Air Operating Permit

Application and Instructions

Publication No. 94-175 (rev. 7/2011)

Air operating permits (AOPs) are issued for a term of five years. After five years, the AOP must be reissued or "renewed."

Northwest Clean Air Agency will send a permit renewal application to each source before the source's AOP expires. If NWCAA does not send a renewal application to an individual source, that source is still obligated to file a timely and complete application. Unless otherwise specified, NWCAA must receive a complete application at least six months before the permit expires.

NWCAA intends to issue renewal permits before the preceding AOPs expire. However, if a renewal permit is issued after the preceding AOP expires, it is important that a timely and complete renewal application was submitted so that the source has an "application shield." The application shield allows a source to operate without a permit from the date the application is determined or deemed to be complete until the final permit is issued. The applicant must also submit any requested additional information by the deadline specified by NWCAA.

Upon receiving an application, NWCAA has 60 days to determine whether it is complete. If NWCAA determines that an application is not complete within 60 days of receiving the application, NWCAA will notify the source in writing. Otherwise, NWCAA will deem the application complete, except as otherwise provided in WAC 173- 401-700(6). Any notification of incompleteness will specify what information is needed to make the application complete, and give a reasonable time frame for the applicant to respond.

If a source submits information to NWCAA under a claim of confidentiality, it should also submit a copy of the information directly to the Environmental Protection Agency (EPA). NWCAA cannot forward your application to EPA. Such information will be treated in accordance with the provisions of 40 CFR Part 2. A claim of confidentiality is subject to both federal law and state law. Each law has different provisions (see below).

> <u>EPA Policy on Confidential Business Information:</u>
> Section 114(c) of the Clean Air Act requires EPA to make available to the public all records, reports or information obtained under Section 114 of the Clean Air Act, except when a source shows EPA to EPA's satisfaction that such information, other than emissions data, would divulge methods or processes entitled to protection as trade secrets of the person requesting confidential treatment.
>
> The rules governing the confidentiality of business information obtained under Section 114 of the Clean Air Act confirm that emission data is not entitled to confidential treatment. See 40 CFR § 2.301(e) and (f). "Emission data" is defined very broadly as:
>
> > (A) Information necessary to determine the identity, amount, frequency, concentration or other characteristics (to the extent related to air quality) of any emission which has been emitted by the source (or of any pollutant resulting from any emission by the source), or any combination of the foregoing;
> >
> > (B) Information necessary to determine the identity, amount, frequency, concentration or other characteristics (to the extent related to air quality) of the emissions which, under an applicable standard or limitation, the source was authorized to emit (including, to the extent necessary for such purposes, a description of the manner or rate of operation of the source); and
> >
> > (C) A general description of the location and/or nature of the source to the extent necessary to identify the source and to distinguish it from other sources (including, to the extent necessary for such purposes, a description of the device, installation or operation constituting the source). See 40 CFR §2.301(a)(2)(i).

EPA believes that all information required to be submitted in an application for a Part 70 permit is "emission data" within the meaning of Section 114 of the Clean Air Act and 40 CFR § 2.301(2) and, therefore, is not entitled to confidential treatment.

NWCAA Position on Confidential Business Information:

The information requested in this Air Operating Permit Application is data concerning emissions, and therefore is not subject to confidentiality protection. However, if information is submitted with the claim of confidentiality, it will be safeguarded until a determination is made as to its true nature.

Revised Code of Washington 70.94.205 is the applicable state law addressing confidentiality. It states that: whenever any records or other information, other than ambient air quality data or emission data, furnished to or obtained by the department of NWCAA or the board of any authority under this chapter, relate to processes or production unique to the owner or operator, or is likely to affect adversely the competitive position of such owner or operator if released to the public or to a competitor, and the owner or operator of such processes or production so certifies, such records or information shall be only for the confidential use of the department of NWCAA or board. Nothing herein shall be construed to prevent the use of records or information by the department of NWCAA or board in compiling or publishing analyses or summaries relating to the general condition of the outdoor atmosphere: PROVIDED, that such analyses or summaries do not reveal any information otherwise confidential under the provisions of this section:
PROVIDED FURTHER, That emission data furnished to or obtained by the department of NWCAA or board shall be correlated with applicable emission limitations and other control measures and shall be available for public inspection during normal business hours at offices of the department of NWCAA or board.

An applicant has the duty to supplement or correct an application. Any applicant who fails to submit any relevant facts or who has submitted incorrect information in a permit application must, upon becoming aware of such failure or incorrect submittal, promptly submit supplementary facts or corrected information. In addition, an applicant must provide additional information as necessary to address any requirements that become applicable to the source after the date it filed a complete application but prior to release of a draft permit.

Please submit three paper copies and one electronic copy of the application to:

Northwest Clean Air Agency
Attention: Mark Buford
1600 S. 2nd Street
Mount Vernon, WA 98273

If you claim confidentiality, you must also submit three paper copies of a redacted version of the application and one copy of the confidential application to:

Regional Administrator
EPA Region 10
AOP Program
Mail Stop OAQ-108
1200 Sixth Ave
Seattle, WA 98101

This application includes 14 pages of instructions. The instructions do not need to be submitted with your completed application. A complete application will contain all eight forms and the listed attachments. You may mark up a copy of your current AOP, attach it to your application, and reference it in your application.

If you have questions regarding this application, please contact Mark Buford at (360) 428-1617.

Air Operating Permit Application

Form 1: General Information and Certification

The purpose of form 1 is to record general information for the facility and to obtain signatures from plant personnel verifying that the information provided is true, accurate, and complete.

Renewal Applications must be signed by an authorized responsible official (Corporations: President, secretary, treasurer or vice-president or other duly authorized person as allowed by WAC 173-401-200(27)(a); Partnership: General partner; Sole proprietorship: Proprietor; Public agency: Principal executive officer or ranking elected official). The following specific instructions apply:

General Information and Certification Form

Item 3.	Unified Business Identification Number is the Washington State uniform business identifier.
Item 15.	Claim of Confidentiality: If materials contained in the complete application contain information considered to be confidential by the applicant, check the box adjacent to the word "are". Proceed with submittal of application by simultaneously submitting both the application and a separate application void of the materials considered confidential. Each page considered confidential must be individually identified by stamping "confidential" or similar method. Include in both the confidential and non-confidential versions of the application.

Air Operating Permit Application

Form 1: General Information and Certification

1. Company Name: City of Bellingham
2. Plant or Facility Name: Post Point Wastewater Treatment Plant
3. Existing Air Operating Permit Number: None (Registration #1318-EM02-W and OAC 287b and 442b)
4. Unified Business Identification Number (UBI#): 371001201
5. Facility Address: 200 McKenzie Street, Bellingham, WA 98225
6. County: Whatcom
7. Mailing Address: (if different) Public Works Department Operations, Plants Division, 2221 Pacific St., Bellingham, WA 98229
8. Owner: City of Bellingham
9. Parent Company: (Same as Owner)
10. Parent Company Address (if different than above): (See Mailing Address)
11. Plant or Facility site manager / contact: Karl Lowry
12. Title: Operations Supervisor
13. Telephone: 360 778-7853
14. Claim of Confidentiality:
    Some of the records and information contained in this application are ☐/are not ☒ (check one) unique to the applicant and/or are likely to adversely affect the competitive position of the applicant if released to the public or a competitor. If a claim of confidentiality is made for this application, provide a separate application for general distribution that is devoid of confidential information.
15. Provide the following:
    a) For applicable requirements with which the source is in compliance, provide a statement that the source will continue to comply with such requirements;

    The plant will comply with all listed applicable requirements.

    b) For applicable requirements that become effective during the permit term, provide a statement that the source will meet such requirements on a timely basis;

    The plant will comply with any new requirements in a timely manner.

c) For applicable requirements with which the source is not in compliance at the time of permit issuance, provide a narrative description and provide a schedule of compliance. Such a schedule shall include a schedule of remedial measures, including an enforceable sequence of actions with milestones, leading to compliance with any applicable requirements for which the source will be in noncompliance at the time of permit issuance. This compliance schedule shall resemble and be at least as stringent as that contained in any judicial consent decree or administrative order to which the source is subject. Any such schedule of compliance shall be supplemental to, and shall not sanction noncompliance with, the applicable requirements on which it is based;

There are no applicable requirements that the plant is not in compliance with.

d) For sources required to have a schedule of compliance to remedy a violation, provide a schedule for submission of certified progress reports every six months or at a more frequent period if specified in an applicable requirement; and

None required

16. **Statement of Certification:** Based on information and belief formed after reasonable inquiry, the statements and information in this document and any attachments are true, accurate and complete.

Kelli Linville	Manager
Name of designated responsible official*	Title of responsible official
[signature]	3/8/19
Signature of responsible official	Date

*Has the responsible official changed from the current AOP? If the answer to this question is ***'Yes'***, attach Responsible Official Duly Authorized Representative Form.

Air Operating Permit Application

Form 2: Emissions Units Form

The purpose of the form 2 is to record information about your facility and its emission units. Description of Emissions Units at Your Facility: Form 2 is designed to provide information on emission units. This information is required under WAC 173-401-510(c).

Emissions Point Identifier: This is a unique name, number or combination that identifies the emissions unit in question. It can be either or both a discharge point or generation point, depending upon how the initial AOP was written.

Pollutants: The applicant should identify regulated pollutants emitted from each emissions point.

Annual Potential Emissions without Regard to Control Device: This is answering the question of how much would this emissions unit emit if there were no control equipment in place.
The intent here is to assist in determining the applicability of the Compliance Assurance Monitoring (CAM) Rule (Title 40 Code of Federal Regulations Part 64).

CAM Needed: Here is where the applicant is to declare whether or not an emissions unit is subject to the CAM. If the applicant declares that the unit is subject, a CAM plan should accompany the renewal application. (See CAM Applicability, below.)

40 CFR 64.2, CAM Applicability.
(a) General applicability. Except for backup utility units that are exempt under paragraph (b)(2) of this section, the requirements of this part shall apply to a pollutant-specific emissions unit at a major source that is required to obtain a part 70 or 71 permit if the unit satisfies all of the following criteria:

(1) The unit is subject to an emission limitation or standard for the applicable regulated air pollutant (or a surrogate thereof), other than an emission limitation or standard that is exempt under paragraph (b)(1) of this section;
(2) The unit uses a control device to achieve compliance with any such emission limitation or standard; and
(3) The unit has potential pre-control device emissions of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source. For purposes of this paragraph, potential pre-control device emissions" shall have the same meaning as potential to emit," as defined in Sec. 64.1, except that emission reductions achieved by the applicable control device shall not be taken into account.

NOTE: Post Point is not a major source as defined by part 64, 70, or 71, therefore CAM is not applicable.

(b) Exemptions.
(1) Exempt emission limitations or standards. The requirements of this part shall not to any of the following emission limitations or standards: apply
(i) Emission limitations or standards proposed by the Administrator after November 15, 1990 pursuant to section 111 or 112 of the Act.
(ii) Stratospheric ozone protection requirements under title VI of the Act.
(iii) Acid Rain Program requirements pursuant to sections 404, 405, 406, 407(a), 407(b), or 410 of the Act.
(iv) Emission limitations or standards or other applicable requirements that apply solely under an emissions trading program approved or promulgated by the Administrator

under the Act that allows for trading emissions within a source or between sources.
(v) An emissions cap that meets the requirements specified in Sec. 70.4(b)(12) or Sec. 71.6(a)(13)(iii) of this chapter.
(vi) Emission limitations or standards for which a part 70 or 71 permit specifies a continuous compliance determination method, as defined in Sec. 64.1. The exemption provided in this paragraph (b)(1)(vi) shall not apply if the applicable compliance method includes an assumed control device emission reduction factor that could be affected by the actual operation and maintenance of the control device (such as a surface coating line controlled by an incinerator for which continuous compliance is determined by calculating emissions on the basis of coating records and an assumed control device efficiency factor based on an initial performance test; in this example, this part would apply to the control device and capture system, but not to the remaining elements of the coating line, such as raw material usage).

(2) Exemption for backup utility power emissions units. The requirements of this part shall not apply to a utility unit, as defined in Sec. 72.2 of this chapter, that is municipally-owned if the owner or operator provides documentation in a part 70 or 71 permit application that:
(i) The utility unit is exempt from all monitoring requirements in part 75 (including the appendices thereto) of this chapter;
(ii) The utility unit is operated for the sole purpose of providing electricity during periods of peak electrical demand or emergency situations and will be operated consistent with that purpose throughout the part 70 or 71 permit term. The owner or operator shall provide historical operating data and relevant contractual obligations to document that this criterion is satisfied; and
(iii) The actual emissions from the utility unit, based on the average annual emissions over the last three calendar years of operation (or such shorter time period that is available for units with fewer than three years of operation) are
less than 50 percent of the amount in tons per year required for a source to be classified as a major source and are expected to remain so.

Annual Potential Emissions: Information on "potential to emit" may be required to determine whether certain requirements apply to a source or emission unit. Where required, applicants should list potential annual emissions or "potential to emit" for each regulated pollutant. "Potential to emit" means the maximum capacity of a stationary source to emit air pollutants under its physical and operational design. Any physical or operational limitation on the capacity of a source to emit an air pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation is federally enforceable. *This is different than Annual Potential Emissions without Regard to Control Device.*

Actual Emissions or Regulated Parameter: Applicants must provide information on actual emissions of regulated pollutants. Actual emissions must be expressed in terms of tons/year. The applicant may also need to report emissions in other terms that are necessary to evaluate compliance with an applicable requirement. In most cases these emissions will be the same as reported on the last annual emissions inventory. If allowed by the permit, actual emissions may be estimated using source test results, vendor guaranteed emission rates or concentrations, AP-42 emission factors, or other methods approved by the permitting authority. All data, assumptions, and calculations should be documented in attachments to the application form.

- → For emission rates based on source test results, please provide a one-page summary including test results, the name of the testing firm, the test date, and reference to testing methods.
- → For emission estimates based on vendor guarantees, please provide a signed and dated copy of the guarantee from the vendor.
- → For calculated emission estimates (i.e., emission estimates based upon AP-42 emission factors), please provide assumptions, operational data, calculations, and other pertinent information used to prepare estimates.
- → Additional applicability documentation, such as operational requirements, should be submitted in narrative form.
- → The applicant should also provide numerical information for standards that contain numerical limits on parameters other than emissions (i.e., sulfur content in fuels).

Air Operating Permit Application

Form 2: Emissions Units Form

Facility Name: Post Point Wastewater Treatment Plant

Confidentiality Claim? Yes ☐ No ☒ Process #: 1

Emissions and Emissions Units						
		Emissions			Compliance Assurance Monitoring	
Emissions Point Identifier	Emission Point Description (including existing air pollution control equipment)	Annual Potential Emissions (tpy) (for all regulated air pollutants)	Have Potential Emissions Changed Since Submittal of Most Recent AOP Application?	Actual Emissions for Calendar Year (tpy)	Annual Potential Emissions without regard to Control Device (tpy)	CAM needed? (yes or no)
Incinerator #1	Multiple Hearth Sewage Sludge Incinerator, with afterburner, venturi scrubber, water tray scrubber, and wet electrostatic			2281 tons of sludge in 2018		
	CO	43.3	Revised, see Notes 1 – 3	18.0	43	No
	NO_x	21.2	Revised, see Notes 1 – 3	8.8	21	No
	SO_2	0.13	Revised, see Notes 1 – 3	0.06	77	No[4]
	VOCs[2]	4.4	Revised, see Notes 1 – 3	1.8	5	No
	PM, Filterable	0.06	Revised, see Notes 1 – 3	0.02	274	No[4]
	Mercury	1.90E-03	Revised, see Notes 1 – 3	7.91E-04	0.09	No
	Cadmium	2.03E-05	Revised, see Notes 1 – 3	8.46E-06	0.10	No
	Lead	0.00004	Revised, see Notes 1 – 3	0.00002	0.27	No
	HCL	0.006	Revised, see Notes 1 – 3	0.002	0.55	No
	Total PCDD/PCDF (Total Mass	1.68E-09	Revised, see Notes 1 – 3	6.99E-10	5.49E-06	No
	Fugitive Emissions	<5% VE	No	<5% VE	-	No

Emissions and Emissions Units						
Emissions Point Identifier	Emission Point Description (including existing air pollution control equipment)	Emissions			Compliance Assurance Monitoring	
		Annual Potential Emissions (tpy) (for all regulated air pollutants)	Have Potential Emissions Changed Since Submittal of Most Recent AOP Application?	Actual Emissions for Calendar Year (tpy)	Annual Potential Emissions without regard to Control Device (tpy)	CAM needed? (yes or no)
Incinerator #2	Multiple Hearth Sewage Sludge Incinerator, with afterburner, venturi scrubber, water tray scrubber, and wet electrostatic precipitator			1740 tons of sludge in 2018		
	CO	2.6	Revised, see Notes 1 – 3	0.8	2.6	No
	NO_x	10.0	Revised, see Notes 1 – 3	3.1	10.0	No
	SO_2	0.22	Revised, see Notes 1 – 3	0.07	80	No[4]
	VOCs[2]	4.6	Revised, see Notes 1 – 3	1.4	5	No
	PM, Filterable	0.05	Revised, see Notes 1 – 3	0.02	285	No[4]
	Mercury	2.52E-03	Revised, see Notes 1 – 3	7.69E-04	0.09	No
	Cadmium	2.91E-05	Revised, see Notes 1 – 3	8.89E-06	0.11	No
	Lead	3.82E-05	Revised, see Notes 1 – 3	1.17E-05	0.28	No
	HCL	0.041	Revised, see Notes 1 – 3	0.012	0.57	No
	Total PCDD/PCDF (Total Mass	4.21E-10	Revised, see Notes 1 – 3	1.29E-10	5.71E-06	No
	Fugitive Emissions	<5% VE	No	<5% VE	-	No

Note 1: Uncontrolled emission factors for CO and NOx are the same as the source test derived emission factors. (Source test conducted in October 2018.) All other uncontrolled emission factors are from AP-42, 5th edition, Volume 1, Chapter 2.2.

Note 2: Controlled and uncontrolled VOC emission factors are from AP-42 (chapter as cited above.)

Note 3: HCL and Mercury uncontrolled emission rates based on assumption respective AP-42 (chapter as cited above) controlled emission rates represent, conservatively, 90% control efficiency.

Note 4: There are operating emission limits that preclude the facility from being a major source. Not being a major source as concurred by NWCAA, the facility is not subject CAM 40 CFR 64 requirements.

Air Operating Permit Application
Form 3: Facility SIC Codes and Products

The purpose of Form 3 is to give the permit writer, inspectors, and permit reviewers an overall understanding of how your facility operates. Using Form 3, list the principal (e.g. marketable) products produced by your facility, grouping them according to standard industrial classification codes (SIC) codes, see *Standard Industrial Classification Manual*, 1987 ed. Include the maximum annual production, taking into account any federally enforceable limits of each of these products and the units of measure for these products. If you wish this information to be kept confidential, circle the confidential indicator on the form.

Air Operating Permit Application

Form 3: Facility SIC Codes and Products

Facility Name: Post Point Wastewater Treatment Plant

Confidentiality Claim? Yes ☐ No ☒

Principal Product Name	Principal Product Description	Maximum Annual Production	Units of Measure	SIC Code	SIC Description
Wastewater Treatment	Treated Waste Water	Maximum secondary treated flow: 14,600 MMgy Maximum primary treated flow: 11,680 MMgy Maximum total flow: 26,280 MMgy	Million Gallons per Year (MMgy)	4952	Sewerage Systems

Air Operating Permit Application

Form 4: Process Information

The purpose of Form 4 is to give the permit writer, inspectors, and reviewers an overall understanding of how your facility operates. Using Form 4, briefly describe all manufacturing processes, and/or commercial activities. Assign each process a number. This number will be used on Forms 2, 5, and 6, (see "Process #_____) on these forms). "Process #1" should be used exclusively to describe plant-wide activities (refer to page 1). If you wish this information to be kept confidential, circle the confidential indicator on the form. Number each process sequentially, assigning each process a unique number. Include normal and all alternative operating scenarios. Use additional copies of Form 4 as necessary.

Air Operating Permit Application

Form 4: Process Information

Facility Name: Post Point Wastewater Treatment Plant

Confidentiality Claim? Yes ☐ No ☒

Process Number	Process Name	SIC Code	Process Description
1	Sewage Sludge Incineration	4952	Two Multiple Hearth Sewage Sludge Incinerators, with afterburners, venturi wet scrubbers, tray scrubbers, mist eliminators, and wet electrostatic precipitators.

Form 5: Raw Materials Used by Processes

The purpose of Form 5 is to give the permit writer, inspectors, and reviewers an overall understanding of how your facility operates. Using Form 5, briefly describe the raw materials, not including fuels, associated with each process listed on form 4. Enter the number of the process (using the number indicated on Form B-2) which use these raw materials under the process number column. Include the maximum annual use of the raw material taking into account any federally enforceable limits. Enter the units of measure (UOM) for annual use. Use additional copies of form 5 as necessary. If you wish this information to be kept confidential, circle the confidential indicator on the form.

Raw materials are "substances that enter into the process and become part of the product(s) or by-product(s)." By-products include emissions. This does not preclude listing emissions as otherwise required, but simplifies the raw materials list. For example, maintenance may be a process at a facility; but there are no raw materials in that process.

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Form 5: Raw Materials Used by Processes

Facility Name: Post Point Wastewater Treatment Plant

Confidentiality Claim? Yes ☐ No ☒ Process #: 1

Number of Process Using Raw Material	Raw Material Name/Description	Maximum Annual Use	UOM
1	Municipal wastewater sludge	No. 1 Incinerator: 5,475 No. 2 Incinerator: 5,694	Dry tons of sludge per year

Air Operating Permit Application
Form 6: Fuels Used by Processes

The purpose of Form 6 is to give the permit writer, inspectors, and reviewers an overall understanding of how your facility operates. Using Form 6, briefly describe the fuels associated with each process. Enter the number of the process using the number indicated on Form 4, and provide information on all fuel types including whether they use primary, back-up, or emergency fuels. Include the maximum annual use of the fuel, taking into account any federally enforceable limits and note units of measure (UOM). Use additional copies of the form as necessary. If you wish this information to be kept confidential, circle the confidential indicator on the form.

Air Operating Permit Application
Form 6: Fuels Used by Processes

Facility Name: Post Point Wastewater Treatment Plant

Confidentiality Claim? Yes ☐ No ☒ Process #: 1

Number of Process Using Fuel	Fuel Name/Description	Maximum Annual Use	Unit of Measure
Incinerator #1 Incinerator #2	Natural gas	24	Million cubic feet per year

Air Operating Permit Application
Form 7: Applicable Requirements

We are looking for data about the limits and other applicable requirements that have been placed on the units at the facility. Since one of the main purposes of the Air Operating Permit Program is to insure compliance with the applicable requirements, we are asking for what the compliance determination methods are for each unit. The type of required compliance determination would depend upon the history and size of each unit.

Applicable Requirements: Form 7 (or attachments) must include a list of all applicable requirements:

State Only: The applicant should identify which requirements are state-only requirements. These include rules and regulatory orders that are not included in the State Implementation Plan and/or been approved by EPA under Section 111 or Section 112 of the Federal Clean Air Act. All other requirements are assumed to be Federally enforceable requirements.

Requirement Identification: For each discharge point, the applicant should identify all applicable requirements for each regulated pollutant. The requirement identification is the number of the regulation (or order of approval), section, and subsection. For example, an applicant may list WAC 173-400-060 as an applicable requirement for general process units.

Air Operating Permit Application

Form 7: Applicable Requirements

Facility Name: Post Point Wastewater Treatment Plant

Confidentiality Claim? Yes ☐ No ☒ Process #: 1

Form 7a: Applicable Requirements

General Local Applicable Requirements

Requirement Number	Citation	Description	Required Monitoring, Recordkeeping & Reporting (MR&R)
A1 O&M	NWCAA 342 (7/14/05) State Only	***Operation and Maintenance*** Sources are required to keep any process and/or air pollution control equipment in good operating condition and repair. Operating instructions and maintenance schedules for process and/or control equipment must be available on the site.	Maintain operating instructions and maintenance schedules for process and/or control equipment on site and follow MR&R C13.
A2 Opacity	NWCAA 451.1 (11/8/07) State Only	***Emission of Particulate Matter - Visual Standard*** Opacity shall not exceed 20% for any period aggregating more than 3 minutes in any one hour.	Follow MR&R B2.

Requirement Number	Citation	Description	Required Monitoring, Recordkeeping & Reporting (MR&R)
A3 PM	NWCAA 455.1 (5/11/95) WAC 173-400-050 (9/16/18) State Only	***Emission of Particulate Matter*** Particulate emissions limited to 0.10 grain/dscf corrected to 7% oxygen.	Follow MR&R C18.
A4 SO_2	NWCAA 462 (7/8/69) State Only	***Emission of Sulfur Compounds*** Sulfur compound emissions, calculated as SO_2, shall not exceed 1,000 ppmvd at 7% oxygen, 60 consecutive minute average.	Follow MR&R C17.
A5 SO_2	NWCAA 520 (5/9/96) State Only	***Sulfur Compounds in Fuel:*** It shall be unlawful for any person to burn, sell, or make available for sale for burning in fuel burning equipment, or refuse burning equipment, within the jurisdiction of the NWCAA, any fuel containing a weight of sulfur in excess of: #1 Distillate - 0.3% or less sulfur by weight #2 Distillate - 0.5% or less sulfur by weight Other distillate or solid fuels – 2.0% or less sulfur by weight Gaseous fuel - 50 grains (412 ppm @ standard conditions) or less sulfur per 100 standard cubic feet except that this subsection shall not apply to those sources subject to Section 460.	Use pipeline natural gas.
A6 Carbonyl	WAC 173-400-050 (9/16/18) State Only	***Emission of Carbonyls*** Emissions limit: less than or equal to 100 ppm of total carbonyls.	Follow MR&R C17.

Form 7b: Applicable Requirements

Specific Local Applicable Requirements

Requirement Number	Citation	Description	Required MR&R
B1 PM	OAC 287b (1) (1/25/18) State Only	***Particulate Emissions*** Particulate emissions from the Incinerator #2 stack shall not exceed 0.02 grains per dry standard cubic foot of exhaust gas corrected to seven percent oxygen (0.02 gr/dscf @ 7% O_2).	Follow MR&R C18.
B2 Opacity	OAC 287b (2) (1/25/18) State Only	***Visible Emissions*** Visible emission from the Incinerator #2 stack shall not exceed an average of five percent (5%) opacity in any consecutive 6-minute period as determined by 40 CFR 60 Appendix A Method 9.	Compliance shall be demonstrated using 40 CFR 60 Appendix A Method 9 during annual performance testing.
B3 Odor	OAC 287b (3) (1/25/18) State Only	***Nuisance Odors*** Nuisance odors from the facility are prohibited at or beyond the property boundary as determined by NWCAA staff.	Upon receiving an odor complaint from the NWCAA or the public, check all potential sources of the odor emissions at the facility and identify possible causes. Problems identified shall be repaired or corrected as soon as practicable. If the problems identified cannot be repaired or corrected within 4 hours, action shall be taken to minimize emissions until repairs can be made. The results of the investigation, identification of any malfunctioning equipment or aberrant operation, and the date and time of repair or mitigation shall be recorded. A log of these records shall be maintained and made available for inspection or upon request. Receipt of a nuisance complaint in itself shall not necessarily be a violation.

Requirement Number	Citation	Description	Required MR&R
B4 Feed Rate	OAC 287b (4) (1/25/18) State Only	***Sewage Sludge Feed Rate*** The dry sewage sludge feed rate to Incinerator #2 shall not exceed permitted capacity of 1,300 pounds per hour.	Compliance with this condition shall be determined by monitoring the hourly dry sewage sludge feed rate pumped to the incinerator and performing solids testing from composited feed sludge. The feed pump shall be installed, operated and calibrated in accordance with good industry practices. Monitoring records must be retained for at least five years from the date of generation.
B5 PM	OAC 442b (1) (1/25/18) State Only	***Particulate Emissions*** Particulate emissions from the Incinerator #1 stack shall not exceed 0.02 grains per dry standard cubic foot of exhaust gas corrected to seven percent oxygen (0.02 gr/dscf @ 7% O_2).	Follow MR&R C18.
B6 Opacity	OAC 442b (2) (1/25/18) State Only	***Visible Emissions*** Visible emission from the Incinerator #1 stack shall not exceed an average of five percent (5%) opacity in any consecutive 6-minute period as determined by 40 CFR 60 Appendix A Method 9.	Follow MR&R B2.
B7 Odor	OAC 442b (3) (1/25/18) State Only	***Nuisance Odors*** Nuisance odors from the facility are prohibited at or beyond the property boundary as determined by NWCAA staff.	Follow MR&R B3.
B8 Feed Rate	OAC 442b (4) (1/25/18) State Only	***Sewage Sludge Feed Rate*** The dry sewage sludge feed rate to Incinerator #1 shall not exceed its permitted capacity of 1,250 pounds per hour.	Follow MR&R B4.

Form 7b: Applicable Requirements

Specific Federal Applicable Requirements

Requirement Number	Citation	Description	Required MR&R
C1 40 CFR 60 Subpart O NSPS for Sewage Treatment Plants	40 CFR 60.152(a)(1) (10/6/75)	***Particulate Matter Limit*** Particulate matter limit of 1.30 lb/ton (0.65 g/kg) dry sludge input.	Initial performance test and monitor operations per MR&R C18.
C2 40 CFR 60 Subpart O NSPS for Sewage Treatment Plants	40 CFR 60.152(a)(2) (10/6/75)	***Opacity Limit*** Shall not exceed 20% opacity in any consecutive 6-minute period as determined by 40 CFR 60 Appendix A Method 9.	Initial performance test and monitor operations per MR&R B2.
C3 40 CFR 60 Subpart O NSPS for Sewage Treatment Plants	40 CFR 60.153(a) 60.153(b) (10/17/00)	***Monitoring of Operations*** Continuously monitor parameters to ensure compliance with emission limits.	Follow MR&R C17.
C4 40 CFR 60 Subpart O NSPS for Sewage Treatment Plants	40 CFR 60.153(c) (10/17/00)	***Recordkeeping Requirements*** Shall retain, for a minimum of 2 years, required recordkeeping information and make it available for inspection.	(1) Pressure drop measurements across the venturi scrubber and tray scrubber combined. Verify pressure drop is no less than 70% of the pressure drip recorded during the performance test for each 15-minute averaging period. (2) Oxygen content measurements of the incinerator exhaust gas. (3) The rate of sludge charged to the incinerator, the measured temperatures of the incinerator, the fuel flow to the incinerator, and the total solids and volatile solids content of the sludge charged to the incinerator.

Requirement Number	Citation	Description	Required MR&R
C5 40 CFR 60 Subpart O NSPS for Sewage Treatment Plants	40 CFR 60.153(d) (10/17/00)	***Recordkeeping Exemptions*** If particulate matter emission rate measured during the performance test (see Requirement C6) is less than or equal to 0.38 g/kg of dry sludge input (0.75 lb/ton), then reduced recordkeeping is allowed.	(1) Continuous operation of the monitoring devices and data recorders in MR&R C3(1), (5), (6) shall not be required. (2) Daily sampling and analysis of sludge feed in MR&R C3(7) shall not be required. (3) Recordkeeping specified in MR&R C4(3) shall not be required.
C6 40 CFR 60 Subpart O NSPS for Sewage Treatment Plants	40 CFR 60.155 (10/6/88)	***Reporting Requirements*** Semi-annual reporting.	(1) A record of average scrubber pressure drop measurements for each period of 15 minutes duration or more during which the pressure drop of the scrubber was less than, by a percentage specified below, the average scrubber pressure drop measured during the most recent performance test. The percent reduction in scrubber pressure drop for which a report is required shall be determined as follows: o For incinerators that achieved an average particulate matter emission rate of 0.38 kg/Mg (0.75 lb/ton) dry sludge input or less during the most recent performance test, a scrubber pressure drop reduction of more than 30 percent from the average scrubber pressure drop recorded during the most recent performance test shall be reported. (2) A record of average oxygen content in the incinerator exhaust gas for each period of 1-hour duration or more that the oxygen content of the incinerator exhaust gas exceeds the average oxygen content measured during the most recent performance test by more than 3 percent. (3) Per 40 CFR 60.7(c) All reports shall be postmarked by the 30th day following the end of each six-month period.
C7 40 CFR 61 Subpart E National Emission Standard for Mercury	40 CFR 61.52(b) (10/17/00)	***Mercury Emissions Limit*** Emissions from sludge incineration plants shall not exceed 3.2 kg (7.1 lb) of mercury per 24-hour period.	As determined by either a stack test conducted in accordance with EPA Method 101 as required by 40 CFR 61.53(d) or through sludge sampling in accordance with EPA Method 105 and 40 CFR 61.54. Also see MR&R C17.

Requirement Number	Citation	Description	Required MR&R
C8 40 CFR 61 Subpart E National Emission Standard for Mercury	40 CFR 61.55 (10/17/00)	***Ongoing Monitoring for Mercury*** If mercury emissions exceed 1.6 kg (3.5 lb) per 24-hour period, demonstrated either by stack sampling according to 40 CFR 61.53 or sludge sampling according to 40 CFR 61.54, shall monitor mercury emissions at intervals of at least once per year by use of Method 105 of appendix B or the procedures specified in 40 CFR 61.53 (d) (2) and (4). The results of monitoring shall be reported and retained according to 40 CFR 61.53(d) (5) and (6) or 40 CFR 61.54 (f) and (g).	Mercury emissions shown through testing to be less than 1.6 kg per 24-hour period; therefore, no ongoing monitoring is required. Continued compliance shall be demonstrated each time the incinerator is required to be tested under 40 CFR 62 Subpart LLL, following EPA Method 29.
C9 40 CFR 62 Subpart LLL SSI Units	40 CFR 62.15900 (4/29/16)	***Maintaining Control Plan*** Control Plan must contain: (1) A description of the devices for air pollution control and process changes that you will use to comply with the emission limits and standards and other requirements of this subpart; (2) The type(s) of waste to be burned, if waste other than sewage sludge is burned in the unit; (3) The maximum design sewage sludge burning capacity; and (4) If applicable, the petition for site-specific operating limits under §62.15965.	Maintain an onsite copy of the final control plan including any notifications filed.

C10 40 CFR 62 Subpart LLL SSI Units	40 CFR 62.15920; 62.15925(c); 62.15930; 62.15935; 62.15940; 62.15950; 62.16025(c)(1) & (2) (4/29/16)	***Operator Training and Qualification*** Trained and Qualified SSI Operators When the SSI is operating, a trained and qualified operator or their supervisor must be at the facility or accessible within 1 hour. In addition, SSI operators and supervisors must be trained and qualified within 6 months of assuming the responsibility for operating or supervising the operation of a SSI. Initial Training and Qualification Initial training and qualification must be obtained by completing either a state-approved program or an incinerator operator training course that includes: • Training on the 10 subjects listed in paragraphs 40 CFR 62.15920(c)(1)(i)-(x), • An examination designed and administered by the state-approved program or instructor administering the subjects in 40 CFR 62.15920(c)(1), and • Written material covering the training course topics that may serve as reference material following completion of the course. Annual Refresher Operator qualification must be maintained by completing an annual review or refresher course covering the 5 topics described in 62.15935(a) through (e) no later than 12 months following the previous review. Renewal of Lapsed Qualification Lapsed operator qualification must be renewed before operating an SSI unit by either: • Completing a standard annual refresher course if the lapse is less than 3 years, or	Maintain records showing the names of SSI operators and supervisors including; o Date of initial review and subsequent annual reviews required under 62.15950(b). o Date operator completed training that met the criteria for qualification and subsequent qualification renewals. Training documentation including the following 10 subjects must be maintained and available on site to SSI unit operators: (i) Environmental concerns, including types of emissions; (ii) Basic combustion principles, including products of combustion; (iii) Operation of the specific type of incinerator to be used by the operator, including proper startup, sewage sludge feeding and shutdown procedures; (iv) Combustion controls and monitoring; (v) Operation of air pollution control equipment and factors affecting performance (if applicable); (vi) Inspection and maintenance of the incinerator and air pollution control devices; (vii) Actions to prevent malfunctions or to prevent conditions that may lead to malfunctions; (viii) Bottom and fly ash characteristics and handling procedures; (ix) Applicable federal, state and local regulations, including Occupational Safety and Health Administration workplace standards; and (x) Pollution prevention. Annual refreshers must include the following topics: (a) Update of regulations; (b) Incinerator operation, including startup and shutdown procedures, sewage sludge feeding and ash handling; (c) Inspection and maintenance; (d) Prevention of malfunctions or conditions that may lead to malfunction; and (e) Discussion of operating problems encountered by attendees.

Requirement Number	Citation	Description	Required MR&R
		• Repeating the initial qualification requirement if the lapse is 3 years or more.	
C11 40 CFR 62 Subpart LLL SSI Units	40 CFR 62.16025(c)(3) & (4), 62.15945 (4/29/16)	***Qualified Operator Not Accessible*** If a qualified operator is not at the facility and is not accessible within 1 hour. • When a qualified operator is not accessible for more than 8 hours the SSI may be operated for less than 2 weeks by other plant personnel who are familiar with the operation and who have completed review of the information specified in 62.15950 within the past 12 months. • When a qualified operator is not accessible for 2 weeks or more a request shall be made to the Administrator to continue operating the SSI.	Maintain a record of: • Each period when no qualified operators were accessible for more than 8 hours, but less than 2 weeks, and • Each period when no qualified operators were accessible for 2 weeks or more along with copies of reports submitted as required in below. When a qualified operator is not accessible for 2 weeks or more: • Notify the administrator of the deviation in writing within 10 days, stating: o The cause of deviation o what is being done to ensure a qualified operator is accessible, o when it is anticipated that a qualified operator will be accessible, and • Submit request for approval from the Administrator to continue operation of the SSI that includes a status report to the Administrator every 4 weeks, outlining: o what is being done to ensure a qualified operator is accessible, o when it is anticipated that a qualified operator will be accessible, and If the Administrator denies the request to continue operation of the SSI unit, the SSI unit may continue to operate for 30 days and then must cease operation. SSI operation may resume if a qualified operator is accessible. Notify the Administrator within 5 days of having resumed operations and having a qualified operator accessible.

Requirement Number	Citation	Description	Required MR&R
C12 40 CFR 62 Subpart LLL SSI Units	40 CFR 62.15960(f), 62.16025(f)(ii) (4/29/16)	***Sewage Sludge Feed Rate*** Monitor and record the daily average feed rate of sewage sludge to the SSI including its moisture content.	Continuously monitor the sewage sludge feed rate and calculate a daily average for all hours of operation during each 24-hour period. Keep a record of the daily average feed rate. Take at least one grab sample per day of the sewage sludge fed to the sewage sludge incinerator. If you take more than one grab sample in a day, calculate the daily average for the grab samples. Keep a record of the daily average moisture content.
C13 40 CFR 62 Subpart LLL SSI Units	40 CFR 62.16010, 62.16030(c)(ii) (4/29/16)	***Control Device Inspection*** Inspect each control device annually.	Conduct an annual inspection of each air pollution control device used to comply with the emission limits no later than 12 months following the previous annual air pollution control device inspection. Within 10 operating days following an air pollution control device inspection, all necessary repairs must be completed unless you obtain written approval from the Administrator establishing a date whereby all necessary repairs of the affected SSI unit must be completed.
C14 40 CFR 62 Subpart LLL SSI Units	40 CFR 62.15985 (4/29/16)	***Establishing Operating Limits*** Shall establish site-specific operating limits during initial performance tests and must confirm these operating limits or re-establish new operating limits using operating data recorded during any performance tests or performance evaluations.	Confirm or re-establish operating limits with each performance test or evaluation.
C15 40 CFR 62 Subpart LLL SSI Units	40 CFR 62.15995 (4/29/16)	***Site-Specific Monitoring Plan*** Shall operate and maintain each continuous monitoring system and ash handling system in accordance with the approved site-specific monitoring plan.	Update and resubmit monitoring plan if there are any changes or potential changes in monitoring procedures or if there is a process change.

Requirement Number	Citation	Description	Required MR&R
C16 40 CFR 62 Subpart LLL SSI Units	40 CFR 62.16015 (4/29/16)	***Testing, Monitoring, and Calibration*** Shall meet performance testing requirements, monitoring requirements, air pollution control device inspections requirements, and the bypass stack provisions.	All performance tests must consist of a minimum of three test runs conducted under conditions representative of normal operations. Document the dry sludge burned during the performance test is representative of the sludge burned under normal operating conditions by: o Maintaining a log of the quantity of sewage sludge burned during the performance test by continuously monitoring and recording the average hourly rate that sewage sludge is fed to the incinerator. o Maintaining a log of the moisture content of the sewage sludge burned during the performance test by taking grab samples of the sewage sludge fed to the incinerator for each 8-hour period that testing is conducted. All performance tests must be conducted using approved test methods, minimum sampling volume, observation period, and averaging method. All pollutant concentrations must be adjusted to 7-percent oxygen. Provide the Administrator at least 30 days prior notice of any performance test. If after 30 days' notice for an initially scheduled performance test, there is a delay (due to operational problems, etc.) in conducting the scheduled performance test, notify the Administrator as soon as possible of any delay in the original test date, either by providing at least 7 days prior notice of the rescheduled date of the performance test, or by arranging a rescheduled date with the Administrator by mutual agreement. Shall operate SSI at a minimum of 85-percent of maximum permitted capacity during tests.

C17 40 CFR 62 Subpart LLL SSI Units	40 CFR 62.15955, 62.15960(a) & (b), 62.15980(a) & (c), 62.15985 62.16000, 62.16005(a) & (b), 62.16020(a), 62.16025(e), 62.16030(c), (d), (g) & (h), 62.15955 Tables 3, 4 & 5 (4/2 9/16)	***CO, NOx, SO_2, Mercury, Dixons/Furans*** Except during periods of startup and shutdown, the SSI shall not exceed the following emission limits, corrected to 7% oxygen and standard conditions, based on a 12-hour block average. • CO: 3,800 ppmvd • NO_x: 220 ppmvd • Mercury: 0.28 mg/dscm • Dioxins/Furans: 5.0 ng/dscm (total mass basis) or 0.32 ng/dscm (toxic equivalency basis) • SO_2: 26 ppmvd Determine ongoing compliance by meeting the following performance test based operating limits[1]: • Afterburner temperature: Incinerator #1: 1177 °F minimum, 12-hour block Incinerator #2: 1240 °F minimum, 12-hour block • Venturi scrubber flow: Incinerator #1: 389 gpm minimum, 12-hour block Incinerator #2: 393 gpm minimum, 12-hour block • Wet ESP power: Incinerator #1: 49 watt minimum, 12-hour block Incinerator #2: 71 watt minimum, 12-hour block [1]These operating limits may be revised based on recent performance test data and a notice to the agency of the revision.	Conduct a performance test using methods specified in Table 3, 62.15985 and 62.15980 of Subpart LLL to establish operating limits. The testing shall be conducted annually and may be relaxed to every three years for pollutants tested at ≤ 75% of the limit for two consecutive years. Any pollutants that test at > 75% of the limit must revert back to annual testing. Continuously operate, calibrate and maintain the continuous parameter monitoring systems to monitor and record the following operating parameters in accordance with the site-specific monitoring plan. Monitoring data shall be taken least once every 15 minutes and recorded as hourly averages. • Afterburner temperature • Venturi scrubber flow • Secondary voltage of the electrostatic precipitator collection plates • Secondary amperage of the electrostatic precipitator collection plates • Influent water flow rate at the of inlet to the wet electrostatic precipitator[2] Record monitoring data, quality assurance, quality control and repair action taken on each operating parameter monitoring system. [2]Reference January 8, 2016 petition to EPA in lieu of effluent flow rate.

Requirement Number	Citation	Description	Required MR&R
C18 40 CFR 62 Subpart LLL SSI Units	Table 3 to 40 CFR 62 Subpart LLL (4/29/16)	***Particulate Matter*** At all times the SSI unit is operating and during periods of malfunction, emissions of PM shall not exceed 80 mg/dscm at 7% O_2, dry basis at standard conditions.	Conduct performance test (Method 5 at 40 CFR 60, Appendix A-3; Method 26A or Method 29 at 40 CFR 60, Appendix A-8). 3-run average (collect a minimum volume of 0.75 dry standard cubic meters per run).
C19 40 CFR 62 Subpart LLL SSI Units	Table 3 to 40 CFR 62 Subpart LLL (4/29/16)	***Hydrogen Chloride*** At all times the SSI unit is operating and during periods of malfunction, emissions of HCl shall not exceed 1.2 ppmvd at 7% O_2, dry basis at standard conditions.	Conduct performance test (Method 26 or 26A at 40 CFR part 60, appendix A-8). 3-run average (For Method 26, collect a minimum volume of 200 liters per run. For Method 26A, collect a minimum volume of 1 dry standard cubic meters per run).
C20 40 CFR 62 Subpart LLL SSI Units	Table 3 to 40 CFR 62 Subpart LLL (4/29/16)	***Cadmium*** At all times the SSI unit is operating and during periods of malfunction, emissions of Cd shall not exceed 0.095 mg/dscm at 7% O_2, dry basis at standard conditions.	Conduct performance test (Method 29 at 40 CFR 60, Appendix A-8). Use GFAAS or ICP/MS for the analytical finish. 3-run average (collect a minimum volume of 1 dry standard cubic meters per run).
C21 40 CFR 62 Subpart LLL SSI Units	Table 3 to 40 CFR 62 Subpart LLL (4/29/16)	***Lead*** At all times the SSI unit is operating and during periods of malfunction, emissions of Pb shall not exceed 0.030 mg/dscm at 7% O_2, dry basis at standard conditions.	Conduct a performance test (Method 29 at 40 CFR 60, Appendix A-8). Use GFAAS or ICP/MS for the analytical finish. 3-run average (collect a minimum volume of 1 dry standard cubic meters per run)

Requirement Number	Citation	Description	Required MR&R
C22 40 CFR 62 Subpart LLL SSI Units	Table 3 to 40 CFR 62 Subpart LLL (4/29/16)	***Fugitive Emissions from Ash Handling*** Visible emissions of combustion ash from an ash conveying system (including conveyor transfer points) for no more than 5 percent of any compliance test hourly observation period. At all times the SSI unit is operating and during periods of malfunction, no visible emissions shall be observed from the combustion ash conveyor, including conveyor transfer points, for more than 3 minutes in any hour.	Conduct a visible emission test (Method 22 at 40 CFR 60, Appendix A-7) for three 1-hr observation periods during 40 CFR 62 LLL testing.
C23 40 CFR 62 Subpart LLL SSI Units	40 CFR 62.15970 (4/29/16)	***Startup, Shutdown and Malfunction*** The emission limits and standards apply at all times and during periods of malfunction.	The operating limits apply at all times that sewage sludge is in the combustion chamber (i.e., until the sewage sludge feed to the combustor has been cut off for a period of time not less than the sewage sludge incineration residence time).
C24 40 CFR 62 Subpart LLL SSI Units	40 CFR 62.16015(d), 62.16020(d), 62.16025(m) & 62.16030 (d)(4)(vi) (4/29/16)	***Bypass Stack Deviation*** Use of the bypass stack at any time that sewage sludge is being charged to the SSI unit is an emissions standards deviation for all pollutants regulated by Subpart LLL.	Install, calibrate (to manufacturers' specifications), maintain and operate a device or method for measuring the use of the bypass stack including date, time and duration. Maintain a record of each event that a bypass stack was used including date, time and duration. Include in semiannual deviation reports, the date, time and duration of each bypass event and the corrective action taken if the bypass constitutes a violation.

Requirement Number	Citation	Description	Required MR&R
C25 40 CFR 62 Subpart LLL SSI Units	40 CFR 62.15955, 62.15960(a) & (b), 62.15980(a) & (c), 62.15985 62.16000, 62.16005(a) & (b), 62.16020(a), 62.16025(e), 62.16030(c), (d), (g) & (h), 62.15955 Tables 3, 4 & 5 (4/29/16)	***Reporting*** Submit semi-annual and annual reports.	Semi-annual report (by August 1st and February 1st): • Monitoring deviations including malfunctions and out of control periods. • 12-hour block averages that exceeded the operating limit for all established control parameters except for pH which is a 3-hour average. Annual report (12 months following previous annual report): • Highest and lowest 12-hour average for each operating parameter. • Performance test reports including operating parameter 3-hour test run averages and sludge feed rate data. • Statement identifying compliance with each operating limit, each performance test and requirements for each monitoring system. • Statement that there were no revisions to the site-specific monitoring plan or submit a revised plan. • Information on each monitoring system malfunction and out of control period, and each performance evaluation conducted on a monitoring system. • Statement that there were no revisions to the site-specific monitoring plan or submit the revised monitoring plan. • A description of each SSI malfunction that may have caused an emission limit to be exceeded. Notify the agency one month in advance of starting or stopping a continuous operating parameter monitoring system. Submit performance test data and annual RATA data to EPA electronically via CERDI.

Form 8: Compliance Status

Form 8 discloses the compliance status of the source.

Compliance Information: The applicant needs to provide information to evaluate compliance with all applicable requirements:

In or Out of Compliance: The applicant must determine the compliance status of each emission unit and each applicable requirement based on information and belief formed after reasonable inquiry including but not limited to comparing actual emissions with allowable limits. Requirements that a source is not complying with should be identified in the compliance plan. For those requirements, the applicant must include a schedule of measures to achieve compliance with the applicable requirement in the compliance plan required under WAC 173-401-510(2)(h).

Continuous or Intermittent Compliance: The applicant must disclose whether the compliance status (in or out) has been continuous or intermittent over the past year. If the status has been intermittent, the schedule of compliance should assure that ongoing compliance will be continuous or justify why compliance will continue to be intermittent.

Method or Test Used to Determine Compliance Status: The applicant should identify the method used to determine compliance. The test method for establishing initial compliance will generally be the method in the underlying regulation, order, or permit. If the underlying requirement does not specify a method, the applicant must propose one. Test methods may include compliance calculations, stack tests, surrogate parameters (i.e., scrubber pressure drop), or continuous emissions monitoring.

Air Operating Permit Application

Form 8: Compliance Status

Facility Name: Post Point Wastewater Treatment Plant

Confidentiality Claim? Yes ☐ No ☒ Process #: 1

Applicable Requirement Identifier	Current Compliance Status (In or Out)	Compliance Status over Past Year (Continuous or Intermittent)	Method used to Determine Compliance Status
A1	In	Continuous	See MR&R A1
A2	In	Intermittent*	See MR&R B2
A3	In	Continuous	See MR&R C18
A4	In	Continuous	See MR&R C17
A5	In	Continuous	See MR&R A5
A6	In	Intermittent*	See MR&R C17
B1	In	Intermittent*	See MR&R C18
B2	In	Intermittent*	See MR&R B2
B3	In	Continuous	See MR&R B3
B4	In	Continuous	See MR&R B4
B5	In	Intermittent*	See MR&R C18
B6	In	Intermittent*	See MR&R B2
B7	In	Continuous	See MR&R B3
B8	In	Continuous	See MR&R B4
C1	In	Intermittent*	See MR&R C1
C2	In	Intermittent*	See MR&R C2
C3	In	Continuous	See MR&R C17
C4	In	Continuous	See MR&R C4
C5	In	Continuous	See MR&R C5

Applicable Requirement Identifier	Current Compliance Status (In or Out)	Compliance Status over Past Year (Continuous or Intermittent)	Method used to Determine Compliance Status
C6	In	Continuous	See MR&R C6
C7	In	Intermittent*	See MR&R C7
C8	In	Continuous	See MR&R C8
C9	In	Continuous	See MR&R C9
C10	In	Continuous	See MR&R C10
C11	In	Continuous	See MR&R C11
C12	In	Continuous	See MR&R C12
C13	In	Continuous	See MR&R C13
C14	In	Continuous	See MR&R C14
C15	In	Continuous	See MR&R C15
C16	In	Continuous	See MR&R C16
C17	In	Intermittent*	See MR&R C17
C18	In	Intermittent*	See MR&R C18
C19	In	Intermittent*	See MR&R C19
C20	In	Intermittent*	See MR&R C20
C21	In	Intermittent*	See MR&R C21
C22	In	Continuous	See MR&R C22
C23	In	Intermittent*	See MR&R C23
C24	In	Intermittent*	See MR&R C24
C25	In	Continuous	See MR&R C25

*All intermittent compliance issues have been resolved and ongoing compliance will be continuous.

List of Application Attachments

The following information must accompany your Air Operating Permit Renewal Application:

1) Emissions calculations used for Form 2:
   Attached

2) A CAM plan, if required by Title 40 Code of Federal Regulations (CFR) Part 64. (For copy of this CFR, go to http://access.gpo.gov/nara/cfr/cfr-table-search.html#page1)
   Not Applicable

3) A list of modifications that have taken place without a Notice of Construction and/or were considered de minimis under WAC 173-400-110. (For copy of this WAC, go to http://www.ecy.wa.gov/laws- rules/ecywac.html#air)
   None

4) Process flow diagram(s) for source.
   Attached

5) Site map of source.
   Attached

6) List of insignificant emission units (IEU), including IEU classification. See WAC 173-401-530, -531, -532, and -533. (For copy of this WAC, go to http://www.ecy.wa.gov/laws-rules/ecywac.html#air)
   Attached

7) Schedule of compliance for Form 8, if applicable. The schedule should include a narrative description of how (including milestone dates) the source will achieve compliance with the relevant requirements and a schedule of submission of certified progress reports.
   N/A - All intermittent compliance issues have been resolved and ongoing compliance will be continuous.

8) Title IV, Acid Rain Program, permit applications and compliance plans, if required by Title 40 Code of Federal Regulations (CFR) Part 72. (For copy of this CFR, go to http://access.gpo.gov/nara/cfr/cfr-table- search.html#page1)
   Not Applicable

9) Risk Management Plan, if required by Title 40 Code of Federal Regulations (CFR) Part 68. (For copy of this CFR, go to http://access.gpo.gov/nara/cfr/cfr-table-search.html#page1
   Not Applicable

10) List of inapplicable requirements and request to extend the permit shield to those requirements, if desired.
    Attached

11) Other supporting information.
    None

ATTACHMENT 1

Emissions and Emission Factors Derived from October 2018 Source Testing - City of Bellingham Sewage Sludge Incinerators

Incinerator #1	Permitted Maximum Sludge Feed Rate:		1250 lbs dry sludge/hour		*2281 tons of sludge for 2018*		
Pollutant	**Source Test[1] Emission Rate (lb/hr)**	**Test Feed Rate as Percentage of Permitted Maximum**	**Derived Emission Factor (lb/ton sludge)**	**Potential to Emit (tpy)**	***2018 Actual Emissions (tpy)***	**Uncontrolled Emission Factor[1] (lb/ton sludge)**	**Uncontrolled Potential to Emit (tpy)**
CO	9.8	99.2%	15.8	43.3	*18.0*	15.8	43
NO_x	4.8	99.2%	7.7	21.2	*8.8*	7.7	21
SO_2	0.03	99.2%	0.048	0.13	*0.06*	28	77
VOCs[2]	-	-	1.6	4.4	*1.8*	1.7	5
PM, Filterable	0.013	95.1%	0.022	0.06	*0.02*	100	274
Mercury[3]	4.30E-04	99.2%	6.94E-04	1.90E-03	*7.91E-04*	0.032	0.09
Cadmium	4.60E-06	99.2%	7.42E-06	2.03E-05	*8.46E-06*	0.037	0.10
Lead	9.30E-06	99.2%	0.000015	0.00004	*0.00002*	0.1	0.27
HCL[3]	0.0012	95.1%	0.0020	0.006	*0.002*	0.20	0.55
Total PCDD/PCDF (Total Mass Basis)	3.80E-10	99.2%	6.13E-10	1.68E-09	*6.99E-10*	2.01E-06	5.49E-06

Incinerator #2	Permitted Maximum Sludge Feed Rate:		1300 lbs dry sludge/hour		*1740 tons of sludge for 2018*		
Pollutant	**Source Test Emission Rate (lb/hr)**	**Test Feed Rate as Percentage of Permitted Maximum**	**Derived Emission Factor (lb/ton sludge)**	**Potential to Emit (tpy)**	***2018 Actual Emissions (tpy)***	**Uncontrolled Emission Factor[1] (lb/ton sludge)**	**Uncontrolled Potential to Emit (tpy)**
CO	0.6	100.9%	0.91	2.6	*0.8*	0.91	2.6
NOx	2.3	100.9%	3.5	10.0	*3.1*	3.5	10.0
SO2	0.05	100.9%	0.076	0.22	*0.07*	28	80
VOCs[2]	-	-	1.6	4.6	*1.4*	1.7	5
PM, Filterable	0.012	98.6%	0.019	0.05	*0.02*	100	285
Mercury[3]	5.80E-04	100.9%	8.84E-04	2.52E-03	*7.69E-04*	0.032	0.09
Cadmium	6.70E-06	100.9%	1.02E-05	2.91E-05	*8.89E-06*	0.037	0.11
Lead	8.80E-06	100.9%	1.34E-05	3.82E-05	*1.17E-05*	0.1	0.28
HCL[3]	0.0092	98.6%	0.014	0.041	*0.012*	0.20	0.57
Total PCDD/PCDF (Total Mass Basis)	9.70E-11	100.9%	1.48E-10	4.21E-10	*1.29E-10*	2.01E-06	5.71E-06

[1] Uncontrolled emission factors for CO and NO_x are the same as the source test derived emission factors. (Source test conducted in October 2018.) All other uncontrolled emission factors are from AP-42, 5th edition, Volume 1, Chapter 2.2.

[2] Controlled and uncontrolled VOC emission factors are from AP-42 (chapter as cited above.)

[3] HCL and Mercury uncontrolled emission rates based on assumption respective AP-42 (chapter as cited above) controlled emission rates represent, conservatively, 90% control efficiency.

Annual Incinerator Emission Report Data

Month	INC1 #1 Count total hours	INC1 #1 incin lbs/day	INC1 #1 incin total gas raw	INC1 #1 incin standby gas	INC2 #2 incin Count hours	INC2 #2 incin lbs/day	INC2 #2 incin total gas raw	INC2 #2 incin standby gas
Jan 2018	713	685,126	888,664	36,348				
Feb 2018	430	442,201	723,669	189,392	247	267,244	593,725	169,624
Mar 2018	291	291,715	586,721	255,221	427	443,109	642,043	109,490
Apr 2018	691	673,709	742,688	30,195				
May 2018	479	438,023	605,501	130,173	243	224,063	441,730	72,309
Jun 2018			29,264	29,264	685	656,637	798,446	50,226
Jul 2018	706	626,208	839,927	50,394	35	29,408	218,075	133,634
Aug 2018	699	646,454	643,389	45,873				
Sep 2018	480	406,422	650,777	214,421	212	188,256	56,702	8,651
Oct 2018	354	351,186	598,870	278,474	299	308,232	120,871	26,938
Nov 2018			111,932	111,932	698	688,461	391,396	9,245
Dec 2018			0		710	675,538	363,613	7,836
Total	**4,843**	**4,561,044**	**6,421,402**	**1,371,686**	**3,556**	**3,480,946**	**3,626,601**	**587,953**

MONTROSE
AIR QUALITY SERVICES

EXCERPTS FROM:

SOURCE TEST REPORT
2018 SOURCE EVALUATION TESTING
CITY OF BELLINGHAM
POST POINT TREATMENT PLANT
BELLINGHAM, WASHINGTON

Prepared For:

City of Bellingham
200 McKenzie Avenue
Bellingham, WA 98225

For Submittal To:

US EPA Region 10
1200 6th Avenue, Suite 900, OAW-150
Seattle, WA 98101-1128

Prepared By:

Montrose Air Quality Services, LLC
1325 Meador Avenue, Suite 101
Bellingham, WA 98229

Document Number: 035AS-468952-RT-93
Test Date: October 1-16, 2018
Submittal Date: December 14, 2018

MONTROSE
AIR QUALITY SERVICES

REVIEW AND CERTIFICATION

All work, calculations, and other activities and tasks performed and documented in this report were carried out by me or under my direction and supervision. I hereby certify that to the best of my knowledge, Montrose operated in conformance with the requirements of the Montrose Quality Manual and ASTM D7036-04 during this test project.

Name: Scott Chesnut Title: Field Project Manager

Sign: Scott Chesnut Date: 12/10/2018

I have reviewed, technically and editorially, details, calculations, results, conclusions, and other appropriate written materials contained herein. I hereby certify that to the best of my knowledge the presented material is authentic and accurate and conforms to the requirements of the Montrose Quality Manual and ASTM D7036-04.

Name: Dan Duncan Title: QA/QC Manager

Sign: Dan Duncan Date: 12/10/2018

1.0 INTRODUCTION AND SUMMARY

1.1 PROGRAM OBJECTIVES

Montrose Air Quality Services, LLC (Montrose) was contracted by the City of Bellingham (COB) to perform a series of air emission tests at the Post Point Wastewater Treatment facility located in Bellingham, Washington. The tests were conducted on two multi-hearth sewage sludge incinerators to determine compliance with annual testing as required by 40 CFR 62 Subpart LLL and with the source testing limitations of the Northwest Clean Air Agency (NWCAA) Order of Approval to Construct (OAC) 287b and 442b.

The testing was conducted by Scott Chesnut, David Wagner, Blake Ingman and Colin Rodkey of Montrose on October 1-16, 2018. Peg Wendling of the City of Bellingham coordinated the testing program. The tests were conducted according to a test plan dated August 31, 2018 that was submitted to the EPA and NWCAA. Montrose performed the tests to measure the following emission parameters:

- Emission Compliance:
  - Particulate matter (PM) – gr/dscf @ 7% O_2, mg/dscm @ 7% O_2
  - Dioxins/furans (PCDD/PCDF) – ng/dscm @ 7% O_2
  - Hydrogen chloride (HCl) – ppmvd @ 7% O_2
  - Mercury (Hg) – mg/dscm @ 7% O_2
  - Cadmium (Cd) – mg/dscm @ 7% O_2
  - Lead (Pb) – mg/dscm @ 7% O_2
  - Sulfur dioxide (SO_2) - ppmvd @ 7% O_2
  - Nitrogen oxides (NOx) – ppmvd @ 7% O_2
  - Carbon monoxide (CO) – ppmvd @ 7% O_2
  - Fugitive emissions - % of observation period
- O_2 and CO_2 (% volume dry) – for molecular weight & dilution calculations
- Stack volumetric flow rate (dscfm) and moisture content (% by volume)

This report presents the test results and supporting data, descriptions of the testing procedures, descriptions of the facility and sampling locations, and a summary of the quality assurance procedures used by Montrose. The average emission test results are summarized and compared to their limitations in the 40 CFR 62 LLL in Table 1-1. Detailed results for individual test runs can be found in Section 5.0. All supporting data can be found in the appendices.

Both qualitative and quantitative factors contribute to field measurement uncertainty and should be taken into consideration when interpreting the results contained within this report. Whenever possible, Montrose personnel reduce the impact of these uncertainty factors by using approved and validated test methods. In addition, Montrose personnel perform routine instrument and equipment calibrations and ensure that the calibration standards, instruments, and equipment used during test events meet, at a minimum, test method specifications as well as the specifications of our Quality Manual and ASTM D 7036-04. The limitations of the various methods, instruments, equipment, and materials utilized during this test have been reasonably considered,

but the ultimate impact of the cumulative uncertainty of this project is not fully identified within the results of this report.

TABLE 1-1
SUMMARY OF AVERAGE COMPLIANCE RESULTS
POST POINT WASTEWATER TREATMENT FACILITY
SEWAGE SLUDGE INCINERATORS
OCTOBER 1-16, 2018

Parameter	Unit 1	Unit 2	Subpart LLL/OAC Limits
CO Emissions:			
ppmvd @ 7% O_2	571.6	34.5	3,800
NO_X Emissions:			
ppmvd @ 7% O_2	171	86.3	220
SO_2 Emissions:			
ppmvd @ 7% O_2	0.65	1.3	26
Cadmium Emissions:			
mg/dscm @ 7% O_2	<0.01 [1]	<0.01 [1]	0.095
Lead Emissions:			
mg/dscm @ 7% O_2	<0.01 [1]	<0.01 [1]	0.30
Mercury Emissions:			
mg/dscm @ 7% O_2	0.03	0.04	0.28
HCl Emissions:			
ppmvd @ 7% O_2	0.06	0.47	1.2
Filterable PM Emissions:			
mg/dscm @ 7% O_2	1.1	0.96	80
gr/dscf @ 7% O_2	<0.01 [1]	<0.01 [1]	0.02 [2]
PCDD/DF Emissions:			
ng/dscm @ 7% O_2[1]	0.03	<0.01 [1]	5.0
ng/dscm @ 7% O_2[2]	<0.01 [1]	<0.01 [1]	0.32
Fugitive Emissions:			
% of observation period	0	0	5

[1] Some results reported as < in Table 1-1 are reported so as to maintain precision with the permit limit, and not because the results were below detection limits. See Section 5 for detailed results.
[2] NWCAA OAC 287b
[3] Total mass basis
[4] Toxic equivalency basis

1.2 PROJECT CONTACTS

A list of project participants is included below:

Facility Information

Source Location:	City of Bellingham Post Point Wastewater Treatment Plant 200 McKenzie Avenue Bellingham, WA 98225
Project Contact:	Peg Wendling
Role:	Technical Supervisor
Company:	City of Bellingham
Telephone:	360-778-7872
Email:	pwendling@cob.org

Agency Information

Regulatory Agency:	U.S. EPA Region 10
Agency Contact:	Geoffrey Glass
Telephone:	206-553-1847
Email:	glass.geoffrey@epa.gov

Testing Company Information

Testing Firm:	Montrose Air Quality Services, LLC (Montrose)	
Contact:	Scott Chesnut	Robert Rusi
Title:	District Manager	Client Project Manager
Telephone:	(360) 922-6143	(360) 922-6143
Email:	schesnut@montrose-env.com	rrusi@montrose-env.com

Laboratory Information

Laboratory:	Chester LabNet
City, State:	Tigard, Oregon
Laboratory:	Enthalpy Analytical
City, State:	Wilmington, NC

3.0 TEST DESCRIPTION

3.1 PROGRAM OBJECTIVES

The objective of this test program was to determine compliance with the emission limits and standards of 40 CFR Part 62, Subpart LLL and NWCAA OAC 287b and 442b limits.

TABLE 3-1
EMISSION LIMITS

Emission Parameter	Units of Measurement	Subpart / AOP Limitations	Subpart / AOP Reference
Oxides of Nitrogen (NO_X)	ppmvd @ 7% O_2	220	LLL Table 3
Carbon Monoxide (CO)	ppmvd @ 7% O_2	3,800	LLL Table 3
Sulfur Dioxide (SO_2)	ppmvd @ 7% O_2	26	LLL Table 3
Hydrogen Chloride (HCl)	ppmvd @ 7% O_2	1.2	LLL Table 3
Particulate Matter (Filterable)	mg/dscm @ 7% O_2 gr/dscf @ 7@ O_2	80 0.02	LLL Table 3 OAC 287b/442b
Cadmium	mg/dscm @ 7% O_2	0.095	LLL Table 3
Lead	mg/dscm @ 7% O_2	0.30	LLL Table 3
Mercury	mg/dscm @ 7% O_2	0.28	LLL Table 3
Dioxins/Furans (total mass basis)	ng/dscm @ 7% O_2	5.0	LLL Table 3
Dioxins/Furans (toxic equivalency basis)	ng/dscm @ 7% O_2	0.32	LLL Table 3
Fugitive Emissions	% of observation period	5	LLL Table 3

3.2 TEST CONDITIONS

Emission tests were performed while the source units, and applicable abatement units, were operating at the conditions required by Subpart LLL. Tests were performed at each of the following conditions:

- Unit 1 at >85% capacity (capacity is 1,250 lb/hr feed rate)
- Unit 2 at >85% capacity (capacity is 1,300 lb/hr feed rate)

Plant personnel established the test conditions and collected all applicable unit-operating data. Montrose monitored the collection of process data.

3.3 TEST PROGRAM SCHEDULE

The test program schedule is presented in Table 3-2.

TABLE 3-2
TEST MATRIX AND SCHEDULE

Date	Source ID/ Activity	Sample Runs	Sample Duration
October 1, 2018	**Unit 2, Outlet**		
	O_2, CO_2	1	240 minutes
	PM, HCl, Moisture, Vol. Flow Rate	1	240 minutes
October 2, 2018	**Unit 2, Outlet**		
	O_2, CO_2	2, 3	240 minutes
	PM, HCl, Moisture, Vol. Flow Rate	2, 3	240 minutes
October 3, 2018	**Unit 2, Outlet**		
	NO_x, O_2, CO_2, CO, SO_2	1, 3	240 minutes
	Metals, Moisture, Vol. Flow Rate	1, 2	240 minutes
	Dioxin/Furan, Moisture, Vol. Flow Rate	1, 3	240 minutes
October 4, 2018	**Unit 2, Outlet**		
	NO_x, O_2, CO_2,CO, SO_2	4	240 minutes
	Metals, Moisture, Vol. Flow Rate	3	240 minutes
	Dioxin/Furan, Moisture, Vol. Flow Rate	4	240 minutes
	Fugitive emissions	1, 2, 3	60 minutes
October 9, 2018	**Unit 1, Outlet**		
	O_2, CO_2	1, 2	240 minutes
	PM, HCl, Moisture, Vol. Flow Rate	1, 2	240 minutes
October 10, 2018	**Unit 1, Outlet**		
	O_2, CO_2	3	240 minutes
	PM, HCl, Moisture, Vol. Flow Rate	3	240 minutes
October 15, 2018	**Unit 1, Outlet**		
	NO_x, O_2, CO_2, CO, SO_2	1, 3	240 minutes
	Metals, Moisture, Vol. Flow Rate	1	240 minutes
	Dioxin/Furan, Moisture, Vol. Flow Rate	1, 3	240 minutes
October 16, 2018	**Unit 1, Outlet**		
	NO_x, O_2, CO_2, CO, SO_2	4	240 minutes
	Metals, Moisture, Vol. Flow Rate	3, 4	240 minutes
	Dioxin/Furan, Moisture, Vol. Flow Rate	4	240 minutes

3.4 MONTROSE TEST PROCEDURES

The test procedures used for this test program are summarized in Table 3-3 below. Additional information regarding specific applications or modifications to standard procedures is presented in the following sub-sections.

TABLE 3-3
TEST PROCEDURES

Parameter	Measurement Principle	Reference Method
NO_X	Chemiluminescence	EPA 7E
CO_2	Non-dispersive infrared	EPA 3A
O_2	Paramagnetism	EPA 3A
CO	Gas filter correlation	EPA 10
SO_2	Non-dispersive ultraviolet absorption	EPA 6C
Particulate matter	Gravimetry	EPA 5
HCl	Isokinetic impinger train w/ ion chromatography	EPA 26A
Dioxins/Furans	Isokinetic impinger train w/ GC/MS w/ isotope dilution	EPA 23
Metals	Isokinetic impinger train w/ analysis by ICP for non-Hg metals and CVAAS for Hg	EPA 29
Volumetric flow rate	Pitot/temperature traverse	EPA 1, 2
Moisture content	Impinger weight gain	EPA 4
Fugitive Emissions	Visible emissions observations	EPA 22

3.4.1 Gaseous Emissions

Concentrations of the gaseous constituents of the stack gas (SO_2, CO, NO_X, O_2, and CO_2) were measured using Montrose's dry extractive reference method (RM) monitor system. This system meets the requirements of EPA methods for gaseous species. Pertinent information regarding the performance of the methods is presented below:

- Method Deviations: None
- Method Options: N/A
- Detection limit: 2% of calibration span

3.4.2 Particulate Matter Emissions

Emissions of filterable particulate matter (PM) were measured using EPA Method 5. Pertinent information regarding the performance of the methods is presented below:

- Method Deviations: None
- Method Options: N/A
- Minimum Required Sample Volume: 0.75 dscm
- Analytical Laboratory: Chester LabNet, Tigard, OR

TABLE 5-1
RESULTS SUMMARY FPM AND HCI EMISSIONS
CITY OF BELLINGHAM – POST POINT TREATMENT PLANT
INCINERATOR #1

Test No.:	EU1-M26A-R1	EU1-M26A-R2	EU1-M26A-R3	Average
Date:	10/9/18	10/9/18	10/10/18	–
Time:	742-1149	1233-1639	747-1150	–
Flue Gas:				
O_2, % volume dry	13.5	13.2	13.1	13.3
CO_2, % volume dry	6.3	6.6	6.6	6.5
Flue gas temperature, °F	145	149	147	147
Moisture content, % volume	2.64	2.54	2.42	2.53
Volumetric flow rate, dscfm	5760	5779	5733	5757
Isokinetic, %	102.5	101.7	101.9	102.0
Filterable PM Emissions:				
mg/dscm	0.49	0.58	0.72	0.60
mg/dscm @ 7% O_2	0.94	1.05	1.32	1.10
gr/dscf	2.0×10^{-4}	3.0×10^{-4}	3.0×10^{-4}	3.0×10^{-4}
gr/dscf @ 7% O_2	4.0×10^{-4}	5.0×10^{-4}	6.0×10^{-4}	5.0×10^{-4}
lb/hr	1.1×10^{-2}	1.3×10^{-2}	1.6×10^{-2}	1.3×10^{-2}
Hydrogen Chloride (HCl):				
ppm volume dry	3.3×10^{-2}	3.3×10^{-2}	4.0×10^{-2}	3.5×10^{-2}
ppmvd @ 7% O_2	6.3×10^{-2}	5.9×10^{-2}	7.2×10^{-2}	6.4×10^{-2}
lb/hr	1.1×10^{-3}	1.1×10^{-3}	1.3×10^{-3}	1.2×10^{-3}

TABLE 5-2
RESULTS SUMMARY METALS EMISSIONS [3]
CITY OF BELLINGHAM – POST POINT TREATMENT PLANT
INCINERATOR #1

Test No.:	EU-1-R1-M29	EU-1-R2-M29	EU-1-R3-M29	Averages
Date:	10/15/2018	10/16/2018	10/16/2018	--
Time:	1314-1720	0830-1238	1343-1749	--
Flue Gas:				
O_2, % vol. dry	11.85	11.96	11.96	11.92
CO_2, % vol. dry	7.36	7.17	7.28	7.27
Moisture, % vol.	2.91	3.06	3.06	3.01
Flue gas temperature, °F	141.5	128.0	130.1	133.2
Volumetric flow rate, dscfm	6111	6019	6318	6150
Isokinetic, %	97.82	96.61	96.48	96.97
Mercury (Hg):				
mg/dscm	1.7×10^{-2}	1.9×10^{-2}	2.0×10^{-2}	1.9×10^{-2}
mg/dscm @ 7% O_2	2.6×10^{-2}	3.0×10^{-2}	3.0×10^{-2}	2.9×10^{-2}
lb/hr	3.9×10^{-4}	4.4×10^{-4}	4.6×10^{-4}	4.3×10^{-4}
Cadmium (Cd):				
mg/dscm	2.1×10^{-4}	3.1×10^{-4}	8.4×10^{-5}	2.0×10^{-4}
mg/dscm @ 7% O_2	3.2×10^{-4}	4.8×10^{-4}	1.3×10^{-4}	3.1×10^{-4}
lb/hr	4.8×10^{-6}	6.9×10^{-6}	2.0×10^{-6}	4.6×10^{-6}
Lead (Pb):				
mg/dscm	3.1×10^{-4}	4.6×10^{-4}	4.4×10^{-4}	4.0×10^{-4}
mg/dscm @ 7% O_2	4.8×10^{-4}	7.1×10^{-4}	6.8×10^{-4}	6.2×10^{-4}
lb/hr	7.1×10^{-6}	1.0×10^{-5}	1.0×10^{-5}	9.3×10^{-6}

[3] Emissions results flagged per EPA Guideline Document 51F. Results flagged ND (or BDL) were below the laboratory's reported detection levels. Results flagged DLL had at least one value (but not all) used in emissions calculations that was less than the laboratory's reported detection level. Results flagged ADL had values that were all above the laboratory's reported detection level. See Section 4.3 for more detail.

TABLE 5-3
RESULTS SUMMARY GASEOUS EMISSIONS
CITY OF BELLINGHAM – POST POINT TREATMENT PLANT
INCINERATOR #1

Test No.:	1-PCDD	3-PCDD	4-PCDD	Averages
Date:	10/15/2018	10/15/2018	10/16/2018	–
Time:	0802-1209	1314-1720	0830-1237	–
Flue Gas:				
O_2, % volume dry	12.2	11.9	12.0	12.0
CO_2, % volume dry	7.3	7.4	7.2	7.3
Moisture, % by volume	2.4	2.9	2.4	2.6
Flue gas temperature, °F	143	142	130	134
Volumetric flow rate, dscfm	6,250	6,111	6,110	6,157
CO Emissions:				
ppm volume dry	284	180	635	366
ppmvd @ 7% O_2	451	276	987	572
lb/hr	7.7	4.8	16.9	9.8
NO_X Emissions:				
ppm volume dry	103	90	136	110
ppmvd @ 7% O_2	164	139	211	171
lb/hr as NO_2	4.6	4.0	6.0	4.8
SO_2 Emissions:				
ppm volume dry[4]	0.27	0.60	0.37	0.42
ppmvd @ 7% O_2	0.43	0.923	0.580	0.65
lb/hr	0.02	0.04	0.02	0.03

[4] SO_2 concentrations for all three runs were below the analyzer detection limit (2% of high span gas). High span gas concentration was 50.13 ppm. The detection limit was used for emissions calculations.

TABLE 5-4
RESULTS SUMMARY DIOXIN/FURAN EMISSIONS
CITY OF BELLINGHAM – POST POINT TREATMENT PLANT
INCINERATOR #1

Test No.:	1-PCDD	3-PCCD	4-PCCD	Averages
Date:	10/15/2018	10/16/2018	10/16/2018	--
Time:	0802-1209	0830-1238	1343-1639	--
Flue Gas:				
O_2, % vol. dry	12.2	12.0	12.0	12.0
CO_2, % vol. dry	7.3	7.2	7.3	7.3
Moisture, % vol.	2.4	2.4	2.5	2.4
Flue gas temperature, °F	143	130	133	135
Volumetric flow rate, dscfm	6250	6110	6326	6229
Isokinetic, %	106.3	97.3	97.8	100.5
Total PCDD Emissions:				
ng/dscm (Total Mass Basis)	6.5×10^{-3}	1.5×10^{-3}	7.4×10^{-3}	5.1×10^{-3}
ng/dscm @ 7% O_2 (Total Mass Basis)	1.0×10^{-2}	2.4×10^{-3}	1.2×10^{-2}	8.1×10^{-3}
lb/hr (Total Mass Basis)	1.5×10^{-10}	3.5×10^{-11}	1.7×10^{-10}	1.2×10^{-10}
Total PCDF Emissions:				
ng/dscm (Total Mass Basis)	1.3×10^{-2}	2.5×10^{-3}	1.8×10^{-2}	1.1×10^{-2}
ng/dscm @ 7% O_2 (Total Mass Basis)	2.0×10^{-2}	3.8×10^{-3}	2.8×10^{-2}	1.7×10^{-2}
lb/hr (Total Mass Basis)	2.9×10^{-10}	5.6×10^{-11}	4.2×10^{-10}	2.6×10^{-10}
Total PCDD/PCDF				
ng/dscm (Total Mass Basis)	1.9×10^{-2}	4.0×10^{-3}	2.5×10^{-2}	1.6×10^{-2}
ng/dscm @ 7% O_2 (Total Mass Basis)	3.0×10^{-2}	6.2×10^{-3}	3.9×10^{-2}	2.5×10^{-2}
ng/dscm @ 7% O_2 (Toxic Equivalency)	6.1×10^{-4}	6.3×10^{-4}	8.2×10^{-4}	6.8×10^{-4}
lb/hr (Total Mass Basis)	4.4×10^{-10}	9.1×10^{-11}	6.0×10^{-10}	3.8×10^{-10}

TABLE 5-5
PROCESS DATA
CITY OF BELLINGHAM – POST POINT TREATMENT PLANT
INCINERATOR #1

Parameter	Run	Cake Feed Rate (lbs/hr)	Afterburner Temp (°F)	Venturi Flow (GPM)	WESP Flush Water Flow (GPM)	Venturi Dif. Press (in w.c.)	WESP Current (mAmp)
		Run Avg	Run Avg	Run Avg	Run Avg	Run Avg	Run Avg
PCDD/DF	Run 1	1296	1335	390	0.58	30.96	0.92
	Run 2	1209	1398	389	0.88	30.07	0.92
	Run 3	1212	1453	456	0.84	30.01	1.44
	AVG	1239	1395	412	0.77	30.35	1.10
HCl/PM/ CEMS	Run 1	1178	1177	463	0.55	31.32	2.16
	Run 2	1166	1250	451	0.57	31.03	2.09
	Run 3	1221	1298	476	0.60	31.37	1.86
	AVG	1188	1242	463	0.58	31.24	2.04
Metals	Run 1	1288	1418	389	0.59	30.40	0.92
	Run 2	1209	1398	389	0.88	30.07	0.92
	Run 3	1212	1453	456	0.84	30.01	1.44
	AVG	1236	1423	411	0.77	30.16	1.09

TABLE 5-6
RESULTS SUMMARY FPM AND HCl EMISSIONS
CITY OF BELLINGHAM – POST POINT TREATMENT PLANT
INCINERATOR #2

Test No.:	EU2-M26A-R1	EU2-M26A-R2	EU2-M26A-R3	Average
Date:	10/1/2018	10/2/2018	10/2/2018	--
Time:	1237-1639	0755-1200	1225-1627	--
Flue Gas:				
O_2, % volume dry	13.2	13.0	13.6	13.3
CO_2, % volume dry	6.4	6.6	6.2	6.4
Flue gas temperature, °F	130	131	129	130
Moisture content, % volume	3.30	3.09	3.04	3.14
Volumetric flow rate, dscfm	220	227	219	222
Isokinetic, %	98.2	100.6	99.6	99.5
Filterable PM Emissions:				
mg/dscm	0.19	0.09	1.2	0.50
mg/dscm @ 7% O_2	0.36	0.17	2.35	0.96
gr/dscf	1.0×10^{-4}	2.0×10^{-4}	5.0×10^{-4}	2.0×10^{-4}
gr/dscf @ 7% O_2	2.0×10^{-4}	1.0×10^{-4}	1.0×10^{-3}	4.0×10^{-4}
lb/hr	4.5×10^{-3}	2.2×10^{-3}	2.9×10^{-2}	1.2×10^{-2}
Hydrogen Chloride (HCl):				
ppm volume dry	0.72	0.02	0.04	0.26
ppmvd @ 7% O_2	1.311	0.04	0.07	0.472
lb/hr	0.03	7.5×10^{-4}	1.3×10^{-3}	9.2×10^{-3}

TABLE 5-7
RESULTS SUMMARY METALS EMISSIONS [5]
CITY OF BELLINGHAM – POST POINT TREATMENT PLANT
INCINERATOR #2

Test No.:	Run 1	Run 2	Run 3	Averages
Date:	10/3/2018	10/3/2018	10/4/2018	–
Time:	0905-1322	1410-1819	0828-1235	–
Flue Gas:				
O_2, % vol. dry	12.16	11.96	11.96	12.03
CO_2, % vol. dry	7.31	7.17	7.28	7.25
Moisture, % vol.	3.11	3.13	3.35	3.20
Flue gas temperature, °F	131	133	133	132
Volumetric flow rate, dscfm	6,383	6,274	6,185	6,280
Isokinetic, %	100.6	101.1	95.9	99.2
Mercury (Hg):				
mg/dscm	2.6×10^{-2}	2.4×10^{-2}	2.4×10^{-2}	2.5×10^{-2}
mg/dscm @ 7% O_2	4.2×10^{-2}	3.8×10^{-2}	3.7×10^{-2}	3.9×10^{-2}
lb/hr	6.3×10^{-4}	5.7×10^{-4}	5.5×10^{-4}	5.8×10^{-4}
Cadmium (Cd):				
mg/dscm	3.3×10^{-4}	1.9×10^{-4}	3.3×10^{-4}	2.8×10^{-4}
mg/dscm @ 7% O_2	5.2×10^{-4}	3.0×10^{-4}	5.2×10^{-4}	4.5×10^{-4}
lb/hr	7.8×10^{-6}	4.5×10^{-6}	7.7×10^{-6}	6.7×10^{-6}
Lead (Pb):				
mg/dscm	4.4×10^{-4}	2.3×10^{-4}	4.6×10^{-4}	3.8×10^{-4}
mg/dscm @ 7% O_2	7.0×10^{-4}	3.5×10^{-4}	7.2×10^{-4}	5.9×10^{-4}
lb/hr	1.1×10^{-5}	5.3×10^{-6}	1.1×10^{-5}	8.8×10^{-6}

[5] Emissions results flagged per EPA Guideline Document 51F. Results flagged ND (or BDL) were below the laboratory's reported detection levels. Results flagged DLL had at least one value (but not all) used in emissions calculations that was less than the laboratory's reported detection level. Results flagged ADL had values that were all above the laboratory's reported detection level. See Section 4.3 for more detail.

TABLE 5-8
RESULTS SUMMARY GASEOUS EMISSIONS
CITY OF BELLINGHAM – POST POINT TREATMENT PLANT
INCINERATOR #2

Test No.:	1-PCDD	3-PCDD	4-PCDD	Averages
Date:	10/3/2018	10/3/2018	10/4/2018	--
Time:	905-1322	1410-1819	828-1231	--
Flue Gas:				
O_2, % volume dry	12.9	12.8	12.7	12.8
CO_2, % volume dry	6.6	6.6	6.8	6.7
Moisture, % by volume	2.8	2.4	3.1	2.8
Flue gas temperature, °F	135	137	134	135
Volumetric flow rate, dscfm	6,257	6,299	6271	6276
CO Emissions:				
ppm volume dry	47	28	33	20
ppmvd @ 7% O_2	80	48	55	34
lb/hr	1.3	0.8	0.9	0.6
NO_X Emissions:				
ppm volume dry	59	41	51	50
ppmvd @ 7% O_2	102	71	87	86
lb/hr as NO_2	2.6	1.9	2.3	2.3
SO_2 Emissions:				
ppm volume dry[6]	1.3	0.09	0.86	0.73
ppmvd @ 7% O_2	2.2	0.16	1.5	1.3
lb/hr	0.08	0.01	0.05	0.05

[6] SO_2 concentrations for Runs 1 and 2 were below the analyzer detection limit (2% of high span gas). High span gas concentration was 50.13 ppm. The detection limit was used for emissions calculations.

TABLE 5-9
RESULTS SUMMARY DIOXIN/FURAN EMISSIONS
CITY OF BELLINGHAM – POST POINT TREATMENT PLANT
INCINERATOR #2

Test No.:	1-PCDD	3-PCDD	4-PCDD	Averages
Date:	10/3/2018	10/3/2018	10/4/2018	--
Time:	905-1322	1410-1819	828-1235	--
Flue Gas:				
O_2, % vol. dry	12.2	12.0	12.0	12.0
CO_2, % vol. dry	7.3	7.2	7.3	7.3
Moisture, % vol.	2.8	2.4	3.1	2.8
Flue gas temperature, °F	135	137	134	135
Volumetric flow rate, dscfm	6,257	6299.21	6270.56	6275.68
Isokinetic, %	108	107.7	98.6	104.8
Total PCDD Emissions:				
ng/dscm (Total Mass Basis)	2.5×10^{-3}	1.7×10^{-3}	2.3×10^{-3}	2.2×10^{-3}
ng/dscm @ 7% O_2 (Total Mass Basis)	4.0×10^{-3}	2.6×10^{-3}	3.6×10^{-3}	3.4×10^{-3}
lb/hr (Total Mass Basis)	5.8×10^{-11}	4.0×10^{-11}	5.4×10^{-11}	5.1×10^{-11}
Total PCDF Emissions:				
ng/dscm (Total Mass Basis)	2.3×10^{-3}	2.4×10^{-3}	1.2×10^{-3}	2.0×10^{-3}
ng/dscm @ 7% O_2 (Total Mass Basis)	3.7×10^{-3}	3.7×10^{-3}	1.9×10^{-3}	3.1×10^{-3}
lb/hr (Total Mass Basis)	5.5×10^{-11}	5.5×10^{-11}	2.8×10^{-11}	4.6×10^{-11}
Total PCDD/PCDF				
ng/dscm (Total Mass Basis)	4.8×10^{-3}	4.0×10^{-3}	3.5×10^{-3}	4.1×10^{-3}
ng/dscm @ 7% O_2 (Total Mass Basis)	7.7×10^{-3}	6.3×10^{-3}	5.5×10^{-3}	6.5×10^{-3}
ng/dscm @ 7% O_2 (Toxic Equivalency)	4.1×10^{-4}	3.9×10^{-4}	4.5×10^{-4}	4.2×10^{-4}
lb/hr (Total Mass Basis)	1.1×10^{-10}	9.5×10^{-11}	8.2×10^{-11}	9.7×10^{-11}

TABLE 5-10
PROCESS DATA
CITY OF BELLINGHAM – POST POINT TREATMENT PLANT
INCINERATOR #2

		Cake Feed Rate (lbs/hr)	Afterburner Temp (°F)	Venturi Scrubber Flow (GPM)	WESP Flush Water Flow (GPM)	Venturi Dif. Press (in w.c.)	WESP Current (mAmp)
Parameter	**Run**	**Run Avg**	**Run Avg**	**Run Avg**	**Run Avg**	**Run Avg**	**Run Avg**
PCDD/DF	Run 1	1315	1483	393	2.03	33.80	1.54
	Run 2	1316	1509	393	0.98	33.61	1.66
	Run 3	1301	1504	393	1.06	33.08	1.41
	AVG	1311	1499	393	1.36	33.49	1.54
HCl/PM/ CEMS	Run 1	1255	1337	435	1.05	33.58	2.25
	Run 2	1275	1376	435	2.12	33.85	2.42
	Run 3	1315	1240	435	0.98	34.17	2.89
	AVG	1282	1318	435	1.38	33.87	2.52
Metals	Run 1	1315	1483	393	2.03	33.80	1.54
	Run 2	1316	1509	393	0.98	33.61	1.66
	Run 3	1301	1504	393	1.06	33.08	1.41
	AVG	1311	1499	393	1.36	33.49	1.54

TABLE 5-11
RESULTS SUMMARY FUGITIVE EMISSIONS
CITY OF BELLINGHAM – POST POINT TREATMENT PLANT
ASH LOADING SYSTEM

Test No.:	Run 1	Run 2	Run 3	Average
Date:	10/4/2018	10/4/2018	10/4/2018	--
Time:	0846-0946	0954-1054	1055-1155	--
Fugitive Emissions:				
% of observation period	0	0	0	0

2.2 Sewage Sludge Incineration

There are approximately 170 sewage sludge incineration (SSI) plants in operation in the United States. Three main types of incinerators are used: multiple hearth, fluidized bed, and electric infrared. Some sludge is co-fired with municipal solid waste in combustors based on refuse combustion technology (see Section 2.1). Refuse co-fired with sludge in combustors based on sludge incinerating technology is limited to multiple hearth incinerators only.

Over 80 percent of the identified operating sludge incinerators are of the multiple hearth design. About 15 percent are fluidized bed combustors and 3 percent are electric. The remaining combustors co-fire refuse with sludge. Most sludge incinerators are located in the Eastern United States, though there are a significant number on the West Coast. New York has the largest number of facilities with 33. Pennsylvania and Michigan have the next-largest numbers of facilities with 21 and 19 sites, respectively.

Sewage sludge incinerator emissions are currently regulated under 40 CFR Part 60, Subpart O and 40 CFR Part 61, Subparts C and E. Subpart O in Part 60 establishes a New Source Performance Standard for particulate matter. Subparts C and E of Part 61--National Emission Standards for Hazardous Air Pollutants (NESHAP)--establish emission limits for beryllium and mercury, respectively.

In 1989, technical standards for the use and disposal of sewage sludge were proposed as 40 CFR Part 503, under authority of Section 405 of the Clean Water Act. Subpart G of this proposed Part 503 proposes to establish national emission limits for arsenic, beryllium, cadmium, chromium, lead, mercury, nickel, and total hydrocarbons from sewage sludge incinerators. The proposed limits for mercury and beryllium are based on the assumptions used in developing the NESHAPs for these pollutants, and no additional controls were proposed to be required. Carbon monoxide emissions were examined, but no limit was proposed.

2.2.1 Process Description[1,2]

Types of incineration described in this section include:

- Multiple hearth,
- Fluidized bed, and
- Electric.

Single hearth cyclone, rotary kiln, and wet air oxidation are also briefly discussed.

2.2.1.1 Multiple Hearth Furnaces -

The multiple hearth furnace was originally developed for mineral ore roasting nearly a century ago. The air-cooled variation has been used to incinerate sewage sludge since the 1930s. A cross-sectional diagram of a typical multiple hearth furnace is shown in Figure 2.2-1. The basic multiple hearth furnace (MHF) is a vertically oriented cylinder. The outer shell is constructed of steel, lined with refractory, and surrounds a series of horizontal refractory hearths. A hollow cast iron rotating shaft runs through the center of the hearths. Cooling air is introduced into the shaft which extend

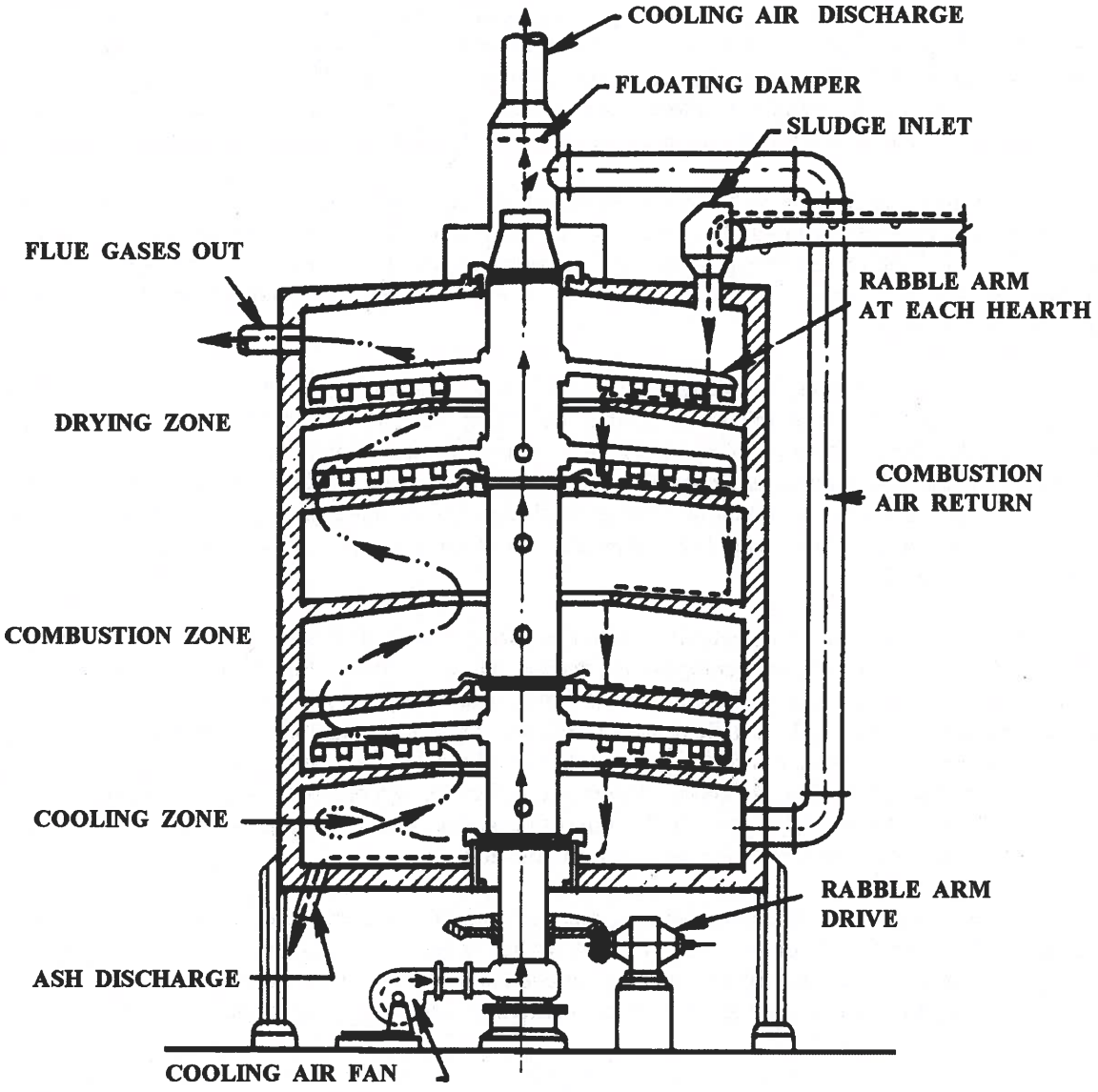

Figure 2.2-1. Cross Section of a Multiple Hearth Furnace

above the hearths. Each rabble arm is equipped with a number of teeth, approximately 6 inches in length, and spaced about 10 inches apart. The teeth are shaped to rake the sludge in a spiral motion, alternating in direction from the outside in, to the inside out, between hearths. Typically, the upper and lower hearths are fitted with four rabble arms, and the middle hearths are fitted with two. Burners, providing auxiliary heat, are located in the sidewalls of the hearths.

In most multiple hearth furnaces, partially dewatered sludge is fed onto the perimeter of the top hearth. The rabble arms move the sludge through the incinerator by raking the sludge toward the center shaft where it drops through holes located at the center of the hearth. In the next hearth the sludge is raked in the opposite direction. This process is repeated in all of the subsequent hearths. The effect of the rabble motion is to break up solid material to allow better surface contact with heat and oxygen. A sludge depth of about 1 inch is maintained in each hearth at the design sludge flow rate.

Scum may also be fed to one or more hearths of the incinerator. Scum is the material that floats on wastewater. It is generally composed of vegetable and mineral oils, grease, hair, waxes, fats, and other materials that will float. Scum may be removed from many treatment units including preaeration tanks, skimming tanks, and sedimentation tanks. Quantities of scum are generally small compared to those of other wastewater solids.

Ambient air is first ducted through the central shaft and its associated rabble arms. A portion, or all, of this air is then taken from the top of the shaft and recirculated into the lowermost hearth as preheated combustion air. Shaft cooling air which is not circulated back into the furnace is ducted into the stack downstream of the air pollution control devices. The combustion air flows upward through the drop holes in the hearths, countercurrent to the flow of the sludge, before being exhausted from the top hearth. Air enters the bottom to cool the ash. Provisions are usually made to inject ambient air directly into the middle hearths as well.

From the standpoint of the overall incineration process, multiple hearth furnaces can be divided into three zones. The upper hearths comprise the drying zone where most of the moisture in the sludge is evaporated. The temperature in the drying zone is typically between 425 and 760°C (800 and 1400°F). Sludge combustion occurs in the middle hearths (second zone) as the temperature is increased to about 925°C (1700°F). The combustion zone can be further subdivided into the upper-middle hearths where the volatile gases and solids are burned, and the lower-middle hearths where most of the fixed carbon is combusted. The third zone, made up of the lowermost hearth(s), is the cooling zone. In this zone the ash is cooled as its heat is transferred to the incoming combustion air.

Multiple hearth furnaces are sometimes operated with afterburners to further reduce odors and concentrations of unburned hydrocarbons. In afterburning, furnace exhaust gases are ducted to a chamber where they are mixed with supplemental fuel and air and completely combusted. Some incinerators have the flexibility to allow sludge to be fed to a lower hearth, thus allowing the upper hearth(s) to function essentially as an afterburner.

Under normal operating condition, 50 to 100 percent excess air must be added to an MHF in order to ensure complete combustion of the sludge. Besides enhancing contact between fuel and oxygen in the furnace, these relatively high rates of excess air are necessary to compensate for normal variations in both the organic characteristics of the sludge feed and the rate at which it enters the incinerator. When an inadequate amount of excess air is available, only partial oxidation of the carbon will occur, with a resultant increase in emissions of carbon monoxide, soot, and hydrocarbons.
Too much excess air, on the other hand, can cause increased entrainment of particulate and unnecessarily high auxiliary fuel consumption.

Multiple hearth furnace emissions are usually controlled by a venturi scrubber, an impingement

tray scrubber, or a combination of both. Wet cyclones and dry cyclones are also used. Wet electrostatic precipitators (Wet ESPs) are being installed as retrofits where tighter limits on particulate matter and metals are required by State regulations.

2.2.1.2 Fluidized Bed Incinerators -

Fluidized bed technology was first developed by the petroleum industry to be used for catalyst regeneration. Figure 2.2-2 shows the cross section diagram of a fluidized bed furnace. Fluidized bed combustors (FBCs) consist of a vertically oriented outer shell constructed of steel and lined with refractory. Tuyeres (nozzles designed to deliver blasts of air) are located at the base of the furnace within a refractory-lined grid. A bed of sand, approximately 0.75 meters (2.5 feet) thick, rests upon the grid. Two general configurations can be distinguished on the basis of how the fluidizing air is injected into the furnace. In the "hot windbox" design the combustion air is first preheated by passing through a heat exchanger where heat is recovered from the hot flue gases. Alternatively, ambient air can be injected directly into the furnace from a cold windbox.

Partially dewatered sludge is fed into the lower portion of the furnace. Air injected through the tuyeres, at pressures of from 20 to 35 kilopascals (3 to 5 pounds per square inch gauge), simultaneously fluidizes the bed of hot sand and the incoming sludge. Temperatures of 750 to 925°C (1400 to 1700°F) are maintained in the bed. Residence times are typically 2 to 5 seconds. As the sludge burns, fine ash particles are carried out the top of the furnace. Some sand is also removed in the air stream; sand make-up requirements are on the order of 5 percent for every 300 hours of operation.

Combustion of the sludge occurs in two zones. Within the bed itself (Zone 1), evaporation of the water and pyrolysis of the organic materials occur nearly simultaneously as the temperature of the sludge is rapidly raised. In the second zone (freeboard area), the remaining free carbon and combustible gases are burned. The second zone functions essentially as an afterburner.

Fluidization achieves nearly ideal mixing between the sludge and the combustion air and the turbulence facilitates the transfer of heat from the hot sand to the sludge. The most noticeable impact of the better burning atmosphere provided by a fluidized bed incinerator is seen in the limited amount of excess air required for complete combustion of the sludge. Typically, FBCs can achieve complete combustion with 20 to 50 percent excess air, about half the excess air required by multiple hearth furnaces. As a consequence, FBC incinerators have generally lower fuel requirements compared to MHF incinerators.

Fluidized bed incinerators most often have venturi scrubbers or venturi/impingement tray scrubber combinations for emissions control.

2.2.1.3 Electric Infrared Incinerators -

The first electric infrared furnace was installed in 1975, and their use is not common. Electric infrared incinerators consist of a horizontally oriented, insulated furnace. A woven wire belt conveyor extends the length of the furnace and infrared heating elements are located in the roof above the conveyor belt. Combustion air is preheated by the flue gases and is injected into the discharge end of the furnace. Electric infrared incinerators consist of a number of prefabricated modules, which can be linked together to provide the necessary furnace length. A cross section of an electric furnace is shown in Figure 2.2-3.

The dewatered sludge cake is conveyed into one end of the incinerator. An internal roller mechanism levels the sludge into a continuous layer approximately one inch thick across the width of the belt. The sludge is sequentially dried and then burned as it moves beneath the infrared heating

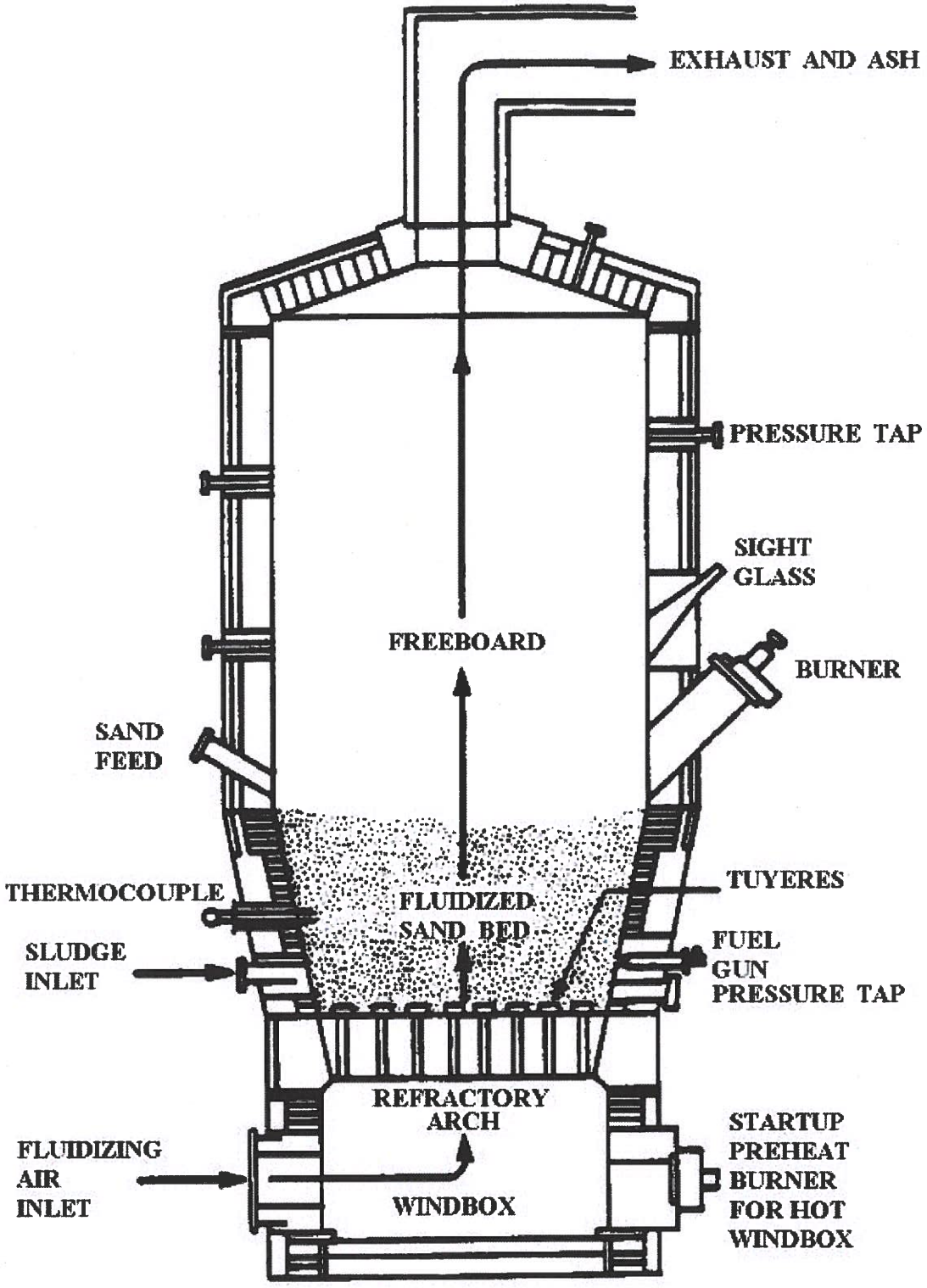

Figure 2.2-2. Cross Section of a Fluidized Bed Furnace

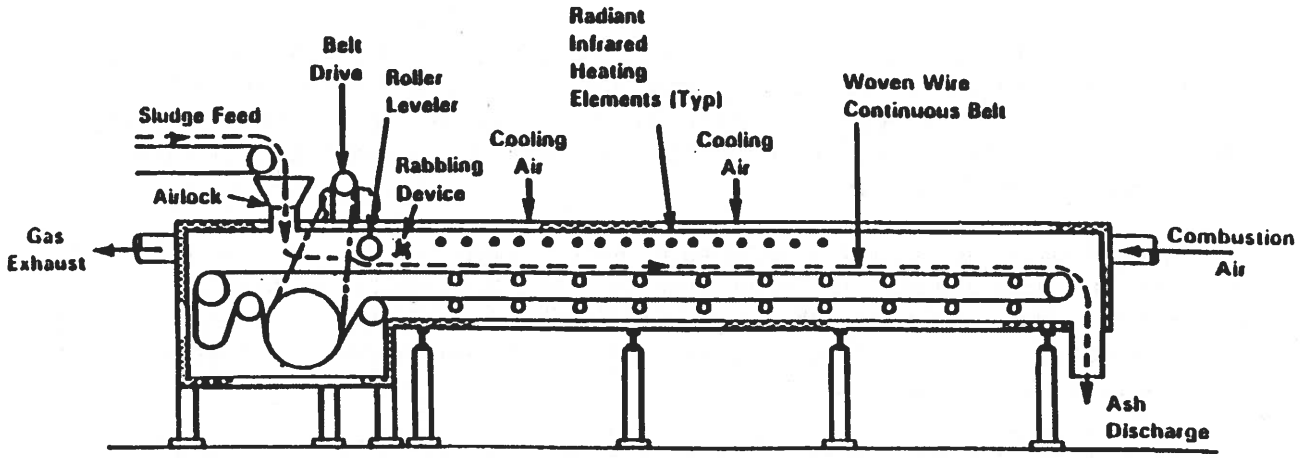

Figure 2.2-3. Cross Section of an Electric Infrared Furnace.

elements. Ash is discharged into a hopper at the opposite end of the furnace. The preheated combustion air enters the furnace above the ash hopper and is further heated by the outgoing ash. The direction of air flow is countercurrent to the movement of the sludge along the conveyor. Exhaust gases leave the furnace at the feed end. Excess air rates vary from 20 to 70 percent.

Compared to MHF and FBC technologies, the electric infrared furnace offers the advantage of lower capital cost, especially for smaller systems. However, electricity costs in some areas may make an electric furnace infeasible. One other concern is replacement of various components such as the woven wire belt and infrared heaters, which have 3- to 5-year lifetimes.

Electric infrared incinerator emissions are usually controlled with a venturi scrubber or some other wet scrubber.

2.2.1.4 Other Technologies -

A number of other technologies have been used for incineration of sewage sludge, including cyclonic reactors, rotary kilns, and wet oxidation reactors. These processes are not in widespread use in the United States and will be discussed only briefly.

The cyclonic reactor is designed for small capacity applications. It is constructed of a vertical cylindrical chamber that is lined with refractory. Preheated combustion air is introduced into the chamber tangentially at high velocities. The sludge is sprayed radially toward the hot refractory walls. Combustion is rapid: The residence time of the sludge in the chamber is on the order of 10 seconds. The ash is removed with the flue gases.

Rotary kilns are also generally used for small capacity applications. The kiln is inclined slightly from the horizontal plane, with the upper end receiving both the sludge feed and the combustion air. A burner is located at the lower end of the kiln. The circumference of the kiln rotates at a speed of about 15 centimeters (cm) per second (6 inches per second). Ash is deposited into a hopper located below the burner.

The wet oxidation process is not strictly one of incineration; it instead utilizes oxidation at elevated temperature and pressure in the presence of water (flameless combustion). Thickened sludge, at about 6 percent solids, is first ground and mixed with a stoichiometric amount of compressed air. The slurry is then pressurized. The mixture is then circulated through a series of heat exchangers before entering a pressurized reactor. The temperature of the reactor is held between 175 and 315°C (350 and 600°F). The pressure is normally 7,000 to 12,500 kilopascals (1,000 to 1,800 pounds per square inch grade). Steam is usually used for auxiliary heat. The water and remaining ash are circulated out the reactor and are finally separated in a tank or lagoon. The liquid phase is recycled to the treatment plant. Offgases must be treated to eliminate odors: wet scrubbing, afterburning, or carbon absorption may be used.

2.2.1.5 Co-incineration and Co-firing -

Wastewater treatment plant sludge generally has a high water content and in some cases, fairly high levels of inert materials. As a result, its net fuel value is often low. If sludge is combined with other combustible materials in a co-incineration scheme, a furnace feed can be created that has both a low water concentration and a heat value high enough to sustain combustion with little or no supplemental fuel.

Virtually any material that can be burned can be combined with sludge in a co-incineration process. Common materials for co-combustion are coal, municipal solid waste (MSW), wood waste and agriculture waste. Thus, a municipal or industrial waste can be disposed of while providing an

autogenous (self-sustaining) sludge feed, thereby solving two disposal problems.

There are two basic approaches to combusting sludge with MSW: (1) use of MSW combustion technology by adding dewatered or dried sludge to the MSW combustion unit, and (2) use of sludge combustion technology by adding processed MSW as a supplemental fuel to the sludge furnace. With the latter, MSW is processed by removing noncombustibles, shredding, air classifying, and screening. Waste that is more finely processed is less likely to cause problems such as severe erosion of the hearths, poor temperature control, and refractory failures.

2.2.2 Emissions And Controls[1-3]

Sewage sludge incinerators potentially emit significant quantities of pollutants. The major pollutants emitted are: (1) particulate matter, (2) metals, (3) carbon monoxide (CO), (4) nitrogen oxides (NO_x), (5) sulfur dioxide (SO_2), and (6) unburned hydrocarbons. Partial combustion of sludge can result in emissions of intermediate products of incomplete combustion (PIC), including toxic organic compounds.

Uncontrolled particulate emission rates vary widely depending on the type of incinerator, the volatiles and moisture content of the sludge, and the operating practices employed. Generally, uncontrolled particulate emissions are highest from fluidized bed incinerators because suspension burning results in much of the ash being carried out of the incinerator with the flue gas. Uncontrolled emissions from multiple hearth and fluidized bed incinerators are extremely variable, however. Electric incinerators appear to have the lowest rates of uncontrolled particulate release of the three major furnace types, possibly because the sludge is not disturbed during firing. In general, higher airflow rates increase the opportunity for particulate matter to be entrained in the exhaust gases. Sludge with low volatile content or high moisture content may compound this situation by requiring more supplemental fuel to burn. As more fuel is consumed, the amount of air flowing through the incinerator is also increased. However, no direct correlation has been established between airflow and particulate emissions.

Metal emissions are affected by metal content of the sludge, fuel bed temperature, and the level of particulate matter control. Since metals which are volatilized in the combustion zone condense in the exhaust gas stream, most metals (except mercury) are associated with fine particulate and are removed as the fine particulates are removed.

Carbon monoxide is formed when available oxygen is insufficient for complete combustion or when excess air levels are too high, resulting in lower combustion temperatures.

Emissions of nitrogen and sulfur oxides are primarily the result of oxidation of nitrogen and sulfur in the sludge. Therefore, these emissions can vary greatly based on local and seasonal sewage characteristics.

Emissions of volatile organic compounds (VOC) also vary greatly with incinerator type and operation. Incinerators with countercurrent airflow such as multiple hearth designs provide the greatest opportunity for unburned hydrocarbons to be emitted. In the MHF, hot air and wet sludge feed are contacted at the top of the furnace. Any compounds distilled from the solids are immediately vented from the furnace at temperatures too low to completely destruct them.

Particulate emissions from sewage sludge incinerators have historically been controlled by wet scrubbers, since the associated sewage treatment plant provides both a convenient source and a good disposal option for the scrubber water. The types of existing sewage sludge incinerator controls range

from low pressure drop spray towers and wet cyclones to higher pressure drop venturi scrubbers and venturi/impingement tray scrubber combinations. Electrostatic precipitators and baghouses are employed primarily where sludge is co-fired with municipal solid waste. The most widely used control device applied to a multiple hearth incinerator is the impingement tray scrubber. Older units use the tray scrubber alone while combination venturi/impingement tray scrubbers are widely applied to newer multiple hearth incinerators and to fluidized bed incinerators. Most electric incinerators and many fluidized bed incinerators use venturi scrubbers only.

In a typical combination venturi/impingement tray scrubber, hot gas exits the incinerator and enters the precooling or quench section of the scrubber. Spray nozzles in the quench section cool the incoming gas and the quenched gas then enters the venturi section of the control device. Venturi water is usually pumped into an inlet weir above the quencher. The venturi water enters the scrubber above the throat and floods the throat completely. This eliminates build-up of solids and reduces abrasion. Turbulence created by high gas velocity in the converging throat section deflects some of the water traveling down the throat into the gas stream. Particulate matter carried along with the gas stream impacts on these water particles and on the water wall. As the scrubber water and flue gas leave the venturi section, they pass into a flooded elbow where the stream velocity decreases, allowing the water and gas to separate. Most venturi sections come equipped with variable throats. By restricting the throat area within the venturi, the linear gas velocity is increased and the pressure drop is subsequently increased. Up to a certain point, increasing the venturi pressure drop increases the removal efficiency. Venturi scrubbers typically maintain 60 to 99 percent removal efficiency for particulate matter, depending on pressure drop and particle size distribution.

At the base of the flooded elbow, the gas stream passes through a connecting duct to the base of the impingement tray tower. Gas velocity is further reduced upon entry to the tower as the gas stream passes upward through the perforated impingement trays. Water usually enters the trays from inlet ports on opposite sides and flows across the tray. As gas passes through each perforation in the tray, it creates a jet which bubbles up the water and further entrains solid particles. At the top of the tower is a mist eliminator to reduce the carryover of water droplets in the stack effluent gas. The impingement section can contain from one to four trays, but most systems for which data are available have two or three trays.

Emission factors and emission factor ratings for multiple hearth sewage sludge incinerators are shown in Tables 2.2-1, 2.2-2, 2.2-3, 2.2-4, and 2.2-5. Tables 2.2-6, 2.2-7, and 2.2-8 present emission factors for fluidized bed sewage sludge incinerators. Table 2.2-9 presents the available emission factors for electric infrared incinerators. Tables 2.2-10 and 2.2-11 present the cumulative particle size distribution and size-specific emission factors for sewage sludge incinerators. Figure 2.2-4, Figure 2.2-5, and Figure 2.2-6 present cumulative particle size distribution and size-specific emission factors for multiple-hearth, fluidized-bed, and electric infrared incinerators, respectively.

Table 2.2-1 (Metric And English Units). CRITERIA POLLUTANT EMISSION FACTORS FOR MULTIPLE HEARTH SEWAGE SLUDGE INCINERATORS[a]

Source Category[b]	Filterable Particulate Matter (PM)			Sulfur Dioxide (SO_2)			Nitrogen Oxides (NO_x)[c]		
	kg/Mg	lb/ton	EMISSION FACTOR RATING	kg/Mg	lb/ton	EMISSION FACTOR RATING	kg/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	5.2 E+01	1.0 E+02	B	1.4 E+01	2.8 E+01	B	2.5 E+00	5.0 E+00	C
Controlled									
Cyclone	2.0 E+00	4.0 E+00	E	2.8 E+00	5.6 E+00	E			
Cyclone/impingement	4.0 E-01	8.0 E-01	E						
Cyclone/venturi	2.5 E-01	5.0 E-01	D						
Cyclone/venturi/impingement	3.1 E-01	6.2 E-01	E						
Electrostatic precipitator									
Fabric filter	2.0 E-03	4.0 E-03	E						
Impingement	7.0 E-01	1.4 E+00	B	3.2 E-01	6.4 E-01	D			
Venturi	1.6 E+00	3.2 E+00	B	2.3 E+00	4.6 E+00	E			
Venturi/impingement/afterburner									
Venturi/impingement	1.1 E+00	2.2 E+00	A	1.0 E-01	2.0 E-01	E			
Venturi/impingement/Wet ESP	2.0 E-01	4.0 E-01	E						
Venturi/Wet ESP									

Table 2.2-1 (cont.).

Source Category	Carbon Monoxide (CO)[c]			Lead[d]			Methane			Total Nonmethane Organic Compounds		
	kg/Mg	lb/ton	EMISSION FACTOR RATING	kg/Mg	lb/ton	EMISSION FACTOR RATING	kg/Mg	lb/ton	EMISSION FACTOR RATING	kg/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	1.55 E+01	3.1 E+01	C	5.0 E-02	1.0 E-01	B				8.4 E-01	1.7 E+00	D
Controlled												
Cyclone				3.0 E-02	6.0 E-02	E				1.5 E+00	3.0 E+00	E
Cyclone/impingement												
Cyclone/venturi				3.0 E-03	6.0 E-03	E				2.2 E-01	4.4 E-01	E
Cyclone/venturi/ impingement				1.1 E-02	2.2 E-02	E						
Electrostatic precipitator				1.0 E-03	2.0 E-03	E						
Fabric filter												
Impingement				2.0 E-02	4.0 E-02	E	3.9 E-01	7.8 E-01	E	7.8 E-01	1.6 E+00	E
Venturi				9.0 E-04	1.8 E-03	E	3.2 E+00	6.4 E+00	E			
Venturi/impingement/ afterburner				5.0 E-02	1.0 E-01	E						
Venturi/impingement				3.0 E-02	6.0 E-02	B						
Venturi/impingement/ Wet ESP												
Venturi/Wet ESP				9.0 E-05	1.8 E-04	E						

[a] Units are pollutants emitted of dry sludge burned. Source Classification Code 5-01-005-15. Blanks indicate no data.
[b] Wet ESP = wet electrostatic precipitator.
[c] Uncontrolled emission factors for NO_x and CO apply to all air pollution control device types.
[d] Hazardous air pollutants listed in the *Clean Air Act*.

Table 2.2-2 (Metric And English Units). ACID GAS EMISSION FACTORS FOR MULTIPLE HEARTH SEWAGE SLUDGE INCINERATORS[a]

Source Category[b]	Sulfuric Acid (H_2SO_4)			Hydrogen Chloride (HCl)[c]		
	g/Mg	lb/ton	EMISSION FACTOR RATING	kg/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	6.0 E-01	1.2 E+00	D			
Controlled						
Cyclone	3.3 E-01	6.6 E-01	E			
Cyclone/impingement				1.0 E-02	2.0 E-02	E
Cyclone/venturi				1.0 E-02	2.0 E-02	E
Cyclone/venturi/impingement						
Electrostatic precipitator						
Fabric filter						
Impingement	5.0 E-02	1.0 E-01	E	1.0 E-02	2.0 E-02	E
Venturi				1.0 E-02	2.0 E-02	E
Venturi/impingement/afterburner						
Venturi/impingement	2.0 E-01	4.0 E-01	E			
Venturi/impingement/Wet ESP						
Venturi/Wet ESP						

[a] Units are pollutants emitted of dry sludge burned. Source Classification Code 5-01-005-15. Blanks indicate no data.
[b] Wet ESP = wet electrostatic precipitator.
[c] Hazardous air pollutants listed in the *Clean Air Act.*

Table 2.2-3 (Metric And English Units). CHLORINATED DIBENZO-P-DIOXIN (CDD) AND CHLORINATED DIBENZOFURAN (CDF) EMISSION FACTORS FOR MULTIPLE HEARTH SEWAGE SLUDGE INCINERATORS[a]

EMISSION FACTOR RATING: E

Source Category[b]	2,3,7,8-TCDD[c]		Total TCDD		Total PCDD	
	µg/Mg	lb/ton	µg/Mg	lb/ton	µg/Mg	lb/ton
Uncontrolled			6.3 E+01	1.3 E-07	2.7 E+00	5.4 E-09
Controlled						
Cyclone						
Cyclone/impingement						
Cyclone/venturi			1.4 E+00	2.8 E-09		
Cyclone/venturi/impingement	3.0 E-01	6.0 E-10				
Electrostatic precipitator						
Fabric filter						
Impingement	5.0 E-01	1.0 E-09	2.8 E+01	5.6 E-08	3.7 E+00	7.4 E-09
Venturi						
Venturi/impingement/afterburner	9.0 E-01	1.8 E-09				
Venturi/impingement	2.0 E+00	4.0 E-09				
Venturi/impingement/Wet ESP						
Venturi/Wet ESP						

Table 2.2-3 (cont.).

Source Category[b]	Total HxCDD		Total HpCDD		Total OCDD	
	µg/Mg	lb/ton	µg/Mg	lb/ton	µg/Mg	lb/ton
Uncontrolled	6.8 E+01	1.4 E-07	3.4 E+02	6.8 E-07	3.7 E+02	7.4 E-07
Controlled						
Cyclone						
Cyclone/impingement						
Cyclone/venturi			8.0 E-01	1.6 E-09	3.4 E+00	6.8 E-09
Cyclone/venturi/impingement	4.4 E+00	8.8 E-09	1.4 E+01	2.8 E-08	3.1 E+01	6.7 E-08
Electrostatic precipitator						
Fabric filter						
Impingement	2.4 E+01	4.8 E-08	7.3 E+01	1.5 E-07	5.3 E+01	1.1 E-07
Venturi						
Venturi/impingement/afterburner	6.0 E+01	1.2 E-07	2.3 E+01	4.6 E-08	1.2 E+01	2.4 E-08
Venturi/impingement	3.8 E+01	7.6 E-08	1.5 E+01	3.0 E-08	1.9 E+01	3.8 E-08
Venturi/impingement/Wet ESP						
Venturi/Wet ESP						

Table 2.2-3 (cont.).

Source Category[b]	2,3,7,8-TCDF[c]		Total TCDF[c]		Total PCDF[c]	
	µg/Mg	lb/ton	µg/Mg	lb/ton	µg/Mg	lb/ton
Uncontrolled	6.2 E+02	1.2 E-06	1.7 E+03	3.4 E-06	9.8 E+02	2.0 E-06
Controlled						
Cyclone						
Cyclone/impingement						
Cyclone/venturi	5.6 E+00	1.1 E-08	5.0 E+01	1.0 E-07	1.1 E+01	2.2 E-08
Cyclone/venturi/impingement			1.8 E+02	3.8 E-07	5.7 E+01	1.1 E-07
Electrostatic precipitator						
Fabric filter						
Impingement	1.8 E+02	3.6 E-07	7.0 E+02	1.4 E-06	3.6 E+02	7.2 E-07
Venturi						
Venturi/impingement/afterburner	5.4 E+01	1.1 E-07	3.5 E+02	7.0 E-07	1.3 E+02	2.6 E-07
Venturi/impingement	4.6 E+01	9.2 E-08	6.0 E+02	1.2 E-06	1.3 E+00	2.6 E-09
Venturi/impingement/Wet ESP						
Venturi/Wet ESP						

Table 2.2-3 (cont.).

Source Category[b]	Total HxCDF[c]		Total HpCDF[c]		Total OCDF[c]	
	µg/Mg	lb/ton	µg/Mg	lb/ton	µg/Mg	lb/ton
Uncontrolled	9.9 E+01	2.0 E-07	4.8 E+02	9.6 E-07	4.9 E+02	9.8 E-07
Controlled						
Cyclone						
Cyclone/impingement						
Cyclone/venturi	3.4 E+00	6.8 E-09	9.0 E-01	1.8 E-09	7.0 E-01	1.4 E-09
Cyclone/venturi/impingement	1.8 E+00	3.6 E-09	2.9 E+00	5.8 E-09	1.8 E+00	3.6 E-09
Electrostatic precipitator						
Fabric filter						
Impingement	1.1 E+02	2.2 E-07	2.0 E+02	4.0 E-07	1.5 E+02	3.0 E-07
Venturi						
Venturi/impingement/afterburner	7.8 E+01	1.5 E-07	4.8 E+01	9.6 E-08	7.7 E+00	1.5 E-08
Venturi/impingement	5.7 E+01	1.1 E-07	4.1 E+01	8.2 E-08	6.3 E+00	1.3 E-08
Venturi/impingement/Wet ESP						
Venturi/Wet ESP						

Table 2.2-3 (cont.).

Source Category[b]	Total Tetra- through Octa- CDD		Total Tetra- through Octa- CDF	
	µg/Mg	lb/ton	µg/Mg	lb/ton
Uncontrolled	8.5 E+02	1.7 E-06	3.8 E+03	7.6 E-06
Controlled				
Cyclone				
Cyclone/impingement				
Cyclone/venturi	5.6 E+00	1.1 E-08	6.6 E+01	1.3 E-07
Cyclone/venturi/impingement	1.1 E+02	2.2 E-07	2.5 E+02	5.0 E-07
Electrostatic precipitator				
Fabric filter				
Impingement	1.8 E+02	3.6 E-07	1.5 E+03	3.0 E-06
Venturi				
Venturi/impingement/afterburner	3.1 E+02	6.2 E-07	4.6 E+02	9.2 E-07
Venturi/impingement	2.7 E+02	5.4 E-07	9.3 E+02	1.9 E-06
Venturi/impingement/Wet ESP				
Venturi/Wet ESP				

[a] Units are pollutant emitted of dry sludge burned. Source Classification Code 5-01-005-15. Blanks indicate no data.
[b] Wet ESP = wet electrostatic precipitator.
[c] Hazardous air pollutants listed in the *Clean Air Act*.

Table 2.2-4 (Metric And English Units). SUMMARY OF ORGANIC COMPOUND EMISSIONS FROM MULTIPLE HEARTH SEWAGE SLUDGE INCINERATORS[a]

Source Category[b]	1,1,1-Trichloroethane[c]			1,1-Dichloroethane[c]			1,2-Dichloroethane[c]		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	6.0 E-02	1.2 E-04	D						
Controlled									
Cyclone									
Cyclone/impingement	1.9 E+00	3.8 E-03	E	2.3 E-01	4.6 E-04	E			
Cyclone/venturi	7.0 E-02	1.4 E-04	E				4.0 E-03	8.0 E-06	E
Cyclone/venturi/impingement									
Electrostatic precipitator									
Fabric filter									
Impingement									
Venturi									
Venturi/impingement/afterburner	1.4 E+00	2.8 E-03	E				3.0 E-02	6.0 E-05	E
Venturi/impingement	6.1 E-01	1.2 E-03	D				1.0 E-02	2.0 E-05	E
Venturi/impingement/Wet ESP									
Venturi/Wet ESP									

Table 2.2-4 (cont.).

Source Category[b]	1,2-Dichlorobenzene			1,3-Dichlorobenzene			1,4-Dichlorobenzene[c]		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	3.7 E-01	7.4 E-04	E				4.1 E-01	8.2 E-04	E
Controlled									
Cyclone									
Cyclone/impingement									
Cyclone/venturi				5.0 E-02	1.0 E-04	E	7.0 E-03	1.4 E-05	E
Cyclone/venturi/impingement									
Electrostatic precipitator									
Fabric filter									
Impingement									
Venturi									
Venturi/impingement/ afterburner									
Venturi/impingement	1.9 E-01	3.8 E-04	E	2.0 E-02	4.0 E-05	E	2.4 E-01	4.8 E-04	E
Venturi/impingement/Wet ESP									
Venturi/Wet ESP									

Table 2.2-4 (cont.).

Source Category[b]	2-Nitrophenol			Acetaldehyde[c]			Acetone		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	6.0 E+00	1.2 E-02	E						
Controlled									
Cyclone									
Cyclone/impingement									
Cyclone/venturi	3.8 E-01	7.6 E-04	E						
Cyclone/venturi/impingement									
Electrostatic precipitator									
Fabric filter									
Impingement				1.6 E-01	3.2 E-04	E			
Venturi							3.2 E+00	6.4 E-03	E
Venturi/impingement/afterburner									
Venturi/impingement	1.2 E+00	2.4 E-03	E						
Venturi/impingement/Wet ESP									
Venturi/Wet ESP									

Table 2.2-4 (cont.).

Source Category[b]	Acetonitrile[c]			Acrylonitrile[c]			Benzene[c]		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	2.5 E+01	5.0 E-02	E	2.5 E+01	5.0 E-02	E	5.8 E+00	1.2 E-02	D
Controlled									
Cyclone									
Cyclone/impingement									
Cyclone/venturi				1.5 E-01	3.0 E-04	E	3.5 E-01	7.0 E-04	E
Cyclone/venturi/impingement									
Electrostatic precipitator									
Fabric filter									
Impingement									
Venturi							1.4 E+01	2.8 E-02	E
Venturi/impingement/ afterburner	7.4 E-01	1.5 E-03	E	4.9 E-01	9.8 E-04	E	1.7 E-01	3.4 E-04	E
Venturi/impingement	9.7 E+00	2.0 E-02	E	1.7 E+01	3.4 E-02	E	6.3 E+00	1.3 E-02	D
Venturi/impingement/Wet ESP									
Venturi/Wet ESP									

Table 2.2-4. (cont.).

Source Category[b]	Bis(2-ethylhexyl)phthalate[c]			Bromodichloromethane			Carbon Tetrachloride[c]		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	9.3 E-01	1.9 E-03	E	4.0 E-03	8.0 E-06	E	1.0 E-02	2.0 E-05	E
Controlled									
Cyclone									
Cyclone/impingement									
Cyclone/venturi	4.0 E-02	8.0 E-05	E				7.0 E-03	1.4 E-05	E
Cyclone/venturi/impingement									
Electrostatic precipitator									
Fabric filter									
Impingement									
Venturi				1.5 E+00	3.0 E-03	E			
Venturi/impingement/ afterburner							1.0 E-03	2.0 E-06	E
Venturi/impingement	3.2 E-01	6.4 E-04	E				3.0 E-02	6.0 E-05	D
Venturi/impingement/Wet ESP									
Venturi/Wet ESP									

Table 2.2-4 (cont.).

Source Category[b]	Chlorobenzene[c]			Chloroform[c]		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	7.5 E-01	1.5 E-03	E	3.0 E-02	6.0 E-05	E
Controlled						
Cyclone						
Cyclone/impingement						
Cyclone/venturi	6.0 E-03	1.2 E-05	E	2.0 E-02	4.0 E-05	E
Cyclone/venturi/impingement						
Electrostatic precipitator						
Fabric filter						
Impingement						
Venturi	4.2 E+00	8.4 E-03	E	3.3 E+00	6.6 E-03	E
Venturi/impingement/afterburner	2.6 E-01	5.2 E-04	E	4.9 E-01	9.8 E-04	E
Venturi/impingement	6.0 E-01	1.2 E-03	E	1.3 E+00	2.6 E-03	D
Venturi/impingement/Wet ESP						
Venturi/Wet ESP						

Table 2.2-4 (cont.).

Source Category[b]	Ethylbenzene[c]			Formaldehyde[c]			Methyl Ethyl Ketone[c]		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	8.0 E-01	1.6 E-03	E				6.1 E+00	1.2 E-02	E
Controlled									
Cyclone									
Cyclone/impingement									
Cyclone/venturi	3.0 E-03	6.0 E-06	E	1.3 E+00	2.6 E-03	E			
Cyclone/venturi/impingement									
Electrostatic precipitator									
Fabric filter									
Impingement									
Venturi	6.0 E+00	1.2 E-02	E	4.0 E-01	8.0 E-04	E	6.1 E+00	1.2 E-02	E
Venturi/impingement/ afterburner	2.0 E-02	4.0 E-05	E				5.0 E-02	1.0 E-04	E
Venturi/impingement	1.0 E+00	2.0 E-03	D				8.9 E+00	1.8 E-02	E
Venturi/impingement/Wet ESP									
Venturi/Wet ESP									

Table 2.2-4 (cont.).

Source Category[b]	Methyl Isobutyl Ketone[c]			Methylene Chloride[c]			Naphthalene[c]		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled				4.0 E-01	8.0 E-04	D	9.2 E+00	1.8 E-02	E
Controlled									
Cyclone									
Cyclone/impingement	1.0 E-02	2.0 E-05	E						
Cyclone/venturi				3.0 E-01	6.0 E-04	E	9.7 E-01	1.9 E-03	D
Cyclone/venturi/impingement									
Electrostatic precipitator									
Fabric filter									
Impingement									
Venturi									
Venturi/impingement/ afterburner				4.0 E-01	8.0 E-04	E			
Venturi/impingement				9.0 E-01	1.8 E-03	D			
Venturi/impingement/Wet ESP									
Venturi/Wet ESP									

Table 2.2-4 (cont.).

Source Category[b]	Perchloroethylene[c]			Phenol[c]			Tetrachloroethane[c]		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	4.0 E-01	8.0 E-04	E	2.2 E+01	4.4 E-02	E			
Controlled									
Cyclone									
Cyclone/impingement									
Cyclone/venturi	3.0 E-01	6.0 E-04	E						
Cyclone/venturi/impingement									
Electrostatic precipitator									
Fabric filter									
Impingement									
Venturi	2.0 E-01	4.0 E-04	E				1.2 E+01	2.4 E-02	E
Venturi/impingement/ afterburner									
Venturi/impingement				1.8 E+00	3.6 E-03	E			
Venturi/impingement/Wet ESP									
Venturi/Wet ESP									

Table 2.2-4 (cont.).

Source Category[b]	Toluene[c]			Trans-1,2-Dichloroethene[c]			Trichloroethene[c]		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	7.8 E+00	1.5 E-02	D	9.0 E-02	1.8 E-04	E	4.0 E-01	8.0 E-04	E
Controlled									
Cyclone									
Cyclone/impingement									
Cyclone/venturi	3.3 E+00	6.6 E-03	E						
Cyclone/venturi/impingement									
Electrostatic precipitator									
Fabric filter									
Impingement									
Venturi	1.6 E+01	3.0 E-02	E						
Venturi/impingement/ afterburner	6.6 E-01	1.3 E-03	E	4.0 E-02	8.0 E-05	D			
Venturi/impingement	6.5 E+00	1.3 E-02	D	5.0 E-02	1.0 E-04	E	4.5 E-01	9.0 E-04	E
Venturi/impingement/Wet ESP									
Venturi/Wet ESP									

Table 2.2-4. (cont.).

Source Category[b]	Vinyl Chloride[c]			Xylene, m,p[c]			Xylene (total)[c]		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	6.6 E+00	1.3 E-02	E				9.5 E-01	1.9 E-03	E
Controlled									
Cyclone									
Cyclone/impingement									
Cyclone/venturi	1.0 E+00	2.0 E-03	E						
Cyclone/venturi/impingement									
Electrostatic precipitator	8.0 E-01	1.6 E-03	E						
Fabric filter									
Impingement									
Venturi				2.0 E+00	4.0 E-03	E			
Venturi/impingement/ afterburner									
Venturi/impingement	3.7 E+00	7.4 E-03	D						
Venturi/impingement/Wet ESP									
Venturi/Wet ESP									

[a] Units are pollutants emitted of dry sludge burned. Source Classification Code 5-01-005-15. Blanks indicate no data.
[b] Wet ESP = wet electrostatic precipitator.
[c] Hazardous air pollutants in the *Clean Air Act.*

Table 2.2-5 (Metric And English Units). SUMMARY OF METAL EMISSIONS FROM MULTIPLE HEARTH SEWAGE SLUDGE INCINERATORS[a]

Source Category[b]	Aluminum			Antimony[c]			Arsenic[c]		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	2.4 E+02	4.8E-01	D	1.5 E+00	3.0 E-03	E	4.7 E+00	9.4 E-03	B
Controlled									
Cyclone	3.0 E-01	6.0E-04	E	3.2 E-01	6.4 E-04	E			
Cyclone/impingement									
Cyclone/venturi							1.0 E-01	2.0 E-04	E
Cyclone/venturi/impingement							8.5 E-01	1.7 E-03	E
Electrostatic precipitator	3.8 E+02	7.6 E-02	E	4.0 E-02	8.0 E-05	E	1.2 E+00	2.4 E-03	E
Fabric filter	6.8 E-01		E	4.0 E-03	8.0 E-06	E	3.0 E-03	6.0 E-06	E
Impingement									
Venturi							5.0 E-02	1.0 E-04	E
Venturi/impingement/ afterburner							4.0 E-02	8.0 E-05	E
Venturi/impingement	9.2 E+01	1.8E-01	E	2.4 E-01	4.8 E-04	E	6.1 E-01	1.2 E-03	B
Venturi/impingement/ Wet ESP									
Venturi/Wet ESP							6.0 E-01	1.2 E-03	E

Table 2.2-5. (cont.).

Source Category[b]	Barium			Beryllium[c]			Cadmium[c]		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	1.5 E+01	3.0 E-02	D	1.5 E-01	3.0 E-04	E	1.6 E+01	3.7 E-02	B
Controlled									
Cyclone	1.0 E-01	2.0 E-04	E	9.0 E-03	1.8 E-05	D	1.7 E+01	3.4 E-02	D
Cyclone/impingement									
Cyclone/venturi							1.3 E+01	2.6 E-02	C
Cyclone/venturi/impingement							8.1 E+00	1.6 E-02	E
Electrostatic precipitator	7.4 E+00	1.5 E-02	E				1.7 E-01	3.4 E-04	E
Fabric filter	4.0 E-03	8.0 E-06	E				1.0 E-02	2.0 E-05	E
Impingement							1.2 E+00	2.4 E-03	E
Venturi							1.1 E-01	2.2 E-04	E
Venturi/impingement/ afterburner							3.0 E+00	6.0 E-03	E
Venturi/impingement	3.2 E+00	6.4 E-03	D	5.0 E-03	1.0 E-05	E	3.3 E+00	6.6 E-03	E
Venturi/impingement/ Wet ESP							1.0 E-01	2.0 E-04	E
Venturi/Wet ESP							4.0 E-02	8.0 E-05	E

Table 2.2-5 (cont.).

Source Category[b]	Calcium			Chromium[c]			Cobalt[c]		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	7.0 E+02	1.4 E+00	C	1.4 E+01	2.9 E-02	B	9.0 E-01	1.8 E-03	C
Controlled									
Cyclone	1.2 E+00	2.4 E-03	E	1.9 E+00	3.8 E-03	D	2.0 E-01	4.0 E-04	E
Cyclone/impingement				4.0 E-02	8.0 E-05	E			
Cyclone/venturi				5.0 E-01	1.0 E-03	E			
Cyclone/venturi/impingement				1.1 E+01	2.7 E-02	E			
Electrostatic precipitator	3.5 E+02	7.0 E-01	E	1.4 E+00	2.8 E-03	E	3.8 E-01	7.6 E-04	E
Fabric filter	8.0 E-02	1.6 E-04	E	4.0 E-02	8.0 E-05	E	6.0 E-03	1.2 E-05	E
Impingement				9.8 E+00	1.9 E-02	E			
Venturi				5.0 E-01	1.0 E-03	E			
Venturi/impingement/ afterburner				4.9 E+00	9.8 E-03	E			
Venturi/impingement	2.6 E+02	5.2 E-01	D	2.1 E+00	4.2 E-03	E	4.5 E-01	9.0 E-04	D
Venturi/impingement/Wet ESP				1.1 E-01	2.2 E-04	E			
Venturi/Wet ESP				1.0 E-02	2.0 E-05	E			

Table 2.2-5 (cont.).

Source Category[b]	Copper			Gold			Iron		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	4.0 E+01	8.0 E-02	B	3.0 E-02	6.0 E-05	E	5.6 E+02	1.1 E+00	C
Controlled									
Cyclone	2.7 E+00	5.4 E-03	E				1.7 E+00	3.4 E-03	E
Cyclone/impingement									
Cyclone/venturi	1.0 E+00	2.0 E-03	E						
Cyclone/venturi/impingement									
Electrostatic precipitator	2.0 E-01	4.0 E-04	E	9.0 E-03	1.8 E-05	E	2.5 E+01	5.0 E-02	E
Fabric filter	2.0 E-03	4.0 E-06	E	2.0 E-03	4.0 E-06	E	2.3 E-01	4.6 E-04	E
Impingement									
Venturi	4.0 E-01	8.0 E-04	E						
Venturi/impingement/afterburner	5.8 E+00	1.2 E-02	E						
Venturi/impingement	5.5 E+00	1.1 E-02	D	1.0 E-02	2.0 E-05	E	4.8 E+01	9.6 E-02	D
Venturi/impingement/Wet ESP									
Venturi/Wet ESP	1.0 E-02	2.0 E-05	E						

Table 2.2-5 (cont.).

Source Category[b]	Manganese[c]			Magnesium			Mercury[c]		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	9.4 E+00	1.9 E-02	C	1.4 E+02	2.8 E-01	C			
Controlled									
Cyclone	3.3 E-01	6.6 E-04	E	1.4 E+00	2.8 E-03	E	2.3 E+00	4.6E-03	E
Cyclone/impingement									
Cyclone/venturi							1.6 E+00	3.2E-03	E
Cyclone/venturi/impingement									
Electrostatic precipitator	3.2 E-01	6.4 E-04	E	8.8 E+00	1.8 E-02	E			
Fabric filter	5.0 E-03	1.0 E-05	E	3.0 E-02	6.0 E-05	E			
Impingement							9.7 E-01	1.9E-03	E
Venturi									
Venturi/impingement/afterburner									
Venturi/impingement	8.5 E-01	1.7 E-03	D	4.2 E+00	8.4 E-03	D	5.0 E-03	1.0E-05	E
Venturi/impingement/Wet ESP									
Venturi/Wet ESP									

Table 2.2-5 (cont.).

Source Category[b]	Nickel[c]			Phosphorus[c]			Potassium		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	8.0 E+00	1.6 E-02	B	3.8 E+02	7.6 E-01	D	5.3 E+01	1.1 E-01	E
Controlled									
Cyclone	8.0 E-02	1.6 E-04	E	8.9 E+00	1.8 E-02	E	9.0 E-01	1.8 E-03	E
Cyclone/impingement	1.3 E+00	2.6 E-03	D						
Cyclone/venturi	3.5 E-01	7.0 E-04	E						
Cyclone/venturi/impingement	4.5 E+00	9.0 E-03	E						
Electrostatic precipitator	2.0 E+00	4.0 E-03	E	6.9 E+00	1.4 E-02	E			
Fabric filter	1.4 E-02	2.8 E-05	E	2.0 E-01		E			
Impingement	4.1 E+00	8.2 E-03	E						
Venturi	6.0 E-02	1.2 E-04	E	9.6 E-01	1.9 E-03	E			
Venturi/impingement/afterburner	9.0 E-01	1.8 E-03	E						
Venturi/impingement	9.0 E-01	1.8 E-03	A	1.2 E+01	2.4 E-02	D	7.3 E+00	1.4 E-02	E
Venturi/impingement/Wet ESP									
Venturi/Wet ESP	3.0 E-03	6.0 E-06	E						

Table 2.2-5 (cont.).

Source Category[b]	Selenium[c]			Silicon			Silver		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	1.5 E-01	3.0 E-04	D	3.4 E+02	6.8 E-01	E	6.5 E-01	1.3 E-03	E
Controlled									
Cyclone				4.6 E+00	9.2 E-03	E			
Cyclone/impingement									
Cyclone/venturi									
Cyclone/venturi/impingement									
Electrostatic precipitator							6.0 E-03	1.2 E-05	E
Fabric filter	1.2 E-01	2.4 E-04	E				1.0 E-04	2.0 E-07	E
Impingement									
Venturi	6.0 E-02	1.2 E-04	E				4.0 E-01	8.0 E-04	E
Venturi/impingement/afterburner									
Venturi/impingement				4.4 E+01	8.8 E-02	E	9.0 E-02	1.8 E-04	E
Venturi/impingement/Wet ESP									
Venturi/Wet ESP									

Table 2.2-5 (cont.).

Source Category[b]	Sodium			Sulfur			Tin		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	4.7 E+01	9.4 E-02	C	3.6 E+03	7.2 E-00	D	1.3 E+01	2.6 E-02	C
Controlled									
Cyclone	1.8 E+00	3.6 E-03	E	1.9 E+01	3.9 E-02	E	5.9 E+00	1.2 E-02	E
Cyclone/impingement									
Cyclone/venturi									
Cyclone/venturi/impingement									
Electrostatic precipitator	5.5 E-01	1.1 E-03	E				2.0 E-01	4.0 E-04	E
Fabric filter	1.0 E-02	2.0 E-05	E	6.0 E+01	1.2 E-01	E	2.0 E-02	4.0 E-05	E
Impingement									
Venturi									
Venturi/impingement/afterburner									
Venturi/impingement	1.4 E+01	2.8 E-02	D	1.1 E+02	2.2 E-01	E	7.9 E+00	1.6 E-02	D
Venturi/impingement/Wet ESP									
Venturi/Wet ESP									

Table 2.2-5 (cont.).

Source Category[b]	Titanium			Vanadium			Zinc		
	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING	g/Mg	lb/ton	EMISSION FACTOR RATING
Uncontrolled	5.1 E+01	1.0 E-01	C	3.3 E+00	6.6 E-03	C	6.6 E+01	1.3 E-01	C
Controlled							1.1 E+01	2.2 E-02	E
Cyclone	1.0 E-01	2.0 E-04	E	3.0 E-01	6.0 E-04	E			
Cyclone/impingement									
Cyclone/venturi							3.8 E+01	7.6 E-02	E
Cyclone/venturi/impingement									
Electrostatic precipitator	9.0 E-01	1.8 E-03	E	9.9 E-01	2.0 E-03	E	3.9 E-01	7.8 E-04	E
Fabric filter	6.0 E-03	1.2 E-05	E	2.0 E-03	4.0 E-06	E	4.0 E-02	8.0 E-05	E
Impingement									
Venturi							4.4 E+00	8.8 E-03	E
Venturi/impingement/ afterburner							3.3 E+01	6.6 E-02	E
Venturi/impingement	3.1 E+00	6.2 E-03	D	8.0 E-01	1.6 E-03	E	2.4 E+01	4.8 E-02	C
Venturi/impingement/Wet ESP									
Venturi/Wet ESP							2.0 E-01	4.0 E-04	E

[a] Units are pollutants emitted of dry sludge burned. Source Classification Code 5-01-005-15. Blanks indicate no data.
[b] Wet ESP = wet electrostatic precipitator.
[c] Hazardous air pollutants listed in the *Clean Air Act*.

Table 2.2-6 (Metric And English Units). CRITERIA POLLUTANT EMISSION FACTORS FOR FLUIDIZED BED SEWAGE SLUDGE INCINERATORS[a]

EMISSION FACTOR RATING: E

Source Category[b]	Particulate Matter		Sulfur Dioxide		Nitrogen Oxides[c]	
	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton
Uncontrolled	2.3 E+02	4.6 E+02	1.5 E-01	3.0 E-01	8.8 E-01	1.7 E+00
Controlled						
Cyclone						
Cyclone/impingement						
Cyclone/venturi						
Cyclone/venturi/impingement	5.0 E-01	1.0 E+00				
Electrostatic precipitator						
Fabric filter						
Impingement	1.3 E-01	2.6 E-01	3.0 E-01	6.0 E-01		
Venturi	5.7 E-01		9.2 E+00	1.8 E+01		
Venturi/impingement/afterburner						
Venturi/impingement	2.7 E-01	1.1 E+00	4.0 E-01	8.0 E-01		
Venturi/impingement/Wet ESP	1.0 E-01	2.0 E-01				
Venturi/Wet ESP						

Table 2.2-6 (cont.).

Source Category[b]	Carbon Monoxide[c] (CO)		Lead[d]		Methane VOC	
	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton
Uncontrolled	1.1 E+00	2.1 E+00	2.0 E-02	4.0 E-02		
Controlled						
Cyclone						
Cyclone/impingement						
Cyclone/venturi						
Cyclone/venturi/impingement						
Electrostatic precipitator						
Fabric filter			5.0 E-06	1.0 E-05		
Impingement			3.0 E-03	6.0 E-03		
Venturi					1.6 E+00	3.2 E+00
Venturi/impingement/afterburner						
Venturi/impingement			8.0 E-02	1.6 E-01	4.0 E-01	8.0 E-01
Venturi/impingement/Wet ESP			1.0 E-06	2.0 E-06		
Venturi/Wet ESP						

[a] Units are pollutants emitted of dry sludge burned. Source Classification Code 5-01-005-16.
[b] Wet ESP = wet electrostatic precipitator.
[c] Uncontrolled Emission Factors for NO_x and CO apply to all Air Pollution Control Device Types.
[d] Hazardous air pollutants listed in the *Clean Air Act*.

Table 2.2-7 (Metric And English Units). ACID GAS AND ORGANIC COMPOUND EMISSION FACTORS FOR FLUIDIZED BED SEWAGE SLUDGE INCINERATORS[a]

EMISSION FACTOR RATING: E

Pollutant	Uncontrolled		Impingement		Venturi/Impingement		Cyclone/Impingement	
	g/Mg	lb/ton	g/Mg	lb/ton	g/Mg	lb/ton	g/Mg	lb/ton
Sulfuric Acid (H_2SO_4)			3.0 E+01	6.0 E-02	6.0 E+01	1.2 E-01		
Hydrogen Chloride (HCl)[b]					5.0 E+01	1.0 E-01		
2,3,7,8-TCDD[b]					3.0 E-07	6.0 E-10		
Total TCDD					2.2 E-06	4.4 E-09		
Total PCDD	1.1 E-06	2.2 E-09						
Total HxCDD					9.0 E-07	1.8 E-09		
Total HpCDD					9.0 E-07	1.8 E-09		
Total OCDD					4.3 E-06	8.6 E-09		
2,3,7,8-TCDF[b]					2.0 E-07	4.0 E-10		
Total TCDF[b]					6.2 E-06	1.2 E-08		
Total PCDF[b]					5.2 E-06	1.0 E-08		
Total HxCDF[b]					4.1 E-06	8.2 E-09		
Total HpCDF[b]					1.6 E-06	3.2 E-09		
Total OCDF[b]					1.3 E-06	2.6 E-09		
1,1,1-Trichloroethane[b]					2.6 E-01	5.2 E-04		
1,2-Dichlorobenzene					6.4 E+01	1.3 E-01		
1,4-Dichlorobenzene[b]					2.4 E+02	4.8 E-01		
Benzene[b]					2.0 E-01	4.0 E-04		
Bis(2-ethylhexyl)phthalate[b]					4.1 E+01	8.2 E-02		
Carbon Tetrachloride[b]					1.2 E-02	2.4 E-05		
Chlorobenzene[b]					5.0 E-03	1.0 E-05		

Table 2.2-7 (cont.).

Pollutant	Uncontrolled		Impingement		Venturi/Impingement		Cyclone/Impingement	
	g/Mg	lb/ton	g/Mg	lb/ton	g/Mg	lb/ton	g/Mg	lb/ton
Chloroform[b]					2.0 E+00	4.0 E-03		
Ethylbenzene[b]					2.5 E-02	5.0 E-05		
Methylene Chloride[b]					7.0 E-01	1.4 E-03		
Naphthalene[b]					9.7 E+01	1.9 E-01		
Perchloroethylene[b]					1.2 E-01	2.4 E-04		
Toluene[b]							3.5 E-01	7.0 E-04
Trichloroethene[b]					3.0 E-02	6.0 E-05		

[a] Units are pollutants emitted of dry sludge burned. Source Classification Code 5-01-005-16. Blanks indicate no data.
[b] Hazardous air pollutants listed in the *Clean Air Act*.

Table 2.2-8 (Metric And English Units). METAL EMISSION FACTORS FOR FLUIDIZED BED SEWAGE SLUDGE INCINERATORS[a]

EMISSION FACTOR RATING: E

Pollutant	Uncontrolled		Impingement		Venturi/Impingement		Venturi/Impingment/ Wet ESP[b]	
	g/Mg	lb/ton	g/Mg	lb/ton	g/Mg	lb/ton	g/Mg	lb/ton
Aluminum					1.9 E+00	3.8 E-03		
Arsenic[c]	2.2 E+00	4.4 E-03			1.5 E-02	3.0 E-05	5.0 E-03	1.0 E-05
Barium					2.4 E-01	4.8 E-04		
Beryllium[c]					2.0 E-04	4.0 E-07	2.0 E-04	4.0 E-07
Cadmium[c]	2.2 E+00	4.4 E-03	4.0 E-01	8.0 E-04	5.7 E-01	1.1 E-03	1.0 E-03	2.0 E-06
Calcium[c]					5.2 E+00	1.0 E-02		
Chromium[c]			3.2 E-01	6.4 E-04	2.5 E-01	5.0 E-04	3.0 E-02	6.0 E-05
Copper					3.0 E-01	6.0 E-04		
Manganese[c]					3.0 E-01	6.0 E-04		
Magnesium					6.0 E-01	1.2 E-03		
Mercury[c]					3.0 E-02	6.0 E-05		
Nickel[c]	1.78 E+01	3.5 E-02			1.7 E+00	3.4 E-03	5.0E-03	1.0E-05
Potassium					6.0 E-01	1.2 E-03		
Selenium[c]					2.0 E-01	4.0 E-04		
Silicon					3.2 E+00	6.4 E-03		
Sulfur					8.6 E+00	1.7 E-02		
Tin					3.5 E-01	7.0 E-04		
Titanium					4.0 E-01	8.0 E-04		
Zinc					1.0 E+00	2.0 E-03		

[a] Units are pollutants emitted of dry sludge burned. Source Classification Code 5-01-005-16.
[b] Wet ESP = wet electrostatic precipitator.
[c] Hazardous air pollutants listed in the *Clean Air Act*.

Table 2.2-9 (Metric And English Units). SUMMARY OF EMISSION FACTORS FOR ELECTRIC INFRARED SEWAGE SLUDGE INCINERATORS[a]

EMISSION FACTOR RATING: E

Source Category[b]	Particulate Matter		Sulfur Dioxide		Nitrogen Oxides	
	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton
Uncontrolled	3.7 E+00	7.4 E+00	9.2 E+00	1.8 E+01	4.3 E+00	8.6 E+00
Controlled						
Cyclone						
Cyclone/impingement						
Cyclone/venturi	1.9 E+00	3.8 E+00				
Cyclone/venturi/impingement						
Electrostatic precipitator						
Fabric filter						
Impingement	8.2 E-01	1.6 E+00				
Venturi						
Venturi/impingement/ afterburner						
Venturi/impingement	9.5 E-01	1.9 E+00	2.3 E+00	4.6 E+00	2.9 E+00	5.8 E+00
Venturi/impingement/ Wet ESP						
Venturi/Wet ESP						

[a] Units are pollutants emitted of dry sludge burned. Source Classification Code 5-01-005-17.
[b] Wet ESP = wet electrostatic precipitator.

Table 2.2-10 (Metric And English Units). CUMULATIVE PARTICLE SIZE DISTRIBUTION FOR SEWAGE SLUDGE INCINERATORS[a]

EMISSION FACTOR RATING: E

Particle Size (μm)	Cumulative Mass % Stated Size				
	Uncontrolled		Controlled (Scrubber)		
	MH[b]	EI[c]	MH	FB[d]	EI
15	15	43	30	7.7	60
10	10	30	27	7.3	50
5.0	5.3	17	25	6.7	35
2.5	2.8	10	22	6.0	25
1.0	1.2	6.0	20	5.0	18
0.625	0.75	5.0	17	2.7	15

[a] Reference 5.
[b] MH = multiple hearth incinerator. Source Classification Code (SCC) 5-01-005-15.
[c] EI = electric infrared incinerator. SCC 5-01-005-17.
[d] FB = fluidized bed incinerator. SCC 5-01-005-16.

Table 2.2-11 (Metric And English Units). CUMULATIVE PARTICLE SIZE-SPECIFIC EMISSION FACTORS FOR SEWAGE SLUDGE INCINERATORS[a]

EMISSION FACTOR RATING: E

Particle Size (μm)	Cumulative Emission Factor									
	Uncontrolled				Controlled (Scrubber)					
	MH[b]		EI[c]		MH		FB[d]		EI	
	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton
15	6.0 E+00	1.2 E+01	4.3 E+00	8.6 E+00	1.2 E-01	2.4 E-01	2.3 E-01	4.6 E-01	1.2 E+00	2.4 E+00
10	4.1 E+00	8.2 E+00	3.0 E+00	6.0 E+00	1.1 E-01	2.2 E-01	2.2 E-01	4.4 E-01	1.0 E+00	2.0 E+00
5.0	2.1 E+00	4.2 E+00	1.7 E+00	3.4 E+00	1.0 E-01	2.0 E-01	2.0 E-01	4.0 E-01	7.0 E-01	1.4 E+00
2.5	1.1 E+00	2.2 E+00	1.0 E+00	2.0 E+00	9.0 E-02	1.8 E-01	1.8 E-01	3.6 E-01	5.0 E-01	1.0 E+00
1.0	4.7 E-01	9.4 E-01	6.0 E-01	1.2 E+00	8.0 E-02	1.6 E-01	1.5 E-01	3.0 E-01	3.5 E-01	7.0 E-01
0.625	3.0 E-01	6.0 E-01	5.0 E-01	1.0 E+00	7.0 E-02	1.4 E-01	8.0 E-02	1.6 E-01	3.0 E-01	6.0 E-01

[a] Reference 5.
[b] MH = multiple hearth incinerator. Source Classification Code (SCC) 5-01-005-15.
[c] EI = electric infrared incinerator. SCC 5-01-005-17.
[d] FB = fluidized bed incinerator. SCC 5-01-005-16.

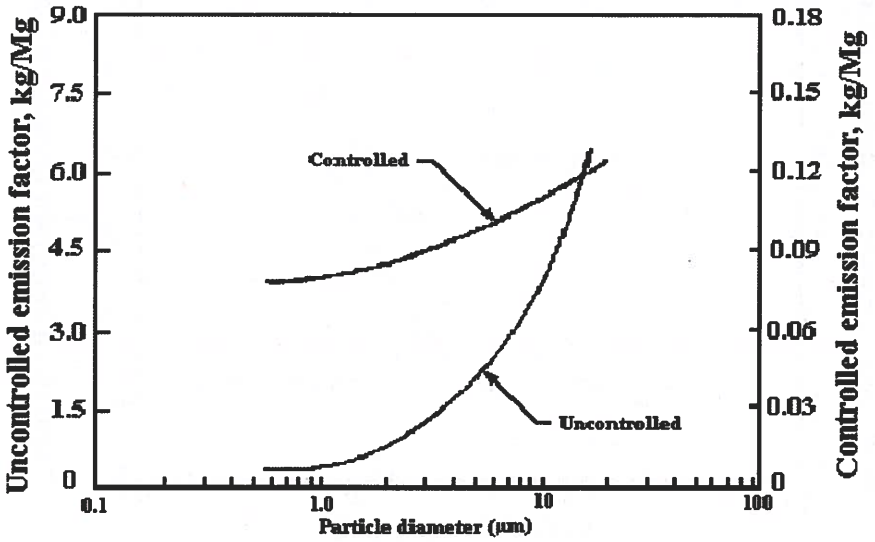

Figure 2.2-4. Cumulative Particle Size Distribution and Size-Specific Emission Factors for Multiple-Health Incinerators

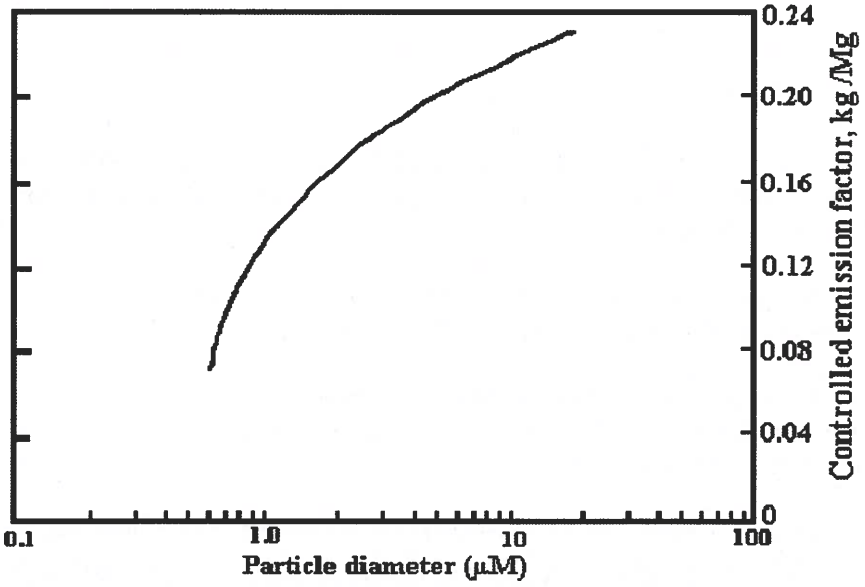

Figure 2.2-5. Cumulative Particle Size Distribution and Size-Specific Emission Factors for Fluidized-Bed Incinerators

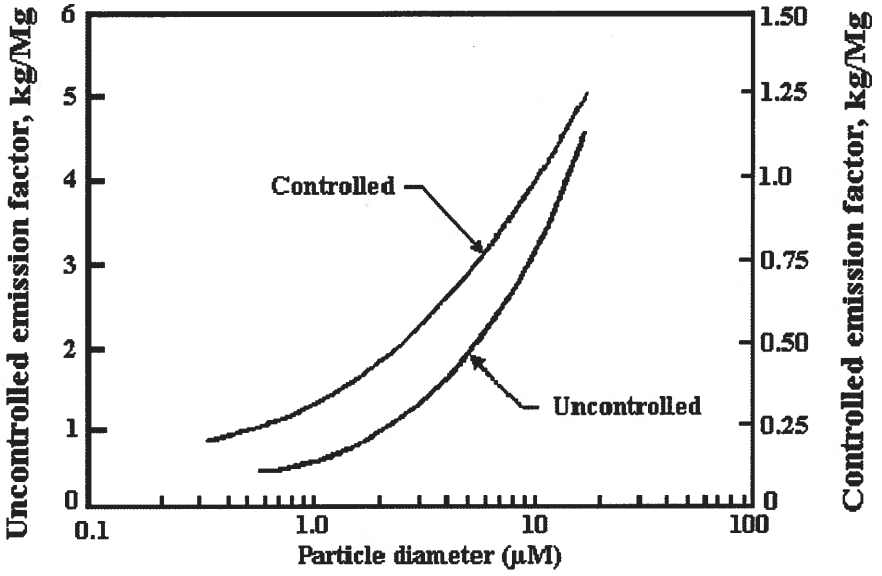

Figure 2.2-6. Cumulative Particle Size Distribution and Size-Specific Emission Factors for Electric (infrared) Incinerators

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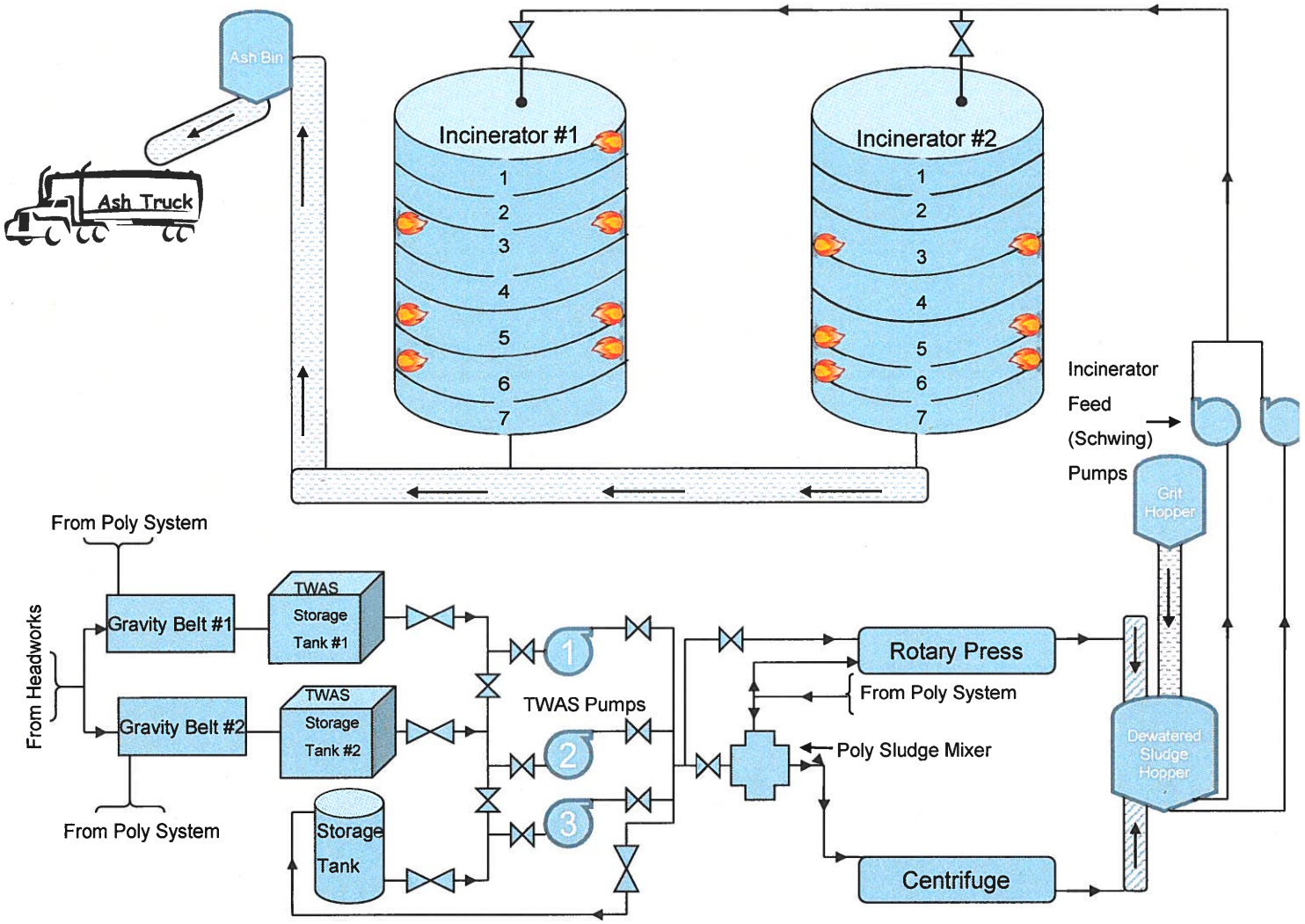
ATTACHMENT 4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Ash Truck
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Incinerator #2
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Incinerator
Feed
(Schwing)
Pumps
Grit
Hopper
From Poly System
From Headworks
Gravity Belt #1
Gravity Belt #2
TWAS
Storage
Tank #1
TWAS
Storage
Tank #2
From Poly System
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Poly Sludge Mixer
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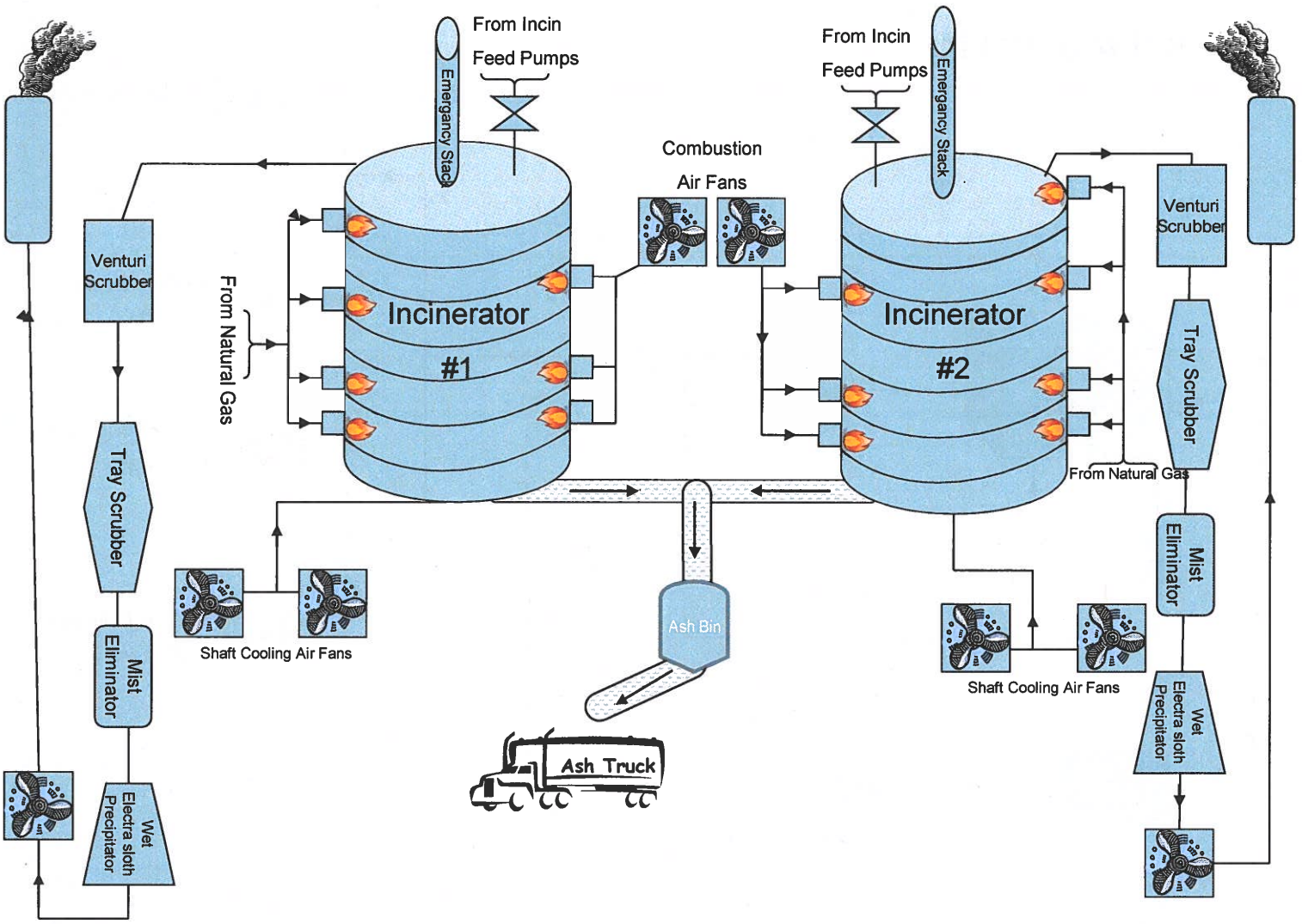
Dewatered
Sludge
Hopper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Emergancy Stack
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Air Fans
Venturi Scrubber
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From Natural Gas
Incinerator #1
Incinerator #2
From Natural Gas
Tray Scrubber
Tray Scrubber
Mist Eliminator
Mist Eliminator
Ash Bin
Shaft Cooling Air Fans
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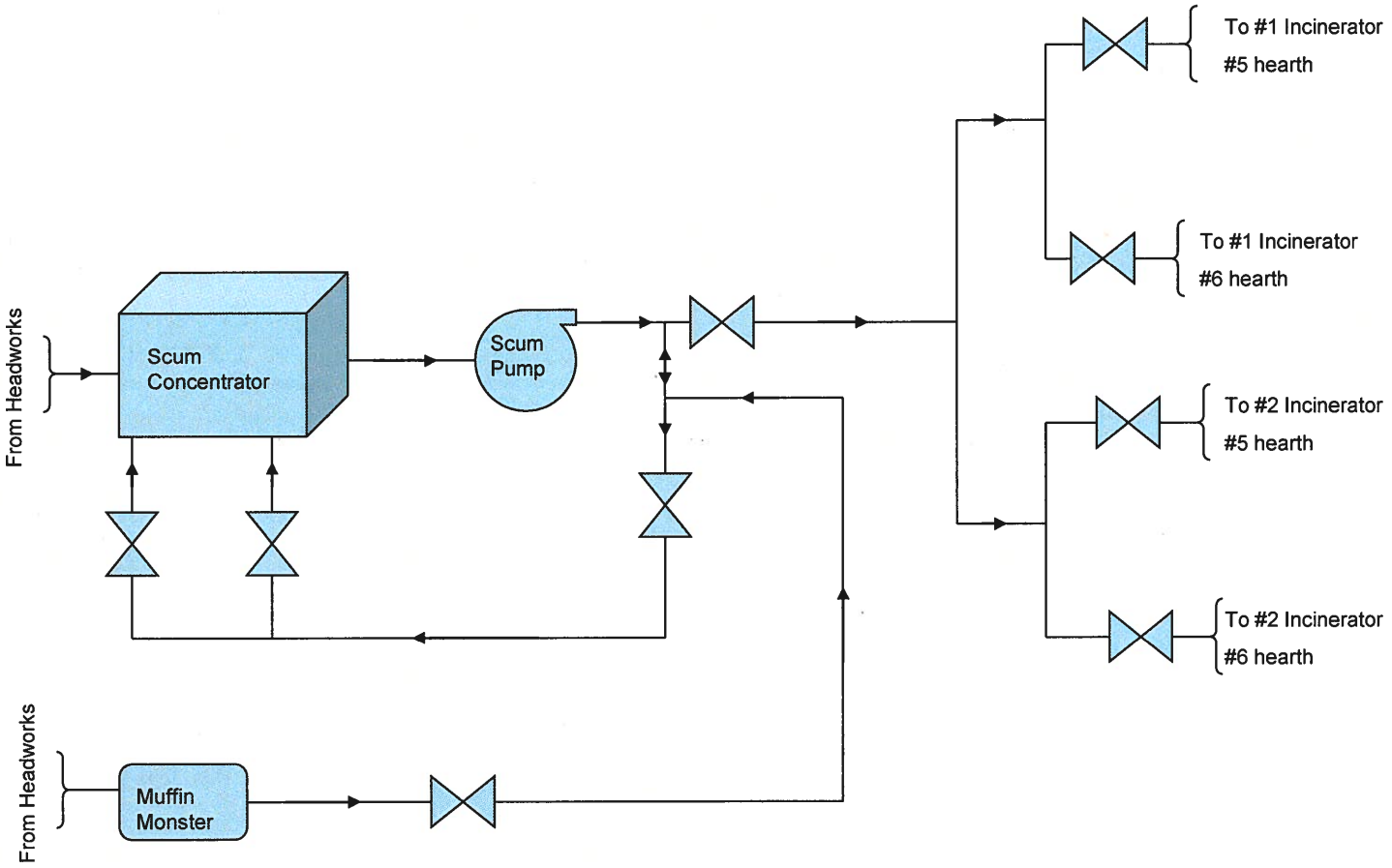
Wet Electra sloth Precipitator
Wet Electra sloth Precipitator
Ash Truck

SCUM SYSTEM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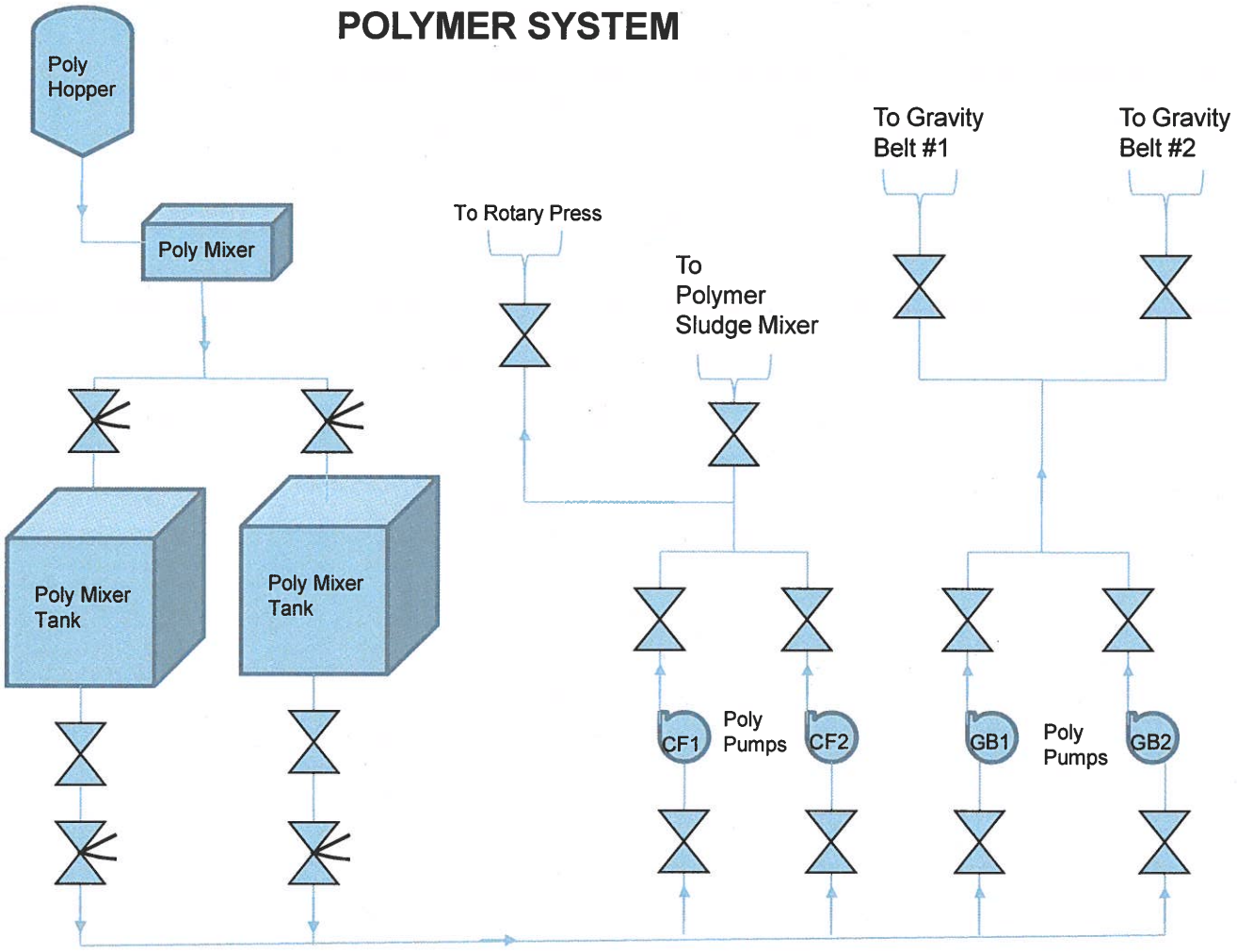
Scum Concentrator
Scum Pump
To #1 Incinerator #5 hearth
To #1 Incinerator #6 hearth
To #2 Incinerator #5 hearth
To #2 Incinerator #6 hearth
From Headworks
Muffin Monster

POLYMER SYSTEM



ATTACHMENT 5

City of Bellingham Post Point Wastewater Treatment Plant

North

March 2019

ATTACHMENT 6

WAC 173-401-532

Categorically exempt insignificant emission units.

(1) General. This section contains lists of units and activities that are categorically exempt from this chapter. The activities listed in this section may be omitted from the permit application.

(2) Mobile transport tanks on vehicles, except for those containing asphalt.

(3) Lubricating oil storage tanks.

(4) Storage tanks, reservoirs and pumping and handling equipment of any size, limited to soaps, lubricants, hydraulic fluid, vegetable oil, grease, animal fat, aqueous salt solutions or other materials and processes using appropriate lids and covers where there is no generation of objectionable odor or airborne particulate matter.

(5) Pressurized storage of oxygen, nitrogen, carbon dioxide, air, or inert gases.

(6) Storage of solid material, dust-free handling.

(7) Vehicle exhaust from auto maintenance and repair shops.

(8) Vents from continuous emissions monitors and other analyzers.

(9) Vents from rooms, buildings and enclosures that contain permitted emissions units or activities from which local ventilation, controls and separate exhaust are provided.

(10) Internal combustion engines for propelling or powering a vehicle.

(11) Recreational fireplaces including the use of barbecues, campfires and ceremonial fires.

(12) Brazing, soldering and welding equipment and oxygen-hydrogen cutting torches for use in cutting metal where in components of the metal do not generate HAPs or HAPs precursors.

(13) Atmospheric generators used in connection with metal heat treating processes.

(14) Metal finishing or cleaning using tumblers.

(15) Metal casting molds and molten metal crucibles that do not contain potential HAPs.

(16) Die casting.

(17) Metal or glass heat-treating, in absence of molten materials, oils, or VOCs.

(18) Drop hammers or hydraulic presses for forging or metalworking.

(19) Electrolytic deposition, used to deposit brass, bronze, copper, iron, tin, zinc, precious and other metals not listed as the parents of HAPs.

(20) Metal fume vapors from electrically heated foundry/forge operations wherein the components of the metal do not generate HAPs or HAP precursors. Electric arc furnaces are excluded from consideration for listing as insignificant.

(21) Metal melting and molten metal holding equipment and operations wherein the components of the metal do not generate HAPs or HAP precursors. Electric arc furnaces are not considered for listing as insignificant.

(22) Inspection equipment for metal products.

(23) Plastic and resin curing equipment, excluding FRP.

(24) Extrusion equipment, metals, minerals, plastics, grain or wood.

(25) Presses and vacuum forming, for curing rubber and plastic products or for laminating plastics.

(26) Roller mills and calendars, rubber and plastics.

(27) Conveying and storage of plastic pellets.

(28) Plastic compression, injection, and transfer molding and extrusion, rotocasting, pultrusion, blowmolding, excluding acrylics, PVC, polystyrene and related copolymers and the use of plasticizer. Only oxygen, carbon dioxide, nitrogen, air, or inert gas allowed as blowing agents.

(29) Plastic pipe welding.

(30) Nonmetallic mineral mines and screening plants except for crushing and associated activities that are not subject to 40 C.F.R. Part 60 Subpart 000. Quarrying of silica rock and associated activities are not considered for listing as insignificant.

(31) Wet sand and gravel screening.

(32) Wax application.

(33) Plant upkeep including routine housekeeping, preparation for and painting of structures or equipment, retarring roofs, applying insulation to buildings in accordance with applicable environmental and health and safety requirements and paving or stripping parking lots.

(34) Agricultural activities on a facility's property that are not subject to registration or new source review by the permitting authority.

(35) Cleaning and sweeping of streets and paved surfaces.

(36) Ultraviolet curing processes.

(37) Hot melt adhesive application with no VOCs in the adhesive formulation.

(38) Laundering, dryers, extractors, tumblers for fabrics, using water solutions of bleach and/or detergents.

(39) Steam cleaning operations.

(40) Steam sterilizers.

(41) Food preparing for human consumption including cafeterias, kitchen facilities and barbecues located at a source for providing food service on the premises.

(42) Portable drums and totes.

(43) Lawn and landscaping activities.

(44) Flares used to indicate danger to the public.

(45) General vehicle maintenance including vehicle exhaust from repair facilities.

(46) Comfort air conditioning or air cooling systems, not used to remove air contaminants from specific equipment.

(47) Natural draft hoods, natural draft stacks, or natural draft ventilators for sanitary and storm drains, safety valves, and storage tanks subject to size and service limitations expressed elsewhere in this section.

(48) Natural and forced air vents and stacks for bathroom/toilet facilities.

(49) Office activities.

(50) Personal care activities.

(51) Sampling connections used exclusively to withdraw materials for laboratory analyses and testing.

(52) Firefighting and similar safety equipment and equipment used to train firefighters excluding fire drill pits.

(53) Materials and equipment used by, and activity related to operation of infirmary; infirmary is not the source's business activity.

(54) Fuel and exhaust emissions from vehicles in parking lots.

(55) Carving, cutting, routing, turning, drilling, machining, sawing, surface grinding, sanding, planing, buffing, shot blasting, shot peening, sintering or polishing: Ceramics, glass, leather, metals, plastics, rubber, concrete, paper stock or wood provided that:

(a) Activity is performed indoors;

(b) Particulate emission control in the immediate vicinity of the activity;

(c) Exhaust from the particulate control is within the building housing the activity;

(d) No fugitive particulate emissions enter the environment.

(56) Oxygen, nitrogen, or rare gas extraction and liquefaction equipment subject to other exemption limitation, e.g., internal and external combustion equipment.

(57) Slaughterhouse equipment except rendering cookers.

(58) Ozonation equipment.

(59) Nonasbestos brake shoe bonding.

(60) Batch loading and unloading of solid phase catalysts.

(61) Demineralization and oxygen scavenging (deaeration) of water.

(62) Pulse capacitors.

(63) Laser trimmers, using dust collection to prevent fugitive emissions.

(64) Plasma etcher, using dust collection to prevent fugitive emissions and using only oxygen, nitrogen, carbon dioxide, or inert gas.

(65) Gas cabinets using only gasses that are not regulated air pollutants.

(66) CO_2 lasers, used only on metals and other materials which do not emit HAPs in the process.

(67) Structural changes not having air contaminant emissions.

(68) Confection cooking equipment.

(69) Mixing, packaging, storage and handling activities of any size, limited to soaps, lubricants, vegetable oil, grease, animal fat, aqueous salt solutions.

(70) Photographic process equipment by which an image is reproduced upon material sensitized to radiant energy, e.g., blueprint activity, photocopiers, mimeograph, telefax, photographic developing, and microfiche.

(71) Pharmaceutical and cosmetics packaging equipment.

(72) Paper trimmers/binders.

(73) Sample gathering, preparation and management.

(74) Repair and maintenance activities, not involving installation of an emission unit and not increasing potential emissions of a regulated air pollutant.

(75) Handling equipment and associated activities for glass and aluminum which is destined for recycling, not the re-refining process itself.

(76) Hydraulic and hydrostatic testing equipment.

(77) Batteries and battery charging.

(78) Porcelain and vitreous enameling equipment.

(79) Solid waste (as defined in the Washington Administrative Code) containers.

(80) Salt baths using nonvolatile salts and not used in operations which result in air emissions.

(81) Shock chambers.

(82) Wire strippers.

(83) Humidity chambers.

(84) Solar simulators.

(85) Environmental chambers not using hazardous air pollutant (HAPs) gasses.

(86) Totally enclosed conveyors.

(87) Steam vents and safety relief valves.

(88) Air compressors, pneumatically operated equipment, systems and hand tools.

(89) Steam leaks.

(90) Recovery boiler blow-down tank.

(91) Salt cake mix tanks.

(92) Continuous digester chip feeders.

(93) Weak liquor and filter tanks.

(94) Process water and white water storage tanks.

(95) Demineralizer tanks.

(96) Clean condensate tanks.

(97) Alum tanks.

(98) Broke beaters, repulpers, pulp and repulping tanks, stock chests and pulp handling.

(99) Lime mud filtrate tank.

(100) Hydrogen peroxide tanks.

(101) Lime mud water.

(102) Lime mud filter.

(103) Liquor clarifiers and storage tanks and associated pumping, piping and handling.

(104) Lime grits washers, filters and handling.

(105) Lime silos and feed bins.

(106) Paper forming.

(107) Dryers (Yankee, after dryer, curing systems and coolings systems).

(108) Vacuum systems exhausts.

(109) Starch cooking.

(110) Stock cleaning and pressurized pulp washing.

(111) Winders.

(112) Chipping.

(113) Debarking.

(114) Sludge dewatering and handling.

(115) Screw press vents.

(116) Pond dredging.

(117) Polymer tanks and storage devices and associated pumping and handling equipment, used for solids dewatering and flocculation.

(118) NonPCB oil filled circuit breakers, oil filled transformers and other equipment that is analogous to, but not considered to be, a tank.

(119) Electric or steam-heated drying ovens and autoclaves.

(120) Sewer manholes, junction boxes, sumps and lift stations associated with wastewater treatment systems.

(121) Water cooling towers processing exclusively noncontact cooling water.

[Statutory Authority: Chapter **70.94** RCW. WSR 94-11-105 (Order 93-30), § 173-401-532, filed 5/17/94, effective 6/17/94.]

WAC 173-401-533

Units and activities defined as insignificant on the basis of size or production rate.

(1) General. This section contains lists of units or activities that are exempt from this chapter on the basis of size or production rate. Units and activities listed in this section must be listed on the permit application.

(2) The following units and activities are determined to be insignificant based on their size or production rate:

(a) Operation, loading and unloading of storage tanks and storage vessels, with lids or other appropriate closure and less than two hundred sixty gallon capacity (35 cft), heated only to the minimum extent to avoid solidification if necessary.

(b) Operation, loading and unloading of storage tanks, not greater than one thousand one hundred gallon capacity, with lids or other appropriate closure, not for use with hazardous air pollutants (HAPs), maximum (max.) vp 550mm Hg.

(c) Operation, loading and unloading of VOC storage tanks (including gasoline storage tanks), ten thousand gallons capacity or less, with lids or other appropriate closure, vp not greater than 80mm Hg at 21°C.

(d) Operation, loading and unloading storage of butane, propane, or liquified petroleum gas (LPG), storage tanks, vessel capacity under forty thousand gallons.

(e) Combustion source less than five million Btu/hr. exclusively using natural gas, butane, propane and/or LPG.

(f) Combustion source, less than five hundred thousand Btu/hr., using any commercial fuel containing less than 0.4% by weight sulfur for coal or less than 1% by weight sulfur for other fuels.

(g) Combustion source, of less than one million Btu/hr. if using kerosene, No. 1 or No. 2 fuel oil.

(h) Combustion source, not greater than five hundred thousand Btu/hr. if burning used oil and not greater than four hundred thousand Btu/hr. if burning waste wood or waste paper.

(i) Welding using not more than one ton per day of welding rod.

(j) Foundry sand molds, unheated and using binders with less than 0.25% free phenol by sand weight.

(k) "Parylene" coaters using less than five hundred gallons of coating per year.

(l) Printing and silkscreening, using less than two gallon/day of any combination of the following: Inks, coatings, adhesives, fountain solutions, thinners, retarders, or nonaqueous cleaning solutions.

(m) Water cooling towers and ponds, not using chromium-based corrosion inhibitors, not used with barometric jets or condensers, not greater than ten thousand gpm, not in direct contact with gaseous or liquid process streams containing regulated air pollutants.

(n) Combustion turbines, of less than 500 HP.

(o) Batch solvent distillation, not greater than fifty-five gallons batch capacity.

(p) Municipal and industrial water chlorination facilities of not greater than twenty million gallons per day capacity. The exemption does not apply to waste water treatment.

(q) Surface coating, using less than two gallons per day.

(r) Space heaters and hot water heaters using natural gas, propane or kerosene and generating less than five million Btu/hr.

(s) Tanks, vessels, and pumping equipment, with lids or other appropriate closure for storage or dispensing of aqueous solutions of inorganic salts, bases and acids excluding:

(i) 99% or greater H_2SO_4 or H_3PO_4

(ii) 70% or greater HNO_3

(iii) 30% or greater HCl

(iv) More than one liquid phase where the top phase is more than one percent VOCs.

(t) Equipment used exclusively to pump, load, unload or store high boiling organic material, material with initial boiling point (IBP) not less than 150°C. or vapor pressure (vp) not more than 5mm Hg

at 21°C. with lids or other appropriate closure.

(u) Smokehouses under twenty square feet.

(v) Milling and grinding activities, using paste-form compounds with less than one percent VOCs.

(w) Rolling, forging, drawing, stamping, shearing, or spinning hot or cold metals.

(x) Dip-coating operations, using materials with less than one percent VOCs.

(y) Surface coating, aqueous solution or suspension containing less than one percent VOCs.

(z) Cleaning and stripping activities and equipment, using solutions having less than one percent VOCs by weight. On metallic substrates, acid solutions are not considered for listing as insignificant.

(aa) Storage and handling of water based lubricants for metal working where the organic content of the lubricant is less than ten percent.

(bb) Municipal and industrial waste water chlorination facilities of not greater than one million gallons per day capacity.

(3) The following units or activities may be determined to be insignificant on a case-by-case basis by the permitting authority:

(a) Pilot plants.

(b) Cold feed aggregate bins for asphalt and concrete production equipment.

(c) Chemical or physical analytical laboratory operations or equipment including fume hoods and vacuum pumps.

(d) NPDES permitted ponds and lagoons utilized solely for the purpose of settling suspended solids and skimming of oil and grease.

(e) Coffee roasters, under fifteen lbs./day of coffee.

(f) Tire buffing of less than six thousand six hundred tires per year.

[Statutory Authority: Chapter **70.94** RCW. WSR 94-11-105 (Order 93-30), § 173-401-533, filed 5/17/94, effective 6/17/94.]

ATTACHMENT 10

Attachment 10. Inapplicable Requirements for AOP

Federal Regulations Not Applicable to the SSI Units

Regulation	Basis for Inapplicability
40 CFR 60 Subpart CCCC Standards of Performance for Commercial and Industrial Solid Waste Incineration Units	Subpart CCCC provides the following exemption under 60.2020. (m) Sewage treatment plants. Incineration units regulated under subpart O of this part (Standards of Performance for Sewage Treatment Plants). The incinerators at Post Point are subject to NSPS Subpart O, therefore Subpart CCCC is not applicable.
40 CFR 60 Subpart DDDD Emissions Guidelines and Compliance Times for Commercial and Industrial Solid Waste Incineration Units (CISWI)	Subpart DDDD applies to commercial or industrial facilities constructed on or before June 4, 2010, that combust solid waste. Post Point is not a commercial or industrial facility. In addition, Subpart DDDD does not directly affect owners and operators of solid waste incinerators. Instead, it is a requirement for states to develop a state plan or follow a federal plan. The State of Washington has not developed a state CISWI plan, nor has EPA promulgated a federal CISWI plan to date.
40 CFR 60 Subpart FFFF Emission Guidelines and Compliance Times for Other Solid Waste Incineration Units That Commenced Construction On or Before December 9, 2004 (OSWI)	60 Subpart FFFF applies to facilities constructed on or before December 9, 2004, that combust municipal or institutional. The sewage sludge incinerators at Post Point do not combust "municipal waste" or "institutional wastes" as defined by Subpart FFFF. In addition, Subpart FFFF does not directly affect owners and operators of solid waste incinerators. Instead, it is a requirement for states to develop a state plan or follow a federal plan. The State of Washington has not developed a state OSWI plan, nor has EPA promulgated a federal OSWI plan to date.
40 CFR 60 Subpart LLLL Standards of Performance for New Sewage Sludge Incineration Units	Subpart LLLL applies to sewage sludge incinerators that commenced construction after October 14, 2010 or commenced a modification after September 21, 2011 (60.4775). The incinerators at Post Point were constructed prior to October 14, 2010, and have not been modified since.
40 CFR 60 Subpart MMMM Emission Guidelines and Compliance Times for Existing Sewage Sludge Incineration Units	This regulation applies to facilities constructed on or before October 14, 2010, that combust sewage sludge. In accordance with 60.5055, Subpart MMMM does not directly affect owners and operators. Instead, it is a requirement for states to develop a state plan, or follow a federal plan per 60.5025. The State of Washington has opted to follow the federal plan promulgated under 40 CFR 62 Subpart LLL.
40 CFR 61 Subpart C National Emission Standard for Beryllium	Subpart C, promulgated April 6, 1973, applies to facilities that have a potential to emit beryllium including sewage sludge incinerators. The Post Point incinerators are not subject to Subpart C because sewage treated at the plant does not contain beryllium waste. This determination is supported by EPA ADI Memo Z980002.
40 CFR 63 Subpart JJJJJJ National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources	The sewage sludge incinerators at Post Point are not equipped with heat recovery steam generating units. Therefore, 63 Subpart JJJJJJ is not applicable.

Federal Regulation Not Applicable to the Entire Wastewater Treatment Plant

Regulation	Basis for Inapplicability
40 CFR 63 Subpart VVV National Emission Standards for Hazardous Air Pollutants: Publicly Owned Treatment Works	Subpart VVV applies to publicly owned wastewater treatment plants that are considered a major source of hazardous air pollutants (HAPs). A letter dated November 12, 2015, by Landau and Associates found that the potential to emit HAPs from the entire Post Point WWTP is less than 10 tons of any single HAP and less than 25 tons for any combination of HAPs. Because the facility is not a major source of HAPs, Subpart VVV is not applicable.

Regulations Applicable to the SSI Units But NOT Under an Air Operating Permit

40 CFR 503 Subpart E Promulgated February 19, 1993	The incinerators at Post Point are subject to Subpart E because they combust sewage sludge. However, Subpart E is not considered an applicable requirement under Title V because Part 503 is not derived from the federal Clean Air Act. Applicable requirements incorporated into Title V permits are defined in WAC 173-401-200. Part 503 requirements do not meet this definition.
NWCAA 530.1 (3/9/00) General Nuisance	Applies to facility. OAC 447b and OAC 287b address specific requirements for Incinerator #1 and Incinerator #2.
NWCAA 535 (3/9/00) Odor Control Measures	Applies to facility. OAC 447b and OAC 287b address specific requirements for Incinerator #1 and Incinerator #2.
NWCAA 550.1 (9/11/14) Preventing Particulate Matter from Becoming Airborne	Applies to facility. OAC 447b and OAC 287b address specific requirements for Incinerator #1 and Incinerator #2.
NWCAA 550.2 (9/11/14) Fallout	Applies to facility. OAC 447b and OAC 287b address specific requirements for Incinerator #1 and Incinerator #2.