west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25304
Phone 304/926-0475 • FAX: 304/926-0479

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.wvdep.org

ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-3327
Plant ID No.:	065-00026
Applicant:	Mountain State Crematory LLC
Facility Name:	Berkeley Springs
Location:	Berkeley Springs, Morgan County, West Virginia
NAICS Code:	812220
Application Type:	Construction
Received Date:	June 21, 2016
Engineer Assigned:	Thornton E. Martin Jr.
Fee Amount:	$1000.00
Date Received:	June 22, 2016
Completeness Date:	August 18, 2016
Newspaper:	*The Morgan Messenger*
Applicant Ad Date:	June 22, 2016
UTMs:	Easting: 738.134 km Northing: 4,390.315 km Zone: 17
Description:	This construction permit application is for the construction and operation of Matthews Power-Pak I crematory.

DESCRIPTION OF PROCESS

Matthews Power-Pak I **(Human Crematory)**

The IE43-PPI Power-Pak I crematory is designed to complete one human cremation in one hundred (100) minutes or less. This time does not include preheating the secondary chamber or the cool-down period before the removal of the remains (½ hour). The crematory has a maximum burn rate of 150 pounds per hour of remains and the associated container, based on the entire cremation period. The crematory is a dual chamber design and is fired with natural gas as an auxiliary fuel. The Power-Pak I can handle loads up to 750 pounds and is designed to be manually loaded in batches. Matthews International Cremation Division, Industrial Equipment & Engineering, Co., the crematory manufacturer, has prescribed specific operating procedures

for cremating remains over 400 pounds up to 750 pounds in the Power-Pak I.

The remains are typically loaded into the primary chamber and then the secondary chamber is preheated to 1400-1800^{0}F in 30 minutes using the secondary chamber burner (afterburner). Then, the primary or cremation burner is ignited to begin the cremation cycle. Actual cycle time varies from 30 minutes to 6 hours. A cool-down period of 30 minutes or more is recommended at the end of the cremation cycle before removing the cremated remains and loading the next set of remains.

The secondary chamber has one Eclipse TJ-150 burner rated at a maximum of 1.2 MM Btu/hr, and is normally set to 1.2 MM Btu/hr. The secondary chamber temperature is monitored by a digital controller which adjusts the after burner gas input to maintain the desired temperature set point. The crematory operates best with a minimum secondary chamber temperature of 1400-1800^{0}F.

The primary chamber has one Eclipse TJ-75 burner rated at a maximum of 0.6 MM Btu/hr and is normally set to 0.6 MM Btu/hr. The primary chamber temperature ranges from 500^{0}F at the beginning of the first cremation of the day to a maximum of 1800^{0}F during successive cremations.

According to Matthew's calculations, the minimum residence time of the exhaust gases in the secondary chamber (retention time) is 2.45 seconds at 1400^{0}F.

SITE INSPECTION

Joseph Kreger of the Division of Air Quality, Eastern Panhandle Regional Office visited the proposed site on August 17, 2016. The proposed site of the crematory is to be inside of existing garages (4 bays) of a building located within an existing business / residential neighborhood in Berkeley Springs, WV. The nearest dwelling is approximately 75 feet from the proposed unit.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

The applicant presented potential emission estimates based on EPA emission factors from Table 2.1-12 of AP-42 (5th Edition). The potential emissions are as follows:

Table #1 – Potential Emissions from an MCD IE43-PPI Crematory		
Pollutant	Hourly Rate	Annual Emissions
	lb/hr	TPY
Particulate Matter ($PM/PM_{10}/PM_{2.5}$)	0.525	0.983
Sulfur Dioxide (SO_2)	0.188	0.351
Oxides of Nitrogen (NO_x)	0.225	0.421
Carbon Monoxide (CO)	0.75	1.40
Volatile Organic Compounds (VOCs)	0.225	0.421
Carbon Dioxide Equivalent (CO_2e)	241.46	1057.6

REGULATORY APPLICABILITY

The following state regulations apply.

45CSR6 - To Prevent and Control Air Pollution From Combustion of Refuse

The purpose of this rule is to prevent and control air pollution from combustion of refuse. The permittee has proposed to install and operate one human remains crematory. This rule defines incineration as the destruction of combustible refuse by burning in a furnace designed for that purpose. The proposed crematory is designed to destroy human remains and associated containers through incineration. Thus, it meets this definition.

Per section 4.1, these crematories must meet the particulate matter limit by weight. The human crematory will have an allowable particulate matter emission rate of 0.952 pounds per hour (based on maximum design-incineration rate of 150 lb/hr). This allowable rate is higher than the estimated hourly potential of 0.525 lb/hr. Thus, the unit should be more than capable of meeting this PM standard.

The crematory is subject to the 20% opacity (visible emission) limitation in section 4.3 of this rule. The opacity and the allowable limits should be met since the crematory is equipped with a secondary chamber with the afterburner, which is designed to reduce the particulate matter and other pollutants entrained in the exhaust stream into products of complete combustion.

The manufacturer calculated the retention time of this crematory to be 2.45 seconds with a secondary chamber temperature of 1,400^{0}F. The rule of thumb for nearly complete combustion is 1.0-second retention time in the secondary chamber. Thus, this particular crematory should be capable of meeting the applicable limitations of this rule.

45CSR13 - Permits for Construction, Modification, Relocation and Operation of Stationary sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation

The potential-to-emit from the proposed crematory is below 6 pounds per hour and 10 tons per year for all of the criteria pollutants, which is less than the permit trigger level as defined in 45CSR§13-2.24.b. However, Rule 6 requires all incinerators to obtain a construction or modification permit regardless of size. Mountain State Crematory has proposed to install a crematory, which is subject to Rule 6. Therefore, the facility is required to obtain a permit as required in 45CSR§6-6.1. and 45CSR§13-2.24.a. The facility has met the applicable requirements of this rule by publishing a Class I Legal Advertisement in *The Morgan Messenger* on June 22, 2016, paid the $1,000.00 application fee, and submitted a complete permit application.

Because of this construction, the Mountain State Crematory will not be classified as a major source of hazardous air pollutants or have the potential to emit 100 tons per year or greater of any criteria pollutants, which is the Title V major source trigger level. In addition, the emission unit is not subject to a New Source Performance Standard. Thus, the facility is not subject to Title V and will not be required to obtain an operating permit under 45CSR30. Therefore, the Berkeley Springs facility will be classified as a "9B - Crematory Incinerator" source as defined in 45CSR22.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

Only trace amounts of non-criteria regulated pollutants will be emitted from this facility. These are acetaldehyde, arsenic, antimony, beryllium, cadmium, chromium, copper, formaldehyde, hydrogen chloride, lead, and mercury. Only the metals, (i.e. cadmium, chromium, mercury, etc.) and hydrogen chloride would not be controlled by the afterburner (secondary chamber).

Under EPA's IRIS program, hydrogen chloride (hydrochloric acid) has undergone a complete evaluation and determination for evidence of human carcinogenic potential. Reference concentration for chronic inhalation exposure to HCl was determined to be 0.02 mg/cu.m. In general, the reference concentration is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily inhalation exposure of the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

All HAPs have other non-carcinogenic chronic and acute effects. These adverse health effects may be associated with a wide range of ambient concentrations and exposure times and are influenced by source-specific characteristics such as emission rates and local meteorological conditions. Health impacts are also dependent on multiple factors that affect variability in humans such as genetics, age, health status (e.g., the presence of pre-existing disease) and

lifestyle. As stated previously, *there are no federal or state ambient air quality standards for these specific chemicals*. The file contains summaries of the IRIS database information on hydrogen chloride and mercury. For a complete discussion of the known health effects, refer to the IRIS database located at *www.epa.gov/iris*.

AIR QUALITY IMPACTS ANALYSIS

The writer deemed that an air dispersion modeling study or analysis was not necessary, because the proposed construction does not meet the definition of a major source as defined in 45CSR14.

MONITORING OF OPERATIONS

For the purposes of ensuring compliance with the proposed emissions limits and applicable rules, the facility should be required to monitor and keep records of the following:

Weight of each charge/batch per cremation.

Temperature of the secondary chamber on a continuous basis for each crematory.

Proper operation of a crematory or any other incinerator begins with not over loading the unit. Overloading an incinerator beyond the manufacturer's rated capacity usually results in incomplete incineration and/or excess emissions.

Monitoring the secondary chamber temperature is an indicator that the temperature in the secondary chamber is sufficient to ensure complete combustion of products of incomplete combustion such as particulate matter, carbon monoxide, and volatile organic compounds. The applicant proposed operating the secondary chamber at a minimum temperature of 1,400^{0}F, which is suggested by the manufacturer. The manufacturer of this unit has programmed timers the combustion control not to start firing the primary burner until the temperature of the secondary has reached 1,400^{0}F. Operating temperature should be maintained below 2,100^{0}F.

This unit is equipped with a digital display of temperature for the secondary chamber as well as a chart recorder to record secondary chamber temperature.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application and the conditions set forth in the permit indicates this human crematory should meet all applicable state rules and federal regulations when operated. Therefore, this writer recommends that a Rule 13 Construction Permit should be granted to Mountain State Crematory LLC for their proposed crematory at the 95 Union Street location in Berkeley Springs, West Virginia.

Thornton E. Martin Jr.
Permit Engineer

August 18, 2016
Date