



New Source Review Permit Application Guidance for Crematory Units

INTRODUCTION

Crematories are incinerators as defined in the Department of Energy and Environmental Protection (DEEP) section 22a-174-1(53) of the Regulations of Connecticut State Agencies (RCSA). A New Source Review (NSR) permit is required for incinerators constructed after June 1, 2009 pursuant to RCSA §22a-174-3a(a)(1)(G).

The proposed crematory unit must be for the cremation of human remains or small animal remains. Livestock, as defined in CGS §8-2n, are not permitted into the unit.

Please be aware that applicable regulations and approved emissions factors have been revised over time and the existence of a crematory unit at your premises does not guarantee the approval of a new or replacement unit.

A NSR permit must be obtained prior to the installation of a unit. It takes an average of six months to complete the permitting process.

Note: The Connecticut Department of Public Health (DPH) has regulations that are applicable to crematory units which may impact your application. The DPH must be contacted prior to the submission of your application.

FEEES AND RELATED EXPENSES

For a new permit or minor modification to an existing permit an **application fee** of \$940.00 is to be submitted with the *Permit Application for Stationary Sources of Air Pollution – New Source Review Form* (DEEP-NSR-APP-200) or *Minor Modification Application for an Existing New Source Review Permit Form* (DEEP-NSR-APP- 200MM), respectively. For municipalities, as defined in CGS §22a-70, a 50% reduction applies.

A public **notice of application** must be published prior to submitting an application for a new permit as required by CGS §22a-6g. The cost of the notice varies with the required newspaper.

There is no notice of application associated with a minor modification application.

A public **notice of tentative determination** is published at the applicant's expense for a new permit at the time when a permit is proposed by DEEP. The cost of the notice varies with the required newspaper. This notice includes a 30 day comment period for the public along with the opportunity to request a public hearing.

There may be a notice of tentative determination associated with a DEEP proposed minor modification permit.

Permit fee – Historically, the potential to emit from a crematory unit has been less than 15 tons per year and therefore there is no permit fee required for the associated permits. If this is not the case, a permit fee would be applicable and these are established in RCSA §22a-174-26.

MONITORING REQUIREMENTS

The following monitoring capabilities are required for the crematory unit:

1. A continuous fuel consumption monitor including a non-resettable totalizing fuel meter;
2. A scale to monitor the weight of each charge loaded into the crematory;
3. A continuous secondary combustion chamber temperature monitor; and
4. The unit shall be equipped with an electronic exhaust scanner system which initiates audible and visible alarms if the opacity of the exhaust gas downstream of the secondary chamber reaches 5% as measured by the scanner system.

REQUIRED APPLICATION FORMS

The following is a list of the forms required to be submitted as part of the application package. Please note that some forms require that applicable attachments be included.

For a New Permit:

1. *Permit Application for Stationary Sources of Air Pollution – New Source Review* (DEEP-NSR-APP-200)
2. *Attachment A – Executive Summary* (DEEP- NSR-APP-222)
3. *Attachment B – Applicant Background Information* (DEEP-NSR-008)
4. *Attachment C – Site Plan*
5. *Attachment D – USGS Map*
6. Attachment E – Supplemental NSR Forms:
 - i. *Attachment E203A – Crematory Units Supplemental Application Form* (DEEP-NSR-APP-E203A)
 - ii. *Attachment E211 – Stack Parameters* (DEEP-NSR-APP-211)
 - iii. *Attachment E212 – Unit Emissions* (DEEP-NSR-APP-212)
7. *Attachment F – Premises Information Form* (DEEP-NSR-APP-217)
8. *Attachment L – Ambient Impact Analysis Form* (DEEP-NSR-APP-218)

For a Minor Modification:

Minor Modification Application for an Existing New Source Review Permit (DEEP-NSR-APP-200MM) and the associated Attachments.

DEFAULT EMISSION FACTORS

The applicant shall use DEEP provided default emissions factors for criteria pollutants when completing *Attachment E212, Unit Emissions Supplemental Application Form* unless the applicant submits:

- a complete stack test report and approval of the results from EPA or any state's environmental agency for stack testing completed on an identical make and model unit as the basis for an alternate emission factor; or
- other technically sound justification for an alternate emission factor.

The applicant shall use DEEP provided default emissions factors for hazardous air pollutants when completing *Attachment E212, Unit Emissions Supplemental Application Form*.

The applicant shall use the maximum design processing rate of the unit in all calculations.

Pursuant to RCSA §22a-174-3a(d)(3), in order to obtain a permit, the Applicant shall demonstrate to the Commissioner's satisfaction that the unit will comply with applicable air quality standards and regulatory requirements. A demonstration of compliance made with any source other than the default emissions factors may require additional scrutiny in order to satisfy the Commissioner that the unit will comply with applicable standards and requirements.

Table 1: Criteria Pollutant Emissions Factors for a Human Remains Crematory

Pollutant	Emission Factor (lb/ton)	Source
NOx	26.7	1
SOx (SO ₂)	4.11	1
PM/PM ₁₀ /PM _{2.5}	7.00	2
CO	10.00	2
VOC	3.00	2

Note: Where source of emissions data stated emissions factor in "lb/case" or "lb/body", the value was converted to lb/ton assuming average body/case weight of 150 lb.

Sources:

1. [Review and Recommended Update of DAQ Emission Factors for Human Crematories](#), North Carolina Department of Environment and Natural Resources, Division of Air Quality 2009
2. [AP-42, Table 2.1-12](#) Uncontrolled Emissions Factors for Refuse Combustors Other than Municipal Waste, Industrial/Commercial, Multiple Chamber

Table 2: Criteria Pollutant Emissions Factors for a Small Animal Remains Crematory

Pollutant	Emission Factor (lb/ton)
NO _x	3.56
SO _x (SO ₂)	2.17
PM/PM ₁₀ /PM _{2.5}	4.67
CO	2.95
VOC	0.299

Source:
[AP-42, Tables 2.3-1 and 2.3-2](#), Uncontrolled Emissions Factors for Medical Waste Incinerator

Hazardous Air Pollutant Emissions Factors for Crematories

Applicants must demonstrate compliance with RCSA §22a-174-29 for each Hazardous Air Pollutant in Table 3 for both human remains and small animal remains crematories.

Applicants must demonstrate compliance with RCSA §22a-174-29 for mercury vapor for a human remains crematory. See below.

Hazardous Air Pollutant MASC Calculator

DEEP provides a Maximum Allowable Stack Concentration (MASC) Calculator on the [Air Permitting Assistance webpage](#) to facilitate completing the calculations necessary to demonstrate compliance with RCSA §22a-174-29.

Table 3: Hazardous Air Pollutant Emissions Factors for All Crematories

Pollutant	CAS No.	Emission Factor (lb/ton)	Source
Acetaldehyde	75-07-0	1.85E-03	1
Arsenic	7440-38-2	8.22E-04	1
Barium	7440-39-3	3.46E-04	1
Benzo(a)anthracene	56-55-3	1.73E-07	1
Benzo(a)pyrene	50-32-8	8.80E-07	1
Benzo(b)fluoranthene	205-99-2	2.40E-07	1
Beryllium	7440-41-7	3.46E-05	1
Chromic acid and chromates (as Cr)	-----	2.62E-04	1
Cobalt	7440-48-4	1.81E-04	1
Copper	7440-50-8	3.90E-04	1
Dibenz(a,h)anthracene	53-70-3	1.81E-07	1
Formaldehyde	50-00-0	3.98E-04	1
Hydrogen Fluoride	7664-39-3	1.52E-02	1
Naphthalene	91-20-3	9.04E-04	1
Selenium Compounds (as Se)	-----	5.98E-04	1
Zinc Oxide Fumes	1314-13-2	5.42E-03	1
Cadmium	7440-43-9	2.88E-03	2
Hydrogen Chloride	7647-01-0	3.44	2
Lead	7439-92-1	2.04E-02	2
Antimony & Compounds (as Sb)	-----	4.02E-04	3
Chrysene	218-01-9	7.20E-07	3
Indeno(1,2,3-cd)pyrene	193-39-5	2.06E-07	3
Nickel	7440-02-0	5.10E-04	3
Silver	7440-22-4	9.73E-05	3
Thallium	-----	1.14E-03	3
Chromium (VI), Soluble as Chromic Acid	7440-47-3	1.80E-04	3

Sources:

1. CARB CATEF
2. Woodlawn Cemetery
3. [EPA WebFIRE](#)

Mercury Vapor Emissions Factor for a Human Remains Crematory Only

The best information available to DEEP regarding mercury emissions demonstrates that mercury, in its vapor form, will be emitted from a human remains crematory unit.

Such crematory unit may be operated in either a batch or nearly continuous mode and therefore the applicant must demonstrate compliance with RCSA §22a-174-29 for both short term (1 hour) and long term (8 hour) operations. For short term, the adjustment factor in RCSA §22a-174-29(i) is applied, where T=1.

Table 4: Mercury Vapor Emissions Factors for a Human Remains Crematory

Maximum Emission Factor (Short Term)	Average Emission Factor (Long Term)
0.013 lb Hg/body	0.0034 lb Hg/body

Source: *Default Mercury Emissions Factors for Permit Reviews*, Connecticut Department of Energy and Environmental Protection, May 8, 2019

If either or both comparisons prove exhaust concentrations exceed the respective mercury vapor MASC, then, in order, to obtain a permit the applicant must select one or more of the following options:

1. Relocating the unit;
2. Reducing the number of charges processed within a given amount of time;
3. Installing mercury emissions control equipment to reduce the rate of mercury emissions; or
4. Supplying alternate methods of quantifying mercury emissions from the unit that are satisfactory to the Commissioner.

The option(s) submitted must demonstrate to the Commissioner's satisfaction that the operation of the unit will comply with the MASC for mercury vapor as required pursuant to RCSA §22a-174-3a(d)(3)(M).

THINGS TO KEEP IN MIND

Only natural gas or propane fuels are recommended. Fuel oil units tend to smoke.

In order to comply with RCSA §22a-174-29, the stack for a proposed crematory unit will need to be located at least 155 feet from the nearest property boundary line.

Distance to the nearest property line is measured in linear feet from the stack base to the nearest property boundary line of the subject premises.

No lacquer/varnish/shellac covered caskets may be cremated unless valid emission test data demonstrates the crematory unit can comply with regulatory standards while cremating such casket.

All applicable regulations should be reviewed prior to completing the application form. It is the applicant's responsibility to comply with all applicable regulations.

QUESTIONS?

Visit the [Air Permitting web page](#) or contact the Air Permitting Engineer of the Day at DEEP.BAM.AirPermits@ct.gov or 860-424-4152.

If interested in scheduling a pre-application meeting for a project, please refer to the [DEEP Permit and Licenses](#) webpage to complete the Pre-Application Questionnaire. If you have any questions please contact the Office of Planning and Program Development at DEEP.OPPD@ct.gov or 860-424-3003.

It is recommended that applicants request a pre-application meeting to specifically discuss refined modeling issues prior to submitting an application. Requests for a modeling pre-application meeting can be sent to Samuel.Sampieri@ct.gov.