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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.: R13-3170
Plant ID No.: 037-00018
Applicant: National Fish Health Research Laboratory
Facility Name: Leetown Science Center
Location: Leetown
NAICS Code: 541712
Application Type: Construction
Received Date: January 31, 2014
Engineer Assigned: Edward S. Andrews, P.E.
Fee Amount: \$1000.00
Date Received: February 3, 2014
Completeness Date: February 28, 2014
Due Date: May 30, 2014
Newspaper: The Journal
Applicant Ad Date: January 30, 2014
UTMs: Easting: 764.7 km Northing: 4,360.2 km Zone: 17
Description: This construction permit application is for the construction and operation of Pennram Model LLC-50 incinerator.

DESCRIPTION OF PROCESS

In 1930-31 the U.S. Fisheries Experimental Station was established in Leetown, West Virginia, and was operated by the U.S. Department of Commerce, Bureau of Fisheries, Division of Fish Culture and Division of Scientific Inquiry. In 1939 the Station was transferred to the DOI Bureau of Fisheries. In 1940, the Bureau of Fisheries and the Biological Survey were consolidated to form the U.S. Fish and Wildlife Service (USFWS) within the Department of the Interior. In 1944 the station transferred to the Division of Game Fish and Hatcheries and Fishery Biology and renamed the U.S. Fish Cultural Station. Sometime around 1959 the station was again renamed, to the Leetown National Fish Hatchery and Research Station, and transferred to the Bureau of Sport Fisheries and Wildlife within the USFWS. In the early 1970's the USFWS Division of Fishery Ecology Research took over the administration of the Station. In

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1977 the station was designated as The National Fisheries Center–Leetown. At this time The National Fisheries Center took over program supervision of six other USFWS research and development components scattered across the nation (Tunison Laboratory of Fish Nutrition; Hagerman, Idaho, Field Station; the Southeastern Fish Cultural Laboratory; the Fish Farming Experimental Station; the National Fisheries Research and Development Laboratory; and, the Fish Genetics Laboratory). This historical information is taken from an unpublished manuscript written by George Gutsell entitled, “Leetown...50 years in Retrospect: History of The National Fisheries Center–Leetown”.

In 1993, The National Fisheries Center–Leetown was transferred to the new U.S. Biological Survey, established within the DOI by Secretary Bruce Babbitt. In 1995, the U.S. Biological Survey, along with The National Fisheries Center–Leetown, was transferred to the U.S. Geological Survey and became the Biological Resources Division. Upon its transfer to the U.S. Geological Survey, Biological Resources Division, The National Fisheries Center–Leetown was renamed the Leetown Science Center. The Center is currently headquartered in Leetown, West Virginia, on approximately 466 acres in the “Eastern Panhandle” region of West Virginia, approximately 70 miles west of Washington, DC. The site is noted for its supply of cold-water springs, extensive water holding and distribution systems, and modern research pond facility, which provide outstanding support for the conduct of a wide variety of aquatic research. The Center conducts research at five components: the Fish Health Branch, the Aquatic Ecology Branch; the Southern Appalachian Field Branch; the Northern Appalachian Research Laboratory; and, the Conte Anadromous Fish Research Laboratory.

In support of these research efforts at the facility, the National Fish Health Research Laboratory operates an animal crematory to destroy the fish and amphibian remains. The center freezes the remains until the center has accumulated at least 200 pounds of remains. At that point, the remains are sent to the crematory to be destroyed as a single batch.

LLC-50 (Animal Incinerator)

The LLC-50 animal crematory is designed to destroy 400 pounds of remains over an 8 hour period (50 pounds per hour incineration rate). This time does not include preheating the secondary chamber or the cool-down period before the removal of the remains (½ hour). The crematory is a dual chamber design and is fired with natural gas as an auxiliary fuel. It is designed to be manually loaded in batches with maximum daily capacity of 400 pounds.

The remains are typically loaded into the primary chamber and then the secondary chamber is preheated to 1400-1800⁰F which takes about 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 8 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.

SITE INSPECTION

On December 4, 2013, Mr. Joseph Kreger conducted an inspection of the facility. Dr. Anne Anderson, Biologist, was present during this inspection. The U.S. Geological Survey near Leetown, WV operates the Leetown Science Center. Mr. Kreger noticed that the existing crematory had been replaced with this LLC-50 and informed the facility needed to obtain a construction permit for this unit. The previous unit had never obtained permit. Mr. Kreger did not notice any other issues with the Leetown Science Center.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

The applicant presented potential emission estimates based on emission factors or emission rates provided by the crematory manufacturer. The hourly rates were annualized to create an annual emission rate for each pollutant at the maximum annual operating schedule possible.

Pollutant	Hourly Rate	Annual Emissions
	lb/hr	TPY
Particulate Matter (PM/PM ₁₀ /PM _{2.5})	0.033	0.06
Sulfur Dioxide (SO ₂)	0.054	0.10
Oxides of Nitrogen (NO _x)	0.089	0.17
Carbon Monoxide (CO)	0.073	0.14
Volatile Organic Compounds (VOCs)	0.007	0.01
Carbon Dioxide Equivalents (CO ₂ e)	128.8	564.18

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 animal 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 animal remains and associated containers through incineration. Thus, the unit meets this definition.

Per section 4.1, these crematories must meet the particulate matter limit by weight. The animal crematory will have an allowable particulate matter emission rate of 0.14 pounds per hour (based on maximum design-incineration rate of 50 lb/hr). This allowable rate is higher than the estimated hourly potential of 0.3 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 an afterburner, which is designed to reduce the particulate matter and other pollutants entrained in the exhaust stream into products of complete combustion. The manufacturer has designed the secondary chamber to achieve at least one-second retention time for this crematory at a temperature of 1,800⁰F. Maintaining a temperature of 1,600⁰F in the secondary chamber, 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 be required to obtain a construction or modification permit regardless of size. The NFHRL 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 Journal* on January 30, 2014, paid the \$1,000.00 application fee, and submitted a complete permit application.

The Leetown Science Center is classified as an area source of hazardous air pollutants and is not major source under Title V of the Clean Air Act Amendments of 1990. 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 Leetown Science Center will remain as "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 animal carcinogenic potential. Reference concentration for chronic inhalation exposure to HCl was determined to be 0.02 mg/m³. In general, the reference concentration is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily inhalation exposure of the animal population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

Mercury

Mercury emissions are a potential concern from crematories. Mercury vapor is released from the animal remains during the cremation process.

The inhalation Reference Concentration (RfC) is analogous to the oral RfD and is likewise based on the assumption that thresholds exist for certain toxic effects such as cellular necrosis. The inhalation RfC considers toxic effects for both the respiratory system (portal-of-entry) and for effects peripheral to the respiratory system (extrarespiratory effects). It is expressed in units of mg/m³. In general, the RfC is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily inhalation exposure of the animal population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. The RfC for mercury is 0.0003 mg/m³. The critical effect of mercury exposure can be hand tremor, increases in memory disturbance; slight subjective and objective evidence of autonomic dysfunction.

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 animals 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

An air dispersion modeling study or analysis was not required, 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 (Chart Recorder).

Quarterly Visible Emission Checks (Method 22 Observation)

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.

The best indicator for monitoring the performance of the secondary chamber is the temperature in the secondary chamber, which would ensure complete oxidation 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 1,600⁰F, which is suggested by the manufacturer.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application and the conditions set forth in the permit indicates this crematory should mee'ahenderson@usgs.gov't all applicable state rules and federal regulations when operated. Therefore, it is recommended that a Rule 13 Construction Permit be granted to National Fish Health Research Laboratory for their proposed crematory at the Leetown Science Center.

Edward S. Andrews, P.E.
Engineer

Date: May 21, 2014