AIR QUALITY PERMIT

Issued To: City of Great Falls
Wastewater Treatment Plant
1600 6th Street NE
Great Falls, MT 59404

Permit: #4176-00
Application Complete: 1/3/08
Preliminary Determination Issued: 2/6/08
Department's Decision Issued: 2/22/08
Permit Final: 3/11/08
AFS #: 013-0039

An air quality permit, with conditions, is hereby granted to the City of Great Falls Wastewater Treatment Plant (Great Falls WWTP), pursuant to Sections 75-2-204 and 211 of the Montana Code Annotated (MCA), as amended, and Administrative Rules of Montana (ARM) 17.8.740, *et seq*., as amended, for the following:

SECTION I: Permitted Facilities

A. Permitted Equipment

Great Falls WWTP owns and operates a municipal wastewater treatment plant incorporating a natural gas/digester gas-fired internal combustion engine to produce electricity, an emergency/back-up industrial flare, various boilers, and associated equipment. A complete list of permitted equipment is contained in the permit analysis to this permit.

B. Plant Location

The Great Falls WWTP is located at 1600 6th Street NE in Great Falls, MT 59404. The legal description of the site is in Section 1, Township 20 North, Range 3 East, in Cascade County, Montana.

SECTION II: Conditions and Limitations

A. Emission Limitations

1. The 762 brake horsepower (bhp) capacity GE Jenbacher lean-burn internal combustion engine shall combust only natural gas or digester gas collected from the wastewater treatment process (ARM 17.8.749 and ARM 17.8.752).

2. Emissions from the 762 bhp capacity GE Jenbacher natural gas and/or digester gas-fired lean-burn internal combustion engine shall be controlled by good combustion practices and proper operation and maintenance. Emissions from the unit shall not exceed the following (ARM 17.8.752):

   a. Oxides of Nitrogen (NO_X): 4.54 pounds per hour (lb/hr)
   b. Carbon Monoxide (CO): 8.04 lb/hr

3. The 762 bhp capacity GE Jenbacher lean-burn internal combustion engine shall use iron sponge treatment when firing digester gas (ARM 17.8.752).

4. The two 2.51 million British thermal unit per hour (MMBtu/hr) each Cleaver Brooks digester sludge heating boilers may only combust pipeline quality natural gas and/or digester gas only (ARM 17.8.752).

5. The two 10.46 MMBtu/hr each Cleaver Brooks heating boilers shall combust pipeline quality natural gas only (ARM 17.8.752).

6. Emissions from the two 10.46 MMBtu/hr heat input capacity Cleaver Brooks natural gas-fired boilers shall be controlled by good combustion practices and proper operation and maintenance. Emissions from the unit shall not exceed the following (ARM 17.8.752):

    a. NO_X: 1.03 lb/hr
    b. CO: 0.86 lb/hr

7. The Varec waste gas burner shall be used, as necessary, to destroy any excess digester gas not used by either the GE Jenbacher natural gas/digester gas-fired engine and/or the Cleaver Brooks digester sludge heating natural gas/digester gas fired boilers (ARM 17.8.749 and ARM 17.8.752).

8. The emergency diesel generator shall be limited to 500 hours of operation at the Greats Falls WWTP during any 12-month rolling time period (ARM 17.8.749).

9. Great Falls WWTP shall not cause or authorize emissions to be discharged into the outdoor atmosphere from any sources installed after November 23, 1968, that exhibit an opacity of 20% or greater averaged over 6 consecutive minutes (ARM 17.8.304).

10. Great Falls WWTP shall not cause or authorize the use of any street, road, or parking lot without taking reasonable precautions to control emissions of airborne particulate matter (ARM 17.8.308).

11. Great Falls WWTP shall treat all unpaved portions of the haul roads, access roads, parking lots, or general plant area with water and/or chemical dust suppressant as necessary to maintain compliance with the reasonable precautions limitation in Section II.A.10 (ARM 17.8.749).

B. Testing Requirements

1. Great Falls WWTP shall initially test the GE Jenbacher natural gas/digester gas-fired lean-burn engine for NO_X and CO emissions, concurrently, to demonstrate compliance with the NO_X and CO emission limits contained in Section A.2. The initial source test(s) shall be conducted within 365 days of issuance of Permit #4176-00. After the initial source test(s), additional testing to monitor continued compliance with the NO_X and CO emission limits shall be conducted as required by the Department of Environmental Quality (Department) (ARM 17.8.105 and ARM 17.8.749).

2. Great Falls WWTP shall initially test the two 10.46 MMBtu/hr heat input capacity Cleaver Brooks natural gas-fired heating boilers for NO_X and CO emissions, concurrently, to demonstrate compliance with the NO_X and CO emission limits contained in Section A.6. The initial source test(s) shall be conducted within 365 days of issuance of Permit #4176-00. After the initial source test, additional testing to monitor continued compliance with the NO_X and CO emission limits shall be conducted as required by the Department (ARM 17.8.105 and ARM 17.8.749).

3. All compliance source tests shall conform to the requirements of the Montana Source Test Protocol and Procedures Manual (ARM 17.8.106).

4. The Department may require further testing (ARM 17.8.105).

C. Operational Reporting Requirements

1. Great Falls WWTP shall supply the Department with annual production information for all emission points, as required by the Department in the annual emission inventory request. The request will include, but is not limited to, all sources of emissions identified in the emission inventory contained in the permit analysis.

   Production information shall be gathered on a calendar-year basis and submitted to the Department by the date required in the emission inventory request. Information shall be in the units required by the Department. This information may be used to calculate operating fees, based on actual emissions from the facility, and/or to verify compliance with permit limitations (ARM 17.8.505).

2. Great Falls WWTP shall notify the Department of any construction or improvement project conducted pursuant to ARM 17.8.745, that would include a change in control equipment, stack height, stack diameter, stack flow, stack gas temperature, source location or fuel specifications, or would result in an increase in source capacity above its permitted operation or the addition of a new emission unit. The notice must be submitted to the Department, in writing, 10 days prior to start up or use of the proposed de minimis change, or as soon as reasonably practicable in the event of an unanticipated circumstance causing the de minimis change, and must include the information requested in ARM 17.8.745(1)(d) (ARM 17.8.745).

3. All records compiled in accordance with this permit must be maintained by Great Falls WWTP as a permanent business record for at least 5 years following the date of the measurement, must be available at the plant site for inspection by the Department, and must be submitted to the Department upon request (ARM 17.8.749).

4. Great Falls WWTP shall maintain an emergency/back-up digester gas industrial safety flare operations log to monitor compliance with the applicable operating conditions in Section II.A.7. The log shall contain, at a minimum, the initials of the documenting personnel and the fuel usage and run-times for the Varec waste gas burner, the GE Jenbacher natural gas/digester gas-fired engine, and the Cleaver Brooks natural gas/digester gas-fired disgester sludge heating boilers. The information contained in the emergency/back-up digester gas industrial safety flare operations log shall be submitted to the Department upon request (ARM 17.8.749).

5. Great Falls WWTP shall document, by month, the hours of operation of the emergency diesel generator. By the 25th day of each month, Great Falls WWTP shall total the emergency diesel generator operating hours for the previous month. The monthly information will be used to verify compliance with the rolling 12-month operational limitation in Section II.A.8. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).

SECTION III: General Conditions

A. Inspection – Great Falls shall allow the Department's representatives access to the source at all reasonable times for the purpose of making inspections or surveys, collecting samples, obtaining data, auditing any monitoring equipment (CEMS, CERMS) or observing any monitoring or testing, and otherwise conducting all necessary functions related to this permit.

B. Waiver – The permit and the terms, conditions, and matters stated herein shall be deemed accepted if Great Falls fails to appeal as indicated below.

C. Compliance with Statutes and Regulations – Nothing in this permit shall be construed as relieving Great Falls of the responsibility for complying with any applicable federal or Montana statute, rule, or standard, except as specifically provided in ARM 17.8.740, *et seq*. (ARM 17.8.756).

D. Enforcement – Violations of limitations, conditions and requirements contained herein may constitute grounds for permit revocation, penalties, or other enforcement action as specified in Section 75-2-401, *et seq*., MCA.

E. Appeals – Any person or persons jointly or severally adversely affected by the Department's decision may request, within 15 days after the Department renders its decision, upon affidavit setting forth the grounds therefor, a hearing before the Board of Environmental Review (Board). A hearing shall be held under the provisions of the Montana Administrative Procedures Act. The filing of a request for a hearing does not stay the Department's decision, unless the Board issues a stay upon receipt of a petition and a finding that a stay is appropriate under Section 75-2-211(11)(b), MCA. The issuance of a stay on a permit by the Board postpones the effective date of the Department's decision until conclusion of the hearing and issuance of a final decision by the Board. If a stay is not issued by the Board, the Department's decision on the application is final 16 days after the Department's decision is made.

F. Permit Inspection – As required by ARM 17.8.755, Inspection of Permit, a copy of the air quality permit shall be made available for inspection by the Department at the location of the source.

G. Permit Fee – Pursuant to Section 75-2-220, MCA, as amended by the 1991 Legislature, failure to pay the annual operation fee by Great Falls may be grounds for revocation of this permit, as required by that section and rules adopted thereunder by the Board.

Permit Analysis
City of Great Falls
Wastewater Treatment Plant
Permit #4176-00

I. Introduction/Process Description

The City of Great Falls (Great Falls) owns and operates a Wastewater Treatment Plant. The facility is located in Section 1, Township 20 North, Range 3 East, in Cascade County, Montana.

A. Permitted Equipment

The Great Falls Wastewater Treatment Plant (Great Falls WWTP) consists of the following:

- One Varec waste gas burner fired by digester gas
- One GE Jenbacher 762 brake horsepower (bhp) generator fired by natural gas/digester gas
- Two Cleaver Brooks 2.51 million British thermal unit per hour (MMBtu/hr) digester sludge heating boilers fired by natural gas/digester gas
- Two Cleaver Brooks 10.46 MMBtu/hr heating boilers fired by natural gas
- One portable emergency 67 bhp generator
- Wastewater process tanks (primary and secondary clarifiers, aeration basins)

B. Source Description (New permit)

The Great Falls WWTP operates a GE Jenbacher generating set with an internal combustion engine that is fired with either natural gas or digester gas collected from the digesters at the waste-water treatment facility. Digesters are used during the treatment and processing of municipal wastewater. The digesters are covered tanks operated under anaerobic conditions. Although variable, the gas produced by the digesters is approximately 57% methane (CH_4) and 42% carbon dioxide (CO_2) with relatively low levels of hydrogen sulfide (H_2S) and nitrogen and trace level contaminants.

Great Falls WWTP collects the digester gas and uses it as supplemental fuel in the GE Jenbacher engine to generate electricity. The GE Jenbacher engine and associated co-generation equipment is capable of producing up to 4.73 million kilowatt-hours of electricity annually based on its peak generating capacity of 540 kilowatts (kW). The electricity is used at the Great Falls WWTP facility and consequently reduces the demand for electricity from the power grid.

II. Applicable Rules and Regulations

The following are partial explanations of some applicable rules and regulations that apply to the facility. The complete rules are stated in the Administrative Rules of Montana (ARM) and are available, upon request, from the Department of Environmental Quality (Department). Upon request, the Department will provide references for location of complete copies of all applicable rules and regulations or copies where appropriate.

A. ARM 17.8, Subchapter 1 – General Provisions, including but not limited to:

1. ARM 17.8.101 Definitions. This rule includes a list of applicable definitions used in this chapter, unless indicated otherwise in a specific subchapter.

2. ARM 17.8.105 Testing Requirements. Any person or persons responsible for the emission of any air contaminant into the outdoor atmosphere shall, upon written request of the Department, provide the facilities and necessary equipment (including instruments and sensing devices) and shall conduct tests, emission or ambient, for such periods of time as may be necessary using methods approved by the Department.

3. ARM 17.8.106 Source Testing Protocol. The requirements of this rule apply to any emission source testing conducted by the Department, any source or other entity as required by any rule in this chapter, or any permit or order issued pursuant to this chapter, or the provisions of the Clean Air Act of Montana, 75-2-101, *et seq*., Montana Code Annotated (MCA).

   Great Falls shall comply with the requirements contained in the Montana Source Test Protocol and Procedures Manual, including, but not limited to, using the proper test methods and supplying the required reports. A copy of the Montana Source Test Protocol and Procedures Manual is available from the Department upon request.

4. ARM 17.8.110 Malfunctions. (2) The Department must be notified promptly by telephone whenever a malfunction occurs that can be expected to create emissions in excess of any applicable emission limitation or to continue for a period greater than 4 hours.

5. ARM 17.8.111 Circumvention. (1) No person shall cause or permit the installation or use of any device or any means that, without resulting in reduction of the total amount of air contaminant emitted, conceals or dilutes an emission of air contaminant that would otherwise violate an air pollution control regulation. (2) No equipment that may produce emissions shall be operated or maintained in such a manner as to create a public nuisance.

B. ARM 17.8, Subchapter 2 – Ambient Air Quality, including, but not limited to the following:

1. ARM 17.8.210 Ambient Air Quality Standards for Sulfur Dioxide
2. ARM 17.8.211 Ambient Air Quality Standards for Nitrogen Dioxide
3. ARM 17.8.212 Ambient Air Quality Standards for Carbon Monoxide
4. ARM 17.8.214 Ambient Air Quality Standard for Hydrogen Sulfide

Great Falls WWTP must maintain compliance with the applicable ambient air quality standards.

C. ARM 17.8, Subchapter 3 – Emission Standards, including, but not limited to:

1. ARM 17.8.304 Visible Air Contaminants. This rule requires that no person may cause or authorize emissions to be discharged into the outdoor atmosphere from any source installed after November 23, 1968, that exhibit an opacity of 20% or greater averaged over 6 consecutive minutes.

2. ARM 17.8.308 Particulate Matter, Airborne. (1) This rule requires an opacity limitation of less than 20% for all fugitive emission sources and that reasonable precautions be taken to control emissions of airborne particulate matter. (2) Under this rule, Great Falls WWTP shall not cause or authorize the use of any street, road, or parking lot without taking reasonable precautions to control emissions of airborne particulate matter (PM).

3. ARM 17.8.309 Particulate Matter, Fuel Burning Equipment. This rule requires that no person shall cause, allow, or permit to be discharged into the atmosphere particulate matter caused by the combustion of fuel in excess of the amount determined by this rule.

4. ARM 17.8.310 Particulate Matter, Industrial Process. This rule requires that no person shall cause, allow, or permit to be discharged into the atmosphere particulate matter in excess of the amount set forth in this rule.

5. ARM 17.8.322 Sulfur Oxide Emissions--Sulfur in Fuel. This rule requires that no person shall burn liquid, solid, or gaseous fuel in excess of the amount set forth in this rule.

6. ARM 17.8.324 Hydrocarbon Emissions--Petroleum Products. (3) No person shall load or permit the loading of gasoline into any stationary tank with a capacity of 250 gallons or more from any tank truck or trailer, except through a permanent submerged fill pipe, unless such tank is equipped with a vapor loss control device as described in (1) of this rule.

7. ARM 17.8.340 Standard of Performance for New Stationary Sources and Emission Guidelines for Existing Sources. This rule incorporates, by reference, 40 CFR Part 60, Standards of Performance for New Stationary Sources (NSPS). This facility is not an NSPS affected source because it does not meet the definition of any NSPS subpart defined in 40 CFR Part 60.

D. ARM 17.8, Subchapter 5 – Air Quality Permit Application, Operation, and Open Burning Fees, including, but not limited to:

1. ARM 17.8.504 Air Quality Permit Application Fees. This rule requires that an applicant submit an air quality permit application fee concurrent with the submittal of an air quality permit application. A permit application is incomplete until the proper application fee is paid to the Department. Great Falls WWTP submitted the appropriate permit application fee for the current permit action.

2. ARM 17.8.505 Air Quality Operation Fees. An annual air quality operation fee must, as a condition of continued operation, be submitted to the Department by each source of air contaminants holding an air quality permit (excluding an open burning permit) issued by the Department. The air quality operation fee is based on the actual or estimated actual amount of air pollutants emitted during the previous calendar year.

   An air quality operation fee is separate and distinct from an air quality permit application fee. The annual assessment and collection of the air quality operation fee, described above, shall take place on a calendar-year basis. The Department may insert into any final permit issued after the effective date of these rules, such conditions as may be necessary to require the payment of an air quality operation fee on a calendar-year basis, including provisions that prorate the required fee amount.

E. ARM 17.8, Subchapter 7 – Permit, Construction, and Operation of Air Contaminant Sources, including, but not limited to:

1. ARM 17.8.740 Definitions. This rule is a list of applicable definitions used in this chapter, unless indicated otherwise in a specific subchapter.

2. ARM 17.8.743 Montana Air Quality Permits--When Required. This rule requires a person to obtain an air quality permit or permit alteration to construct, alter, or use any air contaminant sources that have the potential to emit (PTE) greater than 25 tons per year (TPY) of any pollutant. Great Falls WWTP has a PTE greater than 25 TPY of nitrogen oxides (NO_x) and carbon monoxide (CO); therefore, an air quality permit is required.

3. ARM 17.8.744 Montana Air Quality Permits--General Exclusions. This rule identifies the activities that are not subject to the Montana Air Quality Permit program.

4. ARM 17.8.745 Montana Air Quality Permits--Exclusion for De Minimis Changes. This rule identifies the de minimis changes at permitted facilities that do not require a permit under the Montana Air Quality Permit Program.

5. ARM 17.8.748 New or Modified Emitting Units--Permit Application Requirements. (1) This rule requires that a permit application be submitted prior to installation, alteration, or use of a source. Great Falls submitted the required permit application for the current permit action. (7) This rule requires that the applicant notify the public by means of legal publication in a newspaper of general circulation in the area affected by the application for a permit. Great Falls WWTP submitted an affidavit of publication of public notice for the December 14, 2007, issue of the *Great Falls Tribune*, a newspaper of general circulation in the Town of Great Falls in Cascade County, as proof of compliance with the public notice requirements.

6. ARM 17.8.749 Conditions for Issuance or Denial of Permit. This rule requires that the permits issued by the Department must authorize the construction and operation of the facility or emitting unit subject to the conditions in the permit and the requirements of this subchapter. This rule also requires that the permit must contain any conditions necessary to assure compliance with the Federal Clean Air Act (FCAA), the Clean Air Act of Montana, and rules adopted under those acts.

7. ARM 17.8.752 Emission Control Requirements. This rule requires a source to install the maximum air pollution control capability that is technically practicable and economically feasible, except that Best Available Control Technology (BACT) shall be utilized. The required BACT analysis is included in Section III of this permit analysis.

8. ARM 17.8.755 Inspection of Permit. This rule requires that air quality permits shall be made available for inspection by the Department at the location of the source.

9. ARM 17.8.756 Compliance with Other Requirements. This rule states that nothing in the permit shall be construed as relieving Great Falls of the responsibility for complying with any applicable federal or Montana statute, rule, or standard, except as specifically provided in ARM 17.8.740, *et seq*.

10. ARM 17.8.759 Review of Permit Applications. This rule describes the Department's responsibilities for processing permit applications and making permit decisions on those permit applications that do not require the preparation of an environmental impact statement.

11. ARM 17.8.762 Duration of Permit. An air quality permit shall be valid until revoked or modified, as provided in this subchapter, except that a permit issued prior to construction of a new or altered source may contain a condition providing that the permit will expire unless construction is commenced within the time specified in the permit, which in no event may be less than 1 year after the permit is issued.

12. ARM 17.8.763 Revocation of Permit. An air quality permit may be revoked upon written request of the permittee, or for violations of any requirement of the Clean Air Act of Montana, rules adopted under the Clean Air Act of Montana, the FCAA, rules adopted under the FCAA, or any applicable requirement contained in the Montana State Implementation Plan (SIP).

13. ARM 17.8.764 Administrative Amendment to Permit. An air quality permit may be amended for changes in any applicable rules and standards adopted by the Board of Environmental Review (Board) or changed conditions of operation at a source or stack that

do not result in an increase of emissions as a result of those changed conditions. The owner or operator of a facility may not increase the facility's emissions beyond permit limits unless the increase meets the criteria in ARM 17.8.745 for a de minimis change not requiring a permit, or unless the owner or operator applies for and receives another permit in accordance with ARM 17.8.748, ARM 17.8.749, ARM 17.8.752, ARM 17.8.755, and ARM 17.8.756, and with all applicable requirements in ARM Title 17, Chapter 8, Subchapters 8, 9, and 10.

14. ARM 17.8.765 Transfer of Permit. This rule states that an air quality permit may be transferred from one person to another if written notice of intent to transfer, including the names of the transferor and the transferee, is sent to the Department.

F. ARM 17.8, Subchapter 8 – Prevention of Significant Deterioration of Air Quality, including, but not limited to:

1. ARM 17.8.801 Definitions. This rule is a list of applicable definitions used in this subchapter.

2. ARM 17.8.818 Review of Major Stationary Sources and Major Modifications--Source Applicability and Exemptions. The requirements contained in ARM 17.8.819 through ARM 17.8.827 shall apply to any major stationary source and any major modification, with respect to each pollutant subject to regulation under the FCAA that it would emit, except as this subchapter would otherwise allow.

This facility is not a major stationary source because is not a listed source and the facility's PTE is less than 250 TPY of any pollutant.

G. ARM 17.8, Subchapter 12 – Operating Permit Program Applicability, including, but not limited to:

1. ARM 17.8.1201 Definitions. (23) Major Source under Section 7412 of the FCAA is defined as any source having:

a. PTE > 100 tons/year of any pollutant;

b. PTE > 10 tons/year of any one hazardous air pollutant (HAP), PTE > 25 tons/year of a combination of all HAPs, or lesser quantity as the Department may establish by rule; or

c. PTE > 70 tons/year of particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}) in a serious PM_{10} nonattainment area.

2. ARM 17.8.1204 Air Quality Operating Permit Program. (1) Title V of the FCAA amendments of 1990 requires that all sources, as defined in ARM 17.8.1204(1), obtain a Title V Operating Permit. In reviewing and issuing Air Quality Permit #4176-00 for Great Falls WWTP, the following conclusions were made:

a. The facility's PTE is less than 100 tons/year for any pollutant.

b. The facility's PTE is less than 10 tons/year for any one HAP and less than 25 tons/year for all HAPs.

c. This source is not located in a serious PM_{10} nonattainment area.

d. This facility is not subject to any current NSPS.

e. This facility is not subject to any current NESHAP standards.

f. This source is not a Title IV affected source, or a solid waste combustion unit.

g. This source is not an EPA designated Title V source.

Based on these facts, the Department determined that Great Falls WWTP will be a minor source of emissions as defined under Title V.

III. BACT Determination

A BACT determination is required for each new or altered source. Great Falls WWTP shall install on the new or altered source the maximum air pollution control capability which is technically practicable and economically feasible, except that BACT shall be utilized.

A BACT analysis was submitted by Great Falls WWTP in Permit Application #4176-00, addressing some available methods of controlling PM/PM_{10}, NO_x, CO, SO_2, and VOC emissions from the GE Jenbacher natural gas/digester gas-fired lean-burn engine; the Cleaver Brooks natural gas/digester gas-fired digester sludge heating boilers; the Cleaver Brooks natural gas-fired heating boilers; the digester gas-fired Varec waste gas burner, the emergency diesel generator, and the wastewater process tanks. The Department reviewed these methods, as well as previous BACT determinations. The following control options have been reviewed by the Department in order to make the following BACT determination.

A. GE Jenbacher Natural Gas/Digester Gas-Fired Lean-Burn Engine (762 bhp)

The GE Jenbacher engine combusts either natural gas or digester gas collected from the facility digesters. The use of digester gas reduces facility demand for electricity from the power grid. Digesters are used during the treatment of municipal wastewater. The digester gas is made up of approximately 57% CH_4 and 42% CO_2 with relatively low levels of H_2S, nitrogen, and trace levels of other contaminants.

1. GE Jenbacher Natural Gas/Digester Gas-Fired Lean-Burn Engine NO_x and CO Emissions

An internal combustion engine firing digester gas inherently produces significantly lower NO_x emissions than the combustion of natural gas in the same unit. The lower CH_4 concentration in digester gas, as compared to natural gas (63% vs. 90%), significantly reduces the combustion temperature; thereby, resulting in lower thermal NO_x emissions.

In addition to the inherently lower NO_x emissions resulting from combustion of digester gas, the NO_x and CO control strategy potentially applicable for the GE Jenbacher engine is adding selective catalytic reduction (SCR) to the exhaust system.

SCR for digester gas-fired engines is limited by contamination of the digester gas fuel with siloxanes and other trace contaminants. These contaminants are captured and trapped on the catalysts thereby fouling and substantially reducing catalyst life. Operational experience has indicated that catalyst fouling may occur within less than 1 hour of engine run time, although some catalysts remained partially effective for several weeks of engine run time. The typical catalyst life for an engine combusting natural gas is approximately 2 to 3 years. If the digester gas is not treated to remove these contaminants prior to combustion, the use of catalytic reduction is technically infeasible. Great Falls WWTP uses iron sponge technology to remove hydrogen sulfide and other treatment to remove

siloxanes from the digester gas. These treatment technologies are intended to minimize damage to the engine. Increased levels of digester gas treatment would be needed to use SCR and may be unreliable.

The NO_x and CO cost-effective analysis for SCR for the proposed project is included below. The costs in the table assume the generating set is fired only by natural gas. If digester gas is used to supplement the fuel source, which is the case with Great Falls WWTP, the maintenance requirements are technically infeasible and the costs for treating the digester gas would increase the cost per ton of reducing NO_x and CO significantly. A complete economic impact analysis is included in the application for Permit #4176-00.

NO_x Control Cost-Effective Analysis			
Control Technology/Strategy	**Emission Rate (TPY)**	**Annual Cost ($)**	**Cost-Effective Value ($/ton removed)**
No Additional Control	19.9	---	---
SCR	2.0	$41,994	$2,346
CO Control Cost-Effective Analysis			
No Additional Control	35.2	---	---
SCR	5.3	$41,994	$1,403

Based on the above-cited information the Department determined that the addition of SCR to the existing and proposed GE Jenbacher engine is technically and economically infeasible for the proposed project and does not constitute BACT, in this case. The Department determined that good combustion practices with no additional control constitutes BACT for NO_x and CO emissions from the GE Jenbacher natural gas/digester gas-fired lean-burn engine, in this case.

2. GE Jenbacher Natural Gas/Digester Gas-Fired Lean-Burn Engine SO_2, PM/PM_{10}, and VOC Emissions

Potential SO_2, PM/PM_{10}, and VOC emissions from the GE Jenbacher engine are less than 1 ton per year, respectively. When the engine is fired by digester gas, iron sponge treatment is used to remove more than 95% of the hydrogen sulfide (the source of SO_2) for the purpose of extending engine life. Additional controls are not proposed for SO_2, PM/PM_{10}, and VOCs. Because potential emissions of these pollutants are low, incorporation of available pollutant-specific control technologies would result in high cost-effective ($/ton removed) values thereby making pollutant-specific add-on controls for SO_2, PM/PM_{10}, and VOCs economically infeasible in this case. Therefore, the Department determined that proper operation and maintenance of the GE Jenbacher digester gas-fired lean-burn engine with the use of iron sponge treatment constitutes BACT for PM/PM_{10} and VOC emissions, in this case.

B. Two Cleaver Brooks Natural Gas/Digester Gas-Fired Digester Sludge Heating Boilers (2.51 MMBtu/hr each)

Natural gas fired boilers are inherently low emitters of air pollution due to characteristics of the natural gas fuel fired to operate the boiler. Potential NO_x emissions from the Cleaver Brooks boiler are 1.08 TPY, while potential emissions of all other regulated pollutants are less than 1 TPY. Because potential emissions of all regulated pollutants are low, incorporation of available pollutant-specific control technologies would result in high cost-effective ($/ton removed) values thereby making pollutant-specific add-on controls for NO_x, CO, SO_2, PM/PM_{10} and VOCs economically infeasible in this case. Therefore, the Department determined that proper operation and maintenance of the Cleaver Brooks boiler with no additional control constitutes BACT for all regulated pollutants, in this case.

C. Two Cleaver Brooks Natural Gas-Fired Heating Boilers (10.461 MMBtu/hr each)

Natural gas fired boilers are inherently low emitters of air pollution due to characteristics of the natural gas fuel fired to operate the boiler. Potential NO_x and CO emissions from the Cleaver Brooks boiler are 4.49 TPY and 3.77 TPY, respectively, while potential emissions of all other regulated pollutants are less than 1 TPY. Because potential emissions of all regulated pollutants are low, incorporation of available pollutant-specific control technologies would result in high cost-effective ($/ton removed) values thereby making pollutant-specific add-on controls for NO_x, CO, SO_2, PM/PM_{10} and VOCs economically infeasible in this case. Therefore, the Department determined that combustion of pipeline quality natural gas only and proper operation and maintenance of the Cleaver Brooks heating boilers with no additional control constitutes BACT for all regulated pollutants, in this case.

D. Varec Waste Gas Burner and Emergency Diesel Generator

The Varec waste gas burner is an emission control strategy in and of itself as it is used to destroy the collected digester gas in circumstances where the GE Jenbacher engine is non-operational. Non-operational circumstances for the digester gas engine include engine maintenance, engine repair, and/or necessary engine shutdown due to wastewater treatment plant operational circumstances such as changing the treatment plant digesters. Similarly, the emergency diesel generator is used only in circumstances where the normal sources of power to the Great Falls WWTP are interrupted. The emergency/back-up operating status of the affected units inherently results in low potential emissions of all regulated pollutants. Because potential emissions of all regulated pollutants are low, incorporation of available pollutant-specific control technologies would result in high cost-effective ($/ton removed) values thereby making pollutant-specific add-on controls for NO_x, CO, SO_2, PM/PM_{10} and VOCs economically infeasible in this case. Therefore, the Department determined that proper operation and maintenance of the affected emitting units with no additional control constitutes BACT for all regulated pollutants, in this case.

E. Wastewater Process Tanks

The potential to emit of all regulated pollutants from the wastewater process tanks is negligible. Emissions from these sources are controlled by existing pre-treatment controls for individual wastewater entering the wastewater treatment plant as well as biological degradation of fugitive VOC emissions in the tanks. Because potential emissions of all regulated pollutants are negligible, incorporation of available pollutant-specific control technologies would result in high cost-effective ($/ton removed) values thereby making pollutant-specific add-on controls economically infeasible in this case. Therefore, the Department determined that proper operation and maintenance of the affected emitting units with no additional control constitutes BACT for all regulated pollutants, in this case.

The control options selected have controls and control costs comparable to other recently permitted similar sources and are capable of achieving the appropriate emission standards.

IV. Emission Inventory

	tons of pollutant/year[a]					
Emitting Unit	**PM**	**PM_{10}**	**NO_x**	**CO**	**SO_2**	**VOC**
GE Jenbacher Lean Burn Engine[b]	---	---	19.90	35.22	0.01	2.56
Cleaver Brooks Digester Sludge Heating Boilers[b] (2)	0.16	0.16	2.16	1.82	0.02	0.12
Cleaver Brooks Heating Boilers (2)	0.68	0.68	8.98	7.54	0.06	0.50
67 hp Emergency Generator	0.04	0.04	0.52	0.11	0.03	0.04
Varec Waste Gas Burner[c]	0.23	0.23	0.53	10.00	7.89	---
Wastewater Process Tanks	---	---	---	---	---	10.04
Total Emissions	**1.11**	**1.11**	**32.09**	**54.69**	**8.01**	**13.26**

[a] A complete emission inventory was included in the applications for air quality Permits #4176-00 and is on file with the Department
[b] Assumes worst-case emissions combusting 100% natural gas
[c] Assumes continuous operation combusting any excess digester gas not used by other permitted digester gas-fired units

V. Existing Air Quality

The Great Falls WWTP is located in Section 1, Township 20 North, Range 3 East, in Cascade County, Montana in Section 1, Township 20 North, Range 3 East, in Cascade County, Montana. The air quality of this area is classified as better than National Standards or unclassifiable/attainment for the National Ambient Air Quality Standards (NAAQS) for criteria pollutants.

VI. Ambient Air Impact Analysis

Based on the relatively low levels of pollutants emitted from the Great Falls WWTP, the Department determined that ambient air impacts from this permitting action will be minor. The Department believes the facility, operating under the limits and conditions included in this permit, will not cause or contribute to a violation of any applicable ambient air quality standard.

VII. Taking or Damaging Implication Analysis

As required by 2-10-105, MCA, the Department conducted a private property taking and damaging assessment and determined there are no taking or damaging implications.

VIII. Environmental Assessment

An environmental assessment, required by the Montana Environmental Policy Act, was completed for this project. A copy is attached.

DEPARTMENT OF ENVIRONMENTAL QUALITY
Permitting and Compliance Division
Air Resources Management Bureau
P.O. Box 200901, Helena, Montana 59620
(406) 444-3490

FINAL ENVIRONMENTAL ASSESSMENT (EA)

Issued To: City of Great Falls
Wastewater Treatment Plant
1600 6th Street NE
Great Falls, MT 59404

Air Quality Permit Number: 4176-00

Preliminary Determination Issued: 2/06/08
Department Decision Issued: 02/22/08
Permit Final: 3/11/08

1. *Legal Description of Site*: The Great Falls WWTP facility is located in Section 1, Township 20 North, Range 3 East, in Cascade County, Montana.

2. *Description of Project*: Great Falls WWTP owns and operates a municipal wastewater treatment plant incorporating a natural gas/digester gas-fired internal combustion engine to produce electricity, an emergency/back-up industrial flare, various boilers, and associated equipment.

3. *Objectives of Project*: The objective of the proposed air quality permitting action is to bring the Great Falls WWTP facility into compliance with the permitting requirements of the Montana Clean Air Act.

4. *Alternatives Considered*: In addition to the proposed action, the Department also considered the "no-action" alternative. The "no-action" alternative would deny issuance of the air quality preconstruction permit to the proposed facility. However, the Department does not consider the "no-action" alternative to be appropriate because Great Falls demonstrated compliance with all applicable rules and regulations as required for permit issuance. Therefore, the "no-action" alternative was eliminated from further consideration.

5. *A Listing of Mitigation, Stipulations, and Other Controls*: A list of enforceable conditions, including a BACT analysis, would be included in Permit #4176-00.

6. *Regulatory Effects on Private Property*: The Department considered alternatives to the conditions imposed in this permit as part of the permit development. The Department determined that the permit conditions are reasonably necessary to ensure compliance with applicable requirements and demonstrate compliance with those requirements and do not unduly restrict private property rights.

7. The following table summarizes the potential physical and biological effects of the proposed project on the human environment. The "no-action" alternative was discussed previously.

		Major	Moderate	Minor	None	Unknown	Comments Included
A	Terrestrial and Aquatic Life and Habitats			X			Yes
B	Water Quality, Quantity, and Distribution			X			Yes
C	Geology and Soil Quality, Stability and Moisture			X			Yes
D	Vegetation Cover, Quantity, and Quality			X			Yes
E	Aesthetics			X			Yes
F	Air Quality			X			Yes
G	Unique Endangered, Fragile, or Limited Environmental Resources				X		Yes
H	Demands on Environmental Resource of Water, Air and Energy			X			Yes
I	Historical and Archaeological Sites			X			Yes
J	Cumulative and Secondary Impacts			X			Yes

SUMMARY OF COMMENTS ON POTENTIAL PHYSICAL AND BIOLOGICAL EFFECTS: The following comments have been prepared by the Department.

A. Terrestrial and Aquatic Life and Habitats

Emissions from the project would affect terrestrial and aquatic life and habitats in the proposed project area. However, as discussed in Section VI of the permit analysis, any emissions and resulting impacts from the project would be minor due to the low level of those pollutants emitted.

Further, the waste-water treatment plant is an existing facility and no new construction or ground disturbance to the area would occur as a result of the current permit action. Overall, any impact to the terrestrial and aquatic life and habitats of the proposed project area would be minor.

B. Water Quality, Quantity and Distribution

By design, the wastewater treatment plant would result in beneficial impact to water quality in the proposed project area. Further, emissions from the proposed project would result in minor negative impacts to water quality in the proposed project area. However, as discussed in Section VI of the permit analysis any emissions and resulting deposition impacts from the project would be minor due to the low level of those pollutants emitted.

Further, the waste-water treatment plant is an existing facility and no new water use would occur as a result of the current permit action. Overall, any impact to the water quality, quantity, and distribution in the proposed project area would be minor and generally beneficial.

C. Geology and Soil Quality, Stability and Moisture

The project would not impact the geology, soil quality, stability, and moisture of the proposed project area. The waste-water treatment plant is an existing facility and no new construction or ground disturbance to the area would occur as a result of the current permit action.

Further, as discussed in Section VI of the permit analysis, the wastewater treatment plant would result in minor air pollution emissions to the outside ambient environment. These pollutants would deposit on the soils in the surrounding area. Any impact from deposition of these pollutants would be minor and typical due to the existing industrial nature of the area and the low level of those pollutants emitted. Overall, any impact to the geology and soil quality, stability, and moisture of the proposed project area would be minor.

D. Vegetation Cover, Quantity, and Quality

The project would not impact the vegetation cover, quantity, and quality in the proposed project area. The waste-water treatment plant is an existing facility and no new construction or ground disturbance to the area would occur as a result of the current permit action.

Further, as discussed in Section VI of the permit analysis, the wastewater treatment plant would result in minor air pollution emissions to the outside ambient environment. These pollutants would deposit on the vegetation in the surrounding area. Any impact from deposition of these pollutants would be minor and typical due to the existing industrial nature of the area and the low level of those pollutants emitted. Overall, any impact to the vegetation cover, quantity, and quality of the proposed project area would be minor.

E. Aesthetics

The project would result in minor impacts to the aesthetic nature of the proposed project area because the wastewater treatment plant would operate within an existing building located in an area zoned as commercial and no new construction or further site disturbance would be required for the project. Because the wastewater treatment plant is an existing facility located in an area zoned for commercial uses, the project would not change the aesthetic nature of the area. Further, visible emissions from the source would be limited to 20% opacity and the permit would include emission control requirements. Also, the project would not result in excess noise from normal operations. Overall, any impact to the aesthetic character of the proposed project area would be minor.

F. Air Quality

The proposed project would result in the emission of various air pollutants to the ambient air in the proposed project area. However, based on the relatively low levels of pollutants emitted from the Great Falls WWTP, the Department determined that ambient air impacts from this permitting action would be minor. The Department determined that the facility, operating under the limits and conditions included in this permit, will not cause or contribute to a violation of any applicable ambient air quality standard. Overall, any impact to the air quality of the proposed project area would be minor.

G. Unique Endangered, Fragile, or Limited Environmental Resources

During the permit action for Permit #4176-00, the Department contacted the Montana Natural Heritage Program (MNHP) in an effort to identify any species of special concern that may be located within or near the Great Falls WWTP site (Section 1, Township 20 North, Range 30 East, in Cascade County, Montana). Search results concluded that there are eight such species of special concern on file for the area. The species of special concern located within the defined area include the *Funaria americana* (common name unknown), *Buteo swainsoni* (Swainson's Hawk), *Spea bombifrons* (Plains Spadefoot), *Carex sychnocephala* (Many-headed Sedge), *Psoralea hypogaea* (Little Indian Breadroot), *Centunculus mimus* (Chaffweed), Entoshodon rubiginosus (common name unknown), and *Buteo regalis* (Ferrunginous Hawk).

While these species of special concern may be found in specific habitats within or near the defined area, the MNHP search did not indicate that these species of special concern would locate directly on or relatively near the existing industrial site. Given the existing industrial nature of the project area, it is unlikely that these species of special concern would locate on or near the project site and thus unlikely that these species of special concern would realize any impact from the wastewater treatment plant operations beyond minor air emission impacts discussed in greater detail below.

Emissions from the proposed project could impact the previously highlighted unique, endangered, fragile, or limited environmental resources located in the proposed project area. However, as detailed in Section VI of the permit analysis, any emissions and resulting impacts from the project would be minor due to the low concentration of those pollutants emitted and typical due to the existing industrial nature of the area. Overall, any impact to unique endangered, fragile, or limited environmental resources of the proposed project area would be minor.

H. Demands on Environmental Resource of Water, Air and Energy

The project would result in minor demands on environmental resources of water as discussed in Section 7.B of this EA. In addition, the proposed project would permit a digester gas engine which is capable of producing up to 4.73 million kW hours annually, based on its peak generating capacity of 540 kW. Therefore, the project would impact energy resources; however, any impacts would be minor and positive due to the relatively small size of the industrial operations and the ability to produce energy thereby avoiding reliance on additional energy resources in the area.

Further, as discussed in Section VI of the permit analysis, the wastewater treatment plant would result in minor air pollution emissions to the outside ambient environment. Any impact from the emission of these pollutants would be minor and typical due to the existing industrial nature of the area and the low level of those pollutants emitted. Overall, any impact to the demands on environmental resource of water, air, and energy in the proposed project area would be minor.

I. Historical and Archaeological Sites

The proposed project would not result in any impact on historical and archaeological sites in the proposed project area. The wastewater treatment plant would operate within an existing building located in an area zoned as commercial and would not require any additional construction and ground disturbance.

According to previous correspondence from the Montana State Historic Preservation Office, there is low likelihood of any disturbance to any known archaeological or historic site, given previous industrial disturbance within the area. Therefore, the project would not impact any known historic or archaeological site that may be located within or near the proposed operating site.

J. Cumulative and Secondary Impacts

The Great Falls WWTP is an existing facility. Emissions from the existing Great Falls WWTP would continue to impact the above-cited physical and biological resources of the environment after issuance of Permit #4176-00. However, the purpose of the current permit action would be to bring the existing Great Falls WWTP into compliance with the Montana Clean Air Act through issuance of the required Montana Air Quality Permit. Therefore, because the current permit action would not result in any changes to the existing facility, no direct or secondary and cumulative impacts to the above-cited physical and biological resources of the project area would occur as a result of the current permit action.

Overall, the cumulative and secondary impacts from this project on the physical and biological environment in the immediate area would be minor due to the relatively small size and potential environmental impact of the proposed operation. The Department believes that this facility could be expected to operate in compliance with all applicable rules and regulations as outlined in Permit #4176-00.

8. The following table summarizes the potential economic and social effects of the proposed project on the human environment. The "no-action" alternative was discussed previously.

		Major	Moderate	Minor	None	Unknown	Comments Included
A	Social Structures and Mores				X		Yes
B	Cultural Uniqueness and Diversity				X		Yes
C	Local and State Tax Base and Tax Revenue			X			Yes
D	Agricultural or Industrial Production				X		Yes
E	Human Health			X			Yes
F	Access to and Quality of Recreational and Wilderness Activities				X		Yes
G	Quantity and Distribution of Employment				X		Yes
H	Distribution of Population				X		Yes
I	Demands for Government Services			X			Yes
J	Industrial and Commercial Activity			X			Yes
K	Locally Adopted Environmental Plans and Goals				X		Yes
L	Cumulative and Secondary Impacts			X			Yes

SUMMARY OF COMMENTS ON POTENTIAL ECONOMIC AND SOCIAL EFFECTS: The following comments have been prepared by the Department.

A. Social Structures and Mores
B. Cultural Uniqueness and Diversity

The proposed project would not have any impact on the above economic and social resources of the proposed area of operation because the project is small by industrial standards and operations would take place within an existing building and no additional construction or employment would be required.

Further, the surrounding area is currently and would remain commercial/industrial in nature. The predominant use of the surrounding area would not change as a result of the proposed project.

C. Local and State Tax Base and Tax Revenue

The proposed project would have a minor impact on the local and state tax base and tax revenue because the project is small by industrial standards and would not result in any increased commercial activity beyond the proposed project. Further, the plant would operate within an existing industrial site with no new construction or ground disturbance occurring as a result of the current permit action.

D. Agricultural or Industrial Production

The proposed project would operate within an existing industrial area; therefore, the project would not affect or displace any land used for agricultural production. Further, because the current action would not require any additional industrial construction and the facility is an existing industrial operation, it is unlikely that the project would impact any industrial production.

E. Human Health

Permit #4176-00 would include limits and conditions to ensure the facility would be operated in compliance with all applicable air quality rules and standards. These rules and standards are designed to be protective of human health. As described in Section III of the permit analysis, the air emissions from the proposed facility would be minimized by the use of BACT as required by Permit #4176-00. Overall, only minor impacts would be expected on human health from the proposed operations.

F. Access to and Quality of Recreational and Wilderness Activities

Because the proposed project would operate within an existing industrial area, the project would not affect any access to or quality of any recreation or wilderness activities in the area.

G. Quantity and Distribution of Employment
H. Distribution of Population

The proposed project would not require any new employment in the area. The project would utilize existing employee(s) to operate the plant; therefore, the proposed project would not impact the quantity and distribution of population and employment in the area.

I. Demands for Government Services

Government services would be required for acquiring the appropriate permits from government agencies. In addition, the permitted source of emissions would be subject to periodic inspections by government personnel. Demands for government services would be minor.

J. Industrial and Commercial Activity

The proposed project would result in only a minor impact on local industrial and commercial activity because the proposed project would operate within an existing industrial area, would not require any additional industrial construction, and would not result in additional industrial production. Overall, any industrial or commercial activity occurring as a result of the project would be minor.

K. Locally Adopted Environmental Plans and Goals

The Department is not aware of any locally adopted environmental plans or goals in the immediate area affected by the proposed project. The state standards would be protective of the proposed project area.

L. Cumulative and Secondary Impacts

The Great Falls WWTP is an existing facility and would continue to impact the above-cited social and economic resources of the environment after issuance of Permit #4176-00. However, the purpose of the current permit action would be to bring the existing Great Falls

WWTP into compliance with the Montana Clean Air Act through issuance of the required Montana Air Quality Permit. Therefore, because the current permit action would not result in any changes to the existing facility, no direct or secondary and cumulative impacts to the above-cited physical and biological resources of the project area would occur as a result of the current permit action.

Overall, the cumulative and secondary impacts from this project on the physical and biological environment in the immediate area would be minor due to the relatively small size and potential environmental impact of the proposed operation. The Department believes that this facility could be expected to operate in compliance with all applicable rules and regulations as outlined in Permit #4176-00.

Recommendation: No Environmental Impact Statement (EIS) is required.

If an EIS is not required, explain why the EA is an appropriate level of analysis: The current permitting action is for the operation of the Great Falls WWTP. Permit #4176-00 includes conditions and limitations to ensure the facility will operate in compliance with all applicable rules and regulations. In addition, there are no significant impacts associated with this proposal.

Other groups or agencies contacted or which may have overlapping jurisdiction: Montana Historical Society – State Historic Preservation Office, Natural Resource Information System – Montana Natural Heritage Program

Individuals or groups contributing to this EA: Department of Environmental Quality – Air Resources Management Bureau, Montana Historical Society – State Historic Preservation Office, Natural Resource Information System – Montana Natural Heritage Program

EA prepared by: Trista Glazier
Date: January 14, 2008