Table 6. Extra fine receptors were placed at 25-meter intervals around the APMS fenceline.

Table 5. Used Grid Resolutions in the Initial Modeling Domain

Grid Type	Description	Shape	Spacing (m)	Length (km)
Along fenceline	Extra Fine	Fenceline	25	Fenceline
Cartesian	Fine	Square	100	1,000
Cartesian	Medium	Square	250	2,500
Cartesian	Coarse	Square	500	5,000
Cartesian	Extra Course	Square	1,000	10,000

Meteorological Data: As previously dicussed above, the 1997 Bernalillo meteorological data set available on the NMED air dispersion modeling website, was used to run the AERMOD model. According to AQP, the wind rose from the 1997 Bernalillo meteorological data more closely reflects the wind rose from wind direction measurements taken at a monitoring station near the APMS site. This data can be used as site-specific meteorological data per Mr. Jeff Stonesifer.

Modeling Files: AERMOD – There are two AERMOD modeling files for this project named "APMS_Model All_REV2" and ("APMS_Model All_REV2 _Annual NO2"). These files include all modeled pollutants and their respective averaging times discussed above.

Section 5
Results

This modeling analysis demonstrates that operation of the facility described in this report neither causes nor contributes to any exceedances of NM/NAAQS. This air quality analysis demonstrates compliance with applicable regulatory requirements. Tables 6 and 7 show a detailed summary of the modeled results compared to the applicable standards.

Table 6. Significant Impacts Level Analyses and ROI's

Units	Criteria Pollutant	Averaging Period	Significance Level (ug/m^3)	NAAQS (ug/m^3)	GLC$_{max}$ (ug/m^3)	GLC$_{max}$ < Significance Level? If Yes, NAAQS is met (ug/m^3)	ROI (m)
1 - 4	NO_2	1-Hour	7.5	188.03	118.25	**No**	2,290.6
1 - 4	NO_2	Annual	1.0	99.66	11.02	**No**	223.7
1 - 4	$PM_{2.5}$	24-Hour	1.2	35	16.22	**No**	170.7
1 - 4	$PM_{2.5}$	Annual	0.3	12	2.33	**No**	166.4
1 - 4	PM_{10}	24-Hour	5.0	150	31.15	**No**	25.5
1 - 4	CO	1-Hour	2000	14,997.5	146.82	**Yes, no further analysis required**	0
1 - 4	CO	8-Hour	500	9,960.1	128.86	**Yes, no further analysis required**	0
1 - 4	SO_2	1-Hour	7.8	196.4	59.73	**No**	393.4
1 - 4	SO_2	3-Hour	25.0	1,309.3	56.49	**No**	25.5
1 - 4	SO_2	24-Hour	5.0	261.9	47.75	**No**	82.4
1 - 4	SO_2	Annual	1.0	52.4	4.76	**No**	82.4

Table 7. NM/NAAQS Analyses

Units	Criteria Pollutant	Averaging Period	NM/NAAQS (ug/m³)	GLC_{max} (ug/m³)	Background Concentration (ug/m³)	GLC_{max} incl. Background conc. (ug/m³)	GLC_{max} incl. Background conc. < NAAQS?	ROI (m)	Percent of Standard (%)
1 - 4	NO_2	1-Hour	188.03	182.38	Seasonal	182.38	Yes	2,291	97.0
1 - 4	NO_2	Annual	94.02	11.02	30.00	41.02	Yes	224	43.6
1 - 4	$PM_{2.5}$	24-Hour	35	16.22	18.00	34.22	Yes	171	97.8
1 - 4	$PM_{2.5}$	Annual	12	2.33	5.80	8.13	Yes	166	67.7
1 - 4	PM_{10}	24-Hour	150	31.15	31.00	62.15	Yes	26	41.4
1 - 4	SO_2	1-Hour	196.40	59.73	13.10	72.83	Yes	393	37.1
1 - 4	SO_2	3-Hour	1309.30	56.49	--	56.49	Yes	26	4.3
1 - 4	SO_2	24-Hour	261.90	47.75	--	47.75	Yes	82	18.2
1 - 4	SO_2	Annual	52.40	4.76	--	4.76	Yes	82	9.1

Note:

1-hour NO_2 GLC_{max} is the high 8th high.

Annual NO_2 GLC_{max} is the high 1st high.

PM_{10} and $PM_{2.5}$: 24-hour modeled concentrations is high 2nd high.

SO_2: 1-hour modeled concentration is high 4th high, 3-hour modeled concentration is high 1st high, 24-hour modeled concentration is high 1st high, and annual modeled concentration is high 1st high

Background Concentrations:

Seasonal 1-Hour and annual NO_2 background concentrations were added in the AERMOD model.

NO_2 background data was collected at the Del Norte monitoring site ID 35-001-0023.

24-Hour and annual $PM_{2.5}$ background concentration added from Del Norte monitoring site ID 35-001-0023.

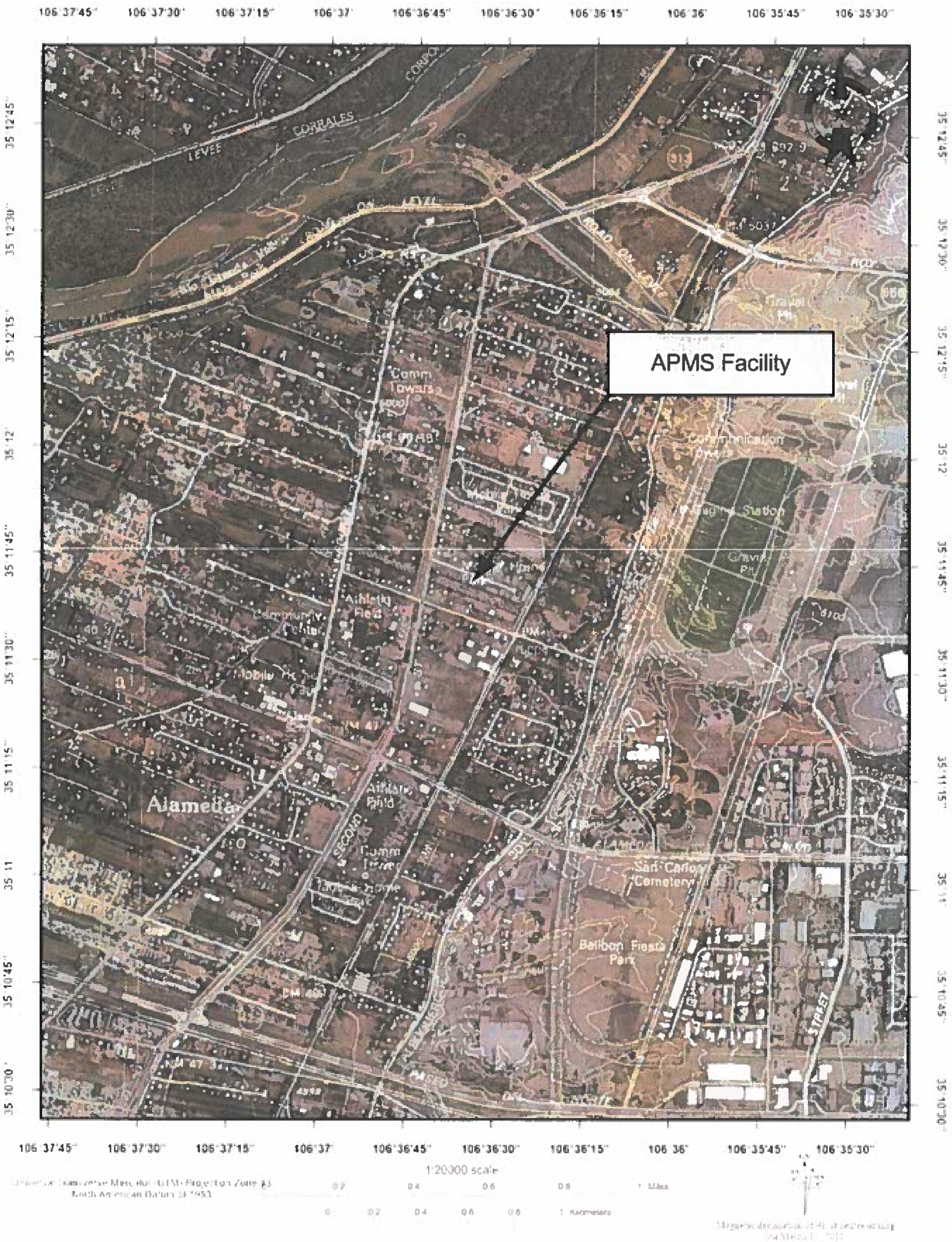
24-Hour PM_{10} background concentration added based on the Air Quality Program's input (North Valley Monitor).

1-Hour SO_2 background concentration added from Del Norte monitoring site ID 35-001-0023.

Background concentrations provided by Mr. Jeff Stonesifer, Air Quality Program, on May 29, 2019.
There are no nearby sources for any of the modeled pollutants. Therefore, only background concentrations, where applicable, were added.

Attachment A

Area Map / Facility Plot Plan



ALLIANT ENVIRONMENTAL, LLC

Area Map

Albuquerque Pet Memorial Service, Inc.

Scale: 1:20,000	Drawn by: MRS	Date: 6/10/2019	**Albuquerque Pet Memorial Service, Inc.** N 35° 11' 41.9" Latitude W 106° 36' 34.4" Longitude	Project No.: 094-001	File Name: **APMS Area Map**	Figure: 2-1
	Chk'd by:	Date:				

ALLIANT Environmental, LLC			**Plot Plan**	**Albuquerque Pet Memorial Service, Inc.**		
Scale: 1:20,000	Drawn by: MRS	Date: 4/22/2019	**Albuquerque Pet Memorial Service, Inc.** N 35° 11' 41.9" Latitude W 106° 36' 34.4" Longitude	Project No.: 094-001	File Name: **APMS Plot Plan_REV1**	Figure: 2-2
	Chk'd by:	Date:				