

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: **042018-005**

Project Number: 2016-06-066
Installation Number: 189-0312

Parent Company: Bridgeton Landfill, LLC

Parent Company Address: 13570 St. Charles Rock Road, Bridgeton, MO 63044

Installation Name: Bridgeton Landfill, LLC

Installation Address: 13570 St. Charles Rock Road, Bridgeton, MO 63044

Location Information: St. Louis County

Application for Authority to Construct was made for:

Operation of four flares to control landfill gas emissions. This review was conducted in accordance with Section (6), 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.

Nicole Weidenbenner

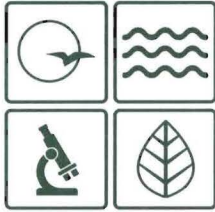
Prepared by
Nicole Weidenbenner, P.E.
New Source Review Unit

Sandy A. [Signature]

Director or Designee
Department of Natural Resources

APR 03 2018

Effective Date



Missouri Department of dnr.mo.gov
NATURAL RESOURCES
Eric R. Greitens, Governor Carol S. Comer, Director

APR 03 2018

Ms. Erin Fanning
Division Manager
Bridgeton Landfill, LLC
13570 St. Charles Rock Road
Bridgeton, MO 63044

RE: New Source Review Permit - Project Number: 2016-06-066

Dear Ms. Fanning:

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, your new source review permit application and with your operating permit 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: <http://dnr.mo.gov/regions/>. The online CAV request can be found at <http://dnr.mo.gov/cav/compliance.htm>.

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: www.oa.mo.gov/ahc.

Ms. Erin Fanning
Page Two

If you have any questions regarding this permit, please do not hesitate to contact Nicole Weidenbenner, P.E., 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



Kendall B. Hale
Permits Section Chief

KBH:nwj

Enclosures

c: St. Louis Regional Office
PAMS File: 2016-06-066

Permit Number: **042018-005**

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.

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:
<http://dnr.mo.gov/regions/>

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 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 (12)(A)10. "Conditions required by permitting authority."

Bridgeton Landfill, LLC ("Permittee")
St. Louis County

1. Superseding Condition

The conditions of this permit supersede all federally and state enforceable special conditions found in all construction permits issued by the St. Louis County Department of Health, Air Pollution Control Program, except for Construction Permits #7864 and 7865 (Missouri Department of Natural Resources, Air Pollution Control Program project #2014-08-002).

2. Plant Wide Emission Limitations

- A. The permittee shall emit less than 100.0 tons of sulfur dioxide (SO₂) in any consecutive 12-month period from the entire installation. The entire installation is defined as the equipment and operations presented in Table 2.

3. Operational Limitations

- A. The permittee shall combust the landfill gas collected by the gas collection system using flares (EP-011, EP-012, EP-013, and EP-014).
- B. The permittee shall maintain an operating and maintenance log for all flares (EP-011, EP-012, EP-013, and EP-014) which shall include the following:
- 1) Dates of all incidents of malfunction, with impact on emissions, duration of event, probable cause, and corrective actions; and
 - 2) Dates of all maintenance activities, with inspection schedule, repair actions, and replacements.
- C. As long as Bridgeton Landfill is subject to 40 CFR 60 Subpart WWW or 10 CSR 10-5.490, the Bridgeton Landfill, LLC shall demonstrate compliance with 40 CFR §60.18 and §60.754 by performing monthly sampling at the flares. The permittee shall keep records of all test results and any corrective actions taken.
- D. For units that combust fuel oil, the permittee shall only combust fuel oil with a sulfur content of 15 ppmv or less.

SPECIAL CONDITIONS:

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

4. Landfill Gas Flow Monitoring and Landfill Gas Sulfur Content Sampling
 - A. Landfill gas flow rates
 - 1) The permittee shall install and operate flow meters at each flare (EP-011, EP-012, EP-013, and EP-014) and the main blower station to quantify the gas flow rate. Each flow meter shall be measured and recorded separately. Flare flow rates shall be recorded at least every 15 minutes, consistent with 60.756(c)(2)(i).
 - 2) The permittee shall operate and maintain all flow meters used for any compliance demonstrations in accordance with the manufacturer's specifications, which shall be kept on site. All flow meters used for compliance demonstrations must be directly calibrated using EPA Methods on a monthly basis.
 - 3) The permittee shall maintain an operating and maintenance log for all flow meters used for compliance demonstrations which shall include the following:
 - a) Dates of all incidents of malfunction, with impact on emissions, duration of event, probable cause, and corrective actions; and
 - b) Dates of all maintenance activities, with inspection schedule, repair actions, and replacements.
 - B. Landfill gas sulfur content
 - 1) The permittee shall collect landfill gas samples at the main blower station using summa canisters.
 - 2) The permittee shall conduct testing on the landfill gas samples to quantify sulfur compounds using ASTM D5504-12 or an alternative approved by the Air Pollution Control Program's Compliance/Enforcement Section. Testing results shall be in units of ppmv.
 - 3) The permittee shall conduct sampling on the frequency detailed in Table 1. The SO₂ emissions shall be calculated using Attachment Actual SO₂ Emissions, or an equivalent.

SPECIAL CONDITIONS:

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

Table 1: LFG sulfur content sampling frequency

| SO ₂ Emissions | Sampling shall be performed a minimum of.... |
|--|--|
| For the first six months after the effective date of this permit or until 12 month rolling emissions are less than or equal to 75, whichever is later: | 1 st and 15 th of each month. |
| If 12 month rolling emissions are less than 75 but greater than or equal to 50: | Monthly. |
| If 12 month rolling emissions are less than 50. | Annually, to be conducted between 11 and 13 months from the previous test. |

5. Leachate Management System Sulfur Emissions

Within 60 days after the issuance date of this permit, the permittee shall perform testing to quantify the volatilized sulfur in the leachate tanks. Within 30 days of the testing date, the permittee shall submit all documentation for the testing. This documentation shall include, but is not limited to, the following information. If the testing results indicate the volatilized sulfur is greater than 1.7%, the permittee shall submit an application for a permit amendment.

- A. Testing date and location;
- B. Sampling procedures and chain of custody;
- C. Field data sheets; and
- D. Sample analysis procedures, calculations, and results.

6. Record keeping

- A. Plant Wide Sulfur dioxide emissions

The permittee shall use Attachment Actual SO₂ Emissions, or equivalent, to determine the monthly SO₂ emissions from the entire installation. This calculation shall be used to determine compliance with the emission limitation in Special Condition #2.

- B. 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.

7. Exceedances

If the records required by this permit show the permittee exceeds the SO₂ emission limitations established in Special Condition # 2, the permittee shall submit an application to obtain a new construction permit, which is based upon the current level of emissions, within 60 days of the date the emission limit is exceeded.

SPECIAL CONDITIONS:

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

8. Reporting Requirements

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 or by email 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 any limitation imposed by this permit.

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE
SECTION (6) REVIEW

Project Number: 2016-06-066
Installation ID Number: 189-0312
Permit Number: 042018 - 005

Installation Address:

Bridgeton Landfill, LLC
13570 St. Charles Rock Road
Bridgeton, MO 63044

Parent Company:

Bridgeton Landfill, LLC
13570 St. Charles Rock Road
Bridgeton, MO 63044

St. Louis County

REVIEW SUMMARY

- Bridgeton Landfill, LLC has applied for authority to control landfill gas emissions.
- The application was deemed complete on February 9, 2017.
- HAP emissions are expected from the equipment.
- 40 CFR 60 Subpart WWW, "Standards of Performance for Municipal Solid Waste Landfills" applies to the equipment.
- 40 CFR part 61 Subpart M "National Emission Standards for Asbestos" applies to installations that have accepted asbestos containing waste. MACT AAAA, National Emission Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills applies to the equipment.
- Flares are used to control the emissions from the landfill. Flares reduce VOC, NMOC, CH₄, and HAPs in the landfill gas. Flares will reduce sulfur compounds (including TRS and RSC) to SO₂. Flares are also an emission source of combustion products including, but not limited to PM, PM₁₀, PM_{2.5}, SO₂, NO_x, CO, and CO₂.
- This review was conducted in accordance with Section (6) 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 St. Louis County, a nonattainment area for the 2008 8-hour ozone standard and the 1997 PM_{2.5} standard and an attainment area for all other criteria pollutants.
- This installation is not on the List of Named Installations found in 10 CSR 10-6.020(3)(B), Table 2.
- Ambient air quality modeling was performed to determine the ambient impact of SO₂.

- Emission testing is required as a part of this permit. Testing may be required as part of other state, federal or applicable rules.
- Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

Bridgeton Landfill, LLC owns and operates an inactive municipal solid waste landfill located at 13570 Saint Charles Rock Road in Bridgeton, Missouri. Bridgeton began landfilling operations in 1952 and has been closed since 2005, with a final capacity of approximately 17,000,000 cubic yards. Current operations at the inactive landfill facility are focused on managing gas and liquids from the landfill. Landfill gas is managed and controlled through the use of a gas collection and control system (GCCS). Additionally, the facility treats leachate onsite at a leachate pretreatment plant (LPTP). LPTP emissions are controlled by two natural gas fired thermal oxidizers, 2.75 MMBtu/hr each, which are permitted under Air Pollution Control Program project 2014-08-008, (St. Louis County permits 7864 and 7865). There are various other emission units onsite, with a complete listing in Table 2 below.

Table 2: Emission points and descriptions

| Emission Point | Unit Description |
|----------------|---|
| EP-011 | Flare #1: 3,500 SCFM John Zink open candlestick flare, installed 2012. |
| EP-012 | Flare #2: 4,000 SCFM John Zink open candlestick flare, installed 2013. |
| EP-013 | Flare #3: 4,000 SCFM John Zink open candlestick flare, installed 2013. |
| EP-014 | Flare LFG CSU: 2,500 SCFM LFG Specialties open candlestick flare, installed 2013. |
| EP-016a | 316,000 gallon leachate treatment tank |
| EP-017a | 4-1 million gallon leachate treatment tanks (Tanks 1 through 4) |
| EP-018a | LMS RTO #1: 2.75 MMBtu/hr Cycle Therm regenerative thermal oxidizer used to control emissions from Leachate Management System (LMS) pretreatment and aeration tanks. |
| EP-018b | LMS RTO #2: 2.75 MMBtu/hr Cycle Therm regenerative thermal oxidizer used to control emissions from Leachate Management System (LMS) pretreatment and aeration tanks. |
| EP-019 | 1000 kW emergency generator, Caterpillar Model No. SR5, Engine Model C32 TA, 4 stroke, 32.10 Displacement, 12 cylinder. Combusts #2 fuel oil. Located in main flare yard. |
| EP-020 | 175 hp emergency generator, Caterpillar Model No. XQ175-2, Engine Model CAT C6.6 ACERT. Combusts #2 fuel oil. |
| EP-021 | 543 kW emergency generator, Perkins Model 2506C-E15TAG3. Combusts #2 fuel oil. Located at |
| EP-I09 | Storage tank, #2 fuel oil, 500 gallon capacity |
| EP-I10 | 24 leachate frac tanks |
| EP-I11 | LMS treated leachate tank, discharges to MSD, 97,000 gallon capacity |

The following New Source Review permits have been issued to Bridgeton Landfill, LLC from the St. Louis County Department of Health, under delegated authority from the Air Pollution Control Program. This project is the first permit issued for the facility from the Air Pollution Control Program.

Table 3: Permitting history

| Permit # | Description |
|---|--|
| 1496 | 2500 SCFM ground flare, permit voided 1993 |
| 5454 | 3500 SCFM enclosed flare, installed 2003, removed 2008 |
| 5924 | 3500 SCFM John Zink ZTOF enclosed flare, decommissioned September 24, 2013 |
| 7734 (temporary use) Project 2012-07-011 Section (5) Construction Permit Effective July 18, 2012 | EP-008T LFG CSU, 2500 SCFM utility open flare, temporary, limited to 100 tons CO total, installed July 2012, decommissioned October 2013 |
| 7735 and 7736 Project 2012-08-034 Section (5) Construction Permit Effective Sept. 27, 2012 | <ol style="list-style-type: none"> 1. EP-008B (7735) 3500 SCFM enclosed flare, Callidus Model G-7A60, installed 2012, start-up date October 3, 2012, decommissioned September 24, 2013 2. (7736) Emission Point EP-008U, Installation ID Flare #1, 3500 SCFM utility backup flare, open candlestick, manufactured by John Zink, installed 2012, start-up date January 30, 2013, decommissioned October 2013 |
| Project 2013-05-026 County Construction/Operating Permit #7787, #7788 and #7790, Modification to County Operating Permit #7736 Section (6) Construction Permit Effective August 7, 2013 | <ol style="list-style-type: none"> 1. (7787) Emission Point EP-012, Installation ID Flare #2, 4000 scfm John Zink Candlestick Open Flare, Start-up Date September 24, 2013 2. (7788) Emission Point EP-013, Installation ID Flare #3, 4000 scfm John Zink Candlestick Open Flare, Start-up Date September 20, 2013 3. (7790) Emission Point EP-014, Installation ID Flare LFG CSU, 2500 scfm LFG Specialties Candlestick Open Flare, Start-up Date October 1, 2013 4. (7736) Emission Point EP-011, Installation ID Flare #1, 3500 SCFM utility backup flare, open candlestick, manufactured by John Zink, installed 2012, start-up date October 1, 2013 |
| 7784 Effective April 11, 2013 | 1000 kW Emergency Generator, #2 Fuel Oil, Caterpillar Model No. SR5, Engine Model C32 TA, 4 Stroke, 32.10 L Displacement, 12 Cylinder |
| Project 2014-05-068 County Construction Permit #7839 and #7840 Section (5) Const. Permit Effective June 19, 2014 | One 3,500 scfm John Zink ZTOF enclosed flare (decommissioned 2015), and one Caterpillar CAT C6.6 ACERT diesel emergency use engine. |

Table 3: Permitting history, continued

| Permit # | Description |
|--|--|
| Project 2014-08-002 County Construction Permit #7864 and #7865 Section (5) Const. permit Effective August 25, 2014 | LMS RTO #1 and #2: 2.75 MMBtu/hr (each) Cycle Therm regenerative thermal oxidizer used to control emissions from Leachate Management System (LMS) pretreatment and aeration tanks. Combusts natural gas. Also contains Perkins emergency generator (EP-021). |

PROJECT DESCRIPTION

On June 27, 2016, Bridgeton Landfill, LLC submitted a construction permit application for the control of landfill gas. The installation currently uses flares to control landfill gas emissions. This permit allows the continued use of flares.

Due to the complicated flare permitting history, this permit supersedes all state and federally enforceable provisions from all previous construction permits except Project #2014-08-002 (County permits #7864 and #7865) which authorized construction of the two 2.75 MMBtu/hr natural gas fired thermal oxidizers for the leachate pretreatment plant (LPTP). This permit is not intended to supersede any local ordinances. This permit contains a new limitation of 100 tons per year of sulfur oxides to classify the installation as a minor source for construction permitting purposes.

Due to the unique characteristics of the landfill gas at this installation, compliance with the sulfur oxides emission limitation will be determined by periodic sampling and analysis. The permit requires the use of ASTM D5504-12, which quantifies the following sulfur compounds:

- | | |
|--------------------------|---------------------------|
| 1. Hydrogen Sulfide | 12. Thiophene |
| 2. Carbonyl Sulfide | 13. Isobutyl Mercaptan |
| 3. Methyl Mercaptan | 14. Diethyl Sulfide |
| 4. Ethyl Mercaptan | 15. n-Butyl Mercaptan |
| 5. Dimethyl Sulfide | 16. 3-Methylthiophene |
| 6. Carbon Disulfide | 17. Tetrahydrothiophene |
| 7. Dimethyl Disulfide | 18. 2,5-Dimethylthiophene |
| 8. Isopropyl Mercaptan | 19. 2-Ethylthiophene |
| 9. tert-Butyl Mercaptan | 20. Diethyl Disulfide |
| 10. n-Propyl Mercaptan | 21. Dimethyl Trisulfide |
| 11. Ethyl Methyl Sulfide | |

Because the sulfur emissions are expected to decrease over time, this permit allows for a graduated sampling schedule.

Previous permits contained a 250 ton/year carbon monoxide emission limitation. These permits have been superseded. Potential to emit calculations for carbon monoxide are shown below:

Basis:

Total flare capacity=14,000 SCFM

Methane content of LFG=15%

Emission factor: 62.4 lb CO/MMCF methane, derived from the AP42 draft Section 2.4 background document

$$\frac{14,000 \text{ scf}}{\text{min}} \times \frac{60 \text{ min}}{\text{hr}} \times \frac{8760 \text{ hr}}{\text{yr}} \times 15\% \text{ methane} \times \frac{62.4 \text{ lb CO}}{\text{MMSCF methane}} \times \frac{1 \text{ MMSCF}}{10^6 \text{ scf}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = 34 \frac{\text{ton CO}}{\text{year}}$$

Conducting a back calculation using these values to determine the maximum methane content needed to achieve emissions of 250 tons CO per year indicate a methane percentage in excess of 100% is needed. It is highly unlikely that the methane percentage would surpass this value, therefore the 250 ton CO per year limitation is not necessary and has not been carried forward into this permit.

EMISSIONS/CONTROLS EVALUATION

The emission factors and control efficiencies used in this analysis were obtained from the EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition, and from site specific testing conducted January 5 through September 7, 2016, as well as VOC testing conducted in 2015. The selected landfill gas data used for this permit is summarized in Table 4. These values reflect historical conditions and may not affect future conditions.

Table 4: Landfill gas characteristics for permit basis, 2016 data unless noted

| Parameter | Value | Units | Notes |
|------------------------|-------|----------------|--|
| Landfill gas flow rate | 3100 | scfm | The maximum recorded flow value is 3025 scfm. Using 3100 is most conservative. |
| Net heating value | 164.4 | Btu/ft3 | Maximum value |
| Methane fraction | 13 | % | Maximum value |
| LFG temperature | 25 | C | Ranged from 13 to 65. Using 25 is most conservative. |
| VOC concentration | 6857 | ppmv as hexane | 2015 testing data |
| TRS concentration | 2200 | ppmv | Maximum value |

The following table provides an emissions summary for this project. Flare potentials are based on Table 4 data, including flow rate, and do not include any emissions from the use of natural gas as a flare assist gas. This permit establishes a new 100 ton per year plant wide limitation for SO₂ emissions. This installation is located in a PM_{2.5} non-attainment area, which requires potential emissions to remain less than 100 ton/year for PM_{2.5} and precursors (SO₂) to avoid non-attainment NSR review.

Table 5: Emissions Summary (tpy, except as noted)

| Pollutant | Regulatory <i>De Minimis</i> Levels | Existing Actual Emissions (2016 EIQ) | Potential Emissions of the Flares | Condition Potentials of this permit |
|---|---|--|--------------------------------------|--|
| PM/ PM ₁₀ / PM _{2.5} | 25.0/15.0/1 0.0 | 1.67 | 1.81 | N/A |
| SO ₂ | 40.0 | 148.33 | 293.27 | <100 installation |
| NO _x | 40.0 | 7.88 | 4.27 | N/A |
| VOC | 40.0 | 5.15 | 12.29 | N/A |
| CO | 100.0 | 42.77 | 6.66 | N/A |
| GHG (CO ₂ e) | NA | 9493 ¹ | ND | N/A |
| GHG (mass) | NA | NR | ND | N/A |
| HAPs | 10.0/25.0 | 7.31 | 3.96 | N/A |
| Largest HAP- Hydrogen Chloride | 10 | 1.42 | 3.28 | N/A |

ND=not determined

N/A=not applicable

¹Data from EPA's Greenhouse Gas Reporting Program. Data is reported in metric tons per year and excludes biogenic sources. All other actual emissions data obtained from MOEIS in units of tons per year.

PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (6) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of SO₂ are conditioned below major source levels.

APPLICABLE REQUIREMENTS

Bridgeton Landfill, LLC 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. For a complete list of applicable requirements for your installation, please consult the operating permit.

GENERAL REQUIREMENTS

- *Operating Permits*, 10 CSR 10-6.065
- *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

- *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

- *New Source Performance Regulations*, 10 CSR 10-6.070
 - *Standards of Performance for Municipal Solid Waste Landfills* 40 CFR Part 60, Subpart WWW
- *MACT Regulations*, 10 CSR 10-6.075
 - *National Emission Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills*, 40 CFR Part 63, Subpart AAAA
- *Control of Sulfur Dioxide Emissions*, 10 CSR 10-6.261

AMBIENT AIR QUALITY IMPACT ANALYSIS

Ambient air quality modeling was conducted for the operation of the flares and the two natural gas fired thermal oxidizers. Modeling was based off 2016 actual data, summarized in the table below. The modeling for the 1 hour SO₂ standard used the maximum values, while modeling for the annual SO₂ standard used the highest values of the 95% statistical confidence range. The values are presented in the table below. For the results, see the ambient air quality impact analysis document dated February 9, 2017. Actual 2017 data indicates SO₂ emissions are less than those modeled.

Table 6: Modeling data, 2016 data

| Landfill gas parameter (units) | Max value (1 hour standard) | Highest 95% statistical confidence range value (annual standard) |
|---------------------------------------|-----------------------------|--|
| TRS (ppmv) | 2200 | 1449 |
| LFG flow rate (DSCFM) | 3025 | 2557 |
| LFG temperature (C) | 25 | 25 |
| SO ₂ emission rate (lb/hr) | 65 | 36 |

AMBIENT AIR QUALITY MONITORING

The department operates an SO₂ monitor located at the Rider Trail, I-70 monitoring site. This site is located at 13080 Hollenberg Drive in Bridgeton. The monitor has collected SO₂ data since May 20, 2016. Annual monitoring data indicates values were 14 ppb for 2016, and 15 ppb for 2017. These values are well below the SO₂ standard of 75 ppb.

Additionally, Bridgeton Landfill has installed and operates two SO₂ monitors, located in Spanish Village and along St. Charles Rock Road. The devices collect hourly SO₂ measurements and populate the data in real time online, with results located at the following website: <http://www.bridgetonlandfill.com/so2-monitoring>.

STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (6), 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 June 27, 2016, designating Bridgeton Landfill, LLC as the owner and operator of the installation.
- Ambient Air Quality Analysis for Bridgeton Landfill, LLC, dated February 9, 2017

Attachment Actual SO₂ Emissions

The permittee shall use this attachment, or an equivalent, to calculate the actual plant wide SO₂ emissions. This attachment, or an equivalent, shall be used to demonstrate compliance with the Plant Wide Emission Limitations in Special Condition 2.

Calculation Methodology:

1. The specified time period for all sampling is defined in Table 1.
2. The permittee shall use Equation 1 to quantify the sulfur dioxide emissions from the combustion of all flares (EP-011, EP-012, EP-013, and EP-014), based on the sample results and the time period associated with the sample.
3. The permittee shall use Equation 2 to quantify the sulfur dioxide emissions from all other emission sources.
4. The permittee shall use Equation 3 to sum the values from Equations 1 and 2.

Equation 1: Sulfur dioxide emissions from the combustion of landfill gas

$$SO_{2-EQ1} = \frac{Q_{LFG} * \left(\frac{C_{sulfur, ppmv}}{10^6} \right) * \left(\frac{0.02832 \text{ m}^3}{\text{ft}^3} \right) * (MW_{sulfur}) * \left(\frac{0.00220462 \text{ lb}}{\text{g}} \right) * (P) * \left(\frac{1 \text{ ton}}{2,000 \text{ lb}} \right) * (2)}{(R * (273.15 + T))}$$

Where:

- SO_{2-EQ1} = SO₂ Emissions from the combustion of landfill gas in all flares (EP-011, 012, 013, and 014).
- Q_{LFG} = Total flow of all collected landfill gas, in units of dry standard cubic feet (DSCF) from the previous sampling date to the current sampling date
- $C_{sulfur, ppmv}$ = sampling results from ASTM D5504-12 for the current sampling date, in units of parts per million by volume.
- MW_{sulfur} = $32.06 \frac{\text{g}}{\text{g-mol}}$.
- P = 1 atm, standard atmospheric pressure.
- 2 = molecular ratio of sulfur to SO₂.
- R = ideal gas law constant, $\frac{8.205 \times 10^{-5} \text{ m}^3 * \text{atm}}{\text{K} * \text{g-mol}}$.
- T = 25°C or site specific LFG temperature

Equation 2: Sulfur dioxide emissions from all other sources

$$SO_{2-EQ2} = SO_{2-NG} + SO_{2-EmGen} + SO_{2-LMS}$$

Where:

- SO_{2-EQ2} = SO₂ emissions from all sources not included in Equation 1.
- SO_{2-NG} = SO₂ emissions from the combustion of natural gas. Calculated by multiplying the plant wide natural gas usage from all sources (in MMSCF) for the specified time period by 0.6 lb SO₂/MMSCF (AP42, Table 1.4-2), then dividing by 2000 lb/ton. Sources must include the following emission points: all flares using natural gas assist and all other emission units that combust natural gas except the leachate management system thermal

Attachment Actual SO₂ Emissions

oxidizer units. Emissions from the thermal oxidizers (EP-RTO#1 and RTO#2) are not included here, as they are included in the calculation of SO_{2-LMS} .

$SO_{2-EmGen}$ = SO₂ emissions from the combustion of #2 fuel oil in the emergency generators, and any other sources that combust #2 fuel oil. For the emergency generators, emissions shall be calculated by using the following emission factors, and multiplying by the number of hours each engine is used in the specified time period. These emission factors are based a fuel oil sulfur content of 15 ppmv, and the rated horsepower of each engine.

| Emergency Generator | Emission factor (ton SO ₂ /hour) | Ef Source |
|---------------------|---|-------------------|
| EP-019 | 7.97×10^{-6} | AP42, Table 3.4-1 |
| EP-020 | 4.42×10^{-6} | AP42, Table 3.3-1 |
| EP-021 | 2.55×10^{-4} | AP42, Table 3.4-1 |

SO_{2-LMS} = SO₂ emissions from the leachate management system process. Includes natural gas combustion and volatilized sulfur in leachate tanks. Volatilized sulfur emissions are estimated based on testing data which indicates 99 tons per year of sulfur passes through the leachate system, of which 1.7% volatilizes. Each ton of volatilized sulfur creates two tons of SO₂ when combusted. Potential SO₂ emissions from volatilized sulfur are estimated at 3.37 tons/year (0.28 tons/month). Natural gas combustion emissions are estimated using the natural gas throughput in MMSCF/month and the emission factor 0.6 lb SO₂/MMSCF from AP 42 Table 1.4-2. In lieu of calculating actual emissions, the permittee may use the potential emissions of 3.38 tons/year (0.28 tons/month).

Equation 3:

$$SO_{2\ total} = SO_{2-EQ1} + SO_{2-EQ2}$$

Where:

$$SO_{2\ total} = \text{total plant wide emissions of SO}_2 \text{ from all sources}$$

The permittee shall record a monthly and 12 month rolling sum of $SO_{2-total}$ as shown in the following table. For the first twelve months after issuance of this permit, the permittee shall conduct this calculation on the 1st and 15th of every month. After this initial twelve month period, the testing schedule is dependent upon the 12 month rolling total emissions, as outlined in Table 1.

Attachment Actual SO₂ Emissions

Calculation of 12 month rolling total for month/year: _____

| | |
|---|-----------------------------|
| Sampling dates | <i>SO₂ total</i> |
| Sampling on the 1 st of this month, Equation 3: | |
| Sampling on the 15 th of this month, Equation 3: | |
| [A] Sum of the items above for the current month: | |
| Calculation of Rolling 12 month sum | |
| (1) Total Emissions for this month [A]: | |
| (2) Previous consecutive 11 month emissions total from previous month's worksheets: | |
| (3) Current consecutive 12 month sum [(1) + (2)] | |

*SSM emissions are required to be reported to the Air Pollution Control Program's Compliance/Enforcement Section according to the provisions of 10 CSR 10-6.050. However, worst case SO₂ emissions occur when flares are operational 100% of the time. SSM of the flares is anticipated to decrease SO₂ emissions. As a conservative SO₂ emissions estimation method, there is no separate line item to account for SSM flare emissions.

Compliance with the Emission Limitation of Special Condition 2 is demonstrated when the current rolling 12 month sum (4) is less than 100.0 tons.

APPENDIX A

Abbreviations and Acronyms

| | |
|---|---|
| %percent | Mgal1,000 gallons |
| °Fdegrees Fahrenheit | MWmegawatt |
| acfmactual cubic feet per minute | MHDRmaximum hourly design rate |
| BACTBest Available Control Technology | MMBtuMillion British thermal units |
| BMPsBest Management Practices | MMCFmillion cubic feet |
| BtuBritish thermal unit | MSDSMaterial Safety Data Sheet |
| CAMCompliance Assurance Monitoring | NAAQSNational Ambient Air Quality Standards |
| CASChemical Abstracts Service | NESHAPs National Emissions Standards for Hazardous Air Pollutants |
| CEMSContinuous Emission Monitor System | NO_xnitrogen oxides |
| CFRCode of Federal Regulations | NSPSNew Source Performance Standards |
| COcarbon monoxide | NSRNew Source Review |
| CO₂carbon dioxide | PMparticulate matter |
| CO_{2e}carbon dioxide equivalent | PM_{2.5}particulate matter less than 2.5 microns in aerodynamic diameter |
| COMSContinuous Opacity Monitoring System | PM₁₀particulate matter less than 10 microns in aerodynamic diameter |
| CSRCode of State Regulations | ppmparts per million |
| dscfdry standard cubic feet | PSDPrevention of Significant Deterioration |
| EIQEmission Inventory Questionnaire | PTEpotential to emit |
| EPEmission Point | RACTReasonable Available Control Technology |
| EPAEnvironmental Protection Agency | RALRisk Assessment Level |
| EUEmission Unit | SCCSource Classification Code |
| fpsfeet per second | scfmstandard cubic feet per minute |
| ftfeet | SDSSafety Data Sheet |
| GACTGenerally Available Control Technology | SICStandard Industrial Classification |
| GHGGreenhouse Gas | SIPState Implementation Plan |
| gpmgallons per minute | SMALScreening Model Action Levels |
| grgrains | SO_xsulfur oxides |
| GWPGlobal Warming Potential | SO₂sulfur dioxide |
| HAPHazardous Air Pollutant | tphtons per hour |
| hrhour | tpytons per year |
| hphorsepower | VMTvehicle miles traveled |
| lbpound | VOCVolatile Organic Compound |
| lbs/hrpounds per hour | |
| MACTMaximum Achievable Control Technology | |
| µg/m³micrograms per cubic meter | |
| m/smeters per second | |