

## STATE OF 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: 122010-016 Project Number: 2010-10-013

Installation Number: 021-0105

Parent Company: Great Plains Energy Incorporated

Parent Company Address: P.O. Box 418679, Kansas City, MO 64141

Installation Name: KCP&L Greater Missouri Operations Company - St. Joseph Landfill Generating Station

Installation Address: 9431 50th Rd. S.E., St. Joseph, MO 64507

Location Information: Buchanan County, S13, T56N, R35W

Application for Authority to Construct was made for:  
Two Caterpillar G3520C engines and a 1,300 SCFM enclosed flare. This review was conducted in accordance with Section (6), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*.

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

DEC 30 2010

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EFFECTIVE DATE

  
\_\_\_\_\_  
DIRECTOR OR DESIGNEE  
DEPARTMENT OF NATURAL RESOURCES

## 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 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 Department's Air Pollution Control Program of the anticipated date of start up of these air contaminant sources. The information must be made available within 30 days of actual startup. Also, you must notify the Department of Natural Resources Regional office responsible for the area within which you are located within 15 days after the actual start up of these air contaminant sources.

A copy of this permit and permit review shall be kept at the installation address and shall be made available to Department of Natural Resources' 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 sources(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 at (573) 751-4817. If you prefer to write, please address your correspondence to the Missouri Department of Natural Resources, Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102-0176, attention: Construction Permit Unit.

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Project No.	2010-10-013

**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."*

KCP&L Greater Missouri Operations Company - St. Joseph Landfill Generating Station  
Buchanan County, S13, T56N, R35W

1. Emission Limitation – Carbon Monoxide
  - A. KCP&L Greater Missouri Operations Company - St. Joseph Landfill Generating Station shall emit less than 250.0 tons of carbon monoxide (CO) in any consecutive 12-month period from the 1,300 SCFM enclosed flare (EP-8), engine 1 (EP-9A), engine 2 (EP-9B), and 650 SCFM open flare (EP-7).
  - B. Attachment A or equivalent forms, such as electronic forms, approved by the Air Pollution Control Program shall be used to demonstrate compliance with Special Condition 1.A.
2. Emission Limitation – Nitrogen Oxides
  - A. KCP&L Greater Missouri Operations Company - St. Joseph Landfill Generating Station shall emit less than 40.0 tons of nitrogen oxides (NO<sub>x</sub>) in any consecutive 12-month period from the 1,300 SCFM enclosed flare (EP-8), engine 1 (EP-9A), and engine 2 (EP-9B).
  - B. Attachment B or equivalent forms, such as electronic forms, approved by the Air Pollution Control Program shall be used to demonstrate compliance with Special Condition 2.A.
3. Record Keeping and Reporting Requirements
  - A. KCP&L Greater Missouri Operations Company - St. Joseph Landfill Generating Station 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.

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**SPECIAL CONDITIONS:**

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

- B. KCP&L Greater Missouri Operations Company - St. Joseph Landfill Generating Station shall report to the Air Pollution Control Program's Compliance/Enforcement Section, P.O. Box 176, Jefferson City, MO 65102, no later than ten 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.
4. Performance Testing
- A. KCP&L Greater Missouri Operations Company - St. Joseph Landfill Generating Station shall conduct performance testing on one of the engines (EP-9A or EP-9B) sufficient to quantify the emission rates (pounds of pollutant per million standard cubic feet of methane) of carbon monoxide (CO), and nitrogen oxides (NO<sub>x</sub>) submitted in the permit application [4.13 g CO/bhp-hr (grams per brake horsepower – hour) and 0.88 g NO<sub>x</sub>/bhp-hr] from these sources. The emission test shall provide emission factors for a full range of loads on the engines (i.e. 50, 75, and 100 percent) so that an accurate estimate of CO and NO<sub>x</sub> emissions from the installation during all modes of operation can be determined. The installation shall conduct tests that represent, at a minimum, three different operational loads for each pollutant. The test shall be completed in accordance with the procedures outlined below and subject to the Compliance Section's discretion. An emission factor shall be developed from the CO performance test to be used to determine compliance with Special Condition 1. An emission factor shall be developed from the NO<sub>x</sub> performance test to be used to determine compliance with Special Condition 2.
  - B. These tests shall be performed within 60 days after achieving the maximum production rate of the installation, but not later than 180 days after initial start-up for commercial operation.
  - 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.
  - D. Two copies of a written report of the performance test results shall be submitted to the Director within 30 days of completion of any required

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**SPECIAL CONDITIONS:**

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

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.

- 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 the CO emission rate exceeds 4.13 g/bhp-hr or the NO<sub>x</sub> emission rate exceeds 0.88 g/bhp-hr, KCP&L Greater Missouri Operations Company - St. Joseph Landfill Generating Station shall submit a complete construction permit amendment application to the Air Pollution Control Program within 60 days of the completion of the testing.

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

Project Number: 2010-10-013  
Installation ID Number: 021-0105  
Permit Number:

KCP&L Greater Missouri Operations Company -  
St. Joseph Landfill Generating Station  
9431 50th Rd. S.E.  
St. Joseph, MO 64507

Complete: October 8, 2010

Parent Company:  
Great Plains Energy Incorporated  
P.O. Box 418679  
Kansas City, MO 64141

Buchanan County, S13, T56N, R35W

REVIEW SUMMARY

- KCP&L Greater Missouri Operations Company - St. Joseph Landfill Generating Station has applied for authority to install two Caterpillar G3520C engines and a 1,300 SCFM enclosed flare.
- Hazardous Air Pollutant (HAP) emissions are expected from the proposed equipment.
- 40 CFR 60 Subpart JJJJ, *Standards of Performance for Stationary Spark Ignition Internal Combustion Engines* applies to the engines. 40 CFR 60 Subpart WWW, *Standards of Performance for Municipal Solid Waste Landfills* applies to the installation. §60.752(b)(2) does not apply to the new flare or engines. 40 CFR Subpart A *General Provisions* §60.18 does not apply to the new flare because it is enclosed.
- None of the National Emission Standards for Hazardous Air Pollutants (NESHAPs) apply to this installation. Maximum Achievable Control Technology (MACT) 40 CFR 63 Subpart AAAA, *National Emission Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills* does not yet apply to the installation. MACT Subpart ZZZZ, *National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines* applies to the engines.
- The engines and flare are control devices for volatile organic compounds (VOC), non-methane organic compounds (NMOC) and HAPs, but sources of combustion products.

- This review was conducted in accordance with Section (6) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of nitrogen oxides (NO<sub>x</sub>) are limited to below the de minimis level. Potential emissions of carbon monoxide (CO) are proportionately reduced to minor levels.
- This installation is located in Buchanan 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 performed to determine the ambient impact of carbon monoxide.
- CO and NO<sub>x</sub> performance testing is required for the engines.
- A Part 70 Operating Permit application is required for this installation within 12 months of equipment startup.
- Approval of this permit is recommended with special conditions.

#### INSTALLATION DESCRIPTION

The City of St. Joseph has operated a municipal solid waste landfill since 1976 consisting of Areas 1, 2, 3, and an expansion named the Free Property. According to the applicant, Areas 1 and 2 are pre-Subtitle D (40 CFR Part 258 *Criteria for Municipal Solid Waste Landfills*). None of the four disposal areas have been evaluated by the Air Pollution Control Program (APCP) for construction permit applicability. The landfill currently has a 650 SCFM open flare which has been operational since 2001. The flare was evaluated by the APCP for operating permit applicability under project 2001-04-092, but has not been evaluated for construction permit applicability. Carbon monoxide is typically the pollutant that determines construction permit applicability for flares fueled by landfill gas. Potential emissions of carbon monoxide from the flare, evaluated at its maximum flow, are 16.09 pounds per hour. This exceeds the hourly insignificance level of 6.88 pounds, but is less than the de minimis threshold of 100.0 tons per year.

NSPS Subpart WWW applies to the landfill. However, since January 2006 site specific testing showed 184 ppmv NMOC, and the resulting annual NMOC emission rate was less than 50 megagrams, the flare and engines are not subject to the control device requirements of the subpart at this time. Once the flare and engines are required by NSPS Subpart WWW, the installation will be subject to MACT Subpart AAAA. The engines are subject to NSPS Subpart JJJJ and MACT Subpart ZZZZ. Meeting the requirements of NSPS Subpart JJJJ satisfies the requirements of MACT Subpart ZZZZ.

No permits have been issued to Kansas City Power & Light Greater Missouri Operations Company (KCP&L GMO) - St. Joseph Landfill Generating Station from the Air Pollution Control Program. However, the following permits have been issued to the St. Joseph Sanitary Landfill from the APCP. KCP&L GMO and the landfill are one installation for permitting purposes.

Table 1: Permit History

Permit Number	Description
OP1999-193	Part 70 Operating Permit
OP2006-052	Part 70 Operating Permit

## PROJECT DESCRIPTION

KCP&L GMO proposes to install two Caterpillar G3520C engines and a 1,300 SCFM enclosed flare. Each engine is rated at 2,233 brake horsepower for a combined nominal output of 4,466 brake horsepower. The engines will supply up to 3.2 megawatts of electricity through generators. The engines and flare are fueled exclusively by landfill gas. The engines and flare are control devices for methane, hazardous air pollutant (HAP), and volatile organic compound (VOC) emissions from the landfill gas, but produce carbon monoxide and other combustion products.

## EMISSIONS/CONTROLS EVALUATION

The emission factors and control efficiencies used in this analysis for the flare are obtained from the Environmental Protection Agency (EPA) document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition, Section 2.4 *Municipal Solid Waste Landfills*, November 1998.

The primary constituents of landfill gas are approximately 55 percent methane (CH<sub>4</sub>) and 45 percent carbon dioxide (CO<sub>2</sub>). Typically, landfill gas also contains a small amount of NMOC. This NMOC fraction often contains various organic hazardous air pollutants (HAP), greenhouse gases (GHG), volatile organic compounds (VOC), and other compounds associated with stratospheric ozone depletion.

According to AP-42, the landfill gas collection system is by default 75 percent efficient. The flare is designed to control halogenated compounds at 98.0 percent efficiency, non-halogenated compounds at 99.7 percent efficiency, and NMOC at 99.2 percent efficiency. These pollutants are controlled by the engines at 93.0, 86.1, and 97.2 percent efficiency, respectively. The combustion of landfill gas also creates particulate matter less than ten microns in diameter (PM<sub>10</sub>), sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), and CO.

The engines and flare are permitted at their respective maximum design rates. This is the most conservative scenario. It accounts for increased flow rate to the flare if the flow rate exceeds the engines' capacity, the engines are being serviced, or are otherwise offline. Particulate emissions are calculated using the emission factors found in Table 2.4-5 in AP-42. According to the footnote to this table, most of the particulate

matter will be less than 2.5 microns in diameter, therefore the emission factor can be assumed to estimate total PM, PM<sub>10</sub>, and PM<sub>2.5</sub> emissions. CO and NO<sub>x</sub> emissions for the flare are also calculated by utilizing factors found in Table 2.4-5 of AP-42. CO and NO<sub>x</sub> emissions for the engines are calculated using the applicant supplied emission factors, 4.13 and 0.88 grams per brake horsepower-hour, respectively. SO<sub>x</sub> emissions for the flare and engines were calculated using equations 8, 3, 4, and 7 of AP-42 Section 2.4 and the default concentration of total reduced sulfur compounds of 46.9 ppmv.

Uncontrolled potential emissions are from the four disposal areas and haul roads. Landfill gas flow rate was predicted by LandGEM version 3.02, with the annual waste acceptance, landfill closure year, and site specific NMOC concentration submitted by the applicant. It was determined that a maximum landfill gas generation rate of 1,899 average standard cubic feet per minute (SCFM) would be reached in the year 2030. Uncontrolled NMOC emissions were calculated using the emission rate from LandGEM and the predictive equations (3) and (4) from AP-42 Section 2.4. Uncontrolled VOC and HAP emissions were also calculated using Section 2.4.

Uncontrolled haul road emissions were calculated using AP-42 Section 13.2.2 *Unpaved Roads*, November 2006. The waste receiving road distance, truck weights, and actual amounts hauled were cited from the 2009 Emissions Inventory Questionnaire (EIQ). Hourly waste and soil throughput were calculated by selecting the maximum projected annual waste acceptance from the year 2029, dividing by an estimated 2,600 annual hours as a bottleneck, and scaling to actual vehicle type throughput. Borrow pit in-situ moisture was assumed high such that negligible particulate emissions were expected from excavation, truck loading, truck unloading, and daily cover activities.

Conditioned potential emissions of the application represent the potential of the new equipment, assuming continuous operation (8,760 hours per year). NO<sub>x</sub> emissions are limited to below the de minimis level. Emissions from other pollutants are proportionately reduced. The following table provides an emissions summary for this project.

Table 2: Emissions Summary (tons per year)

Pollutant	Regulatory <i>De Minimis</i> Levels	Uncontrolled Potential Emissions	Existing Actual Emissions (2009 EIQ)	Conditioned Potential Emissions of the Application	New Installation Conditioned Potential
PM <sub>2.5</sub>	10.0	2.74	0.84	9.13	N/A
PM <sub>10</sub>	15.0	27.43	8.76	9.13	N/A
SO <sub>x</sub>	40.0	N/A	0.30	4.15	N/A
NO <sub>x</sub>	40.0	N/A	0.85	< 40.0	N/A
VOC	40.0	17.17	10.49	0.32	N/A
CO	100.0	N/A	15.94	280.68	< 250.0
HAPs	10.0/25.0	28.47	1.33	1.86	N/A
NMOC	50.0	20.21	N/D	0.38	N/A

N/A = Not Applicable; N/D = Not Determined

## 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 nitrogen oxides (NO<sub>x</sub>) are limited to below the de minimis level. Potential emissions of carbon monoxide (CO) are proportionately reduced to minor levels.

## APPLICABLE REQUIREMENTS

KCP&L Greater Missouri Operations Company - St. Joseph Landfill Generating Station 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 your operating permit.

### GENERAL REQUIREMENTS

- *Submission of Emission Data, Emission Fees and Process Information*, 10 CSR 10-6.110. The emission fee is the amount established by the Missouri Air Conservation Commission annually under Missouri Air Law 643.079(1). Submission of a hardcopy Emissions Inventory Questionnaire (EIQ) is required April 1 for the previous year's emissions. Otherwise, submission of an electronic EIQ via MoEIS is required May 1.
- *Operating Permits*, 10 CSR 10-6.065
- *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 – *New Source Performance Standards (NSPS) for Municipal Solid Waste Landfills*, 40 CFR Part 60, Subpart WWW and NSPS Subpart JJJJ, *Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*
- *Maximum Achievable Control Technology (MACT) Regulations*, 10 CSR 10-6.075, *National Emission Standards for Stationary Reciprocating Internal Combustion Engines*, 40 CFR Part 63, Subpart ZZZZ

- *Restriction of Emission of Sulfur Compounds, 10 CSR 10-6.260*

### AMBIENT AIR QUALITY IMPACT ANALYSIS

Ambient air quality modeling was performed to determine the ambient impact of carbon monoxide. The conditioned potential emissions of carbon monoxide exceed the de minimis level when the equipment is evaluated at their respective maximum design rate.

The following table lists the predicted ambient impact from the subject sources and comparison with the applicable National Ambient Air Quality Standards (NAAQS) significant impact level (SIL). The results from the modeling analysis demonstrate compliance with the NAAQS for each modeled pollutant. For more information see the modeling memorandum.

Table 3: Modeling Summary

Pollutant	Modeled Impact ( $\mu\text{g}/\text{m}^3$ )	SIL ( $\mu\text{g}/\text{m}^3$ )	Time Period
CO	504.12	2,000	1 hour
CO	426.61	500	8 hour

### 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*, I recommend this permit be granted with special conditions.

\_\_\_\_\_  
 David Little  
 Environmental Engineer

\_\_\_\_\_  
 Date

### PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated October 6, 2010, received October 8, 2010, designating Great Plains Energy Incorporated as the owner and operator of the installation.
- U.S. EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition.
- Kansas City Regional Office Site Survey, dated October 27, 2010.
- *Ambient Air Quality Impact Analysis (AAQIA) for KCPL Greater Missouri Operations Company – St. Joseph Landfill Generating Station*, dated December 20, 2010.





Mr. Paul Ling  
Environmental Manager  
Kansas City Power & Light  
P.O. Box 418679  
Kansas City, MO 64141

RE: New Source Review Permit - Project Number: 2010-10-013

Dear Mr. Ling:

Enclosed with this letter is your permit to construct. Please study it carefully. 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 modified 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.

If you have any questions regarding this permit, please do not hesitate to contact David Little at the Department's Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102, or by telephone at (573) 751-4817. Thank you for your time and attention to this matter.

Sincerely,

AIR POLLUTION CONTROL PROGRAM

Kendall B. Hale  
New Source Review Unit Chief

KBH:dlk

Enclosures

c: Kansas City Regional Office  
PAMS File: 2010-10-013

Permit Number: