

MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Mike Kehoe
Governor

Kurt U. Schaefer
Director

September 9, 2025

Brent Herring
Deputy Director, Wastewater Operations Officer
Blue River Wastewater Treatment Plant
7300 Hawthorne Road
Kansas City, MO 64120

RE: New Source Review Permit - Project Number: 2023-09-046

Dear Brent Herring:

Enclosed with this letter is your permit to construct. Please study it carefully and refer to Appendix A for a list of common abbreviations and acronyms used in the permit. Also, note the special conditions on the accompanying pages. The document entitled, "Review of Application for Authority to Construct," is part of the permit and should be kept with this permit in your files. Operation in accordance with these conditions and your new source review permit application is necessary for continued compliance. The reverse side of your permit certificate has important information concerning standard permit conditions and your rights and obligations under the laws and regulations of the State of Missouri.

This permit may include requirements with which you may not be familiar. If you would like the department to meet with you to discuss how to understand and satisfy the requirements contained in this permit, an appointment referred to as a Compliance Assistance Visit (CAV) can be set up with you. To request a CAV, please contact your local regional office or fill out an online request. The regional office contact information can be found at the following website: <https://dnr.mo.gov/about-us/division-environmental-quality/regional-office>. The online CAV request can be found at <https://dnr.mo.gov/compliance-assistance-enforcement/request-visit>.

If you were adversely affected by this permit decision, you may be entitled to pursue an appeal before the administrative hearing commission pursuant to Sections 621.250 and 643.075.6 RSMo. To appeal, you must file a petition with the administrative hearing commission within thirty days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the administrative hearing commission, whose contact information is: Administrative Hearing Commission, United States Post Office Building, 131 West High Street, Third Floor, P.O. Box 1557, Jefferson City, Missouri 65102, phone: 573-751-2422, fax: 573-751-5018, website: <https://ahc.mo.gov>



Brent Herring
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If you have any questions regarding this permit, please do not hesitate to contact Kathi Jantz, at the Department of Natural Resources' Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102 or at (573) 751-4817. Thank you for your attention to this matter.

Sincerely,

AIR POLLUTION CONTROL PROGRAM



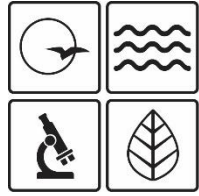
Susan Heckenkamp
New Source Review Unit Chief

SH:kjh

Enclosures

c: Kansas City Regional Office
PAMS File: 2023-09-046

Permit Number: 092025-006



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

MISSOURI AIR CONSERVATION COMMISSION

PERMIT TO CONSTRUCT

Under the authority of RSMo 643 and the Federal Clean Air Act the applicant is authorized to construct the air contaminant source(s) described below, in accordance with the laws, rules and conditions as set forth herein.

Permit Number: 092025-006

Project Number: 2023-09-046
Installation Number: 095-0039

Owner or Operator: Wastewater Treatment Division of Kansas City Water

Owner or Operator Address: 4800 East 63rd Street, Kansas City, MO 64130

Installation Name: Blue River Wastewater Treatment Plant

Installation Address: 7300 Hawthorne Road, Kansas City, MO 64120

Location Information: Jackson County, S25, T50N, R33W

Application for Authority to Construct was made for:

A sewage sludge thermal hydrolysis process. This review was conducted in accordance with Section (5), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*.

☐ Standard Conditions (on reverse) are applicable to this permit.

☒ Standard Conditions (on reverse) and Special Conditions are applicable to this permit.

Director or Designee
Department of Natural Resources

September 9, 2025

Effective Date

STANDARD CONDITIONS:

Permission to construct may be revoked if you fail to begin construction or modification within two years from the effective date of this permit. Permittee should notify the Enforcement and Compliance Section of the Air Pollution Control Program if construction or modification is not started within two years after the effective date of this permit, or if construction or modification is suspended for one year or more.

You will be in violation of 10 CSR 10-6.060 if you fail to adhere to the specifications and conditions listed in your application, this permit and the project review. In the event that there is a discrepancy between the permit application and this permit, the conditions of this permit shall take precedence. Specifically, all air contaminant control devices shall be operated and maintained as specified in the application, associated plans and specifications.

You must notify the Enforcement and Compliance Section of the Department's Air Pollution Control Program and the Department's regional office responsible for the area for which you are located in within 15 days after the actual start up of this (these) air contaminant source(s).

A copy of the permit application and this permit and permit review shall be kept at the installation address and shall be made available to Department's personnel upon request.

You may appeal this permit or any of the listed special conditions to the Administrative Hearing Commission (AHC), P.O. Box 1557, Jefferson City, MO 65102, as provided in RSMo 643.075.6 and 621.250.3. If you choose to appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed. If it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC.

If you choose not to appeal, this certificate, the project review and your application and associated correspondence constitutes your permit to construct. The permit allows you to construct and operate your air contaminant source(s), but in no way relieves you of your obligation to comply with all applicable provisions of the Missouri Air Conservation Law, regulations of the Missouri Department of Natural Resources and other applicable federal, state and local laws and ordinances.

The Air Pollution Control Program invites your questions regarding this air pollution permit. Please contact the Construction Permit Unit using the contact information below.

Contact Information:
Missouri Department of Natural Resources
Air Pollution Control Program
P.O. Box 176
Jefferson City, MO 65102-0176
(573) 751-4817

The regional office information can be found at the following website:
<https://dnr.mo.gov/about-us/division-environmental-quality/regional-office>

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

The special conditions listed in this permit were included based on the authority granted to the Missouri Air Pollution Control Program by the Missouri Air Conservation Law (specifically 643.075) and by the Missouri Rules listed in Title 10, Division 10 of the Code of State Regulations (specifically 10 CSR 10-6.060). For specific details regarding conditions, see 10 CSR 10-6.060 paragraph (3)(E). "Conditions required by permitting authority."

Blue River Wastewater Treatment Plant
Jackson County, S25, T50N, R33W

1. Superseding Condition

- A. The conditions of this permit supersede all special conditions found in the previously issued construction permits from the Kansas City Health Department listed in the table below.

Table 1: Construction Permits – All Special Conditions

Permit Number	Description
I-181	Odor Control Incinerator
510 and amendments A, B, C and D	Three 450 kW generators
591 and amendments A, B, and C	Two Sewage Sludge Incinerators
791	5,000 unleaded gasoline storage tank
1458	Two 6.3 MMBtu/hr natural gas-fired boilers (EU-113 and EU-114)

2. Operational Restriction

- A. The permittee shall not burn digester gas in EU-113 and EU-114 without obtaining a new construction permit.

3. Shut Down of Existing Equipment at Installation

- A. The permittee shall render the Existing Flare (EU-112) inoperable before the date the new equipment being added under this permit begins operations. The equipment may not be operated after the start-up of the new equipment without first obtaining a New Source Review permit.
- B. The permittee shall notify the Air Pollution Control Program's Compliance/Enforcement Section, by mail at P.O. Box 176, Jefferson City, MO 65102 **and** by e-mail at AirComplianceReporting@dnr.mo.gov, no later than 15 days after the following events occur:
- 1) The date of initial start-up of the new equipment added under this permit, and
 - 2) The date the Existing Flare (EU-112) was rendered inoperable.

4. Control Device Requirement – Enclosed Flare (CD-120)

- A. The permittee shall control TRS emissions from the thermal hydrolysis process by venting all biogas from the Thermal Hydrolysis Process (THP) to the enclosed flare (CD-120).
- B. The enclosed flare shall be equipped with a monitoring device that continuously indicates and records the temperature within the combustion chamber/stack.

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

- C. The combustion chamber/stack shall be maintained at or above 1400 degrees Fahrenheit¹ or the minimum temperature established during stack testing.
 - D. The flare shall be operated and maintained in accordance with the manufacturer's specifications, a copy of which shall be kept onsite.
 - E. The permittee shall maintain an operating and maintenance log for the flare (CD-120) which shall include the following:
 - 1) Incidents of malfunction, with impact on emissions, duration of event, probable cause, and corrective actions; and
 - 2) Maintenance activities, with inspection schedule, repair actions, and replacements, etc.
5. Control Device Requirement – Bioscrubbers
- A. The permittee shall control TRS emissions from the pre-THP process operations (Pre-THP Tank 1 & 2 and Pre-THP Centrifuges 1, 2, & 3) using a bioscrubber (CD-BS4).
 - B. The permittee shall control TRS emissions from the sludge screening operations (East Holding Tank, Sludge Screens 1, 2, & 3, Screen Dumpsters and Wet Well) using existing bioscrubbers (CD-BS1, CD-BS2, CD-BS3).
 - C. The bioscrubbers shall be operated and maintained in accordance with the manufacturer's specifications. The bioscrubbers shall be equipped with a gauge or meter, which indicates the pressure drop across the control device. The gauges or meters shall be located such that Department of Natural Resources' employees may easily observe them.
 - D. The permittee shall monitor and record the pressure drop across each bioscrubber at least once every 24 hours of operation. The pressure drop shall be maintained within the manufacturer's design specifications.
 - E. The permittee shall monitor and record the pH of each bioscrubber at least once every 7 days of operation. The pH shall be maintained within the manufacturer's design specifications.
 - F. The permittee shall maintain a copy of the bioscrubbers manufacturer's performance warranty on site.
 - G. The permittee shall maintain an operating and maintenance log for the bioscrubbers that shall include the following:
 - 1) Incidents of malfunction, with impact on emissions, duration of event, probable cause, and corrective actions; and

¹ Minimum enclosed combustor temperature obtained from 40 CFR 60 Subpart OOOO.

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

- 2) Maintenance activities, with inspection schedule, repair actions, and replacements, etc.
6. Performance Testing Requirement – Enclosed Flare (CD-120)
- A. The permittee shall conduct a one-time performance test on the enclosed flare to verify the emission factors for SO₂, NO_x, and CO are less than the emission factors listed in the table below.

Table 2: Emission Factor Requirements

Pollutant	Emission Factor (lb/MMSCF biogas)
SO ₂	861.60
NO _x	54.68
CO	302.44

- B. If the results of the performance testing shows that the emission factor is greater than that indicated in Table 2, another test may be performed within 180 days of the noncompliant test to address any potential issues and take corrective action. If the results of that test are also greater than the emission factor listed in Table 2, then the permittee shall submit an amendment to this permit with an updated potential emission calculations and an evaluation of what effects the higher emission factors would have had on the permit review for this project. The permittee shall submit the results of any such evaluation within 60 days of submitting the performance test report required in Special Condition 6.H. of this permit.
- C. Test method USEPA Method 6, Method 7, and Method 10, or alternative methods preapproved by the Air Pollution Control Program Compliance/Enforcement Section, shall be used.
- D. A completed Proposed Test Plan must be submitted to the Air Pollution Control Program at least 60 days prior to the proposed test date of any such performance tests so that a pretest meeting may be arranged, if necessary, and to assure that the test date is acceptable for an observer from the Air Pollution Control Program to be present.
- E. The Proposed Test Plan must be approved by the Director prior to conducting the above required emissions testing.
- F. The required performance tests shall be conducted during periods of representative conditions and shall be conducted at a minimum biogas process rate of 450 scfm biogas.
- G. The performance tests shall be performed within 180 days after the start of operation of the enclosed flare.
- H. One electronic copy of a written report of the performance test results shall be submitted to StackTesting@dnr.mo.gov within 60 days of

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

completion of any required testing. The report must include legible copies of the raw data sheets, analytical instrument laboratory data, and complete sample calculations from the required U.S. EPA Method for at least one sample run.

- I. The test report is to fully account for all operational and emission parameters addressed both in the permit conditions as well as in any other applicable state or federal rules or regulations. Specifically, the test report shall document:
 - 1) The biogas flowrate to the flare during each test run.
 - 2) The temperature of the enclosed flare combustion chamber during each test run.
 - 3) The ambient air temperature during each test run.
 - 4) The results of the concurrent biogas sulfur concentration testing requirement according to Special Condition 8.
7. Performance Testing Requirement – Bioscrubber (CD-BS4)
 - A. The permittee shall conduct a one-time performance test on the inlet and outlet stream of the bioscrubber (CD-BS4) to verify that the combined control efficiency of TRS compounds is at least 95%.
 - B. If the results of the performance testing shows that the control efficiency is less than that indicated in Special Condition 7.A., another test may be performed within 180 days of the noncompliant test to address any potential issues and take corrective action. If the results of that test are also less than the control efficiency indicated in Special Condition 7.A., then the permittee shall submit an amendment to this permit with an updated potential emissions calculations and an evaluation of what effects the higher emission rates would have had on the permit review for this project. The permittee shall submit the results of any such evaluation within 60 days of submitting the performance test report required in Special Condition 7.H of this permit.
 - C. The most recent version of test method ASTM D5504, or an alternative method preapproved by the Air Pollution Control Program Compliance/Enforcement Section, shall be used to demonstrate compliance with Special Condition 7.A.
 - D. A completed Proposed Test Plan must be submitted to the Air Pollution Control Program at least 60 days prior to the proposed test date of any such performance tests so that a pretest meeting may be arranged, if necessary, and to assure that the test date is acceptable for an observer from the Air Pollution Control Program to be present.
 - E. The Proposed Test Plan must be approved by the Director prior to conducting the above required emissions testing.

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

- F. The required performance tests shall be conducted during periods of representative conditions and shall be conducted at the maximum bioscrubber process rate (15,750 scfm) or within ten percent (10%) of this rated capacity, not to include periods of start-up, shutdown, or malfunction. If the tests are not performed within ten percent (10%) of the maximum process rate, then ten percent (10%) within the tested rate shall become the new maximum process rate.
 - G. The performance tests shall be performed within 180 days after the start of operation of the bioscrubber (CD-BS4).
 - H. One electronic copy of a written report of the performance test results shall be submitted to StackTesting@dnr.mo.gov within 60 days of completion of any required testing. The report must include legible copies of the raw data sheets, analytical instrument laboratory data, and complete sample calculations from the required test method for at least one sample run.
 - I. The test report is to fully account for all operational and emission parameters addressed both in the permit conditions as well as in any other applicable state or federal rules or regulations. Specifically, the test report shall document:
 - 1) The bioscrubber air flowrate during each test run.
 - 2) The pressure drop across the bioscrubber during each test run.
 - 3) The pH of the bioscrubber during each test run.
 - 4) The ambient air temperature during each test run.
 - 5) The concentration in parts per million by volume (ppmv) for each sulfur compound detected for each test run.
8. Sulfur Content Limit
- A. The total sulfur concentration of all sulfur compounds in the biogas vented to the flare shall not exceed 5,200 parts per million by volume (ppmv).
 - 1) One sample shall be collected and analyzed from the biogas in the west holding tank once per quarter, beginning within 60 days after startup of the THP process.
 - 2) If six consecutive tests show compliance with Special Condition 8.A, then testing shall be continued at one sample per year.
 - 3) An additional sample shall be collected at the time of the biogas flare testing required by Special Condition 6.
 - B. The most recent version of test method ASTM D5504, or an alternative method preapproved by the Air Pollution Control Program Compliance/Enforcement Section, shall be used to demonstrate compliance with Special Condition 8.A.
 - 1) Test results shall be validated with concurrent spiking samples collected in the field for each biogas sample collected.

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

- 2) Samples shall be validated according to the procedures outlined in EPA Test Method 18 Section 8.4.2. "Recovery Study for Bag Sampling", except the following:
 - a) The spiking compound shall be limited to hydrogen sulfide for test validation purposes only.
 - b) All compounds measured according to ASTM D5504 shall be corrected with the calculated R value for hydrogen sulfide.
 - 3) Field collected spiking samples may be discontinued upon approval from the Air Pollution Control Program Compliance/Enforcement Section.
 - C. A completed Proposed Sampling/Test Plan must be submitted to the Air Pollution Control Program at least 60 days prior to the first proposed sample collection date so that a pre-sample collection meeting may be arranged, if necessary, and to assure that the sample collection date is acceptable for an observer from the Air Pollution Control Program to be present.
 - D. The Proposed Sampling/Test Plan must be approved by the Director prior to the first sample collection.
 - E. Notification and preapproval of subsequent sample collection and testing may be discontinued after the first sample testing is complete.
 - F. One electronic copy of a written report of the performance test results shall be submitted to StackTesting@dnr.mo.gov within 60 days of completion of any required testing. The report must include legible copies of the raw data sheets, analytical instrument laboratory data, and complete sample calculations from the required method for at least one sample run.
 - G. The test report is to fully account for all operational and emission parameters addressed both in the permit conditions as well as in any other applicable state or federal rules or regulations. Specifically, the test report shall document:
 - 1) The concentration in parts per million by volume (ppmv) for each sulfur compound detected.
 - 2) The total sulfur concentration in parts per million by volume (ppmv).
9. Cooling Tower Operating Requirements
 - A. The cooling towers shall be operated and maintained in accordance with the manufacturer's specifications. Manufacturer's specifications shall be kept on site and made readily available to Department of Natural Resources' employees.
 - B. The cooling tower circulation rate shall not exceed the circulation rate specified in Table 3. The permittee shall demonstrate compliance with the

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

cooling tower circulation rate by maintaining documentation of the circulation rate from the cooling tower manufacturer.

- C. The cooling tower drift loss shall not exceed the drift loss specified in Table 3. The permittee shall demonstrate compliance with the cooling tower drift rate by maintaining documentation of the drift loss from the cooling tower manufacturer.

Table 3: Cooling Tower Specifications

Emission Point	Description	Circulation Rate (gpm)	Drift Loss
EP-123	Amcot ST-60	138	0.2%
EP-124	Amcot ST-150	351	0.2%
EP-125	Marley	3,320	0.001%

- D. The total dissolved solids (TDS) concentration in the recirculated cooling water shall not exceed a TDS concentration of 930 parts per million (ppm). A TDS sample shall be collected, from the recirculated water for each cooling tower and analyzed to determine the TDS concentration using the following schedule:
- 1) One sample shall be collected and analyzed from the recirculated water for each cooling tower once per month, beginning within 30 days after startup of the cooling tower.
 - 2) For cooling towers that share the same recirculated water system, one sample may be used to represent all cooling towers with the shared recirculated water system.
 - 3) If six consecutive tests show compliance with Special Condition 9.D., then testing shall be continued at one sample per year.
10. **Ambient Impact Analysis Requirements**
- A. In the event that the as-built emission rates or stack parameters are different from those used in the ambient impact analysis (See tables at the end of this permit), the permittee shall submit an updated Ambient Air Quality Impact Analysis (AAQIA) to the Department's Air Pollution Control Program for further review. If required, an updated AAQIA shall be submitted within 120 days of the start of operation of the enclosed flare (CD-120).
- B. The permittee shall report any changes to the facility layout to the Department's Air Pollution Control Program upon completion of construction and prior to the start of operation. Staff will determine if the changes require the submittal of an updated AAQIA.
11. **Emission Unit List for Miscellaneous Natural Gas Combustion Sources**
- A. The permittee shall provide with their next operating permit application a list of individual emission units that comprise all natural gas combustion sources installed for this project. The list shall include the individual heat input for each emission unit.

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

12. Record Keeping and Reporting Requirements
 - A. The permittee shall maintain all records required by this permit for not less than five years and shall make them available immediately to any Missouri Department of Natural Resources' personnel upon request.
 - B. The permittee shall report to the Air Pollution Control Program's Compliance/Enforcement Section, by mail at P.O. Box 176, Jefferson City, MO 65102 **and** by e-mail at AirComplianceReporting@dnr.mo.gov, no later than 10 days after the end of the month during which any record required by this permit shows an exceedance of a limitation imposed by this permit.

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE
SECTION (5) REVIEW

Project Number: 2023-09-046
Installation ID Number: 095-0039
Permit Number: 092025-006

Installation Address:

Blue River Wastewater Treatment Plant
7300 Hawthorne Road
Kansas City, MO 64120

Owner or Operator:

KC Water Wastewater Treatment Division
4800 East 63rd Street
Kansas City, MO 64130

Jackson County, S25, T50N, R33W

REVIEW SUMMARY

- The permittee has applied for authority to construct a sewage sludge thermal hydrolysis process.
- The revised application was deemed complete January 28, 2025.
- HAP emissions are expected from the combustion of natural gas in the boilers and the combustion of biogas in the flare.
- 40 CFR 60 Subpart Dc, "Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units" applies to the 14.4 MMBtu/hr natural gas-fired boilers (EU121 & EU122).
- None of the NESHAPs apply to this installation. None of the currently promulgated MACT regulations apply to the proposed equipment.
- An enclosed flare (CD-120) and a bioscrubber (CD-BS4) are being used to control TRS emissions from the equipment in this permit. Three existing bioscrubbers (CD-BS1, BS2, and BS3) are included in the special conditions to make them practically enforceable because their uncontrolled potential emissions exceed the de minimis level for TRS emissions.
- This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of SO₂ are above de minimis levels.
- This installation is located in Jackson County, an attainment/unclassifiable area for all criteria pollutants.
- This installation is not on the List of Named Installations found in 10 CSR 10-6.020(3)(B), Table 2. The installation's major source level is 250 tons per year and fugitive emissions are not counted toward major source applicability.
- Ambient air quality modeling was performed to determine the ambient impact of SO₂.

- Emissions testing is required as a part of this permit. Testing may be required as part of other state, federal or applicable rules.
- A revision to your Part 70 Operating Permit application is required for this installation within 1 year of equipment startup.
- Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

The Blue River Wastewater Treatment Plant (Blue River WWTP) is located on the north side of Kansas City in Jackson County where the Blue River empties into the Missouri River. It is the largest wastewater treatment facility in the Kansas City area. The facility operates under Part 70 Operating Permit #OP2011-026.

Installation History

The following installation description was obtained from an August 28, 2023, facility inspection report:

“The Blue River Wastewater Treatment Plant is a 120 million gallon per day capacity municipal wastewater treatment facility located in the Lower Missouri-Crooked Watershed. Wastewater received at the plant is treated and discharged into the Missouri River. Until recently, solids removed from the wastewater was dewatered and burned in incinerators, landfilled, or sent to Birmingham Farm for land application. The installation had three multiple hearth incinerators, two of which were modified with fume afterburners and scrubbers to reduce emissions to the ambient air. Only the two modified incinerators were permitted to operate. The third incinerator was left to be modified and brought into service should there be a necessity to do so. In reality, the facility operated only one incinerator and the others were inoperable. Other emission units include three engine generators, and two boilers fueled with digester gas and pipeline natural gas; two odor control flares to burn excess digester gas with pipeline natural gas pilots; and portable diesel-powered pumps, generators and compressors. The installation had the potential to emit major levels of nitrogen oxides (NO_x).

As of July 2020, the last remaining incinerator was shut down and Blue River WWTP is currently utilizing lime stabilization to handle the sludge while a new waste management system is being built. KC Water had reviewed the existing system and available replacement options and determined the best economic and earth-friendly investment for Kansas City was to use a Thermal Hydrolysis Process (THP).” (Christina Kerr, Environmental Specialist, Missouri Department of Natural Resources, Kansas City Regional Office, Report of Inspection, August 28, 2023)

The following construction permits have been issued to Blue River WWTP from the Kansas City Health Department. The conditions of this permit supersede the special conditions in previous permits where all the equipment has been removed or is no longer in use. The conditions of permit 1458 have also been superseded because the capability to use digester gas as an alternative fuel has been removed.

Table 4: Construction Permit History

Permit Number	Description	Status of Equipment
I-181	Odor Control Incinerator	Removed/No Longer in Use
510 A, B, and C	Three 450 kW generators	Removed/No Longer in Use
591 A, B, and C	Two Sewage Sludge Incinerators	Removed/No Longer in Use
791	5,000 unleaded gasoline storage tank	Removed/No Longer in Use

1428	350 kW emergency generator	Active
1458	Two 6.3 MMBtu/hr digester or natural gas-fired boilers (EU-113 and EU-114)	Active with the capability if firing digester gas-permanently removed

In the previous five years, Blue River WWTP has received several violations, summarized in the following table:

Table 5: Compliance History

Report Description	Violations
RNOV# KCAP23007 Inspection August 28, 2023	1. Facility was not following the fugitive emission observations monitoring schedule as outlined in the operating permit. 2. Facility has commenced construction of new equipment (thermal hydrolysis process) prior to issuance of a construction permit or a pre-construction waiver.
Inspection October 8, 2021	In compliance
RNOV#AP19005 Stack Testing Report August 2, 2019	Failure to demonstrate compliance with the emission limits and standards located in Table 3 of 40 CFR 60 Subpart M. Blue River exceeded the emission limits for lead (Pb) and Sulfur Dioxide (SO ₂) during the 2019 performance test.
RNOV#API8002 Stack Testing Report March 19, 2019	1. Failure to monitor pH as required by §60.5225 and §60.5190(d) of 40 CFR 60 Subpart M. 2. Failure to conduct the Performance Test under conditions representative of normal operations as required by §60.5220(a)(1) of 40 CFR Subpart M. 3. Failure to demonstrate compliance with the emission limits and standards located in Table 3 of 40 CFR 60 Subpart M. Blue River exceeded the emission limits for lead (Pb) during the 2017 performance test. 4. Failure to adhere to the testing requirements in Table 3 of 40 CFR 60 Subpart M and 40 CFR 60 Subpart A "General Provisions."

PROJECT DESCRIPTION

As indicated in the compliance history table, KC Water submitted this application after receiving a violation for commencing construction prior to obtaining a permit.

This project is the first phase of a two-phase project. For Phase One, Blue River WWTP is installing a sewage sludge processing system that will sterilize the sludge with a new process called a Thermal Hydrolysis Process (THP, EU-120). The THP and anaerobic digestion processes of the WWTP generate a methane-rich biogas. For this project the biogas will be vented to an enclosed flare (CD-120). For Phase Two of the project, the biogas will be vented to a sulfur removal process and converted to Renewable Natural Gas (RNG) for use in the natural gas pipeline. These projects are being reviewed in two phases because the equipment for Phase Two has not been determined. Phase Two will include the emissions associated with Phase One and both projects will be aggregated as a single project for permitting purposes.

The following table provides a summary of the emission units installed or modified for this project (Phase One).

Table 6: Emission Units and Control Devices Being Installed for this Project

Emission Unit	Emission Unit Description	MHDR	Control Device	Control Device Description
EU-120	Cambi THP Anaerobic Digesters (2) West Holding Tank Modified with a Double Membrane Cover	900 scfm biogas	CD-120	John Zink Hamworthy Enclosed ZTOF® Flare 7'8" ID and 8'8" OD 1,308 scfm natural gas 97.7% Removal Efficiency for H ₂ S and VOC
N/D	THP Biosolids Dewatering Processes	94 dry ton per day (roughly 35% solids)	CD-BS4 CD-CS5	Bioscrubber Chemical Scrubber
EU-121	Natural Gas-Fired Boiler # 3	14.4 MMBtu/hr	N/A	N/A
EU-122	Natural Gas-Fired Boiler # 4	14.4 MMBtu/hr	N/A	N/A
EU-123	Cooling Tower 1	8,280 gal/hr	N/A	N/A
EU-124	Cooling Tower 2	21,060 gal/hr	N/A	N/A
EU-125	Cooling Tower 3	199,200 gal/hr	N/A	N/A
N/A	Miscellaneous Natural Gas Combustion Sources each <10 MMBtu/hr	34 MMBtu/hr	N/A	N/A

N/A = Not Applicable; THP = Thermal Hydrolysis Process

THP Process Description (EU-120)

Raw sewage sludge (approx. 16.5% solids) from the wastewater treatment plant is transferred to the thermal hydrolysis equipment which heats the slurry in a batch mode to 330°F for 20 minutes for the purposes of 1) sterilizing the sludge for subsequent land application and 2) hydrolyzing the solids for more efficient digestion. The thermally treated sludge is then transferred to two modified anaerobic digesters where biogas and biosolids (approx. 8% solids) are generated and transferred to the west holding tank. The west holding tank is an existing sludge storage tank which will be modified by replacing the existing roof with a biogas storage membrane cover. Biogas from the west holding tank will be vented to an enclosed flare (CD-120) which is supplemented with natural gas.

Biosolids Dewatering Processes

Biosolids leaving the west storage tank, will go through a series of de-watering steps. The de-watered biosolids will be transported off-site by truck for land-application. The maximum biosolids (approx. 35% solids) produced per day is 268 tons per day (94 dry tons per day).

Associated Equipment/Emission Units

Associated equipment being installed with this project are two 14.4 MMBtu/hr natural gas-fired boilers (EU-121 & EU-122), 3 cooling towers (EU-123, EU-124, and EU-125) and several small natural gas combustion sources (each <10 MMBtu/hr) totaling 34 MMBtu/hr.

EMISSIONS EVALUATION

SO₂ and TRS Emissions

The pollutant of concern from the THP is the air contaminant Total Reduced Sulfur Compounds (TRS). TRS consists of several sulfur-containing compounds, including H₂S and other compounds, which have low odor thresholds. The applicant provided H₂S data for 121 site-specific (Blue River WWTP) biogas samples collected over a five-month period during the year 2020. Although this data was for H₂S only, it was considered the best available data for calculating potential emissions of TRS and SO₂. Potential uncontrolled emissions of TRS² were calculated using the 95th percentile of the H₂S concentration (4780 ppmv H₂S) and the maximum biogas rate of 900 scfm. All biogas from the west holding tank is vented to the flare (CD-120) and a 97.7% destruction efficiency for landfill gas flares obtained from AP-42, Chapter 2.4 "Municipal Solid Waste Landfills" (Draft Section - October 2008) was used to calculate the controlled potential emissions. The PTE for SO₂ was calculated using the potential emissions of TRS and assuming 100% of the sulfur was converted to SO₂ in the flare. The maximum 1-hour emission rate of SO₂ used in the ambient impact analysis was calculated using the maximum H₂S concentration (5,200 ppmv H₂S) that was observed in the biogas samples referenced above and assuming 100% conversion to SO₂. Stack testing is required to verify the emission factor used for the ambient impact analysis. Subsequent sulfur content testing is required to verify the PTE of the installation is less than major source thresholds.

Stack testing of the flare will provide initial verification of the emission factor for SO₂ emissions. Subsequent testing will measure the sulfur content of the biogas vented to the flare. Newer versions of method D5504 require demonstration of sample stability; therefore, this permit requires spiking samples, collected in the field, to assess the sample stability according to the procedures outlined in EPA Test Method 18 Section 8.4.2.

Odor-laden air captured during the pre and post-THP processes contain TRS and ammonia (NH₃), respectively. Odor-laden air will be treated with a bioscrubber (CD-BS4) and a chemical scrubber (CD-CS5) prior to being vented to the atmosphere. The bioscrubber (CD-BS4) controls emissions of TRS from the pre-THP operations (e.g., centrifuges, cake silos, conveyors, sludge screen wet well, screening equipment, etc.). The chemical scrubber (CD-CS5) controls emissions of NH₃ from the post-THP operations (e.g., centrifuges, conveyors, cake hopper). The acid/chemical scrubber (CD-CS5) is not included in the potential emissions calculations because NH₃ emissions are not regulated under 10 CSR 10-6.060 *Construction Permits Required*.

The facility has three existing odor control bioscrubbers that are not controlling any of the new equipment being installed for this project, however the existing bioscrubbers were not considered in previous permitting. It was determined during this project review that the potential uncontrolled emissions from the existing bioscrubbers exceed the de minimis level for TRS. For this reason, the existing bioscrubbers are included in the special conditions of this permit and are now considered practically enforceable.

² The H₂S concentration was converted to an emission factor using mass balance at the standard conditions of 70°F and 14.7 psia and the associated ideal gas constant of 10.73 ft³·psia/°R·lbmol.

Potential emissions from the new and existing bioscrubbers were calculated using the maximum design rates, the maximum expected inlet H₂S concentrations, and a 95% control efficiency obtained from the EPA document “Biosolids and Residuals Management Fact Sheet” (EPA 832-F-00-067, September 2000). Bioscrubber control efficiencies are typically reported in terms of H₂S control, and the control efficiency of other TRS compounds may be different than the control efficiency for H₂S. Since only the H₂S portion of TRS was provided by Blue River for the potential emissions calculations, a special condition of this permit requires that the inlet and outlet TRS concentration be measured to verify the overall TRS control efficiency.

Table 7: Bioscrubber Design Information

Scrubber	New/Existing	Maximum Design Rate (scfm)	Inlet H ₂ S (ppmv)
CD-BS1	Existing	11,200	200
CD-BS2	Existing	8,800	50
CD-BS3	Existing	12,700	200
CD-BS4	New	15,750	15

Particulate Emissions

Emissions of PM₁₀ and PM_{2.5} from the flare were calculated using emission factors for landfill gas flares obtained from AP-42, *Compilation of Air Pollutant Emissions Factors*, Chapter 2.4 “Municipal Solid Waste Landfills” (Draft Section - October 2008) and assuming a worst-case 900 scfm of methane (CH₄). Potential emissions of particulate matter from the cooling towers were calculated using AP 42, Fifth Edition, Volume I, Section 13.4 “Wet Cooling Towers” (January 1995). Particulate emissions from the paved haul roads were provided by the applicant and calculated using AP 42, Section 13.2.1 “Paved Roads” (January 2011).

NO_x, CO, and HAPs

The project emissions of NO_x, CO, and HAPs are products of combustion from the enclosed flare (CD-120), the boilers (EU-121 and EU-122), and the small natural gas combustion sources. Emission factors for the flare were based on the emission factors for landfill gas flares found in AP-42, Chapter 2.4 “Municipal Solid Waste Landfills” (Draft Section - October 2008). Similar-sized wastewater treatment facilities were compared for this review and are major sources of NO_x and CO. Since the potential emissions of NO_x and CO associated with this project are de minimis, it is a special condition of this permit to verify the emission factors assumed for the enclosed flare (CD-120) with a one-time performance test. The flare emission factors listed in the special conditions are the values that would keep the project less than the de minimis levels for NO_x and CO. Potential emissions from the boilers and the small natural gas combustion sources were calculated using the emission factors from AP 42, Fifth Edition, Volume I, Section 1.4 “Natural Gas Combustion” (July 1998).

The following table provides an emissions summary for this project. Existing actual emissions were obtained from the installation’s 2023 EIQ. Conditioned potential emissions of the application represent the potential of the new and modified equipment with practically enforceable control devices and assuming continuous operation (8760 hours per year).

Table 8: Emissions Summary (tpy)

Pollutant	Regulatory <i>De Minimis</i> Levels	Existing Potential Emissions (Note 1)	Existing Actual Emissions (2023 EIQ)	(Phase 1) Conditioned Potential Emissions of the Project	New Potential Emissions of the Installation (Note 2)
PM	25.0	3.05	N/D	8.03	8.46
PM ₁₀	15.0	3.05	0.35	7.73	8.16
PM _{2.5}	10.0	3.05	0.35	7.68	8.10
SO _x	40.0	127.75	2.82	187.49	187.52
NO _x	40.0	12.83	5.52	39.90	45.90
VOC	40.0	1.24	2.02	2.36	2.95
CO	100.0	13.77	7.83	94.19	99.90
TRS	10.0	N/D	N/D	0.27	6.32
H ₂ S	10.0	N/D	N/D	0.27	6.32
HAPs	10.0/25.0	0.33	0.0	0.70	0.89

N/D = Not Determined

Note 1: Existing potential emissions include the existing flare (CD-112) which will be removed.

Note 2: New potential emissions of the installation represent the potential emissions upon completion of the project: including the installation of new equipment, removal of the existing flare, and other existing equipment remaining in operation.

Existing Potential Emissions

Due to the extensive changes to the existing emission units prior to the start of this project, the existing potential emissions were recalculated based on the equipment that was in operation (or capable of being in operation) as of July 2020 according to the August 2023 site inspection. The following table summarizes the existing emission units.

Table 9: Existing Emission Units

Emission Unit	Emission Unit Description	MHDR	Permit
EU-112	existing flare to be removed for this project	24 MMBtu/hr	N/D
EU-113	natural gas-fired boiler	6.3 MMBtu/hr	1458
EU-114	natural gas-fired boiler	6.3 MMBtu/hr	1458
EU-116	natural gas-fired emergency generator	350 kW	1428

N/D = Not Determined

PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of SO₂ are above de minimis levels.

APPLICABLE REQUIREMENTS

Blue River Wastewater Treatment Plant shall comply with the following applicable requirements. The Missouri Air Conservation Laws and Regulations should be consulted for specific record keeping, monitoring, and reporting requirements.

Compliance with these emission standards, based on information submitted in the application, has been verified at the time this application was approved.

GENERAL REQUIREMENTS

- *Start-Up, Shutdown, and Malfunction Conditions*, 10 CSR 10-6.050
- *Submission of Emission Data, Emission Fees and Process Information*, 10 CSR 10-6.110
 - Per 10 CSR 10-6.110(4)(B)2.B(II) and (4)(B)2.C(II) a full EIQ is required for the first full calendar year the equipment (or modifications) approved by this permit are in operation.
- *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*, 10 CSR 10-6.170
- *Restriction of Emission of Visible Air Contaminants*, 10 CSR 10-6.220
- *Restriction of Emission of Odors*, 10 CSR 10-6.165

SPECIFIC REQUIREMENTS

- *Control of Sulfur Dioxide Emissions*, 10 CSR 10-6.261
- *Restriction of Particulate Matter Emissions From Fuel Burning Equipment Used for Indirect Heating*, 10 CSR 10-6.405

ADDITIONAL APPLICABILITY DETERMINATIONS

- The New Source Performance Standards (NSPS) for Sewage Sludge Incinerators, 40 CFR 60 Subparts LLLL and MMMM do not apply to the facility because they have removed their previously permitted sewage sludge incinerators. The thermal hydrolysis process, reviewed for this construction permit, is not a sewage sludge incinerator because it does not combust sewage sludge. [40 CFR §60.4930]
- 40 CFR 63 Subpart VVV does not apply to the source because the facility does not meet the definition of a Group 1 or Group 2 Publicly Owned Treatment Works (POTW). [40 CFR §63.1595]

AMBIENT AIR QUALITY IMPACT ANALYSIS

Ambient air quality modeling was performed using the AERMOD modeling system, Version 23132, to determine the ambient impact of the project's SO₂ emissions. The following table summarizes the results of the significant impact determination for SO₂. The results show exceedances of the significant impact levels for the 1-hour and 3-hour averaging periods, thereby triggering a full impact analysis.

Table 10: Summary of Significant Impact Determination

Pollutant	Modeled Impact $\mu\text{g}/\text{m}^3$	SIL $\mu\text{g}/\text{m}^3$	Time Period
SO ₂	120.01	7.85	1-Hour
SO ₂	91.90	25	3-Hour

SIL = Significant Impact Level

The following table summarizes the results of the full impact analysis which includes SO₂ emissions for both the project and the existing installation and all SO₂ emitting facilities within the significant impact area. The results of the National Ambient Air Quality Standards (NAAQS) determination show compliance with the 3-hour standard and violation of the 1-hour standard. Additional analysis showed that the contribution at violating receptors from the Blue River Wastewater Treatment Plant are insignificant. Per EPA guidance, facilities with an insignificant impact at violating receptors require no further analysis and the SO₂ ambient impact analysis is approved.

Table 11: Summary of NAAQS Compliance Determination

Pollutant	Modeled Impact $\mu\text{g}/\text{m}^3$	NAAQS $\mu\text{g}/\text{m}^3$	Time Period
SO ₂	1320.37	196	1-Hour
SO ₂	1217.28	1300	3-Hour

NAAQS = National Ambient Air Quality Standard

The following table contains a summary of the emission rates used in the ambient impact analysis associated with the new emission sources. Other emission rates associated with existing sources were evaluated and are detailed in the modeling memo.

Table 12: SO₂ Emission Rates

Emission Unit ID	Description	Averaging Period	Emission Rate (lb/hr)
EU-120	Flare	1-hour & 3-hour	46.53
EU-121	Boiler 3	1-hour & 3-hour	8.47E-03
EU-122	Boiler 4	1-hour & 3-hour	8.47E-03
N/A	Miscellaneous Natural Gas Combustion Sources	1-hour & 3-hour	2.00E-02

N/A = Not Applicable

The following table contains a summary of the stack parameters for the project's primary emission units. The miscellaneous natural gas combustion sources are not included because they were modeled as a single point source. The modeling file in the administrative record contains additional modeling information.

Table 13: Stack Parameters

Emission Unit ID	Description	Temperature (F)	Height (ft)	Diameter (ft)	Velocity (fpm)
EU-120	Flare	1832	56.3	3.6	3937
EU-121	Boiler 3	301	9.1	1.7	2108
EU-122	Boiler 4	301	9.1	1.7	2108

STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (5), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, it is recommended that this permit be granted with special conditions.

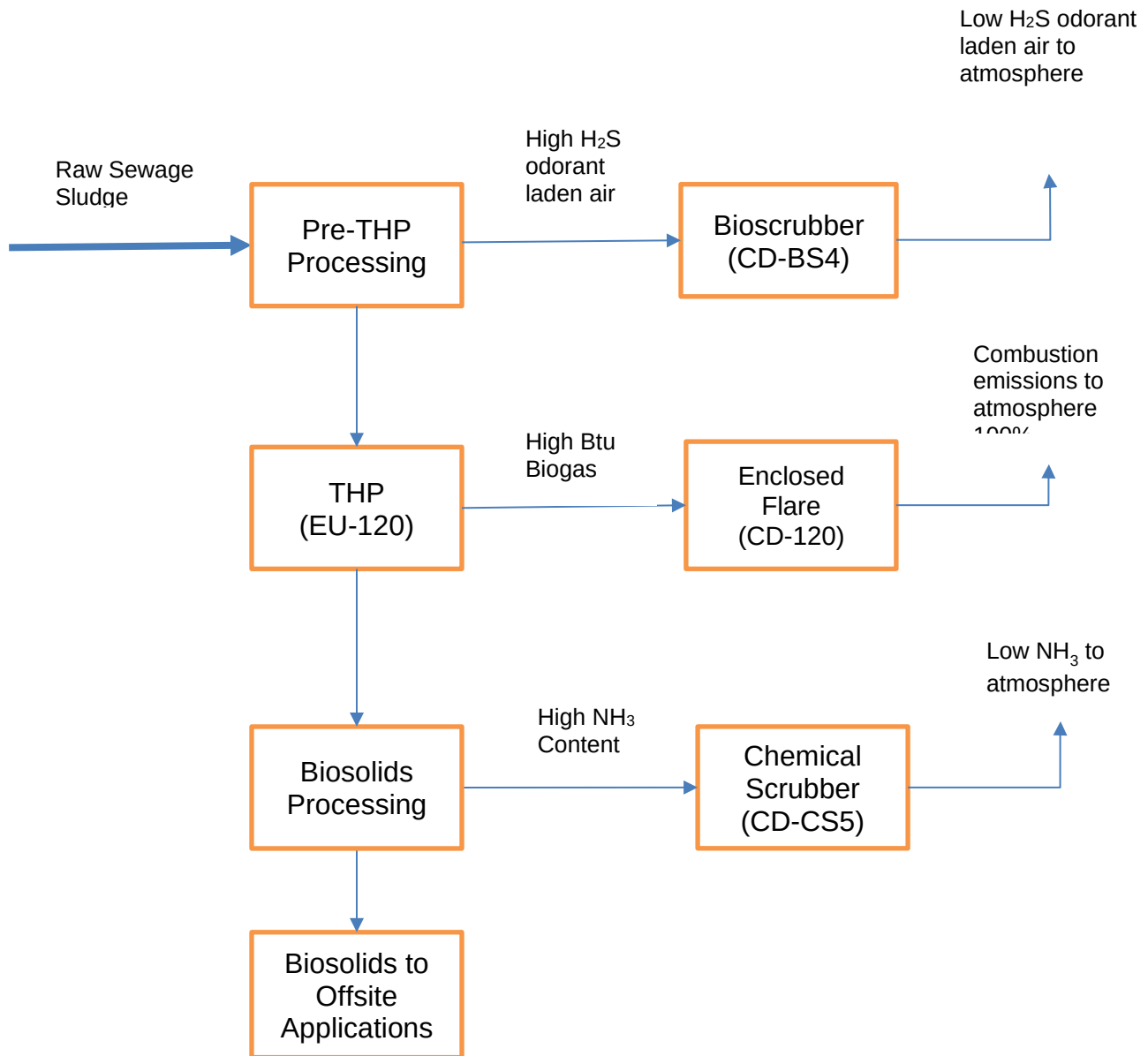
PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated September 26, 2023, received September 26, 2023, designating Wastewater Treatment Division of Kansas City Water as the owner and operator of the installation.

Attachment A – Process Flow for Biogas Controlled by Flare

Blue River Wastewater Treatment Plant
Jackson County, S25, T50N, R33W
Project Number: 2023-09-046
Installation ID Number: 095-0039
Permit Number: 092025-006



APPENDIX A

Abbreviations and Acronyms

%	percent	MMCF	million cubic feet
°F	degrees Fahrenheit	MMSCF	million standard cubic feet
acfm	actual cubic feet per minute	MSDS	Material Safety Data Sheet
BACT	Best Available Control Technology	NAAQS	National Ambient Air Quality Standards
BMPs	Best Management Practices	NESHAPs	National Emissions Standards for Hazardous Air Pollutants
Btu	British thermal unit	NO_x	nitrogen oxides
CAM	Compliance Assurance Monitoring	NSPS	New Source Performance Standards
CAS	Chemical Abstracts Service	NSR	New Source Review
CEMS	Continuous Emission Monitor System	PM	particulate matter
CFR	Code of Federal Regulations	PM_{2.5}	particulate matter less than 2.5 microns in aerodynamic diameter
CO	carbon monoxide	PM₁₀	particulate matter less than 10 microns in aerodynamic diameter
CO₂	carbon dioxide	ppm	parts per million
CO₂e	carbon dioxide equivalent	ppmv	parts per million by volume
COMS	Continuous Opacity Monitoring System	PSD	Prevention of Significant Deterioration
CSR	Code of State Regulations	PTE	potential to emit
dscf	dry standard cubic feet	RACT	Reasonable Available Control Technology
EQ	Emission Inventory Questionnaire	RAL	Risk Assessment Level
EP	Emission Point	SCC	Source Classification Code
EPA	Environmental Protection Agency	scfm	standard cubic feet per minute
EU	Emission Unit	SDS	Safety Data Sheet
fps	feet per second	SIC	Standard Industrial Classification
ft	feet	SIP	State Implementation Plan
GACT	Generally Available Control Technology	SMAL	Screening Model Action Levels
GHG	Greenhouse Gas	SO_x	sulfur oxides
gpm	gallons per minute	SO₂	sulfur dioxide
gr	grains	SSM	Startup, Shutdown & Malfunction
GWP	Global Warming Potential	tph	tons per hour
HAP	Hazardous Air Pollutant	tpy	tons per year
hr	hour	TRS	total reduced sulfur (including hydrogen sulfide)
hp	horsepower	VMT	vehicle miles traveled
lb	pound	VOC	Volatile Organic Compound
lbs/hr	pounds per hour	yr	year
MACT	Maximum Achievable Control Technology		
µg/m³	micrograms per cubic meter		
m/s	meters per second		
Mgal	1,000 gallons		
MW	megawatt		
MHDR	maximum hourly design rate		
MMBtu	Million British thermal units		