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: 042017-010

Project Number: 2016-01-052
Installation Number: 077-0190

Parent Company: Springfield Southwest Clean Water Plant

Parent Company Address: 3301 S. State Hwy FF, Springfield, MO 65807

Installation Name: Springfield Southwest Clean Water Plant

Installation Address: 3301 S. State Hwy FF, Springfield, MO 65807

Location Information: Greene County, S7, T28N, R22W

Application for Authority to Construct was made for:
Installation of two new digester gas-fired Combined Heat and Power (CHP) engine generators, new waste gas flare, new odor control system, and a Rotary Drum Thickener (RDT) vent. 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.

Prepared by
Kathy Kolb
New Source Review Unit

Director or Designee
Department of Natural Resources

APR 25 2017
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 of the anticipated date of start up of this (these) air contaminant source(s). The information must be made available within 30 days of actual startup. Also, you must notify the Department's regional office responsible for the area within which you are located 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:
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."

Springfield Southwest Clean Water Plant
Greene County, S7, T28N, R22W

1. NO_X Emission Limitation
   A. Springfield Southwest Clean Water Plant shall emit less than 40.0 tons of NO_X in any consecutive 12-month period from EP-01 through EP-06.

   B. Attachment A or equivalent forms, such as electronic forms, preapproved by the Air Pollution Control Program shall be used to demonstrate compliance with Special Conditions 1.A.

2. CO Emission Limitation
   A. Springfield Southwest Clean Water Plant shall emit less than 100.0 tons of CO in any consecutive 12-month period from EP-01 through EP-06.

   B. Attachment B or equivalent forms, such as electronic forms, preapproved by the Air Pollution Control Program shall be used to demonstrate compliance with Special Conditions 2.A.

3. SO_2 Emission Limitation
   A. Springfield Southwest Clean Water Plant shall emit less than 40.0 tons of SO_2 in any consecutive 12-month period from EP-01 through EP-06.

   B. Springfield Southwest Clean Water Plant shall develop and use forms to demonstrate compliance with Special Condition 3.A. The forms shall contain at a minimum the following information,
      1) Installation name
      2) Installation ID
      3) Permit number
      4) Current month
      5) Current 12-month date range
      6) Monthly throughput for each emission unit with the potential to emit SO_2 (EP-01, EP-02, EP-03, EP-04, EP-05 and EP-06)
      7) SO_2 emission factors for each emission unit as determined by Test Method ASTM D-5504 and approved by the Air Pollution Control Program.
         a. At the time of this permit's issuance the emission factor for the flare (EP-06) is 1.64E-07 lb SO_2 per scf of biogas throughput (uncontrolled).

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

8) Monthly emissions for each emission unit calculated using the following equation:

$$MonthlySO2Emissions\left[\frac{tons{\cdot}SO_2}{month}\right] = \frac{ppmv}{10^6}\left[\frac{ft^3{\cdot}S}{ft^3{\cdot}biogas}\right] \times FuelUsage\left[\frac{ft^3{\cdot}biogas}{month}\right] \times \frac{1}{R}\left[\frac{lbmol{\cdot}S{\times}°R}{atm{\times}ft^3{\cdot}S}\right] \times P[atm] \times \frac{1}{(T+459.67)}\left[\frac{1}{°R}\right] \times MlrRatio\left[\frac{lbmol{\cdot}SO_2}{lbmol{\cdot}S}\right] \times MW_{SO2}\left[\frac{lb{\cdot}SO_2}{lbmol{\cdot}SO_2}\right] \times \frac{1\ ton}{2{,}000\ lb}$$

Where,

Parameter		Parameter Description		Units of Measure		Value
MonthlySO_2Emissions*	=	Monthly SO_2 emissions		[tons per month]	=	Varies (calculated each month)
ppmv	=	Sulfur concentration in biogas		[ppmv]	=	Varies (determined from test required in Special Condition 6)
FuelUsage	=	Monthly fuel usage		[cubic feet / month]	=	Varies (determined from biogas fuel flow monitors)
R	=	Ideal gas constant		[atm x ft^3 / (lbmol x °R)]	=	0.7302
P	=	Pressure of biogas		[atm]	=	1 (assumed)
T	=	Temperature of biogas		[°F]	=	77 (assumed 25 °C)
MlrRatio	=	Molar ratio		[lbmol / lbmol]	=	1 (from chemical reaction {$1\,S + 1\,O_2 \rightarrow 1\,SO_2$} 1 mole of SO_2 is formed for every 1 mole of S †)
MW_{SO2}	=	Molecular weight of SO_2		[lb / lbmol]	=	64.058 (S=32.06, O=15.999)

*Assumes all sulfur in the biogas is emitted as SO_2

9) Monthly emissions of SO_2 calculated by summing all SO_2 emissions from EP-01, EP-02, EP-03, EP-04, EP-05, and EP-06
10) 12-month rolling total SO_2 emissions from EP-01, EP-02, EP-03, EP-04, EP-05, and EP-06 and the sum of all SO_2 emissions from startup, shutdown, and malfunction as reported the Air Pollution Control Program's Compliance/Enforcement Section
11) Indication of compliance with Special Condition 3.A.

4. Flow Meters
A. Springfield Southwest Clean Water Plant shall install flow meters on the following:
1) CHP engines-a separate flow meter shall be installed on each engine (EP-04 and EP-05) for each fuel type (digester gas/natural gas) for a total of four flow meters.
2) Flare-a flow meter shall be installed prior to the flare (EP-06).
3) Boilers- a separate flow meter shall be installed on each boiler (EP-01 and EP-02 in the Main Equipment Building and EP-03 in the Process Building) for each fuel type (digester gas/natural gas) for a total of six flow meters.

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

B. The flow meters shall be located in such a way that it can be observed by the Department of Natural Resources' employees.

5. Digester Gas Conditioning System
   A. Springfield Southwest Clean Water Plant shall control sulfur emissions of the biogas prior to the intake of the CHP engines and boilers (EP-01 through EP-05).

   B. The scrubber shall be operated and maintained in accordance with the manufacturer's specifications. Pressure drop shall be recorded daily and maintained within the range established at the most recent sulfur test.

   C. Springfield Southwest Clean Water Plant shall maintain a copy of the scrubber manufacturer's performance warranty on site.

   D. Springfield Southwest Clean Water Plant shall maintain an operating and maintenance log for the scrubber 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.

6. Record Keeping and Reporting Requirements
   A. Springfield Southwest Clean Water Plant 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. Springfield Southwest Clean Water Plant shall report to the Air Pollution Control Program's Compliance/Enforcement Section, P.O. Box 176, Jefferson City, MO 65102, 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.

7. Biogas Sulfur Content Testing
   A. Springfield Southwest Clean Water Plant shall test biogas prior to and after the sulfur control system.

   B. Test method ASTM D-5504, or an alternative method preapproved by the Air Pollution Control Program Compliance/Enforcement Section shall be used.

   C. Initial testing of the biogas prior to engine/boiler combustion shall be performed within 180 days after initial start-up of CHP engines (EP-04 and

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

EP-05). Subsequent testing shall be performed according to the following schedule,

1) If the test results indicate a concentration of 22.5 ppmv or less, then subsequent testing shall be performed once per calendar year. No two calendar year tests shall be performed with 3 months of each other.
2) If the test results indicate a concentration greater than 22.5 ppmv then subsequent testing shall be performed at least once quarterly.
3) If four consecutive quarterly tests indicate a concentration of 22.5 ppmv or less, then testing shall revert to C.1).

D. Initial testing of the uncontrolled biogas shall be performed within 180 days after initial start-up of flare (EP-06). Subsequent testing shall be performed according to the following schedule,

1) If the test results indicate a concentration of 2,250 ppmv or less, then subsequent testing shall be performed once per calendar year. No two calendar year tests shall be performed with 3 months of each other.
2) If the test results indicate a concentration greater than 2,250 ppmv, then subsequent testing shall be performed at least once quarterly.
3) If four consecutive quarterly tests indicate a concentration of 2,250 ppmv or less, then testing shall revert to D.1).

E. A completed Proposed Test Plan Form (enclosed) shall be submitted to the Air Pollution Control Program at least 30 days prior to the proposed initial test date so that the Air Pollution Control Program may arrange a pretest meeting, if necessary, and assure that the test date is acceptable for an observer to be present. The Proposed Test Plan may serve the purpose of notification and shall be approved by the Air Pollution Control Program Compliance/Enforcement Section prior to conducting the required initial emission testing. Subsequent tests do not require prior notification.

F. Two copies (one hardcopy, one electronic) of the full initial test report and results shall be submitted to the Air Pollution Control Program Compliance/Enforcement Section within 30 days of completion of the initial test. The report shall include legible copies of the raw data sheets, analytical instrument laboratory data, and complete sample calculations from the required test method. Copies of subsequent test reports shall be kept onsite.

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

8. Performance Testing

A. Springfield Southwest Clean Water Plant shall conduct initial and subsequent performance testing on each engine (EP-4 and EP-5) to determine respective NO_X, CO, VOC and SOx emission factors.

1) The emission tests shall provide emission factors for a full range of loads on the engines (i.e. 50, 75, and 100 percent). The tests shall be conducted to represent, at a minimum, three different operational loads for each pollutant. One 3-run test set shall be conducted with the emission unit operating at permitted capacity. Permitted capacity is defined as 90 to 100 percent of the maximum operation rate (Table 1) allowed by the permit. If it is impractical to test at permitted capacity, an emission unit may be tested at less than the maximum permitted capacity; in this case, subsequent engine operation is limited to 110 percent of the test rate until a new test is conducted. Once the engine is so limited, operation at higher capacities is allowed for no more than 15 total days for the purpose of additional compliance testing to regain the authority to operate at the permitted capacity.

Table 1: Maximum Operation Rate

Emission Unit	Engine Power (brake hp)	Biogas Flowrate (scf/hr)	Genset electrical power (eKW)	Engine mechanical power (kW)
EP-04	1,665.55	17,430	1,200	1,242
EP-05	1,655.55	17,430	1,200	1,242

2) The tests shall be completed in accordance with the procedures outlined in Special Condition 8 and 40 CFR 60 Subpart JJJJ.

3) NO_X, CO and SOx emission factors shall be developed from the most recent performance tests and applicable sulfur content testing of the biogas to be used to determine compliance with Special Conditions 1, 2 and 3, and 40 CFR 60 Subpart JJJJ.

B. The initial tests shall be performed within 60 days after achieving the maximum production rate of the engines, but not later than 180 days after initial start-up. The subsequent tests shall be performed every 8,760 hours of operation or three years, whichever comes first, thereafter.

C. A completed Proposed Test Plan Form (enclosed) must be submitted to the Air Pollution Control Program 30 days prior to the proposed test date so that the Air Pollution Control Program may arrange a pretest meeting, if necessary, and assure that the test date is acceptable for an observer to be present. The Proposed Test Plan may serve the purpose of notification and must be approved by the Director prior to conducting the required emission testing.

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

D. Two copies of a written report of the performance test results shall be submitted to the Environmental Protection Agency, Air and Waste Management Division, 11201 Renner Blvd., Lenexa, KS 66219, within 60 days of testing completion. Copy the Air Pollution Control Program on all correspondence. The report must include legible copies of the raw data sheets, analytical instrument laboratory data, and complete sample calculations from the required EPA Method for at least one sample run.

E. 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.

F. If the performance testing indicates peak load outside of the permitted capacity established in Special Condition 8.A.I. or indicates emission rates exceeding the values in Table 2, Springfield Southwest Clean Water Plant shall submit a construction permit amendment application to the Air Pollution Control Program within 60 days of submitting the test report required by Special Condition 8.D.

Table 2: Emission Limits (gram/hp)

Emission Unit	NOx	VOC	CO
EP-04	2.0	1.0	5.0
EP-05	2.0	1.0	5.0

9. Springfield Southwest Clean Water Plant shall only operate the waste gas flare (EP-06) during an emergency when the CHP engines and existing boilers are out of service, when the digester gas treatment system is not operable, or when there is an excess of digester gas.

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE
SECTION (5) REVIEW
Project Number: 2016-01-052
Installation ID Number: 077-0190
Permit Number: 042017-010

Installation Address:
Springfield Southwest Clean Water Plant
3301 S. State Hwy FF
Springfield, MO 65807

Parent Company:
Springfield Southwest Clean Water Plant
3301 S. State Hwy FF
Springfield, MO 65807

Greene County, S7, T28N, R22W

REVIEW SUMMARY

- Springfield Southwest Clean Water Plant has applied for authority to install two new digester gas-fired combine heat and power (CHP) engine generators (natural gas back-up), new waste gas flare, new odor control system, and a rotary drum thickener (RDT) vent.

- The application was deemed complete on March 16, 2016.

- HAP emissions are expected from the incomplete combustion of biogas or natural gas. Also, HAPS are generated by the anaerobic digestion and reduced by the CHP engines, flare and boilers from the combustion of biogas.

- 40 CFR 60 Subpart JJJJ, "Standards of Performance for Stationary Spark Ignition Internal Combustion Engines" applies to the CHP engines.

- 40 CFR 63 Subpart ZZZZ, "National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines" applies to the CHP engines.

- A scrubber is being used to control the reduced sulfur compounds emissions from the biogas.

- This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of NOx, SO_2 and CO are conditioned below de minimis levels.

- This installation is located in Greene County, an attainment 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 not performed since potential emissions of the application are below de minimis levels.

- Sulfur compound testing is required for the biogas as a part of this permit. Emission testing for the engines is required as stated in NSPS Subpart JJJJ.

- A Basic Operating Permit application is not required for this installation because the installation conditioned potential emissions are de minimis for all pollutants.

- Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

The City of Springfield owns and operates the Southwest Clean Water Plant (SWCWP), formerly known as the Springfield Southwest Wastewater Treatment Plant. The SWCWP is located in the southwest portion of Springfield, Missouri, in Greene County near the intersection of State Highway FF and the James River Freeway. The SWCWP is a publicly-owned 64 million gallon per day (mgd) wastewater treatment facility which treats domestic and industrial wastewater, with a peak treatment capacity of 100 mgd. The existing facility contains two treatment trains, a single-stage extended aeration plant and a two-stage pure oxygen activated sludge plant. The facility currently does not have any air permits with the Missouri Department of Natural Resources' Air Pollution Control Program.

The City of Springfield is proposing to convert the existing single-stage anaerobic digestion process to a two-phase (acid/gas), three-stage digestion system to increase digestion capacity, provide more effective stabilization of the biosolids, and reduce biosolids related odors. The conversion will be accomplished by installing a new anaerobic digester complex consisting of a new acid-phase digester and a new gas-phase digester. The project will also include implementing co-thickening of the primary and waste activated sludge, rehabilitation of the existing digesters, modifications to the hauled waste truck unloading facility, diffuser replacements in the existing nitrification tanks and rehabilitation of the aeration piping in the nitrification, oxygenation tanks influent and effluent channels. Modifications in the existing Process Building include a new rotary drum thickener (RDT) and associated polymer feed system. In addition to wastewater treatment process modifications, the project will include the addition of two new, digester gas-fired or natural gas combined heat and power (CHP) engine generators, the installation of a new digester gas conditioning system, a new waste gas flare, a new odor control system, and venting of the rotary drum thickening (RDT) equipment within the existing Process Building. There are three existing boilers used to produce heat;

1. Main Equipment Building Sludge Boiler, Hurst Series 500, 6.0 MMBtu/hr capable of burning digester gas or natural gas. (Installed 2014)
2. Main Equipment Building Boiler (Building Heat), Hurst Series 500, 3.36 MMBtu/hr capable of burning digester gas, natural gas, or distillate No. 2. (Installed 2012)

3. Process Building Boiler (Building Heat), Hurst Series 500, 4.20 MMBtu/hr, capable of burning digester gas, natural gas, or distillate No. 2. (Installed 2014)

PROJECT DESCRIPTION

The proposed project consists of the air emission units that include the two CHP engines, the digester gas conditioning (odor control) system, the waste gas flare, and the RDT vent. There are three existing boilers that were never permitted and their emissions are being included in this project as they will now have the capability of burning biogas.

Combined Heat and Power Engine-The CHP facility will consist of two 1200 ekW genset output (1242 kW mechanical engine output) engine generators with the required gas cleaning equipment. The engines will only be fueled with the cleaned digester gas or natural gas as a back-up. The engines will produce electricity and hot water for facility and process uses. A new vertical heat recovery silencer will be installed for each engine generator. The waste heat loop from the new engine generators will be added to the overall heating system circulation piping. Two new outdoor radiators will be installed to reject any heat that exceeds the heat required by the main heating water system.

Digester Gas Conditioning System-The existing digester gas system collects the gas produced from the four anaerobic digesters. The new gas cleaning system will be packaged and will include a scrubber for hydrogen sulfide removal, a dryer system for additional siloxanes removal, and a siloxane absorber for final additional removal. Any excess digester gas that is not utilized by the engine generators or boilers will be sent to a new waste gas flare.

Waste Gas Flare- A new flare system will be provided to flare off any excess gas generated that exceeds the plant's ability to utilize the digester gas. The facility currently has an existing waste gas flare; however, this existing waste gas flare will be demolished. The new waste gas flare will be candlestick typed flare and will utilize natural gas as the backup pilot gas. As gas is produced, the pressure relief valve functions to maintain a preset pressure in the digester gas collection manifold. As gas production causes the pressure to increase, excess gas is released to the waste gas flare for combustion. The flare has a maximum design capacity of 28,620 scfh.

Odor Control System-An odor control system will be an activated carbon canister type and include a fan to ventilate the space within the new waste unloading facility at 12 air changes per hour. The system will vent to a single fan and a single 9 foot carbon absorption unit. The carbon unit is designed to remove 99 percent of the hydrogen sulfide in the air stream.

RDT Vent- The co-thickening of the primary and waste activated sludge at the RDT within the existing Process Building will generate an odor consisting primarily of H_2S.

The exhaust from the RDT is tied directly into the room's exhaust fan duct. The exhaust fan is designed for six air changes per hour. As the amount of H_2S is presumed to be minor, an odor control system will not be installed.

Table 3: Equipment List

Emission Point	Equipment Description	Fuels
EP-01	Existing Boiler-Sludge Hurst Series 500/ 6.0 MMBTU/hr (2014)	Digester gas, Natural Gas
EP-02	Existing Boiler-Main Equipment Building Heat/ 3.36 MMBTU/hr (2012)	Digester gas, Natural Gas, (Distillate No. 2) Fuel Oil
EP-03	Existing Boiler-Process Building Heat/ 4.20 MMBTU/hr (2014)	Digester gas, Natural Gas, (Distillate No. 2) Fuel Oil
EP-04	CHP Engine #1/1242 kW mechanical	Digester gas, Natural Gas
EP-05	CHP Engine #2/1242 kW mechanical	Digester gas, Natural Gas
EP-06	Flare	Digester gas, NG for pilot
EP-07	RDT Vent	

EMISSIONS/CONTROLS EVALUATION

Engines--The NO_X, VOC, and CO emission factors used in this analysis were obtained from the emission standards in NSPS JJJJ. Biogas fueled engines are subject to variable fuel inputs, atmospheric conditions, and tuning specifications that can cause a range of emission values. In order to not require the engines to operate at a possibly difficult to maintain, precise calibration based upon a one-time performance test, the engines' potential emissions for NO_X, VOC, and CO have been updated to reflect the higher NSPS standards.

Potential PM, PM_{10}, $PM_{2.5}$ emissions were calculated using the emission factors from AP-42, Fifth Edition, Vol. I, Chapter 3 "Stationary Internal Combustion Sources", Section 3.2 "Natural Gas-Fired Reciprocating Engines", July 2000.

Potential SO_X emissions were calculated using the application sulfur concentration of 30 ppmv post scrubber (75% of 30 ppmv is 22.5 ppmv which is the test threshold). Prescrubber emissions are 3,000 ppmv (75% of 3,000 ppmv is 2,250 which is the testing threshold) using 99% control as stated in the application.

Potential HAP emissions were calculated using the AP-42 default Natural Gas emission factors.

Potential CO_2 emissions can be calculated using 40 CFR 98.

Conditioned potential emissions of the project represent the potential of the emission units listed in Table 1 assuming continuous operation (8,760 hours per year), but with voluntary NO_X, CO and SO_2 limits to avoid ambient air impact quality analysis. A limit

for each pollutant is needed because due to the relationship between combustion generated NO_X, CO and SO_2, limiting one does not proportionately reduce the other.

Existing potential and actual emissions were not available since this is a new installation.

Springfield Southwest Clean Water Plant may amend this permit to reflect the results of the test if emission rates are higher than what is stated in this permit. Springfield Southwest Clean Water Plant may also amend this permit to reflect the results of the test if emission rates are lower than what is stated in this permit in order to obtain a greater operating capacity.

Flare-- The flare PTE was evaluated operating at 8,760 hours per year (143,100,000 scf in any consecutive 12-month period). The flare will only operate as an emergency when the CHP engines and existing boilers are out of service, when the digester gas treatment system is not operable, or when there is an excess of digester gas. The emission factors were obtained from the USEPA FIRE Database (SCC 50200601: Waste Gas Flares) and San Diego Air Pollution Control District, Emission Factors – Flares, Digester Gas Fired.

Boilers—Emission factors were obtained from

- AP-42, Fifth Edition, Vol.1, Chapter2 "Solid Waste Disposal", Section 2.4 "Municipal Waste Landfills", November 1998; Table 2.4-5 "Emission Rates for Secondary Compounds Exiting Control Devices".
- AP-42, Fifth Edition, Vol. 1. Chapter 1 "External Combustion Sources", Section 1.4 "Natural Gas Combustion", July 1998;
    - Table 1.4-2 "Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion"
    - Table 1.4-4 "Emission Factors for Metals from Natural Gas Combustion"
    - Table 1.4-3 "Emissions Factors for Speciated Organic Compounds from Natural Gas Combustion"
    - Table 1.4-1 "Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion"

Table 4: Emissions Summary (tpy)

Pollutant	Regulatory *De Minimis* Levels	Existing Potential Emissions	Existing Actual Emissions	Potential Emissions of the Project	New Installation Conditioned Potential
PM	25.0	N/A	N/A	2.49	2.49
PM_{10}	15.0	N/A	N/A	3.19	3.19
$PM_{2.5}$	10.0	N/A	N/A	3.14	3.14
SO_2	40.0	N/A	N/A	62.8	<40.0
NOx	40.0	N/A	N/A	74.8	<40.0
VOC	40.0	N/A	N/A	38.8	38.8
CO	100.0	N/A	N/A	187.1	<100.0
Sulfuric Acid Mist (H_2SO_4)	7.0	N/A	N/A	1.27	0.81
Hydrogen Sulfide (H_2S)	10.0	N/A	N/A	2.70	1.72
Reduced Sulfur Compounds	10.0	N/A	N/A	2.70	1.72
Total Reduced Sulfur	10.0	N/A	N/A	2.70	1.72
GHG (CO_2e)	N/A	N/A	N/A	17,645	17,645
GHG (mass)	N/A	N/A	N/A	17,556	17,556
HAPs	10.0/25.0	N/A	N/A	0.82	0.82

N/A = Not Applicable; 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 NOx, SO_2 and CO are conditioned below de minimis levels.

APPLICABLE REQUIREMENTS

Springfield Southwest Clean Water 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

- *Submission of Emission Data, Emission Fees and Process Information,* 10 CSR 10-6.110

- *Operating Permits*, 10 CSR 10-6.065 is not required for this installation because the installation conditioned potential emissions are de minimis for all pollutants.

- *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*, 10 CSR 10-6.170

- *Restriction of Emission of Odors*, 10 CSR 10-6.165

SPECIFIC REQUIREMENTS

- *Restriction of Emission of Particulate Matter From Industrial Processes*, 10 CSR 10-6.400 does not apply to either engine as they are fueled exclusively by a gaseous fuel and air introduced for purposes of combustion, and therefore do not meet the definition of process weight according to 10 CSR 10-6.020(2)(P).

- *New Source Performance Regulations*, 10 CSR 10-6.070
    - *Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*, 40 CFR Part 60, Subpart JJJJ applies to the engines. The engines are subject to emission standards, performance testing, notification, recordkeeping and reporting requirements. The regulation should be consulted for specific requirements. All reports and notifications should be submitted to Missouri Department of Natural Resources' Air Pollution Control Program.

- *MACT Regulations*, 10 CSR 10-6.075
    - *National Emission Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines,* 40 CFR Part 63, Subpart ZZZZ applies to the engines. The engines are subject to monitoring, installation, collection, operation and maintenance, initial notification, recordkeeping and reporting requirements. At this time, the Air Pollution Control Program has not accepted implementation and enforcement delegation of this regulation. Missouri Department of Natural Resources relies on EPA Region 7 for compliance management. Please submit all reports and notifications at the address in Special Condition 8.D. for complete requirements, and copy the Air Pollution Control Program Compliance/Enforcement Section on all EPA correspondence.

    - *National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources*, 40 CFR Part 63, Subpart JJJJJJ applies to engines EP-02 and EP-03 when combusting fuel oil (diesel) as stated in §63.11237.

- *Restriction of Emission of Sulfur Compounds*, 10 CSR 10-6.260 and 10 CSR 10-6.261 applies to the engines, boilers and flare. SO_2 compliance for the flare is assumed if the exhaust is 3,521.5 scfm and the input is 477scfm; then the SO_2 was calculated to be 399.4 pmmv. This is less than 500 ppmv which is the level stated in the rule. It is assumed that the engines and boilers will also be in compliance since the controlled sulfur content of the cleaned biogas is 30 ppmv.

SO_3 and sulfuric acid compliance is assumed due to the low SO_2 concentration and also assuming most of the SO_X is SO_2.

- *Restriction of Particulate Matter Emissions from Fuel Burning Equipment,* 10 CSR 10-6.405

- *Restriction of Emission of Visible Air Contaminants,* 10 CSR 10-6.220 applies to the existing flare which will be demolished and to the new waste gas flare. CHP engines are considered internal combustion engines and are therefore exempt from this rule as state in 10 CSR 10-.220(1)(A). The new odor control system and RDT vent does not emit any visible emissions; therefore, this rule is not applicable to them.

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 January 11, 2016, received January 28, 2016, designating Springfield Southwest Clean Water Plant as the owner and operator of the installation.

Attachment A – NOx Compliance Worksheet

Springfield Southwest Clean Water Plant
Greene County, S7, T28N, R22W
Project Number: 2016-01-052
Installation ID Number: 077-0190
Permit Number: 042017-010

This sheet covers the period from ____________________ (month, year) to ____________________ (month, year).

A	B	C	D	E	F	G	H	I
Month, Year	Emission Unit, Description	Output (eKW / month)	NO_X Emission Factor (gram / hp)	NO_X Emissions (lbs/month)	NO_X Emissions (tons/month)	12-month NO_X Emissions from Previous Month (tons)	Monthly NO_X Emissions from This Month Last Year (tons)	12-month NO_X Emissions (tons)
example	EP-04 CHP	*600,000*	*2.0*	*3,734.4*	*4.5*	*39.6*	*4.8*	*39.3*
	EP-05 CHP	*864,000*	*2.0*	*5,377.5*				
example	EP-04 CHP	*651,081*	2.0	*4,052.3*	*4.6*	*39.3*	*4.7*	*39.2*
	EP-05 CHP	*812,317*	2.0	*5,055.9*				
	EP-04 CHP							
	EP-05 CHP							
	EP-04 CHP							
	EP-05 CHP							
	EP-04 CHP							
	EP-05 CHP							
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	EP-04 CHP							
	EP-05 CHP							
	EP-04 CHP							
	EP-05 CHP							
	EP-04 CHP							
	EP-05 CHP							

A. Record the current month and year.
B. Emission unit and description.
C. Record each unit's total electric kilowatt output for this month.
D. NO_X emission factors. Record the highest, 3-run average, most recent value from performance testing for the engines. Until the engines are tested use 2.0 gram / hp.
E. Calculate each unit's NO_X emissions. E = [(C x D x 1.341) / (0.95 x 453.5924)], where 1.341 hp = 1 KW, 0.95 = mechanical to electrical efficiency at 0.8 power factor, 453.5924 grams = 1 lb.
F. Calculate the current month's NO_X emissions. F = $(E_1 + E_2)$ / 2,000.
G. Record the 12-month NO_X emissions (I) from the previous month.
H. Record the monthly NO_X emissions (F) from this month last year.
I. Calculate the current month's NO_X emissions. I = F + G – H. A value less than 40.0 tons indicates compliance.

Attachment B – CO Compliance Worksheet

Springfield Southwest Clean Water Plant
Greene County, S7, T28N, R22W
Project Number: 2016-01-052
Installation ID Number: 077-0190
Permit Number: 042017-010

This sheet covers the period from ____________ (month, year) to ____________ (month, year). Copy this sheet as needed.

A	B	C	D	E	F	G	H	I
Month, Year	Emission Unit, Description	Output (eKW / month)	CO Emission Factor (gram / hp)	CO Emissions (lbs/month)	CO Emissions (tons/month)	12-month CO Emissions from Previous Month (tons)	Monthly CO Emissions from This Month Last Year (tons)	12-month CO Emissions (tons)
example	EP-04 CHP	*600,000*	*5.0*	*9,336.0*	*11.4*	*80.6*	*10.1*	*81.9*
	EP-05 CHP	*864,000*	*5.0*	*13,443.8*				
example	EP-04 CHP	*651,081*	*5.0*	*10,130.8*	*11.4*	*81.9*	*8.8*	*84.5*
	EP-05 CHP	*812,317*	*5.0*	*12,639.6*				
	EP-04 CHP							
	EP-05 CHP							
	EP-04 CHP							
	EP-05 CHP							
	EP-04 CHP							
	EP-05 CHP							
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	EP-05 CHP							
	EP-04 CHP							
	EP-05 CHP							
	EP-04 CHP							
	EP-05 CHP							
	EP-04 CHP							
	EP-05 CHP							

A. Record the current month and year.
B. Emission unit and description.
C. Record each unit's total electric kilowatt output for this month.
D. CO emission factors. Record the highest, 3-run average, most recent value from performance testing for the engines. Until the engines are tested use 5.0 gram / hp.
E. Calculate each unit's CO emissions. E = [(C x D x 1.341) / (0.95 x 453.5924)], where 1.341 hp = 1 KW, 0.95 = mechanical to electrical efficiency at 0.8 power factor, 453.5924 grams = 1 lb.
F. Calculate the current month's CO emissions. $F = (E_1 + E_2) / 2{,}000$.
G. Record the 12-month CO emissions (I) from the previous month.
H. Record the monthly CO emissions (F) from this month last year.
I. Calculate the current month's CO emissions. I = F + G – H. A value less than 100.0 tons indicates compliance.

APPENDIX A

Abbreviations and Acronyms

%.....percent
°F.....degrees Fahrenheit
acfm.....actual cubic feet per minute
BACT.....Best Available Control Technology
BMPs.....Best Management Practices
Btu.....British thermal unit
CAM.....Compliance Assurance Monitoring
CAS.....Chemical Abstracts Service
CEMS.....Continuous Emission Monitor System
CFR.....Code of Federal Regulations
CO.....carbon monoxide
CO_2.....carbon dioxide
CO_2e.....carbon dioxide equivalent
COMS.....Continuous Opacity Monitoring System
CSR.....Code of State Regulations
dscf.....dry standard cubic feet
EIQ.....Emission Inventory Questionnaire
EP.....Emission Point
EPA.....Environmental Protection Agency
EU.....Emission Unit
fps.....feet per second
ft.....feet
GACT.....Generally Available Control Technology
GHG.....Greenhouse Gas
gpm.....gallons per minute
gr.....grains
GWP.....Global Warming Potential
HAP.....Hazardous Air Pollutant
hr.....hour
hp.....horsepower
lb.....pound
lbs/hr.....pounds per hour
MACT.....Maximum Achievable Control Technology
µg/m^3.....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
MMCF.....million cubic feet
MSDS.....Material Safety Data Sheet
NAAQS....National Ambient Air Quality Standards
NESHAPs National Emissions Standards for Hazardous Air Pollutants
NO_x.....nitrogen oxides
NSPS.....New Source Performance Standards
NSR.....New Source Review
PM.....particulate matter
$PM_{2.5}$.....particulate matter less than 2.5 microns in aerodynamic diameter
PM_{10}.....particulate matter less than 10 microns in aerodynamic diameter
ppm.....parts per million
PSD.....Prevention of Significant Deterioration
PTE.....potential to emit
RACT.....Reasonable Available Control Technology
RAL.....Risk Assessment Level
SCC.....Source Classification Code
scfh.....standard cubic feet per hour
scfm.....standard cubic feet per minute
SDS.....Safety Data Sheet
SIC.....Standard Industrial Classification
SIP.....State Implementation Plan
SMAL.....Screening Model Action Levels
SO_x.....sulfur oxides
SO_2.....sulfur dioxide
tph.....tons per hour
tpy.....tons per year
VMT.....vehicle miles traveled
VOC.....Volatile Organic Compound

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

APR 2 5 2017

Mr. Brian Wirth
Superintendent of Clean Water Service
Springfield Southwest Clean Water Plant
3301 S. State Hwy FF
PO Box 8368
Springfield, MO 65807

RE: New Source Review Permit - Project Number: 2016-01-052

Dear Mr. Wirth:

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.

If you have any questions regarding this permit, please do not hesitate to contact Kathy Kolb, 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:kkj

Enclosures

c: Southwest Regional Office
PAMS File: 2016-01-052

Permit Number: 042017-010