ENGINEERING EVALUATION

Facility Name:	Silver Lining Cremation
Equipment Type:	Human crematory [14A]
Application Number:	APCD2023-APP-007896
Facility ID:	APCD2021-SITE-03705
Equipment Address:	421 S Andreason Drive Escondido, CA 92006
Facility Contact:	Tatiana Maka
Contact Title:	Owner
Contact Affiliation:	Silver Lining Cremations
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Permitting Engineer:	Liliana Jaime
Senior Engineer:	Nick Horres

1.0 BACKGROUND

1.1 Type of Application: Human Crematory (14A)

1.2 Permit History:
This is the application for the installation of a second crematory unit for Silver Lining. This is the initial application for this equipment.

1.3 Facility Description:
This site is a crematory for human remains.

1.4 Other Background Information:
This site requires CEQA approval.

2.0 PROCESS DESCRIPTION

2.1 Equipment Description:
Human Crematory: American Crematory, Model A-300-Trilogy, natural gas fired; with a primary chamber equipped with one 750,000 Btu/hr burners, Eclipse Therm Jet Low-NOx burner and a secondary chamber with an internal volume of 101 cubic feet, equipped with one 1.25 MMBtu/hr burner, Eclipse Therm Jet Low-NOx burner; vented to a stack with a minimum height of 26 feet above ground level.

2.2 Process:
This equipment is used for the incineration of human remains. The primary chamber is heated, and the body is loaded into the equipment. Exhaust from the primary chamber enters a secondary chamber at a temperature of 1600°F. The equipment is rated at 200 lbs/hr with a maximum loading capacity of 800 lbs.

2.3 Emissions Controls:

The crematory is equipped with low-NOx burners and a secondary chamber maintained over 1600°F with a retention time of greater than 2 second.

2.4 Attachments:

Manufacturer's specs included with the application.

3.0 EMISSIONS

3.1 Emission Estimate Summary for both incinerators:

Table 1. Criteria Pollutants Emissions

POLLUTANT	HOURLY EMISSIONS (lbs/hr)	DAILY EMISSIONS (lbs/day)	ANNUAL EMISSIONS (ton/yr)	ANNUAL EMISSIONS (lb/yr)
NOx	0.44	5.24	1.0172	2034.31
CO	0.37	4.40	0.8544	1708.82
SOx	0.00	0.03	0.0061	12.21
ROG	0.02	0.29	0.0559	111.89
TSP	1.14	13.65	2.6975	5395.00
PM10	1.14	13.65	2.6975	5395.00
PM10 Site Specific	0.43	5.20	1.0183	2036.67

Table 2. TACs Emissions

POLLUTANT	HOURLY EMISSIONS (lbs/hr)	ANNUAL EMISSIONS (lb/yr)
Acetaldehyde	1.05E-03	5.29E-01
Arsenic	4.06E-04	2.04E-01
Benzene	5.04E-04	2.54E-01
Berillium	1.40E-05	7.05E-03
Cadmium	1.12E-04	5.64E-02
Chromium Non-Hexavalent	2.24E-04	6.70E-02
Chromium Hexavalent	1.33E-04	1.13E-01
Copper	2.80E-04	1.41E-01
Formaldehyde	2.80E-04	1.41E-01
Hydrogen Chloride	6.02E-01	3.03E+02
Hydrogen Flouride	5.46E-03	2.75E+00
Lead	6.86E-04	3.45E-01
Mercury	4.36E-03	1.02E+01
Nickel	3.99E-04	2.01E-01
PAH's Uspecified	3.64E-05	1.83E-02
Selenium	4.55E-04	2.29E-01
Toluene	6.93E-03	3.49E+00

Xylene	1.96E-03	9.87E-01
Zinc	3.64E-04	1.83E-01

Table 3. Greenhouse Emissions

Pollutant	Emission Factors		Annual Emissions (ton CO2/yr)
	Global Warming Potential	Tons CO2/MMBtu	
CO2	1	0.058489	1,213.64
CH4	25	2.76E-05	0.57
N2O	298	3.28E-05	0.68
TOTAL			**1,214.89**

3.2 Emission Estimate Assumptions:

1. Emissions calculated using District Method C01 – Updated 4/20/2022.
2. A maximum of 6 cremations per day, 2500 cremations per year; average 2 hours per cremation (12 hrs/day, 5000 hr/yr).
3. Rated charging rate is 800 lbs/hr (maximum, used for hourly emissions of volatile compounds), 200 lbs/hr (average, used for hourly emissions of particulate compounds, as well as daily and annual emissions).
4. Emission calculations assume that the crematories are started and operated simultaneously; however, permit conditions require a staggering of 15 minutes between starts of cremation in order to pass the HRA, which results in combined emissions from the two crematories on an hourly basis being reduced by approximately 12.5% compared to a direct sum of emissions.

3.3 Emission Calculations:

See attached spreadsheets.

3.4 Attachments:

APP-007896-calculations – 12.05.23

4.0 APPLICABLE RULES

4.1 Prohibitory Rules:

Rule 50 – Visible Emissions:

This rule limits air contaminant emissions into the atmosphere of shade greater than Ringlemann Number 1, to a maximum aggregate of three minutes in any consecutive sixty-minute time period.

With proper maintenance and operation as required by ATC conditions, visible emissions are expected to be well below this limit.

Rule 51 – No Nuisance:

This rule prohibits discharge of air contaminants that cause or have a tendency to cause injury, nuisance, or annoyance to people and/or the public or damage to business or property.

With proper maintenance and operation as required by ATC conditions, no nuisance complaints are expected from the operation of this equipment.

Rule 53 – Particulate Matter:

A person shall not discharge into the atmosphere from any single source of emission whatsoever any one or more of the following contaminants, in any state or combination thereof, exceeding in concentration at the point of discharge:
(1) Sulfur compounds calculated as sulfur dioxide (SO2): 0.05 percent, by volume, on a dry basis.
(2) Combustion particulates: except as provided in Subsections (d)(3) and (d)(4) of this rule, 0.10 grains per dry standard cubic foot (0.23 grams per dry standard cubic meter) of gas which is standardized to 12 percent of carbon dioxide (CO2) by volume. In measuring the combustion particulates from incinerators used to reduce combustible material by burning, the carbon dioxide (CO2) produced by combustion of any liquid or gaseous fuels shall be excluded from the adjustment to 12 percent of carbon dioxide (CO2) by volume.

Compliance with (1) is ensured through the use of natural gas as a fuel. Compliance with condition (2) will be ensured through initial and periodic source testing as specified in permit conditions.

Rule 58 – Incinerator Burning:

This rule prohibits burning of any combustible refuse in any incinerator except in a multi-chamber incinerator or an acceptable equivalence.

This crematory is equipped with a primary combustion chamber and a secondary combustion chamber and is, therefore, in compliance with this rule.

Rule 62 – Sulfur Content of Fuels:

This rule prohibits the use of any gaseous fuel containing more than 10 grains of sulfur compounds, calculated as H_2S, per 100 dscf of gas, and any liquid fuel containing more than 0.5% sulfur by weight.

Rule 20 of the Public Utility Commissions (PUC) requires the sulfur content of natural gas sold in San Diego County to be less than 0.25 grains of H_2S per 100 dscf and less than 0.75 grains of total sulfur per 100 dscf. California diesel fuel contains 15ppmw (0.0015% by weight) or less.

4.2 New Source Review:

Rule 20.2 (a) – Applicability:

This part of the rule specifies that this rule applies to any new modified stationary source, to any new or modified emission unit and to any relocated emission unit being moved from a stationary source provided that after completion of the project, the stationary source is not a major stationary source.

Estimated emissions will not cause this facility to exceed major source thresholds. Therefore, this rule is applicable.

Rule 20.2 (d)(1)(iv) – Non-Major Stationary Source BACT:

This part of the rule requires the installation of best available control technology on the equipment if the emission threshold value of 10 lbs/day is equaled or exceeded for NOx, CO, VOC, SOx, or PM_{10}.

Estimated emissions are below BACT thresholds. BACT is not applicable.

Rule 20.2 (d)(2) – Non-Major Stationary Source AQIA:

This part of the rule requires the applicant to conduct an Ambient Air Quality Impact Analysis of the unit's emissions if the emission threshold values are equaled or exceeded for NOx, CO, SOx, or PM_{10}. The threshold values for NOx and SOx are 25 lbs/hr, 250 lbs/day or 40 tons/yr.

The threshold values for CO are 100 lbs/hr, 550 lbs/day or 100 tons/yr. The threshold values for PM_{10} are 100 lbs/day or 15 tons/yr.

Estimated emissions are below AQIA thresholds, AQIA is not applicable.

Rule 20.2 (d)(3) – Prevention of Significant Deterioration:

This part of the rule requires that notification be given to the Federal Land Manager, Federal EPA, ARB, SCAQMD and ICAPCD for any project which is expected to have a significant impact on any Class I area as determined by an AQIA. The threshold level for a significant impact is 250 tons/yr of NOx, CO, VOC, SOx, or PM_{10} emissions.

Estimated emissions are below AQIA thresholds. Therefore, no significant impact on any Class I area is expected and no notification is required.

Rule 20.2 (d)(4) – Public Notice and Comment:

This part of the rule requires that a public notice and comment period be provided for any project subject to an AQIA.

Estimated emissions are below AQIA thresholds. Therefore, no public notice and comment period is required.

4.3 Toxics New Source Review:

Rule 1200 – Toxic Air Contaminants, New Source Review

This rule requires that a Health Risk Assessment be performed if emissions of any toxic air contaminant exceed the de minimum values specified in the rule. The cancer risk determined by the HRA must be less than one in a million or less than ten in a million if TBACT is installed. Additionally, both the chronic non-cancer and the acute health hazard indexes determined by the HRA must be less than one.

While this application only consists of addition of a crematory, the risk assessment was conducted as if it was evaluated as a project cumulatively with the first crematory because it was installed so recently and to prevent circumvention of risk and HHI standards and ensure adequate protection of public health.

Estimated toxic emissions exceed de minimis levels. Note that the initial HRA performed using the parameters submitted with the application showed that the Cancer Risk was greater than one in a million and the Acute HHI was greater than one. Therefore, the applicant, accepted to have a staggered time to reduce their hourly emissions and reduce their Acute HHI risk. It was also assumed that all mercury emissions of mercury would occur within the first hour of operation. The HRA report from the Toxics Group is attached. The results are as follows:

Maximum Cancer Risk:	*2.58 in a million*
Chronic Noncancer HHI:	*0.56*
8-Hour Noncancer HHI:	*0.20*
Acute HHI:	*1.08*

With the stagger time of 15 minutes, the HRA results are as follows:

Maximum Cancer Risk:	*2.58 in a million*
Chronic Noncancer HHI:	*0.56*
8-Hour Noncancer HHI:	*0.20*
Acute HHI:	*0.96*

See attached file APP007896-HRA Limits

To comply with this rule, the crematory must be equipped with T-BACT. A review of crematory literatures on secondary chamber retention time and operating temperature showed the following findings. A permit issued in 2020 by the Michigan Department of Environment, Great Lakes, and Energy Air Quality Division for a 150 lbs/hour crematory unit required a secondary chamber temperature of 1600°F and retention time of 1 second. A permit issued in 2017 by Maricopa County Air Quality Department for a crematory unit requires secondary chamber retention time of 1 second and 1400°F. A 2016 Audit Report for the Crematoria Industry Sector by South Australia Environmental Protection Agency recommends secondary chamber temperature of 850 °C (1562°F) and retention time of 2 seconds but recommends increasing the secondary chamber temperature if the residence time of 2 seconds cannot be achieved. Therefore, it is determined that T-BACT should be the use of the natural gas, with the secondary chamber operating temperature of 1600°F for a retention time of 1 second. Permit conditions will require a secondary combustion chamber of 1600°F prior to insertion of the charge and during all cremations. Based on the location of the thermocouple and secondary chamber dimensions data provided by the manufacturer, the residence time at 1600°F is 1.8 seconds at an exhaust flow rate of 2700 cfm Therefore, this equipment meets T-BACT and compliance with this rule is expected. Note that the thermocouple is located approximately midway in the afterburner chamber so the total residence time is longer, but there is no guarantee that after the thermocouple the temperature will be at 1600°F or more.

4.4 AB3205:

This assembly bill requires public notification prior to issuing an Authority to Construct for equipment emitting hazardous air contaminants within 1000 feet of a school (kindergarten through 12th grade).

There are no schools within 1000 feet of this equipment. Therefore, AB3205 does not apply.

4.5 Federal and State Regulations:

This equipment is not subject to any state or federal regulations. However, the issuance of the permit is subject to review under the California Environmental Quality Act (CEQA).

The District acted as lead agency for the CEQA process and prepared an initial study which will publicly noticed for 30 days. The initial study supports a determination that there are no significant adverse effect on the environment from this project and the District intends to adopt a negative declaration in support of the project. If any significant comments are received, the District will review and respond and make any necessary revisions to the authority to construct prior to issuance.

5.0 RECOMMENDATION

This equipment is expected to comply with all rules and regulations of the San Diego Air Pollution Control District. Therefore, it is recommended that an Authority to Construct for this equipment be granted with the conditions specified below.

6.0 RECOMMENDED CONDITIONS

See recommended conditions on BCMS under application record and attached draft Authority to Construct.