

DRAFT
Engineering Evaluation Report
Grissom's Chapel and Mortuary
267 E. Lewelling Blvd.
San Lorenzo, CA 94580
Plant # 19463
Application # 19563

BACKGROUND

Grissom's Chapel and Mortuary is applying for an Authority to Construct/Permit to Operate a crematory at their facility in San Lorenzo. The applicant is applying for an Authority to Construct the following unit:

S-1 MULTIPLE CHAMBER CREMATORY – CMS Millennium III, 2.25 MMBtu/hr, 100 lbs/hr capacity

The cremator is equipped with a 0.75 MM BTU/hr burner in the primary chamber and one 1.5 MM BTU/hr burner in the secondary chamber. A similar unit is currently operating at Fernwood in Mill Valley (Plant # 15949).

The source will be within 1000 feet of the following schools:

St. John Elementary School
270 E Lewelling Blvd.
San Lorenzo, CA 94580
(510) 276-6632
Enrollment: ~271 students

San Lorenzo High School
50 E. Lewelling Blvd.
San Lorenzo, CA 94580
(510) 317-3000
Enrollment: ~1605 students

Colonial Acres Elementary
17115 Meekland Ave.
Hayward, CA 94541
(510) 317-4500
Enrollment: ~574 students

EMISSIONS CALCULATIONS

Basis:

- Firing Rate = 2.25 MM Btu/hr (approx. 46,800 therms/yr)
- Natural Gas Gross Heating Value = 1020 BTU/ft³
- Bodies/yr/cremator = 500 (limited by permit condition)
- Average body weight = 150 lbs
- Burning Rate = 100 lb/hr
- Operating Schedule = 8 hours/day, 5 days a week, 52 weeks a year
- Hours of operation = (500 body/yr)(150 lb/body) / (100 lb/hr) = 750 hr/yr
- Fuel Usage = (750 hr/yr)(2.25 MMBTU/hr) = 1687.5 MM BTU/yr

a. Natural Gas Combustion

Pollutant	Emission Factor, lbs/MMscf	Emission Factor, lbs/MMBtu ⁽¹⁾	Daily Emissions Lb/day ⁽²⁾	Annual Emissions lbs/year ⁽³⁾	TPY
PM ₁₀	7.6	7.45E-03	0.05	12.57	0.006
NO _x	100	9.80E-02	0.64	165.37	0.083
SO _x	0.6	5.88E-04	<0.01	0.99	<0.001
CO	84	8.24E-02	0.53	139.05	0.069
POC	5.5	5.39E-03	0.03	9.10	0.005

1. Emission Factor, lbs/MMBtu = (emission factors, lbs/MMscf) / (1020 Btu/scf)
2. $(500 \text{ body/yr})(150\text{lb/body})/[(100 \text{ lb/hr})(260 \text{ day/yr})]= 2.88 \text{ hr/day}$
 Daily Fuel Usage = $(2.88 \text{ hr/day})(2.25 \text{ MMBTU/hr}) = 6.48 \text{ MMBTU/day}$
 Daily Emissions, lbs/day = (daily fuel usage, MMBTU/day)(emission factors, (lbs/MMBTU))
3. Annual Emissions, lbs/yr = (fuel usage, MMBtu/yr) *(emission factors, lbs/MMBtu)

b. **Emissions from Cremations** - *In addition to natural gas combustion, there are also emissions attributed to the combustion of the casket and body.*

Basis: Number of bodies: 500 per year
 Average body weight: 150 lbs/body
 Personal effects: 5 lbs/body

Pollutant	Emission Factor, lbs/ton	Daily Emissions lbs/day ⁽¹⁾	Annual Emissions lbs/year ⁽²⁾	Annual Emissions TPY
PM ₁₀	1.13	0.17	43.79	0.022
NO _x	3.56	0.53	137.95	0.069
SO _x	2.17	0.32	84.09	0.042
CO	2.95	0.44	114.31	0.057
POC	2.99	0.45	115.86	0.058

⁽¹⁾ Daily Emissions lbs/day = (Annual Emissions, lbs/yr)/ 260 day/yr)

⁽²⁾ Annual Emissions, lbs/yr =(emission factor lb/ton)(500 body/yr)(155 lb/body)/(ton/2000 lb)
 Annual Emissions, TPY = (Annual Emissions, lbs/yr)/(2000 lb/tons)

Summary of Total Emissions from Fuel Usage and Cremation of Human Remains

Pollutant	Daily Emissions (lbs/day)	Annual Emissions (lb/yr)	Annual Emissions (TPY)
PM10	0.22	56.36	0.028
NO _x	1.17	303.32	0.152
SO _x	0.32	85.08	0.043
CO	0.97	253.36	0.127
POC	0.48	124.96	0.063

Toxic Emissions from the Cremated Body

Toxic Pollutant Emission Factors taken from Permit Handbook, Section 11, Misc.

Sources – Crematory

(Emission Factor (lbs/body))(500 bodies/yr) = Lbs/yr Trigger Levels

Compounds	Emission Factors	Lbs/year	Trigger Levels
Acetaldehyde:	1.30E-04	6.50E-02	7.2 E +01
Arsenic:	3.00E-05	1.50E-02	2.5 E -02
Antimony	3.00E-05	1.50E-02	7.7 E+00
Beryllium:	1.40E-06	7.00E-04	1.4 E -02
Cadmium:	1.10E-05	5.50E-03	4.6 E -02
Chromium Hexavalent:	1.40E-05	7.00E-03*	1.3 E -03
Copper:	2.70E-05	1.35E-02	4.6 E +02
Formaldehyde:	3.40E-05	1.70E-02	3.3 E +01
Hydrogen chloride:	7.20E-02	3.60E+01	1.4 E +03
Hydrogen fluoride:	6.60E-04	3.30E-01	1.1 E +03
Lead:	6.60E-05	3.30E-02	1.6 E +01
Mercury:	1.10E-03	5.50E-01	5.8 E +01
Nickel:	3.80E-05	1.90E-02	7.3 E -01
Selenium:	4.40E-05	2.20E-02	9.7 E +01
Zinc:	3.50E-04	1.75E-01	6.8 E +03
Chlorinated dibenzodioxins and furans (expressed as 2,3,7,8 TCDD equivalents)	1.40E-09	7.00E-07	1.2 E -06
PAHs, benzo (a) pyrene equiv:	4.90E-08	2.45E-05	4.04 E-02

*** exceeds trigger levels**

Toxic Risk Screen Analysis is required. (See below)

PLANT CUMULATIVE INCREASE EMISSIONS

The cumulative increases from this application are from the natural gas combustion and cremations. There are no existing cumulative emissions.

Pollutant	Current (TPY)	Proposed (lb/yr)	Total Emissions (TPY)
PM10	0	56.36	0.028
NO _x	0	303.32	0.152
SO _x	0	85.08	0.043
CO	0	253.36	0.127
POC	0	124.96	0.063

TOXIC RISK SCREENING ANALYSIS

The applicant is requesting a throughput limit of 500 bodies a year. In addition, the crematory retort may emit some TACs in amounts that exceed the risk screen trigger levels. (See Toxic Emissions from the Cremated Body section). The results of the health risk screening analysis, based on the crematory retort operating schedule of 8 hours per day, 5 days a week, 52 weeks per year and a maximum of 500 bodies cremated per year, are presented in the table below.

Receptor	Cancer Risk in a Million	Chronic Hazard Index	Acute Hazard Index
Off-site Worker	2.3	0.2	0.8
Residential	2.2	0.2	0.9
Student (St. John)	0.2	0.03	0.1
Student (SLHS)	0.04	0.007	0.04
Student (Colonial Acres)	0.03	0.005	0.05

Under the District's Risk Management Policy, the proposed project, with an incremental cancer risk less than ten in a million and a chronic hazard index less than one, is acceptable for operations that meet best available control technology for toxic emissions (TBACT). For the students who attend nearby schools, the maximum increased cancer risk is 0.2 chances in a million, the chronic hazard index is 0.03 and the acute hazard index is 0.1. These health risk values meet the criteria for acceptable levels established in Regulation 2, Rule 5.

BACT ANALYSIS

BACT is not triggered for PM₁₀, POC, NO_x, CO and SO₂ emissions, each of which does not exceed 10 pounds per highest day. However, TBACT is required for projects that result in an incremental cancer risk of more than one, but less than ten in a million. This facility will meet TBACT by operating the natural gas-fired crematory retort with the secondary combustion chamber operating at or above 1650°F, a residence time greater than one second, and exhaust gas grain loading less than 0.06 grains per dry scf adjusted to 7% O₂.

OFFSET ANALYSIS

Total facility emissions, including this project, will be less than 10 tons per year of POC or NO_x. Therefore, offsets are not required.

CEQA REVIEW

This project is considered to be ministerial under the District's CEQA Regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factors and therefore is not discretionary as defined by CEQA (Permit Handbook Chapter 11.6).

STATEMENT OF COMPLIANCE

S-1 is subject to the following requirements:

- Regulation 6 - 301 - Ringelmann No. 1 Limitation
- Regulation 6 - 302 - Opacity Limitation
- Regulation 6 - 310 - Particulate Weight Limitation
- Regulation 1 - 301 - Public Nuisances.

Grissom's Chapel and Mortuary is located within 1000 feet of the following schools:

St. John Elementary School
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San Lorenzo, CA 94580
(510) 276-6632
Enrollment: ~271 students

San Lorenzo High School
50 E. Lewelling Blvd.
San Lorenzo, CA 94580
(510) 317-3000
Enrollment: ~1605 students

Colonial Acres Elementary
17115 Meekland Ave.
Hayward, CA 94541
(510) 317-4500
Enrollment: ~574 students

Grissom's Chapel and Mortuary is subject to the public notification requirement of Regulation 2-1-412. A public notice will be prepared and posted on the Internet and mailed to all parents and guardians of students enrolled at St. John Elementary School, Colonial Acres Elementary School and San Lorenzo High School. It will be mailed to all residential neighbors located within 1000 feet of the source of pollution.

PSD, NSPS and NESHAPS do not apply to this project.

CONDITIONS:

1. The owner/operator shall operate cremator S-1 in such a way that the unit's processing rate shall not exceed 100 pounds per hour and the maximum firing rate shall not exceed 2.25 MM BTU/Hr.
2. The owner/operator of S-1 shall not perform more than a total of 500 cremations in any consecutive 12-month period. (Basis: cumulative increase; toxic risk screen)
3. The owner/operator shall maintain the operating temperature in the secondary chamber of the cremator at or above 1650 degree Fahrenheit during the cremation mode. Any temperature excursion below 1600 degree Fahrenheit during the cremation mode will be considered a violation of this permit condition. The owner/operator shall equip the cremator with a District approved continuous temperature monitoring and recording device to ensure compliance with this condition. The location of the thermocouple shall be approved by the Source Test Section of the District. Natural gas input to the secondary chamber burner shall be increased, if necessary, to increase temperature sufficiently to control odor and visible plume.
(Basis: Regulation 6-301, 6-310; TBACT)
4. After the shutdown, the owner/operator shall not cremate until the cremator has been preheated so that the temperature in the secondary chamber is at least 1650 degree Fahrenheit. (Basis: Regulation 6-301, 6-310; TBACT)
5. The owner/operator shall fire the cremator with natural gas only.
(Basis: cumulative increase; TBACT)
6. The owner/operator shall use the cremator to cremate only human remains. No other material contaminated with toxic air contaminants as listed by Air Resources Board,

including radioactive and biohazardous waste shall be incinerated in this cremator without prior approval of the District.
(Basis: cumulative increase; toxic risk screen)

7. The District may require the owner/operator of the cremator to conduct a District approved source test to determine particulate matter, hydrocarbon, NOX, CO, O2, HCl, and toxic emissions under unusual conditions, such as: obese case, disaster bags. The Source Test Section of the District shall be contacted to obtain approval for the source test method. The Source Test Section shall be notified at least 7 days in advance of any expected source test. A copy of source test report for each test shall be provided to the District within 30 days of source test date.
(Basis: cumulative increase; toxic risk screen)
8. The owner/operator shall have the cremator equipped with sampling ports and platforms, the location of which shall have the approval of the Source Test Section of the District.
(Basis: Regulation 6-310)
9. The owner/operator shall have an operator present at all times during cremations.
(Basis: Regulation 6-301)
10. The owner/operator shall keep the cremator in good working condition. The date and detailed description of the type of maintenance done on cremator shall be recorded in a District approved logbook. (Basis: Regulation 6-301, 6-310)
11. To determine compliance with the above conditions, the owner/operator shall maintain the following records and provide all of the data necessary to evaluate compliance with the above conditions, including but not limited to daily records of the following information:
 - a. operating hours
 - b. number of cremations
 - c. weight of the human remains
 - d. processing rate(Basis: Regulation 1-441, cumulative increase, TBACT, toxic risk screen)
12. The owner/operator shall keep all monitoring, source test, and maintenance records as required per parts 7, 10, and 11 on site for at least two years from the date of data entry, and the records shall be made available to the District staff for inspection. These recordkeeping requirements shall not replace the recordkeeping requirements contained in any applicable District Regulations.
(Basis: cumulative increase, TBACT; Regulation 6-301, 6-310).
13. The exhaust stack from S-1 shall be at least 28 feet above grade. (Basis: toxic risk screen)

RECOMMENDATION

It is recommended that an Authority to Construct shall be issued to Grissom Chapel and Mortuary for the following:

S-1 MULTIPLE CHAMBER CREMATORY – CMS Millennium III, 2.25 MMBtu/hr, 100 lbs/hr capacity

By: _____
Nancy M Yee
Air Quality Engineer

4/14/09 _____
Date