

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: **08 2007 - 007** Project Number: 2007-03-053

Parent Company: City of Columbia Sanitary Landfill

Parent Company Address: P.O. Box 6015, Columbia, MO 65205

Installation Name: City of Columbia Sanitary Landfill

Installation Address: 5700 Peabody Road, Columbia, MO 65202

Location Information: Boone County, S22, T49N, R12W

Application for Authority to Construct was made for:

The installation of four (4) reciprocating internal combustion engines, each rated at 1468 brake horsepower and each equipped with a 1059 Kilowatt generator. The engines will be fueled solely by landfill gas from the Columbia Landfill. 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.

AUG - 6 2007

EFFECTIVE DATE



DIRECTOR OR DESIGNEE
DEPARTMENT OF NATURAL RESOURCES

2001 11 17

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 this (these) air contaminant source(s). The information must be made available not more than 60 days but at least 30 days in advance of this date. Also, you must notify the Department of Natural Resources Regional office responsible for the area within which you are located with 15 days after the actual start up of this (these) air contaminant source(s).

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 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 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.

STATE OF MISSOURI



DEPARTMENT OF NATURAL RESOURCES

MISSOURI AIR CONSERVATION COMMISSION

PERMIT TO CONSTRUCT

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Permit Number: Project Number: 2007-03-053

Parent Company: City of Columbia Sanitary Landfill

Parent Company Address: P.O. Box 6015, Columbia, MO 65205

Installation Name: City of Columbia Sanitary Landfill

Installation Address: 5700 Peabody Road, Columbia, MO 65202

Location Information: Boone County, S22, T49N, R12W

Application for Authority to Construct was made for:

The installation of four (4) reciprocating internal combustion engines, each rated at 1468 brake horsepower and each equipped with a 1059 Kilowatt generator. The engines will be fueled solely by landfill gas from the Columbia Landfill. 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.

EFFECTIVE DATE

DIRECTOR OR DESIGNEE
DEPARTMENT OF NATURAL RESOURCES

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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.

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Permit No.	
Project No.	2007-03-053

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.”

City of Columbia Sanitary Landfill
Boone County, S9, T35N, R33W

1. Stack Testing Requirements – Landfill Gas to Energy (LGE) Electrical Generators
 - A. City of Columbia Sanitary Landfill shall conduct performance testing on one of the LGE electrical generators (EP-08, EP-09, EP-10 or EP-11) sufficient to quantify the emission rates (pounds of pollutant per million cubic feet of methane) of carbon monoxide (CO), and nitrogen oxides (NO_x) claimed in the permit application from these sources. The application used 3.0 g CO per bhp-hr and 0.6 g NO_x per bhp-hr. The emission tests should provide emission factors for a full range of loads on the generators (i.e. at loads from 50% to 100%) so that an accurate estimate of CO, and NO_x emissions from the installation during all modes of operation can be determined. The installation shall conduct tests that represent, at a minimum, three (3) different operational loads for each pollutant. The test(s) shall be done in accordance with the procedures outlined below and subject to the Compliance Section’s discretion. An emission factor shall be developed from the NO_x performance test.
 - B. A completed Proposed Test Plan (form enclosed) must be submitted to the Air Pollution Control Program (APCP) at least 30 days prior to the proposed test date of any such performance tests so that a pretest meeting may be arranged, if necessary, and to assure that the test date is acceptable for an observer from the APCP to be present. The Proposed Test Plan must be approved by the Director prior to conducting the above required emissions testing.
 - C. The stack tests required by this permit shall be performed within 60 days after achieving the maximum generation production rate at which the units will be operated, but not later than 180 days after initial start-up of the LGE electrical generators.
 - D. Two (2) copies of a written report of the performance test results must be submitted to the Director within 90 days of completion of the performance testing. The report must include legible copies of the raw data sheets, analytical instrument laboratory

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Permit No.	
Project No.	2007-03-053

SPECIAL CONDITIONS:

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

data, and complete sample calculations from the required method for at least one sample run for each air pollutant tested.

- E. If the stack tests required by Special Condition 1.A of this permit indicate that the potential emissions (emissions when operating 8,760 hours per year) of CO will exceed the major source threshold (250 tons per year), City of Columbia Sanitary Landfill shall limit the hours of operation such that the major source threshold will not be exceeded. An emission rate of 3.0 grams CO per brake horse power was used to calculate the potential emissions, if the testing shows that the emission rate is higher than 3.0 grams CO per brake horsepower this permit will have to be amended. The GE model JSG 320 engines to calculate the potential emission were rated at 1468 bhp each.

2. Bioreactor

- A. City of Columbia Sanitary Landfill shall not install or operate a bioreactor, at this site without obtaining approval from the Air Pollution Control Program.

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

Project Number: 2007-03-053
Installation ID Number: 019 0091
Permit Number:

City of Columbia Sanitary Landfill
5700 Peabody Road
Columbia MO 65202

Complete: January 22, 2007
Reviewed: June 15, 2007

Parent Company:
City of Columbia Sanitary Landfill
P.O. Box 6015
Columbia MO 65205-6015

Boone County, S22, T49N, R12W

REVIEW SUMMARY

- City of Columbia Sanitary Landfill has applied for authority to construct four (4) General Electric Reciprocating Engines, Model JGS-320 each rated at 1468 brake horsepower (bhp) (5872 bhp total).
- Hazardous Air Pollutant (HAP) emissions are expected from the combustion of landfill gas but in negligible quantities.
- Subpart WWW, Standards of Performance for Municipal Solid Waste Landfills, of the new Source Performance Standards (NSPS) applies to the fuel preparation system at the City of Columbia Sanitary Landfill. None of the New Source Performance Standards (NSPS) applies to the proposed reciprocating engines, generating sets or steam generators.
- Subpart ZZZZ, the *National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engine*, does not apply because the installation is not a major source of HAPs. None of the National Emission Standards for Hazardous Air Pollutants (NESHAPs) or currently promulgated Maximum Achievable Control Technology (MACT) regulations applies to the proposed equipment.
- Landfill gas emissions are being controlled by the reciprocating internal combustion engines.
- This review was conducted in accordance with Section (6) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of CO is above de minimis levels, but below major source levels.
- This installation is located in Boone County, an attainment area for all criteria air pollutants.

- This installation is not on the List of Named Installations [10 CSR 10-6.020(3)(B), Table 2].
- Ambient air quality modeling was performed to determine the ambient impact of CO.
- Emissions testing is required for the equipment in this permit.
- City of Columbia Sanitary Landfill is required to submit a Part 70 Operating Permit application for the installation within one (1) year of startup.
- Approval of this permit is recommended with special conditions.

INSTALLATION/PROJECT DESCRIPTION

The City of Columbia owns and operates a 107 acre solid waste landfill located in the northern portion of a 560 acre site. The landfill is located approximately 1.2 miles east of Route B on Peabody Road in Columbia, Missouri. The landfill consists of a 51 acre pre-Subtitle D area and a 56 acre Subtitle D area of which approximately 27 acres have been developed to date.

The Columbia Sanitary Landfill was issued a Solid Waste permit number 101908 for a 107 acre sanitary landfill in August 1985, by the Missouri Department of Natural Resources Solid Waste program. The pre-subtitle D portion of the landfill is a 51 acre area located to the north of the 56 acre subtitle D area. A vertical expansion approved in 2001 increased the landfill design capacity to a total of 12,147,700 cubic yards.

The Columbia Landfill has constructed three of the six cells of the subtitle D area of the landfill. After the development of the 56 acre Subtitle D area, the landfill will expand over the pre-Subtitle D area as well as the Subtitle D area to the permitted vertical expansion elevations.

The generation units will consist of four (4) General Electric model JGS 320 reciprocating engines each equipped with a 1059 kilowatt (kW) generator. The engines are each rated at 1,468 brake horsepower (bhp) of mechanical output at full load with a maximum heat input of approximately 10 million British thermal units (mmBtu per hour). One emission release point is associated with each unit. Exhaust from the engines will pass through a silencer prior to releasing to the atmosphere. A summary of emission release points is provided in Table 1.

Table 1: Emission Release Points.

Emission Point	Description
EP-08	Engine 1 Exhaust Vent
EP-09	Engine 2 Exhaust Vent
EP-10	Engine 3 Exhaust Vent
EP-11	Engine 4 Exhaust Vent

Landfill gas (LFG) results from the decomposition of waste, and is composed primarily of methane (CH₄) and carbon dioxide (CO₂). Methane (CH₄) and carbon dioxide (CO₂) are not considered regulated air pollutants. LFG contains trace amounts of other non-methane organic compounds (NMOC). Regulated air pollution emissions from the generation sets will include particulate matter (PM₁₀), sulfur dioxide (SO₂), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC) and hazardous air pollutants (HAPs).

The following permits have been issued to Columbia Sanitary Landfill from the Air Pollution Control Program.

Table 2: Permit actions for City of Columbia Sanitary Landfill

Permit Number	Description
OP	Part 70 Operating Permit Renewal(project number 2003-05-056)
Application required	112J revisions (project number 2002-05-168)
OP	Permit Amendment -New Responsible Official (project number 2002-03-153)
122001-005	New waste cell (project number 2001-05-087)
0298-016	New landfill cell (project number 0190091006)
Application required	New landfill cell (project number 0190091005)
P019-0091	Part 70 Operating Permit (project number 0190091020)

In the event, at a future date, a bioreactor is added to the City of Columbia Sanitary Landfill, that reactor and this project will be considered as one project. The application for this project did not address a bioreactor being included in this evaluation despite many references in the news and print media. City of Columbia Sanitary Landfill has acknowledged that a bioreactor is part of the planning of this project in a phone call on June 05, 2007. A bioreactor may refer to any device or system that supports a biologically active environment and is used to increase the fuel available from the landfill and as defined in the regulations.

EMISSIONS/CONTROLS EVALUATION

The emission factors for PM₁₀ used in this analysis were 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* (11/1998). Emission factors for CO, NO_x and VOC were based on information from a performance test, supplied by the applicant. A special condition is included in this permit for stack testing to verify the emission rates claimed by the applicant. Sulfur oxide (SO_x) and HAP emissions were calculated based on the equations found in Section 2.4 of AP-42 and an analysis of the LFG, provided by Columbia Sanitary Landfill. Potential emissions of the application represent the potential of the new equipment, assuming continuous operation (8760 hours per year). The following table provides an emissions summary for this project.

Table 3: Emissions Summary (tons per year)

Pollutant	Regulatory <i>De Minimis</i> Levels	Existing Potential Emissions	Existing Actual Emissions (2006 EIQ)	Potential Emissions of the Application	New Installation Conditioned Potential
PM ₁₀	15.0	16.78	2.00	8.39	N/A
SO _x	40.0	N/D	1.17	4.16	N/A
NO _x	40.0	1.03	3.35	33.58	N/A
VOC	40.0	62.80	2.19	11.19	N/A
CO	100.0	21.68	62.85	167.88	N/A
HAPs	10.0/25.0	3.93	0.85	0.53	N/A

N/A = Not Applicable

Note 1: Existing potential emission taken from permit 122001-005 with project number 2001-05-087.

The engines act as a control device burning the HAPs as fuel. The destruction efficiencies is 93% for halogenated and 68.1% for non-halogenated HAPs are obtained from AP-42, Table 2.4-3, Control Efficiencies for LFG Constituents.

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 CO are above de minimis levels.

APPLICABLE REQUIREMENTS

City of Columbia Sanitary Landfill 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 an Emissions Inventory Questionnaire (EIQ) is required April 1 for the previous year's emissions.
- *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 10-3.090

SPECIFIC REQUIREMENTS

- *Restriction of Emission of Sulfur Compounds*, 10 CSR 10-6.260
- *Restriction of Emission of Particulate Matter From Industrial Processes*, 10 CSR 10-6.400
- *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

AMBIENT AIR QUALITY IMPACT ANALYSIS

Ambient air quality modeling was performed to determine the ambient impact of CO since potential emissions are above the de minimis threshold. The following table lists the hourly emission rate, the predicted ambient impact from the subject sources and comparison with the applicable National Ambient Air Quality Standards (NAAQS). The results from the Screen3 analysis demonstrate compliance with the NAAQS for CO.

Table 4: Modeled Impact of NO_x and CO (µg/m³)

Pollutant	Modeled Impact	NAAQS	Time Period
CO	232.64	40,000	1-hour
	162.85	10,000	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.

 Timothy Paul Hines
 Environmental Engineer

 Date

PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated 03/14/2007, received 03/16/2007, designating City of Columbia Sanitary Landfill as the owner and operator of the installation.
- U.S. EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition.
- Northeast Regional Office Site Survey, dated 03/30/2007.

Mr. Richard Wieman
Solid Waste Utility Manager
City of Columbia Sanitary Landfill
P.O. Box 6015
Columbia MO 65205-6015

RE: New Source Review Permit - Project Number: 2007-03-053

Dear Mr. Wieman:

Enclosed with this letter is your permit to construct. Please study it carefully. Also, note the special conditions, if any, 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.

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

Sincerely,

AIR POLLUTION CONTROL PROGRAM

Kendall B. Hale
New Source Review Unit Chief

KBH:tphl

Enclosures

c: Northeast Regional Office
PAMS File 2006-09-024
Permit Number: