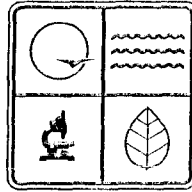


STATE OF MISSOURI  
DEPARTMENT OF NATURAL RESOURCES  
MISSOURI AIR CONSERVATION COMMISSION

PERMIT BOOK



## 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: 122004-017

Project Number: 2004-03-143

Owner: Aquila, Incorporated

Owner's Address: 20 West 9<sup>th</sup> Street, Kansas City, Missouri 64105

Installation Name: South Harper Peaking Facility

Installation Address: 24110 S. Harper Road, Peculiar, Missouri 64078

Location Information: Cass County, S29/32, T45N, R32W

Application for Authority to Construct was made for:

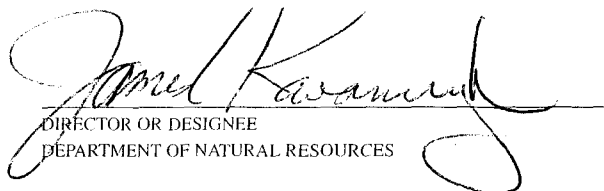
Installation of three natural gas fired simple cycle combustion turbines, a 9.8 million Btu per hour natural gas fired heater, and a 0.47 million Btu per hour emergency diesel fire pump to generate a total nominal electrical power output of 341 megawatts during peak electricity demand periods. This review was conducted in accordance with Section (8), 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 (listed as attachments starting on page 2) are applicable to this permit.

DEC 29 2004

EFFECTIVE DATE

  
DIRECTOR OR DESIGNEE  
DEPARTMENT OF NATURAL RESOURCES

2004-03-143

Aquila, Incorporated

20 West 9<sup>th</sup> Street, Kansas City, Missouri 64105

South Harper Peaking Facility

24110 S. Harper Road, Peculiar, Missouri 64078

Cass County, S29/32, T45N, R32W

Installation of three natural gas fired simple cycle combustion turbines, a 9.8 million Btu per hour natural gas fired heater, and a 0.47 million Btu per hour emergency diesel fire pump to generate a total nominal electrical power output of 341 megawatts during peak electricity demand periods. This review was conducted in accordance with Section (8), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*.

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Project No.	2004-03-143

## 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."*

South Harper Peaking Facility  
Cass County, S29/32, T45N, R32W

1. Operational Limitation
  - A. South Harper Peaking Facility (Aquila) shall burn only natural gas from the three natural gas fired simple cycle combustion turbines. If Aquila wishes to use any other type of fuel in the future in any of the three turbines, the Best Available Control Technology (BACT) analysis and ambient air quality analysis will need to be re-evaluated.
  - B. Aquila shall limit the total hours of operation of the three Siemens-Westinghouse Model 501D5A turbines (Emissions Points EP-01, EP-02, and EP-03) to less than 5,000 hours in any consecutive 12-month period.
  - C. Aquila shall limit the total hours of operation of each of the three Siemens-Westinghouse Model 501D5A turbines (EP-01, EP-02, and EP-03) to less than 2,000 hours in any consecutive 12-month period, except in the case of a Force Majeure Event. In the case of a Force Majeure Event that renders one or two gas turbines inoperable, the total unused permitted hours of operation may be transferred to the remaining operable unit(s). In order for an event to be considered a Force Majeure Event, Aquila must receive approval from the Air Pollution Control Program's Enforcement Section.
  - D. Except during periods of startup and shutdown, Aquila shall limit the total hours of operation of the gas heater (EP-04) to less than 6,000 hours in any consecutive 12-month period.
  - E. Except during periods of startup and shutdown, Aquila shall run the three Siemens-Westinghouse Model 501D5A turbines (EP-01, EP-02, and EP-03) at a load level no less than 75 percent.
  - F. Aquila shall only operational test the emergency fire pump between the hours of 1:00 p.m. and 5:00 p.m. and shall limit the total hours of operation to less than 250 hours in any consecutive 12-month period.

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## SPECIAL CONDITIONS:

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

### 2. Emission Limitation

- A. Except during periods of startup and shutdown, Aquila shall limit Nitrogen Oxide (NO<sub>x</sub>) emissions from each of the Siemens-Westinghouse Model 501D5A turbines (EP-01, EP-02, and EP-03) to 15 parts per million by volume (ppmvd) corrected to 15 percent (%) oxygen on a dry basis for a three-hour rolling average.
- B. Except during periods of startup and shutdown, Aquila shall limit Carbon Monoxide (CO) emissions from each of the Siemens-Westinghouse Model 501D5A turbines (EP-01, EP-02, and EP-03) to 25 ppmvd corrected to 15 percent (%) oxygen on a dry basis for a one hour rolling average.
- C. Except during periods of startup and shutdown, Aquila shall limit emissions of Particulate Matter less than ten microns in aerodynamic diameter (PM<sub>10</sub>) to less than 15.25 pounds per hour when utilizing wastewater injection for Turbine Number One (Siemens-Westinghouse Model 501D5A, EP-01) and 10.00 pounds per hour each from Turbine Numbers Two and Three (Siemens-Westinghouse Model 501D5A, EP-02 and EP-03) and Turbine One when not using wastewater injection.

### 3. Compliance Testing

Stack tests shall be performed on one of the three identical gas turbines permitted herein at Aquila sufficient to demonstrate compliance with the Special Conditions contained in this permit. Specifically, the stack testing shall:

- A. Demonstrate compliance with the emission limitations specified in Special Conditions 2.A through 2.C.
- B. Develop a formaldehyde emission factor in order to verify the validity of the emission factor used for the modeling analysis. In the event that the stack testing results in an emission factor that exceeds that used in this review, a revised modeling analysis will need to be submitted by Aquila. The revised modeling must be submitted to the Director of the Air Pollution Control Program within 90 days of completion of the required testing.
- C. Demonstrate compliance with Subpart GG, *Standards of Performance for Stationary Gas Turbines*, of the New Source Performance Standards (NSPS).
- D. Be conducted across the full range of loads (i.e. 75%, 85%, and 100%) that the turbines are expected to operate.
- E. The stack test shall be performed within 60 days of achieving the maximum production rate of the turbines but no later than 180 days after

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Project No.	2004-03-143

### SPECIAL CONDITIONS:

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

initial startup for commercial operation of the turbines and shall be conducted in accordance with the stack procedure outlined in Special Conditions 3.A through 3.D. The test shall be conducted every five (5) years from the date of the initial test.

- F. The date on which performance tests are conducted must be pre-arranged with the Air Pollution Control Program a minimum of 30 days prior to the proposed test so that a pretest meeting may be arranged if necessary, and to assure that the test date is acceptable for an observer to be present. A completed Proposed Test Plan form (copy enclosed) may serve the purpose of notification and must be approved by the Air Pollution Control Program prior to conducting the required emission testing.
- G. Two copies of a written report of the performance test results shall be submitted to the Director of the Air Pollution Control Program within 30 days of completion of any required testing. The report must include legible copies of the raw data sheets, analytical instrument laboratory data, and complete sample calculations from the required EPA method for at least one sample run.
- H. The test report is to fully account for all operational and emission parameters addressed by these permit conditions as well as in Subpart GG of the NSPS.
- I. Pursuant to 40 CFR §60.8(b)(3) and subject to the following conditions, Aquila may substitute the 40 CFR Part 75 NO<sub>x</sub> and diluent continuous emission monitoring system (CEMS) certification procedures for the Reference Method 20 testing for the purpose of demonstrating initial compliance with Subpart GG of the NSPS. If the Part 75 NO<sub>x</sub> and diluent CEMS certification procedures are chosen to demonstrate initial compliance, Aquila shall adhere to the following requirements:
  - 1) Aquila shall successfully complete the Part 75 NO<sub>x</sub> and diluent CEMS certification tests so that the data are, at a minimum, conditionally certified prior to the testing deadlines outlined in 40 CFR §60.8(a) or Part 75, whichever date is earlier.
  - 2) Aquila shall perform a stratification test for NO<sub>x</sub> and diluent pursuant to the procedures specified in 40 CFR Part 75, Appendix A, Section 6.5.6.1(a) through (e) or Section 6.5.6.2 (a) through (e). Once the stratification sampling is completed, Aquila shall analyze the data using the procedures in Section 6.5.6.3(a) and (c) to

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## SPECIAL CONDITIONS:

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

determine if subsequent RATA testing will occur along a short or long reference method measurement line. The short or long reference method measurement line, as determined above, will serve in lieu of the sampling points usually required by Reference Method 20. In no case shall RATA be based on fewer than three sample points as specified in 40 CFR Part 60, Appendix B, Performance Specification 2, Section 3.2.

- 3) Since the PSD permit limits Aquila to only natural gas, the SO<sub>2</sub> measurement requirements under 40 CFR Part 60, Appendix A, Reference Method 20, Section 6.3 are waived pursuant to 40 CFR §60.8(b)(4).
4. Continuous Emission Monitoring System (CEMS)
  - A. Aquila shall install, calibrate, maintain, and operate CEMS, and record the output of the systems, for measuring NO<sub>x</sub> emissions discharged into the atmosphere. The CEMS shall be installed and operated according to the guidelines in 40 CFR Part 75 for the NO<sub>x</sub> and diluent CEMS requirements. These systems shall be placed in an appropriate location on each combustion turbine's flue gas exhaust such that accurate readings are possible.
  - B. Aquila shall install, calibrate, maintain, and operate a CEMS, and record the output of the systems, for measuring the oxygen (O<sub>2</sub>) content of the flue gases at each location where NO<sub>x</sub> emissions are monitored. The O<sub>2</sub> content of the flue gases may be determined by use of either an O<sub>2</sub> CEMS or a CO<sub>2</sub> CEMS. If Aquila elects to use a CO<sub>2</sub> CEMS, the conversion process in EPA Method 20 must be used to correct the NO<sub>x</sub> concentrations to 15 percent O<sub>2</sub>.
5. Record Keeping
  - A. Aquila shall keep monthly, and the sum of the most recent 12-months, records that are adequate to determine compliance with Special Condition Number 1.B (total installation hours of operation). Attachment A, *Operational Schedule of the Three Siemens-Westinghouse Model 501D5A Turbines*, or an equivalent form of the company's own design, is suitable for this purpose. The most recent 60 months of records shall be maintained on-site and shall be made immediately available to Missouri Department of Natural Resources' personnel upon request.
  - B. Aquila shall keep monthly, and the sum of the most recent 12-months, records that are adequate to determine compliance with Special Condition

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## SPECIAL CONDITIONS:

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

Number 1.C (individual turbine hours of operation). Attachment B, *Individual Turbine Operational Schedule*, or an equivalent form of the company's own design, is suitable for this purpose. The most recent 60 months of records shall be maintained on-site and shall be made immediately available to Missouri Department of Natural Resources' personnel upon request.

- C. Aquila shall keep monthly, and the sum of the most recent 12-months, records that are adequate to determine compliance with Special Condition Number 1.D (gas heater hours of operation). Attachment C, *Gas Heater Operational Schedule*, or an equivalent form of the company's own design, is suitable for this purpose. The most recent 60 months of records shall be maintained on-site and shall be made immediately available to Missouri Department of Natural Resources' personnel upon request.
  - D. Aquila shall keep monthly, and the sum of the most recent 12-months, records that are adequate to determine compliance with Special Condition Number 1.F (fire pump hours of operation). Attachment D, *Fire Pump Operational Schedule*, or an equivalent form of the company's own design, is suitable for this purpose. The most recent 60 months of records shall be maintained on-site and shall be made immediately available to Missouri Department of Natural Resources' personnel upon request.
6. Reporting
- A. Aquila shall report to the Air Pollution Control Program's Enforcement Section, P.O. Box 176, Jefferson City, Missouri 65102, no later than ten (10) days after the end of each month if the 12-month cumulative total (Special Condition 5.A) records show that the source exceeded the limitation of Special Condition 1.B (5,000 hours of operation).
  - B. Aquila shall report to the Air Pollution Control Program's Enforcement Section, P.O. Box 176, Jefferson City, Missouri 65102, no later than ten (10) days after the end of each month if the 12-month cumulative total (Special Condition 5.B) records show that the source exceeded the limitation of Special Condition 1.C (2,000 hours of operation per turbine).
  - C. Aquila shall report to the Air Pollution Control Program's Enforcement Section, P.O. Box 176, Jefferson City, Missouri 65102, no later than ten (10) days after the end of each month if the 12-month cumulative total (Special Condition 5.C) records show that the source exceeded the limitation of Special Condition 1.D (6,000 hours of operation).

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Project No.	2004-03-143

### SPECIAL CONDITIONS:

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

- D. Aquila shall report to the Air Pollution Control Program's Enforcement Section, P.O. Box 176, Jefferson City, Missouri 65102, no later than ten (10) days after the end of each month if the 12-month cumulative total (Special Condition 5.D) records show that the source exceeded the limitation of Special Condition 1.F (250 hours of operation).
- E. Pursuant to 40 CFR §60.13(i), Aquila may make use of 40 CFR Part 75, Appendix D as an alternative to the fuel monitoring and sulfur fuel sampling and analysis requirements of Subpart GG of the NSPS. If Aquila elects to use this alternative, Aquila is subject to the following requirements:
  - 1) Aquila shall submit an excess emissions report to the Air Pollution Control Program's Enforcement Section consistent with the format and schedule described in 40 CFR §60.7(d); and
  - 2) For the purpose of excess emission reporting, Aquila shall report each day during which the sulfur content of the fuel exceeds the 0.8 percent by weight limitation.
- F. Aquila shall report to the Air Pollution Control Program's Enforcement Section, P.O. Box 176, Jefferson City, Missouri 65102, no later than ten (10) days after the end of the month, in which performance testing has been performed and indicates non-compliance with Special Condition 2.A, 2.B, or 2.C.
- G. In the case of a Force Majeure Event, Aquila shall notify the Air Pollution Control Program's Enforcement Section, P.O. Box 176, Jefferson City, Missouri 65102, no later than ten (10) days after an event has occurred that Aquila feels meets the definition of a Force Majeure Event.

Note 1: The term "startup and shutdown" used herein is hereby defined as those periods of time that a gas turbine is operated at a load level less than 75%.

Note 2: The term "Force Majeure Event" used herein is hereby defined as any event, occurrence, or circumstance beyond the reasonable control of, and without the fault or negligence of, Aquila. "Force Majeure Event" shall include, but are not limited to, earthquakes, fires, floods, lightning strikes, acts of the public enemy, war, or regulations or restrictions imposed by governmental, military, or lawfully established civilian authorities. A claim of Force Majeure Event is subject to the approval of the Air Pollution Control Program Enforcement Section.

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE  
SECTION (8) REVIEW

Project Number: 2004-03-143  
Installation ID Number: 037-0063  
Permit Number:

South Harper Peaking Facility  
24110 S. Harper Road  
Peculiar, Missouri 64708

Complete: March 29, 2004  
Reviewed: April 7, 2004

Parent Company:  
Aquila, Incorporated  
20 West 9<sup>th</sup> Street  
Kansas City, Missouri 64105

Cass County, S29/32, T45N, R32W

REVIEW SUMMARY

- South Harper Peaking Facility (Aquila) has applied for the authority to install three natural gas fired simple cycle combustion turbines to generate a total nominal electrical power output of 341 megawatts (MW) during peak electricity demand periods. The three gas turbines to be utilized are identical Siemens Westinghouse Model 501D5A units. The individual turbine units have a maximum hourly design rate (MHDR) heat input of 1,455 million British Thermal Units (MMBtu) per hour. The project will also consist of a 9.8 MMBtu per hour natural gas fired heater, used to pre-heat the natural gas fuel supplied to the turbines and a 0.47 MMBtu per hour emergency diesel fire pump.
- Hazardous Air Pollutant (HAP) emissions are expected from the heater and three turbines due to the combustion of natural gas and the fire pump due to the combustion of diesel fuel. The primary HAPs of concern from the proposed equipment are acrolein, formaldehyde, and polycyclic aromatic hydrocarbons (PAH). The potential emissions of formaldehyde (CAS Number 50-00-0) are above its respective threshold level, but less than major source levels.
- 40 CFR Part 60 Subpart GG, *Standards of Performance for Stationary Gas Turbines* is applicable to the three gas turbines permitted herein.
- None of the National Emission Standards for Hazardous Air Pollutants (NESHAP) in 40 CFR Part 61 are applicable to this project.
- Maximum Achievable Control Technology (MACT), Subpart YYYYY, *Combustion Turbines* does not apply because potential emissions of individual and combined HAPs are indirectly limited to a de minimis level by the hours of operation conditions of this permit.
- This review was conducted in accordance with Section (8) of Missouri State Rule 10

CSR 10-6.060, *Construction Permit Required*. Potential emissions of PM<sub>10</sub>, NO<sub>x</sub> and CO are above major thresholds. Potential emissions of VOC are greater than de minimis levels. Potential emissions of individual and combined HAPs are indirectly limited to a de minimis level by the hours of operation conditions of this permit.

- Since potential emissions of total and individual HAPs are at de minimis levels, this installation is not considered a major source of HAPs as defined in 40 CFR Part 63, and 10 CSR 10-6.060(9).
- The Best Available Control Technology (BACT) requirements apply to the proposed equipment. The BACT analysis was based upon each turbine operating in simple cycle mode, burning exclusively natural gas, and operating only 2,000 hours per year. The gas heater will operate only 6,000 hours per year. NO<sub>x</sub> emissions from the gas turbines will be controlled through the use of dry low-NO<sub>x</sub> burners. Low NO<sub>x</sub> burners will also be employed on the gas heater. Ignition Timing Retard will be used on the emergency fire pump for NO<sub>x</sub> emission control. Good combustion practices will be utilized to control CO emissions. The exclusive use of low ash/low sulfur containing fuel, together with good combustion practices, will be utilized in controlling PM<sub>10</sub> and SO<sub>x</sub> emissions from all equipment. A re-evaluation of the BACT analysis and/or ambient air quality analysis will be required if South Harper Peaking Facility wishes to: retrofit the turbines with a heat recovery steam generator within a short period of time (e.g. 4-5 years) that would otherwise be accommodated within a phased Prevention of Significant Deterioration (PSD) permit, burn other forms of fuel in any of the equipment, or wishes to increase the hours of operation limitation for any piece of equipment.
- This installation is on the List of Named Installations [10 CSR 10-6.020(3)(B), Table 2] Number 27. A stationary source category which, as of August 7, 1980, is being regulated under Section 111 or 112 of the Act. This installation is subject to Subpart GG of the NSPS, which applies to gas turbines installed after October 3, 1977. Therefore, the major source threshold for all criteria pollutants is 100 tons per year.
- This installation is located in Cass County, which is not currently designated nonattainment for any criteria pollutant.
- Air quality modeling for this project was performed to determine the ambient impact of those pollutants that will be emitted in significant amounts (NO<sub>x</sub>, CO, and PM<sub>10</sub>). Air quality modeling was also performed to determine the ambient impact of formaldehyde. Based upon the model reviewed by the Air Pollution Control Program staff, the study submitted by Aquila is complete and demonstrates there will not be an exceedance of the National Ambient Air Quality Standards (NAAQS), Risk Assessment Levels (RALs), or available increment.
- Ambient air monitoring was not required for this project since the modeling analysis indicated that the ambient impacts of the modeled pollutants were below significance thresholds. Continuous Emission Monitoring Systems (CEMS) are required on each combustion turbine to demonstrate compliance with NO<sub>x</sub> emissions limits.
- Emission testing for NO<sub>x</sub>, CO, PM<sub>10</sub>, and formaldehyde will be required as specified

in the special conditions of this permit.

- A Part 70 Operating Permit application is required for this installation within 1 year of equipment startup.
- Approval of this permit is recommended with special conditions.

## INSTALLATION/PROJECT DESCRIPTION

South Harper Peaking Facility (Aquila) has applied for the authority to construct three natural gas fired simple cycle combustion turbines to generate a total nominal electrical power output of 341 MW during peak electricity demand periods in Cass County near Peculiar, Missouri. The plant was to be located originally near Harrisonville, Missouri and public notice for the initial location took place earlier this year. On September 13, 2004, a revised PSD permit application was received changing the location of the plant to Peculiar, Missouri.

The three gas turbines to be utilized for this project are identical Siemens-Westinghouse Model 501D5A units that will be fired exclusively with natural gas. The individual turbine units have a heat input of 1,455 MMBtu per hour. This heat input is taken at a worst case ambient temperature of negative 1.8 degrees Fahrenheit (°F), an ambient relative humidity of 60%, a barometric pressure of 14.458 pounds per square inch absolute, and is based on a higher heating value of natural gas. Each 4-stage Siemens-Westinghouse Model 501D5A gas turbine utilizes 14 can-type dry low-NO<sub>x</sub> combustors in a circular array. It incorporates a 19-stage axial flow compressor, and utilizes electric starting motors. Each turbine will power an air-cooled, 60 hertz (i.e. 3600 revolutions per minute) generator. The project will also consist of a 9.8 MMBtu per hour natural gas fired heater used to heat the natural gas fuel supplied to the turbines and a 0.47 MMBtu per hour emergency diesel fire pump.

Simple cycle turbines have high volume, high temperature exhaust streams. The maximum heat input and subsequent generating capacity of each turbine depends on ambient conditions. At higher temperatures, the heat consumption and output generally decreases. Potential emissions from the turbines are greatest during periods of low ambient temperature since more fuel can be burned during these times. However, the turbine is operating at its maximum efficiency during lower temperatures. The Siemens-Westinghouse Model 501D5A turbines are equipped with dry low-NO<sub>x</sub> burners, which will achieve a maximum NO<sub>x</sub> emission rate of 15 parts per million by volume on a dry basis (ppmvd) when corrected to 15% oxygen in the stack gas.

In order to distinguish between a peaking station and a baseload station, the Air Pollution Control Program has previously limited the hours of operation of power plants that are strictly designed as peaking stations. The limitation on hours of operation ensures an installation, that is permitted as a peaking station, does not operate continuously as a baseload station. The annual hours of operations that a power plant will operate impacts the conclusions arrived at in a project's Best Available Control Technology (BACT) analysis.

Recent permits issued by the Air Pollution Control Program have limited each turbine to

2,000 hours per year with a limitation of 5,000 hours per year for all the turbines combined. The same limitations apply to the Aquila installation. For record keeping purposes, operational time is considered to be the total number of hours that Aquila has any of the three or combination of the three turbines connected to the utility grid by closure of the generator breaker.

## EMISSIONS/CONTROLS EVALUATION

All of the criteria pollutants will be emitted from the operation of these units, with PM<sub>10</sub>, NO<sub>x</sub>, and CO being emitted in amounts greater than significance levels (i.e. greater than de minimis levels). HAP emissions are also expected due to the operation of the turbines, with the main HAP of concern being formaldehyde. Potential emissions of both formaldehyde and VOCs are indirectly limited to their respective de minimis levels by the hours of operation conditions in this permit. The emission factor used to determine formaldehyde emissions will be verified through stack testing. Dry low-NO<sub>x</sub> burners will be used to control NO<sub>x</sub> emissions from the turbines. The Special Conditions of this permit limits the NO<sub>x</sub> emissions to 15 ppmvd on a three-hour rolling average. Good combustion practices will be used to control CO emissions from the turbines. The CO emissions of the turbines are limited to 25 ppmvd on a one-hour rolling average by the Special Conditions of this permit.

The emission factors used to estimate emissions from the Siemens-Westinghouse Model 501D5A turbines for the criteria pollutants were provided by the equipment manufacturer.

Potential emissions of the application represent the potential of the proposed equipment, assuming continuous operation (8760 hours per year). Conditioned potential emissions are based on an annual limit of 2,000 hours for each the three turbines and 6,000 hours for the gas heater. The potential emissions in Table 1 represent the emission rate at 100% loading and ambient conditions of 0.0°F. Emissions from start-up and shutdown are not included in the emission estimates in the table.

Table 1: Emissions Summary (tons per year)

Pollutant	Regulatory De Minimis Levels	Existing Potential Emissions	Existing Actual Emissions	Potential Emissions of the Application	Conditioned Potential Based on Hours Limitation	New Installation Conditioned Potential
PM <sub>10</sub>	15.0	N/A	N/A	154.72	35.47	N/A
SO <sub>x</sub>	40.0	N/A	N/A	12.00	2.86	N/A
NO <sub>x</sub>	40.0	N/A	N/A	1,075.16	247.42	N/A
VOC	40.0	N/A	N/A	75.13	17.26	N/A
CO	100.0	N/A	N/A	1,090.22	250.53	N/A
Acrolein	0.04*/10.0	N/A	N/A	0.12	0.03	N/A
Formaldehyde	2.0*/10.0	N/A	N/A	13.58	3.10	N/A
PAH	0.01*/10.0	N/A	N/A	0.04	0.01	N/A
Total HAPs	10.0/25.0	N/A	N/A	19.72	4.54	N/A

N/A = Not Applicable

\* Threshold level for the HAP of concern.

### PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (8) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of NO<sub>x</sub> and CO are above major thresholds. Potential emissions of PM<sub>10</sub> are above significant levels (i.e. de minimis levels). Potential emissions of all other pollutants are at de minimis levels.

### APPLICABLE REQUIREMENTS

South Harper Peaking Facility 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 application.

### 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 10-2.070

## SPECIFIC REQUIREMENTS

- *Maximum Allowable Emissions of Particulate Matter From Fuel Burning Equipment Used for Indirect Heating*, 10 CSR 10-2.040
- *New Source Performance Regulations*, 10 CSR 10-6.070 – *New Source Performance Standards (NSPS) for Stationary Gas Turbines*, 40 CFR Part 60, Subpart GG.
- *Restriction of Emission of Sulfur Compounds*, 10 CSR 10-6.260
- *Acid Rain Source Permits Required*, 10 CSR 10-6.270
- *Emission Limitations and Emissions Trading of Oxides of Nitrogen*, 10 CSR 10-6.350
- *Restriction of Emission of Particulate Matter From Industrial Processes*, 10 CSR 10-6.400

## BACT ANALYSIS

### **Introduction**

Any source subject to Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, Section (8) must conduct a Best Available Control Technology (BACT) analysis on any pollutant emitted in greater than de minimis levels. The BACT requirement is detailed in Section 165(a)(4) of the Clean Air Act, at 40 CFR 52.21 and 10 CSR 10-0.60(8)(B).

A BACT analysis is done on a case by case basis and is performed using a “top-down” method. The following steps detail the top-down approach:

1. Identify all potential control technologies – must be a comprehensive list, it may include technology employed outside the United States and must include the Lowest Achievable Emission Rate (LAER) determinations.
2. Eliminate technically infeasible options – must be well documented and must preclude the successful use of the control option.
3. Rank remaining control technologies – based on control effectiveness, expected emission rate, expected emission reduction, energy impacts, environmental impacts, and economic impacts.
4. Evaluate the most effective controls – based on case by case consideration of

energy, environmental, and economic impacts.

5. Select BACT.

The three turbines, gas heater and emergency fire pump being permitted by Aquila are subject to BACT analysis for PM<sub>10</sub>, NO<sub>x</sub>, and CO emissions. Aquila prepared a BACT analysis based on the U.S. EPA RACT/BACT/LAER Clearinghouse (RBLC) database, vendor information, and previous permits for combustion turbines gas heaters and fire pumps issued in the State of Missouri and elsewhere. The BACT determination for the turbines must be at least as stringent as the NSPS for Combustion Turbines set forth in 40 CFR 60. The applicant has proposed emissions well below the NSPS limits. The BACT analysis is summarized, by pollutant, below.

**NO<sub>x</sub> Control Technologies**

The conditioned potential emissions of NO<sub>x</sub> resulting from the project permitted herein are significant (i.e. greater than 40.0 tons per year). Therefore, a BACT analysis is required for this pollutant. Table 2 lists the control technologies Aquila evaluated for this review (in order of control achieved) and the emission rates each control technology can attain.

Table 2: NO<sub>x</sub> Control Technologies Considered

Control Technology	Equipment	Emission Rate/Control Efficiency Achieved
SCONOX™	Turbines	2 ppmvd
XONON™	Turbines	3 ppmvd
Selective Catalytic Reduction (SCR)	Turbines	3-9 ppmvd
Selective Non-catalytic Reduction (SNCR)	Turbines	4-10 ppmvd
Dry Low-NO <sub>x</sub> Burner	Turbines	9-25 ppmvd
Water/Steam Injection	Turbines	22-42 ppmvd
Low-NO <sub>x</sub> Burner	Gas Heater	N/D*
Selective Catalytic Reduction (SCR)	Gas Heater	90% C.E.
Ignition Timing Retard (ITR)	Emergency Diesel Fire Pump	N/D*
Selective Catalytic Reduction (SCR)	Emergency Diesel Fire Pump	90% C.E.

\*N/D = Not Determined

**SCONOX™**

The SCONOX™ system is an add-on control device that uses an oxidation/absorption/regeneration cycle across a catalyst bed to achieve back-end reductions of NO<sub>x</sub>, CO, and VOC. The system does not require ammonia as a reagent, and involves parallel catalyst beds that are alternately taken off line through means of mechanical dampers for regeneration.

According to Goal Line Technologies, LLC, the SCONOX™ catalyst works by simultaneously oxidizing CO to CO<sub>2</sub>, NO to NO<sub>2</sub>, and then absorbing NO<sub>2</sub>. The NO<sub>2</sub> is absorbed into a potassium carbonate catalyst coating as potassium nitrite (KNO<sub>2</sub>) and potassium nitrate (KNO<sub>3</sub>). When a catalyst module begins to become loaded with KNO<sub>2</sub> and KNO<sub>3</sub>, it is taken off line and isolated from the flue gas stream with mechanical dampers for regeneration.

Once the module has been isolated from the turbine exhaust [contains approximately

five percent (5%) oxygen], four percent (4%) hydrogen in an inert carrier gas of nitrogen or steam is introduced. An absence of oxygen is necessary to retain the reducing properties necessary for regeneration. The lower flammability limit for hydrogen is 4%, so it is important that the air seals around the dampers do not leak. Hydrogen reacts with potassium nitrites and nitrates during regeneration to form water (H<sub>2</sub>O) and nitrogen (N<sub>2</sub>), which is emitted from the stack.

The SCANOX™ system can operate effectively at temperatures ranging from 300°F to 700°F. The gas turbines permitted herein will have an exhaust gas temperature of 950°F to 984°F. The exhaust gas from these turbines would have to be lowered to accommodate this air pollution control system. The SCANOX™ system manufacturer indicates that this technology can be applied to simple cycle turbines. Therefore, this control technology is considered technically feasible for this project.

SCANOX™ is a new technology and has been demonstrated on a 23 MW combined cycle turbine in the State of California. However, it has yet to be demonstrated for long term commercial operation on simple cycle turbines operated as peak power generation units. It is an inherent necessity for peak power generation units to be capable of rapid start-up and shutdown. The unknowns associated with any pollution control system which is the first of its kind, and which has no long term company or operation history, represents a level of risk that would alter the ability to reasonably finance the project. Therefore, SCANOX™ was eliminated as BACT for NO<sub>x</sub> for this project.

### **XONON™**

The XONON™ technology replaces traditional flame combustion with flameless catalytic combustion. The XONON™ system utilizes a chemical process versus a flame to combust fuel, thus limiting temperature and NO<sub>x</sub> formation. Due to the subsequent low temperature of the process, thermal NO<sub>x</sub> is virtually eliminated. This technology designed by Catalytica, Inc. has undergone testing on a 1.5 MW Kawasaki turbine in the State of California, which operates continually in a baseload capacity. NO<sub>x</sub> emissions of three ppm or less have been demonstrated. Tests are currently underway to apply this technology to other types and sizes of turbines, but that data is currently unavailable. At this time it is unclear whether this technology, in its current state, could be applied to turbines used to generate peak power, which experiences repeated start-up, shutdowns, and changing load conditions. Therefore, for the purposes of this BACT analysis, the XONON™ system was not considered to be technically feasible.

### **Selective Catalytic Reduction (SCR)**

SCR is a post-combustion control technology in which ammonia is added to the flue gas in the presence of a catalyst. The ammonia and NO<sub>x</sub> react to form nitrogen and water. Since the exhaust stream for the turbines permitted herein is between 950°F and 984°F, a high temperature catalyst must be considered. High temperature zeolite catalysts do exist that allow the gases entering the SCR to reach temperatures of 1,050°F and greater. High excess air concentrations and high fuel combustion temperatures create NO<sub>x</sub>. Lowering flame temperatures and controlling oxygen-fuel mix ratios at critical points in the combustion process can reduce NO<sub>x</sub> formation. The catalyst accelerates the chemical reaction in which the ammonia and NO<sub>x</sub> react to form nitrogen and water. With SCR technology, the percent reduction of NO<sub>x</sub> emissions can be increased by

adding additional catalyst and ammonia. SCR is considered technically feasible for this application.

The feasibility of SCR was evaluated based upon economic, energy, and environmental impacts. The ammonia that does not react with NO<sub>x</sub> passes through the system and is released into the atmosphere. In addition, SCR would cause a loss of energy due to an increase in back pressure on the combustion turbines as a result of the pressure drop across the catalyst bed. Also, the start-up and shutdown requirements of the additional SCR equipment would severely impair the “quick start” capability of the peaking turbine generators thereby eliminating the “spinning reserve” capacity of the peaking units. The use of SCR was estimated to cost \$13,776 per ton of NO<sub>x</sub> removed. This cost estimate was based upon each turbine operating 2,000 hours per year. Thus, SCR was eliminated as BACT due its cost for the limited number of operational hours being permitted (2,000 hours per turbine per year).

### **Selective Non-catalytic Reduction (SNCR)**

SNCR is a post-combustion NO<sub>x</sub> control technology in which a reagent (ammonia or urea) is injected into the exhaust gases in a temperature range between 1,700°F and 2,000°F. The reagent reacts chemically with NO<sub>x</sub> forming nitrogen and water. Outside the upper end of this temperature range, the reagent is converted to NO<sub>x</sub>. Outside the lower end of this temperature range, the reagent will not react and the reagent is discharged into the atmosphere. The Siemens-Westinghouse Model 501D5A turbines have exhaust temperatures up to approximately 984°F. Thus, in order to reach the temperature range in which SNCR is effective, the exhaust temperature of the turbines would need to be raised. To raise the exhaust temperature, additional fuel would need to be combusted and thereby increasing the NO<sub>x</sub> and other criteria pollutant emissions.

SNCR has not been applied to any combustion turbines according the RBLC database. Based upon this information, SNCR was eliminated as BACT for this project.

### **Dry Low-NO<sub>x</sub> Combustors**

Typically high fuel combustion temperature and high excess air concentrations create NO<sub>x</sub>. Lowering the flame temperature and controlling the oxygen-fuel mix ratios at critical points in the combustion process can reduce NO<sub>x</sub> formation. Because of their low cost-effectiveness per ton of NO<sub>x</sub> reduced, dry low-NO<sub>x</sub> technology has been rapidly incorporated into new equipment designs. Dry low-NO<sub>x</sub> burners can achieve NO<sub>x</sub> emissions at or below 15 ppm. For this project, dry low-NO<sub>x</sub> technology is integrated into the design of the Siemens-Westinghouse Model 501D5A turbines and represents the baseline emission of 15 ppm for this turbine.

### **Water or Steam Injection**

This is a combustion control technology that utilizes water or steam for flame quenching to reduce peak flame temperatures and thereby reduce NO<sub>x</sub> formation. The injection of water or steam into a gas turbine can increase the power output by increasing the mass throughput, but at the same time reduces the efficiency of the turbine. Typically, water injection can achieve NO<sub>x</sub> emission levels of 22 ppm while firing natural gas. Since dry low-NO<sub>x</sub> burners are all ready being installed on the turbines and dry low-NO<sub>x</sub> burners cannot be used with water or steam injection for additional NO<sub>x</sub> control, water injection has been eliminated as BACT for this project.

### **Selection of NO<sub>x</sub> Control Technology for Turbines**

For this project, consisting of three stationary gas turbines operating in simple cycle mode for generation of electrical power during peak electricity demand periods and considering the 2,000 hours per year operational limitation, dry low NO<sub>x</sub> combustors with a NO<sub>x</sub> emission limit of 15 ppmvd when corrected to 15% oxygen on a dry basis is considered BACT. This limitation is based on a three hour rolling average, and is not applicable during periods of startup and shut down.

### **Selection of NO<sub>x</sub> Control Technology for Fuel Gas Heater**

The RBLC web page does not list information regarding control equipment for gas heaters of this size. The only add-on NO<sub>x</sub> control technique available for a unit the size that Aquila intends to install is SCR. The SCR process for removal of NO<sub>x</sub> is discussed in the SCR section above. The vendor's removal efficiency for NO<sub>x</sub> is 90%. The overall initial capital cost of installing an SCR system on the gas heater is approximately \$119,000. On an annual basis, the SCR system would cost \$102,900, which results in a cost per ton of NO<sub>x</sub> removed of \$58,000 while removing only 1.8 tons of NO<sub>x</sub> per year. Based on environmental and economic impacts, low- NO<sub>x</sub> burners are considered to be BACT.

### **Selection of NO<sub>x</sub> Control Technology for Emergency Diesel Fire Pump**

The use of add-on controls has not been documented in the RBLC for emergency fire pumps similar to this unit. However, SCR system vendors have indicated that these controls are available for the fire pump and for a unit of the size Aquila intends to install, 90% removal efficiency can be expected. The overall initial capital cost of installing an SCR system on a fire pump is approximately \$131,300. On an annual basis, the SCR system would cost \$43,960, which results in a cost per ton of NO<sub>x</sub> removed of \$189,690, while removing only 0.2 tons of NO<sub>x</sub> per year. With such a low amount of NO<sub>x</sub> removed at such a high cost per ton, SCR was not selected as BACT. Instead NO<sub>x</sub> emissions on these diesel-fired units will be controlled by the use of ignition timing retard (ITR).

### **CO Control Technology**

The conditioned potential emissions of CO resulting from the project permitted herein are significant (i.e., greater than 100.0 tons per year). Therefore, a BACT analysis is required for this pollutant. Table 3 lists the control technology Aquila evaluated for the BACT analysis for CO (in order of control achieved) and the emission rates each control technology can attain.

Table 3: CO Control Technology

<b>Control Technology</b>	<b>Equipment</b>	<b>Controlled CO Emission Level</b>
SCONOX™	Turbines	2 ppm
Oxidation Catalyst	Turbines	2 ppm
Combustion Control	Turbines	25 ppm
Good Combustion Practices	Gas Heater, Emergency Fire Pump	N/D*
Oxidation Catalyst	Gas Heater, Emergency Fire Pump	N/D*

\*N/D = Not Determined

The SCONOX™ system was described in the BACT analysis for NO<sub>x</sub>. In addition to controlling NO<sub>x</sub>, the SCONOX™ system also controls VOC and CO. In analyzing the feasibility of the SCONOX™ system for this project, the review took into account the fact SCONOX™ controls all three pollutants. The reasons as to why SCONOX™ was eliminated as BACT for NO<sub>x</sub> also result in the elimination of SCONOX™ as BACT for CO.

### **Oxidation Catalysts**

Oxidation catalysts are a post-combustion technology used to oxidize CO to Carbon Dioxide (CO<sub>2</sub>) without the introduction of additional chemicals. The activation energy for this reaction is lowered through the use of a catalyst and the oxidation then proceeds by utilizing excess air present in the turbine exhaust. An oxidation catalyst is usually platinum based, and operates in an optimal temperature range between 700°F and 1,100°F. Catalyst sintering can occur at higher temperatures resulting in permanent damage to the catalyst. Also, the addition of a catalyst bed onto the turbine exhaust will create a pressure drop, resulting in back pressure on the turbine. This reduces the turbine's efficiency and translates into energy costs. Conversion efficiencies for CO up to 95% are possible, and catalysts are available that will effectively handle the temperature range at which these turbines will operate.

Oxidation catalyst has not typically been required as BACT for natural gas combustion turbines operated in simple cycle mode and used exclusively for peaking service. The Missouri Department of Natural Resources acknowledges that oxidation catalyst has not been widely required as BACT in previous determinations. However, the use of oxidation catalyst is increasing and sources are voluntarily installing oxidation catalyst. The use of an Oxidation Catalyst was estimated to cost \$8,618 per ton of CO removed. After evaluating the environmental, economical, and energy impacts for this permit application and considering the limited number of hours of operation to be permitted (2,000 hours per year per turbine), oxidation catalyst was eliminated as BACT for CO control.

### **Combustion Control**

Good combustion practices include turbine design and operational elements to control the amount and distribution of excess air in the turbine combustion section and turbine exhaust gas. Good combustion practices applied to the Siemens Westinghouse Model 501D5A turbines can achieve CO emissions of 25 ppmv when corrected to 15% oxygen on a dry basis, during steady state operation.

### **Selection of CO Control Technology for Turbines**

The control technologies were evaluated considering control effectiveness, expected emission rate, expected emission reduction, energy impacts, environmental impacts, economic impacts, and the limited number of hours of operation (2,000 hours per turbine). For this project, consisting of three stationary gas turbines operating in simple cycle mode for generation of electrical power during peak electricity demand periods and considering the 2,000 hours per year per turbine operational limitation, a CO emission limit of 25 ppmvd when corrected to 15% oxygen on a dry basis using combustion control is considered BACT. This limitation is based on a three-hour rolling average, and is not applicable during periods of start-up and shutdown.

### **Selection of CO Control Technology for Gas Heater**

The RBLC does not list gas heater BACT determinations for control of CO emissions from gas heaters, however, one control vendor has indicated that a CO catalyst system may be used on a gas heater this size. The CO catalyst system is an add-on control that converts CO to CO<sub>2</sub> by use of a catalyst. The system is further described in the Oxidation Catalysts section above. On an annual basis, only 3.2 tons per year of CO would be removed at a cost of close to \$12,700 per ton. This cost is considered to be economically unfeasible, therefore, add-on controls for CO emissions from the gas heater are not considered BACT. BACT for CO emissions from the gas heater is good combustion practices.

### **Selection of CO Control Technology for Emergency Diesel Fire Pump**

The RBLC does not list CO add-on controls for emergency engines of this size. CO catalyst systems are available from vendors, however. A discussion of CO catalyst systems can be found in the Oxidation Catalysts section above. Because only 0.019 tons of CO would be removed, the cost per ton is over \$756,000. These costs are considered economically infeasible, therefore, add-on controls for the emergency diesel fire pump are not considered for BACT. BACT for the fire pump is good combustion practices.

### **PM<sub>10</sub> Control Technology**

The conditioned potential emissions of PM<sub>10</sub> resulting from the project permitted herein are significant (i.e. greater than 15.0 tons per year). Therefore, a BACT analysis is required for this pollutant.

PM<sub>10</sub> emissions resulting from the combustion of natural gas are due to oxidation of sulfur contained in the fuel. Due to its low ash and sulfur content, natural gas combustion generates inherently low PM<sub>10</sub> emissions. Available technologies used for controlling PM<sub>10</sub> are centrifugal (cyclone) collectors, electrostatic precipitators, wet scrubbers, and fabric filters (baghouse).

While all of these post-process technologies would be technically feasible for controlling PM<sub>10</sub> emissions from combustion turbines, none of the previously described control equipment has been applied to combustion turbines exclusively burning natural gas since exhaust gas PM concentrations are inherently low. Combustion turbines operate with a significant amount of excess air that generates large exhaust gas flow rates. Aquila's combustion turbines will generate low PM emissions in comparison to other fuels due to the low ash and sulfur content of natural gas. Exhaust stream PM<sub>10</sub> concentrations of such low magnitude are not amenable to control using available technologies since removal efficiencies would be unreasonably low and cost excessive. Along the same vein, units as small as the gas heater and emergency fire pump are not designed. Because post-process stack controls for PM/PM<sub>10</sub> are not economical for combustion turbines used exclusively in simple cycle peaking service, it was determined that BACT for PM<sub>10</sub> is the use of good combustion practices for all equipment permitted in this project.

Aquila submitted a refined modeling analysis that estimates the ambient impact of NO<sub>x</sub>, CO, PM<sub>10</sub>, and formaldehyde. This analysis was performed with the Industrial Source Complex Short Term (ISCST3) dispersion model. This is an EPA approved model that is appropriate for the refined modeling required for major source review.

Emissions are generated from three combustion turbines, the natural gas heater, and the emergency diesel fire pump. The emission rate from the turbine stack will depend on the mode of operation. The turbines were modeled for operation at the ambient temperature, which corresponds to the maximum emission rate at 75%, 85%, and 100% loads. The maximum emission rate for each load occurs at an ambient temperature of 0.0°F. The following tables contain the release parameters and the emissions rates for emission points from Aquila that were considered in the modeling.

Table 4: Aquila Modeled Stack Parameters

Unit	Source ID	Operating Loads	Stack Height (ft)	Stack Diameter (ft)	Stack Temperature (K)*	Stack Exit Velocity (ft/s)*
Turbine Number 1	EP-01	100%	55	24	786 (766)	58.1 (56.6)
		85%			745 (725)	51.8 (50.5)
		75%			727 (708)	47.7 (46.5)
Turbine Number 2	EP-02	100%	55	24	786	58.1
		85%			745	51.8
		75%			727	47.7
Turbine Number 3	EP-03	100%	55	24	786	58.1
		85%			745	51.8
		75%			727	47.7
Gas Heater	EP-04	100%	43	2.5	616	31.7
Fire Pump	EP-05	100%	17	0.5	804	0.33**

\*Temperature and exit velocity of Turbine 1 are less when wastewater is injected.

\*\*Rain cap on end of stack.

Table 5: Aquila Modeled Emission Rates

Unit	Operating Loads	CO	NO <sub>x</sub> (Note 1)	PM <sub>10</sub>	Formaldehyde
		(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)
Turbine Number 1	100%	82.70	18.61	All Loads 10.00 (15.25)	1.03
	85%	71.00	15.96		0.88
	75%	63.00	14.16		0.79
Turbine Number 2	100%	82.70	18.61	All Loads 10.00	1.03
	85%	71.00	15.96		0.88
	75%	63.00	14.16		0.79
Turbine Number 3	100%	82.70	18.61	All Loads 10.00	1.03
	85%	71.00	15.96		0.88
	75%	63.00	14.16		0.79
Gas Heater	100%	0.80	0.31	0.07	7.21x10 <sup>-4</sup>
Fire Pump	100%	0.17	2.06	0.04	3.67x10 <sup>-5</sup>

Note 1: Emission rate based on 2,000 hours of operation per year per turbine, 6,000 hours per year for the gas heater and 250 hours per year for the fire pump.

Note 2: Emission rate in parenthesis indicates use of wastewater injection.

In each case considered in the modeling, the significance levels were not exceeded for

NO<sub>x</sub>, CO, or PM<sub>10</sub>. The modeling also demonstrated that the 24-hour and annual Risk Assessment Level (RAL) for formaldehyde would not be exceeded. For the criteria pollutants (NO<sub>x</sub>, CO, PM<sub>10</sub>), the significance level is the trigger point for an increment consumption analysis and an overall ambient impact analysis. The demonstration that the significance levels are not exceeded is the only modeling requirement for this review. The insignificant modeled impacts also eliminate the need for pre-construction monitoring for NO<sub>x</sub>, CO, or PM<sub>10</sub>.

Upon further internal review, the Special Conditions contained in this permit were revised as described below to more accurately represent the data used in the modeling analysis. Load-based limits for the turbines were found to be redundant, when coupled with a concentration-based limit and an hourly limit. The pound per hour emission limitations that were part of the draft permit have been removed to minimize record keeping while preserving a cap on emissions. The hourly limits, paired with the concentration limits, insures that the annual emissions shall not exceed the level that was used in the ambient air quality analysis. The emissions used in the modeling analysis assumed the 15 ppmvd for NO<sub>x</sub> and 25 ppmvd for CO at base load, providing the worst-case scenario. Finally, the CO concentration limitation has been revised from a three hour to a one hour rolling average to insure that the hourly CO standards are not violated.

Additionally, a condition was added limiting the emergency fire pump to a maximum of 250 hours of operation in any consecutive 12-month period. No annual emission limits were placed on the fire pump or the gas heater, however, for NO<sub>x</sub>, CO or PM<sub>10</sub>. Both the hourly and annual potential emission rates are relatively insignificant in comparison to the turbines. Additional limits and record keeping would be burdensome and provide no additional benefit to the environment.

The following table lists the maximum modeled impact as well as the significance level or RAL for NO<sub>x</sub>, CO, PM<sub>10</sub> and formaldehyde in units of micrograms per cubic meter (µg/m<sup>3</sup>). For a detailed description of the modeling analysis, along with a discussion of additional impact analyses conducted, please see the attached memorandum, *Revised Aquila – Cass County Air Dispersion Modeling*, dated October 19, 2004.

Table 6: Maximum Modeled Concentrations

Pollutant	Maximum Modeled Impact (µg/m <sup>3</sup> )	Significance Level/RAL (µg/m <sup>3</sup> )	Time Period
NO <sub>x</sub>	0.39	1.0	Annual
CO	76.34	2,000	1-hour
	24.83	500	8-hour
PM <sub>10</sub>	2.59	5.0	24-hour
	0.05	1.0	Annual
Formaldehyde (CAS Number: 50-00-0)	0.024	0.8	24-hour
	0.0005	0.08	Annual

On the basis of this review conducted in accordance with Section (8), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, I recommend this permit be granted with special conditions.

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Lina Klein  
Environmental Engineer

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Date

#### PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated March 26, 2004, received March 29, 2004, designating Aquila, 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 March 1, 2004.
- Stack tests submitted along with the application, dated March 26, 2004.
- Notification of facility name change, dated April 13, 2004.
- Revised permit application for new site, received September 13, 2004.

## ATTACHMENT A: Operational Schedule of the Three Siemens-Westinghouse Model 501D5A Turbines

South Harper Peaking Facility  
 Cass County, S29/32, T45N, R32W  
 Installation ID Number: 037-0063  
 Project Number: 2004-03-143  
 Permit Number: \_\_\_\_\_

This sheet covers the period from \_\_\_\_\_ to \_\_\_\_\_.  
 (month/year) (month/year)

**Copy this sheet as needed.**

Hours that Aquila is Producing Electricity = Electricity Hours		
A. Total Electricity Hours for this Month	(Note 1)	
B. 12-Month Total Electricity Hours From Previous Month's Worksheet	(Note 2)	
C. Monthly Total Electricity Hours From Previous Year's Worksheet	(Note 3)	
D. Current 12-Month Total Electricity Hours	(Note 4)	

- Note 1: Total number of hours that this installation had any of the three or combination of the three turbines (Emission Points EP-01, EP-02, EP-03) connected to the utility grid by closure of the generator breaker.
- Note 2: Running 12-month total of electricity hours from previous month's worksheet.
- Note 3: Electricity hours reported for this month in the last calendar year.
- Note 4: Amount reported in Note 2 minus amount reported in Note 3 plus amount reported in Note 1 ( $D = B - C + A$ ). Less than 5,000 hours indicates compliance.

## ATTACHMENT B: Individual Turbine Operational Schedule

South Harper Peaking Facility  
 Cass County, S29/32, T45N, R32W  
 Installation ID Number: 037-0063  
 Project Number: 2004-03-143  
 Permit Number: \_\_\_\_\_

This sheet covers the period from \_\_\_\_\_ to \_\_\_\_\_.  
 (month/year) (month/year)

This sheet is for Turbine Emission Point EP-\_\_\_\_\_

**Copy this sheet as needed.**

Hours that a Turbine is Burning Natural Gas = Unit Gas Hours		
A. Total Unit Gas Hours for this Month	(Note 1)	
B. 12-Month Total Unit Gas Hours From Previous Month's Worksheet	(Note 2)	
C. Monthly Total Unit Gas Hours From Previous Year's Worksheet	(Note 3)	
D. Current 12-Month Total Unit Gas Hours	(Note 4)	

- Note 1: Total number of hours that this turbine was burning natural gas for this month (unit gas hours).  
 Note 2: Running 12-month total of unit gas hours from previous month's worksheet.  
 Note 3: Unit gas hours reported for this month in the last calendar year.  
 Note 4: Amount reported in Note 2 minus amount reported in Note 3 plus amount reported in Note 1. ( $D = B - C + A$ )  
 Less than 2,000 hours indicates compliance.

## ATTACHMENT C: Gas Heater Operational Schedule

South Harper Peaking Facility  
Cass County, S29/32, T45N, R32W  
Installation ID Number: 037-0063  
Project Number: 2004-03-143  
Permit Number: \_\_\_\_\_

This sheet covers the period from \_\_\_\_\_ to \_\_\_\_\_.  
(month/year) (month/year)

This sheet is for Turbine Emission Point EP-\_\_\_\_\_

**Copy this sheet as needed.**

A. Total Hours of Operation for this Month	(Note 1)	
B. 12-Month Total Hours of Operation From Previous Month's Worksheet	(Note 2)	
C. Monthly Total Hours of Operation From Previous Year's Worksheet	(Note 3)	
D. Current 12-Month Total Hours of Operation	(Note 4)	

Note 1: Total number of hours that the gas heater was operating for this month.

Note 2: Running 12-month total of operational hours from previous month's worksheet.

Note 3: Hours of operation reported for this month in the last calendar year.

Note 4: Amount reported in Note 2 minus amount reported in Note 3 plus amount reported in Note 1. ( $D = B - C + A$ )

Less than 6,000 hours indicates compliance.

## ATTACHMENT D: Fire Pump Operational Schedule

South Harper Peaking Facility  
 Cass County, S29/32, T45N, R32W  
 Installation ID Number: 037-0063  
 Project Number: 2004-03-143  
 Permit Number: \_\_\_\_\_

This sheet covers the period from \_\_\_\_\_ to \_\_\_\_\_.  
 (month/year) (month/year)

This sheet is for Emission Point EP-\_\_\_\_\_

**Copy this sheet as needed.**

A. Total Hours of Operation for this Month	(Note 1)	
B. 12-Month Total Hours of Operation From Previous Month's Worksheet	(Note 2)	
C. Monthly Total Hours of Operation From Previous Year's Worksheet	(Note 3)	
D. Current 12-Month Total Hours of Operation	(Note 4)	

Note 1: Total number of hours that the fire pump was operating for this month.

Note 2: Running 12-month total of operational hours from previous month's worksheet.

Note 3: Hours of operation reported for this month in the last calendar year.

Note 4: Amount reported in Note 2 minus amount reported in Note 3 plus amount reported in Note 1. ( $D = B - C + A$ )

Less than 250 hours indicates compliance.

Mr. Block Andrews  
Director of Environmental Services  
Aquila, Incorporated  
20 West 9<sup>th</sup> Street  
Kansas City, MO 64105

RE: New Source Review Permit - Project Number: 2004-03-143

Dear Mr. Andrews:

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 Part 70 Operating Permit Application 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 the Department of Natural Resources' Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102.

Thank you,

**AIR POLLUTION CONTROL PROGRAM**

Kendall B. Hale  
New Source Review Unit Chief

KLM:lkb

Enclosures

c: Kansas City Regional Office  
PAMS File: 2004-03-143

Permit Number:

MISSOURI DEPARTMENT OF NATURAL RESOURCES  
FOLDER TRANSMITTAL ROUTING SHEET

Document #:  
Division Log #:  
Program Log #:

**DEADLINE:** **Penalty for Missing Deadline: \$**

South Harper Peaking Facility

2004-03-143

Originator: Lina Klein

Telephone: 6-3835

Date: December 27,  
2004

Typist: Linda

File Name: P:\APCP\Permits\Users\Lina Klein\PSD\Aquila\2004-03-143 Aquila Final permit.doc

**FOR SIGNATURE APPROVAL OF:**

DNR Director     DNR Deputy Director     Division Director     Division Deputy Director    X Other: Leanne Tippett Mosby

**PROGRAM APPROVAL:** Approved by: \_\_\_\_\_ Program: APCP Date: \_\_\_\_\_

Other Program Approval (Section/Unit): \_\_\_\_\_ Date: \_\_\_\_\_

Comments:

**ROUTE TO:**

**DIVISION DIRECTOR APPROVAL:** \_\_\_\_\_ Date: \_\_\_\_\_

Comments:

**FINANCIAL REVIEW – DIVISION OF ADMINSTRATIVE SUPPORT:**  
DAS Director: \_\_\_\_\_ Date: \_\_\_\_\_

**Fee Worksheet Received By:** \_\_\_\_\_ Date: \_\_\_\_\_

Accounting: \_\_\_\_\_ Date: \_\_\_\_\_

Budget: \_\_\_\_\_ Date: \_\_\_\_\_

General Services: \_\_\_\_\_ Date: \_\_\_\_\_

Internal Audit: \_\_\_\_\_ Date: \_\_\_\_\_

Purchasing: \_\_\_\_\_ Date: \_\_\_\_\_

Comments:

**LEGAL REVIEW:**  
 General Counsel: \_\_\_\_\_ Date: \_\_\_\_\_

AGO: \_\_\_\_\_ Date: \_\_\_\_\_

Comments:

**DEPARTMENT DIRECTOR APPROVAL:** \_\_\_\_\_ Date: \_\_\_\_\_

Comments:

**NOTARIZATION NEEDED**

INITIALS/DATE

## **Comments and Responses on Aquila's Prevention of Significant Deterioration New Source Review Permit Application**

This document responds to comments made to the PSD draft permit. Comments have been summarized or paraphrased for the sake of clarity. The numbers of Special Conditions in the comments may have changed. The numbers referenced in the response reflect the final Special Condition numbering.

**The following comments were submitted to the Air Pollution Control Program by the Environmental Protection Agency (EPA).**

### **Topic No.1: PM<sub>10</sub> Test Methods**

#### **Comment:**

The PM<sub>10</sub> test method proposed in Conditions 3.E.3 does not measure PM<sub>10</sub>, so would not confirm whether the PM<sub>10</sub> BACT limit proposed in Condition 2.E. is being met or not. To assure compliance with the PM<sub>10</sub> limit, we recommend use of the appropriate methods, which would be Reference Methods 201 or 201a for the filterable PM<sub>10</sub> fraction and Reference Method 202 for the condensable PM<sub>10</sub> fraction. Taken together, these two fractions represent the total PM<sub>10</sub> emissions.

*Air Pollution Control Program's Response:* The Department agrees with the comment. References to specific test methods have been eliminated in the permit for PM<sub>10</sub>, as well as NO<sub>x</sub>, CO and formaldehyde. Appropriate test methods will be determined jointly by Aquila and the Compliance Section of the APCP prior to any stack testing.

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### **Topic No. 2: BACT for Non-Turbine Equipment**

#### **Comment:**

Once a project is "major" for PSD applicability, all equipment associated with the project must minimize its emissions through a BACT emission limitation; irrespective of whether an individual unit emits below the significance thresholds or not. If it is not possible to establish numerical emission limitations for the non-turbine equipment, then the Department may establish a work practice standard for each. The revised application investigates BACT controls for the non-turbine equipment and concludes that all are cost prohibitive. But the application is silent on what level of emissions constitute BACT. If the Department agrees that add-on control technology is not economically or technically available, it should document its decision as part of the written permit record. Further, the Department should establish NO<sub>x</sub>, CO, and PM<sub>10</sub> BACT emission limitations for the natural gas heater and emergency fire suppressant engine, or in absence of a limit the appropriate work practice standards.

*Air Pollution Control Program's Response:* The Department agrees with the comment. Discussion of BACT for the emergency fire pump and gas heater have been incorporated into the permit.

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**Topic No. 3: Redundancy of Part 60 and Part 75 Requirements**

*Comment:*

Condition 4.A. requires Aquila to install a NO<sub>x</sub> and O<sub>2</sub> CEMS to verify compliance with the NO<sub>x</sub> BACT limit. We support this requirement. However, Conditions 4.C. and 4.D. require Aquila to simultaneously demonstrate that they meet the installation, operation, certification, and quality assurance requirements for both Parts 60 (NSPS) and 75 (Acid Rain). Since it is likely that NO<sub>x</sub> CEMS will be required for these units under the acid rain program and the units will have to meet the Part 75 requirements in full, it may cause less confusion if the Part 60 CEMS requirements are dropped altogether. Further, even though we agree that MDNR may require the use of Appendix F quality assurance procedures as a condition of the PSD permit, despite the CEMS not being “direct compliance” monitors under NSPS, the cleaner way to assure that the monitor provides quality assured data, using one set of procedures, is to defer to the Part 75 requirements.

*Air Pollution Control Program's Response:* The Department agrees. The Part 60 requirements have been removed from the permit.

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**Topic No. 4: VOC and Formaldehyde Emissions**

*Comment:*

Even though the permit limits the number of hours of operation for each turbine, which indirectly limits VOC and formaldehyde emissions below 40 and 10 tons per year, respectively, it is possible that higher site specific emission factors could put emissions over their respective thresholds. To ensure that these thresholds are protected, the permit should establish “hard” caps for these pollutants to assure they do not exceed their respective review thresholds. Further, the permit should explicitly require development of a VOC emission factor, in addition to the formaldehyde factor required in Condition 3.B., to verify that the hard caps are met. Lastly, so that there is no confusion about how these caps are to be met, we recommend that the PSD permit include explicit mass balance equations for each pollutant or sample worksheets showing how the calculations are to be made. Past PSD permits issued by the Department provide good examples of how such accounting is to be performed. In the absence of clear instructions, the enforceability of such caps may be called into question and may not be appropriate for limiting these pollutants out of PSD or 112(g) review.

*Air Pollution Control Program's Response:* The Department respectfully disagrees with EPA's proposed development of a VOC emission factor.

The number of hours that the turbines can operate is specifically limited in the Special Conditions. Indirectly conditioned potential VOC emissions would need to increase by more than 225% to exceed the de minimis threshold for VOC (40 tons per year). Additional testing requirements are not justified in the Department's view.

Along the same vein, a hard cap on emissions is unnecessary for formaldehyde. The installation will perform stack testing to validate the emission factor used in the review. Special Condition 3.B has been revised and now includes a requirement to submit revised modeling results to the Department should the stack testing show the emission factor is not valid.

Since no hard caps are included for either VOC or formaldehyde in this permit, no recordkeeping sheets are needed.

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**Topic No. 5: Emissions During Startup and Shutdown**

**Comment:**

Based on a comprehensive review of NO<sub>x</sub> CEMS data for Siemens-Westinghouse 501D5A turbines located in New Mexico and Texas, it appears the NO<sub>x</sub> BACT level selected for the South Harper project is consistent with the emission levels achieved in practice. These data, however, indicate that a significant portion of the total NO<sub>x</sub> emissions from these types of turbines occur during off-peak load periods; in particular for units that appear to operate in peaking mode. In fact, as much as 14 to 18% of the total emissions from the turbines appear to occur at loads less than 70% -- which corresponds closely with the 75% level defined by the permit as normal load (e.g. excluding startup and shutdown periods). The draft permit makes no provision for limiting NO<sub>x</sub> emissions during these off-peak load periods; either by specifying a separate BACT limit during startup and shutdown or by otherwise minimizing the number and duration of startup and shutdown events. Based on EPA case law like that found in the Tockgen EAB decision and other EPA guidance which make clear the permit record must evaluate BACT for all periods of operation, we recommend that the Department carefully reconsider its options for establishing a secondary BACT limit or other enforceable conditions to minimize the emissions during startup and shutdown periods.

**Aquila's Response:** Aquila wishes to comment on the South Harper Prevention of Significant Permit (PSD) public letter from the Environmental Protection Agency (EPA) dated Nov. 19, 2004, question #5.

The combustion turbine emissions have been segregated into either steady state operations (loads 75% or greater) or transient conditions (startup/shutdown). The steady state conditions limits have been well

defined and regulated in the permit; however, EPA is requesting additional limitations on startup/shutdown.

Unlike steady state operations, emissions during startup/shutdown are not controllable with current technologies, and for this reason, the equipment manufacturer cannot and will not guarantee an emissions limitation during these transient conditions. However, the facility is subject to an annual emissions cap defined in the current DRAFT permit that includes startup/shutdown emissions.

Operator control of modern, microprocessor controlled gas turbine combustion systems is highly automated in order to maximize protection of the equipment and to minimize fuel consumption and emissions. Once a "Start" signal is provided to the turbine control system by the Operator, the functions of a) initial systems readiness diagnostic testing and safety interlock arming, b) initial acceleration of the rotor train to firing speed, c) hold at firing speed for gas path purge, d) initial firing with timed acceleration and controlled heat soak to "full speed, no load", e) automatic synchronization to the utility grid, f) automatic generator voltage regulation and breaker closure, f) automatic and timed load ramp-up to the minimum load set point are performed WITHOUT OPERATOR INTERVENTION. A similar automatic sequence of events occurs when a "shut down" signal is initiated by the Operator. Full load and partial load "trips" at anytime are also automatically controlled without Operator intervention by the turbine combustion control system.

The "normal" expected duration, to or from BASE LOAD, of a startup or shutdown event for the Siemens Westinghouse 501D5A gas turbine is about 40 minutes. In order to allow some contingency for unplanned events during the normal sequence, the permitted duration of a "normal" startup or shutdown event for this gas turbine should be a minimum of 60 minutes.

Further, from an investment and operations standpoint, Aquila proactively seeks to minimize the time spent on startup/shutdown in order to minimize fuel consumption cost during this inefficient mode of operation. Each startup/shutdown event costs Aquila approximately \$11,500 including the cost of one hour of fuel at BASE LOAD. The wear and tear on the equipment during startup/shutdown is 35 times greater than during steady state operations and has a major impact to the long-term cost of operations. Further, during startup, the turbine has about one-half the efficiency of steady state operations.

Aquila operates simple cycle combustion turbines in other states that have permits with startup/shutdown provisions. For example, the language

below is a startup/shutdown provision derived from Aquila's Illinois permits, which would be acceptable to Aquila.

The Permittee has affirmatively demonstrated that all reasonable efforts have been made to minimize startup/shutdown emissions, duration of individual startup/shutdown events, and the frequency of startup/shutdown events. This authorization is subject to the following:

- i. This authorization extends for a period of up to 60 minutes following initial firing of fuel for each startup event.
- ii. The Permittee shall take the following measures to minimize emissions resulting from startup/shutdown, the duration of startup/shutdown, and minimize the frequency of startup/shutdown:
  - A. Operating in accordance with the manufacturer's written operating and startup procedures, including a pre-check of the unit, or other written procedures developed and maintained by the Permittee so as to minimize the duration of startup/shutdown and emissions associated with startup/shutdown. These procedures should allow for review of operating parameters of the unit during startup, or shutdown as necessary to make adjustments to reduce or eliminate excess emissions.
  - B. Maintaining units in accordance with written procedures developed and maintained by the Permittee so as to minimize the duration of startup/shutdown and the frequency of startup/shutdown. These maintenance practices shall include maintenance activities before the unit is started up, when the unit is in operation, and when the unit is shut down.
  - C. The procedures described above shall be reviewed at least annually to make necessary adjustments and shall be made available to MDNR upon request.

Aquila believes that its investment and operational interests in the turbines combined with the annual emissions limit in the current DRAFT permit satisfies applicable emissions requirements and regulatory control. In the interests of cooperation, however, Aquila is willing to accept the language listed above to further ensure emissions during startup/shutdown are minimized.

*Air Pollution Control Program's Response:* The Department agrees with EPA's comment. The Special Conditions have been amended to include startup and shutdown in the hourly operating limitations. By so doing, the turbines should not exceed the number of hours for which the ambient air quality analysis was conducted. Essentially all NO<sub>x</sub> formed from natural gas combustion is thermal NO<sub>x</sub> and the highest level of thermal NO<sub>x</sub> emissions are expected during high operating loads due to the higher peak temperature in the flame zone. On a pound per hour basis, the

emission limit set in the permit will not be exceeded. Finally, the MDNR concurs with Aquila that there are no current technologies that can be used successfully to control emissions during startup and shutdown. Inclusion of startup and shutdown into the operating hours limitation forces Aquila to perform startup and shutdown procedures as efficiently as possible, thus minimizing emissions.

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**The citizens of the State of Missouri submitted the following comments to the Air Pollution Control Program during the Public Comment period and Public Hearing in either written or verbal format.**

**Topic No. 1: BACT**

**Comment:**

Selective catalytic reduction (SCR) for reduction of NO<sub>x</sub> should be chosen as BACT. The annualized cost should be reviewed for impact on generated electricity cost on a per kilowatt-hour basis. Assigning the annualized cost of \$2.73M/yr to 500 GWhr/yr generated, the cost per kWhr generated is \$0.0055/kWhr, or just over one-half cent per kWhr. Allowing for transmission and distribution losses from the generators to electric customers, the cost of this peak power as delivered to the end customers is less than 1 cent per kWhr.

**Comment:**

Use of an oxidation catalyst as BACT for reduction of CO should not be rejected. Applying 95% removal to 250.33 tons/year, up to 238 tons/year will be removed from the emissions. At a cost of \$8,618 per ton, the annualized cost of CO removal is \$2.05M. Assigning this annualized cost to the 500 Gwhr/yr of production, the cost per kWhr generated is 0.41 cents. The impact on customer bills is a small fraction of a penny per kWhr. CO control is not prohibitive economically, and is therefore within the Federal EPA definition of BACT for this facility, wherever it may be sited.

**Comment:**

APCP's review of Aquila's BACT analysis has the potential to be a gross conflict of interest; decisions on which BACT measures to require of Aquila have a bearing on the Program's funding (in terms of emissions fees). The more tons of emissions released to the atmosphere, the more funding your Program receives. A thorough and objective BACT analysis should be performed by an independent entity.

**Comment:**

There are better pollution controls available. The best pollution control technologies that are available today must be used on this and all plants as the environmentally friendly thing to do. Greater reductions in emissions must be required if the plant is to be anywhere near people.

**Air Pollution Control Program's Response:** The top-down method detailed in the permit and employed by the MDNR in conducting a BACT analysis necessarily uses the definition of cost effectiveness, "control system

annualized cost divided by annual tons of pollutant emissions reduced". By using this definition, comparisons can be made equally between systems and across industries. Therefore, using the cost per kilowatt-hour to determine economic impacts is prohibited by definition. The top-down method is firmly adhered to by EPA in its PSD permits and EPA advocates the method for state-issued permits. By following top-down procedures, any person performing the analysis should reach the same conclusion as to BACT.

Additionally, the top-down approach only requires that all potentially applicable control options be evaluated on a case-by-case basis in terms of each technology's energy, economic and environmental impacts. Lowest Achievable Emission Rate (LAER) technology is considered during the process, but may be eliminated due to the impacts discussed above. LAER is only required during Section (7) reviews for nonattainment pollutants in nonattainment areas.

No action was taken based on these comments.

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## **Topic No. 2: Modeling Issues**

### **Comment:**

In the wind dispersion modeling, Aquila states that there are no other buildings in the area.

*Air Pollution Control Program's Response:* As with all projects of this type the APCP has instructed Aquila to include all buildings that could have downwash effects on the plume in the modeling analysis. If there is any additional building that meets the criteria laid out in "Guideline for Determination of Good Engineering Practice Stack Height" document, it must be included in the downwash analysis. However, if the buildings are residential or commercial that are not close to the stacks and not tall, they would not impact the modeling results.

If the above comment is meant to compare the number of buildings in the old and new proposed sites, the APCP has asked Aquila to provide a characterization of the area surrounding the site for the purpose of determining whether the area should be modeled as urban or rural. According to our review of the document, the area surrounding the site is rural.

### **Comment:**

A statement in the revised permit application's cover letter, dated Sept. 7, 2004, states that the new site near Peculiar has 'less air quality impacts compared to the Camp Branch site'.

*Air Pollution Control Program's Response:* The modeling results for the new site near Peculiar predicted less air quality impacts from all pollutants (CO, NO<sub>x</sub>, PM<sub>10</sub>, & Formaldehyde) than the Camp Branch site. This is mainly due to the reduction in annual operating hours per turbine to 2000 from 2500, the limit of operation of the gas heater to 6000 from 8760 hours, and raising the gas heater's and turbines' stack heights to 43 from 25 feet and to 55 from 50 feet, respectively.

In any case, if the project's modeled air quality impact is less than the modeling significance levels, no additional analysis is required. This is the case with modeling impacts at both sites.

No action was taken based on this comment.

*Comment:*

There are missing tables in the review document from the MDNR AQAS unit on Aquila's Revised Air Dispersion Modeling submittal.

*Air Pollution Control Program's Response:* All modeling pertaining to the modeling analysis review have been included in both the memorandum and the site's construction permit application.

No action was taken based on this comment.

*Comment:*

The Air Dispersion model that Aquila has run does not account for the cumulative effects of the La Cygne plant emissions and those that will emanate from its own facility. Similar to an assessment of the KC metropolitan attainment standards and PSD, the total accumulation of HAPs that receptors will be exposed to must be figured into Aquila's Air Dispersion model for this facility. This inaccuracy of the model input parameters dictates that Aquila submit a revised Air Dispersion model and that it be available for review to the general public for thirty days.

*Air Pollution Control Program's Response:* In accordance with the current air quality modeling guidelines described in 40 CFR Part 51, Appendix W, "The Guideline on Air Quality Models" and the New Source Review Workshop Manual, a facility must submit an air quality analysis for each pollutant it proposes to emit in excess of the *De Minimis* emission levels outlined in 10 CSR 10-6.020(3)(A) Table 1. If the dispersion model demonstrates that each pollutant does not exceed its Modeling Significance Levels (MSL), then additional modeling evaluation (NAAQS or Increment) for that pollutant is not required. Therefore, under the MSL evaluation, a facility is not required to account for cumulative effects of other facilities.

A Risk Assessment Level (RAL) compliance demonstration is required for each hazardous air pollutant (HAP) exceeding the modeling threshold. Under current Air Pollution Control guidelines, a facility must submit an air quality analysis for all emission points within a facility when a refined analysis is required. This requirement was introduced to ensure that the applicable RAL is not violated near a facility since background concentrations are not a required component of a refined HAPs analysis. Background concentrations are not currently required because they are virtually unknown for most HAPs, thereby, making a background assessment impossible.

No action was taken based on this comment.

Comment:

The potential emissions in Table 1 of the “Emissions/Controls Evaluation” section of the draft permit represent the emission rate at 100% loading and ambient conditions of 0.0°F. We call into question the input parameters used in the Air Dispersion model. It is rarely 0°F in the summer when this plant will be operational.

Air Pollution Control Program’s Response: Modeling analysis for Aquila was conducted at three loads (100%, 85% & 75%). The worst emission rates take place at 0.0°F and the worst flow rate takes place at 95°F. Aquila used the combination of these three parameters to demonstrate compliance with the modeling significance levels. According to attachment B2 in the construction permit application, Aquila is expected to have less emission rates at 95°F than at 0.0°F. Therefore, Aquila utilized the worst case emission rates and worst case stack parameters for the modeling evaluation.

No action was taken based on this comment.

Comment:

Why are data files from KC International Airport and Topeka Municipal Airport being used for input into this model? The National Weather Service office in Pleasant Hill, MO is significantly closer to the project site and data from this site is more pertinent.

Air Pollution Control Program’s Response: Under PSD guidance, the first preference of meteorological data is one year of in site data. If in site data is not available, five years of the most recent surface and upper meteorological data from a representative national weather service can be used. The data from KCI (surface) and Topeka (upper air) were most recent and have been quality checked. Five years of data are utilized in order to ensure that a comprehensive meteorological evaluation is conducted for the project. The differences in the KCI surface data vs.

Pleasant Hill would likely not be meaningful over such a long period of time.

No action was taken based on this comment.

Comment:

On Page 11, Paragraph 2 of the South Harper Peaking Facility's modeling memorandum it states "If the plume is dispersed due to convective activity, it is unlikely that any discoloration of the atmosphere will be visible." What if it is not dispersed by convective activity? Factor in the already discolored air coming up from the La Cygne power plant to the southwest, the stagnant summer atmosphere and Aquila's Class I visibility study results attached to this memorandum (where screening criteria are frequently exceeded), and we find it difficult to believe that discoloration of the atmosphere will not be visible.

Air Pollution Control Program's Response: The result of the VISCREEN Level II showed that the screening criteria were exceeded. The APCP has recommended that in order to improve the class II visibility results, a more refined analysis that incorporates particle size distributions, plume overlap, and different geometries is needed. The EPA guidance on the evaluation of plume visual impact does not suggest evaluating other sources such as La Cygne with the proposed source. The APCP understands that discoloration of the atmosphere could emanate from Aquila's stacks. However, It is important to note that the additional impact analyses are for information purposes only. The APCP can not deny a permit based upon the additional impact analyses alone.

No action was taken based on this comment.

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**Topic No. 3: Startup and Shutdown**

Comment:

There are no restrictions or hourly operational limits on Aquila's three natural gas fired turbines and gas heater during startup and shutdown phases. On Page 8 of the Draft Permit, Note 1 defines "startup and shutdown" as "periods of time that a gas turbine is operated at a load level less than 75%." Although Special Condition 1.E. in the Draft Permit attempts to dictate the load level at which the turbines may be run, it fails to do so. Hypothetically, the turbines, based on the operational conditions set forth by the APCP, could run year round at 70%. The language in the Draft Permit that allows this possibility is completely unacceptable and needs to be revised.

Air Pollution Control Program's Response: Please refer to similar comment concerning startup and shutdown under Topic No. 5 of EPA's comments. The Special Conditions have been amended to include startup and shutdown in the operating hours limitation.

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**Topic No. 4: Health Effects****Comment:**

The EPA assumes that there are no exposures to carcinogens that have zero risk. Even if the risk of cancer or other illness is only increased 'slightly', it is a risk we must not take.

**Comment:**

We have been told that all of these chemicals (formaldehyde, acrolein, CO, NO<sub>x</sub>, PAH, benzene, etc.) are expected to be emitted at low safe levels by the current safety standards. However, what are the safety levels when all of these chemicals are combined and emitted into the environment chronically and for long term? What kind of health impacts can we expect?

**Comment:**

Scientific studies have shown that PM<sub>2.5</sub> is related to significant health problems. More thorough consideration should be given in the review of Aquila in the area of PM<sub>2.5</sub>.

**Air Pollution Control Program's Response:** The Department agrees with EPA's assumption concerning the risk associated with carcinogens. However, current regulations clearly state the authority the MDNR has in regards to its permit decisions with regard to PM<sub>10</sub>, SO<sub>x</sub>, NO<sub>x</sub>, VOC, CO, lead, as well as specific, regulated hazardous air pollutants (HAPs), some which are probable human carcinogens. Modeling of criteria pollutants, in addition to formaldehyde, whose potential emissions exceed established threshold levels has occurred during this review. The results are within levels currently considered acceptable. There is no State regulation that addresses PM<sub>2.5</sub> at this time.

No action was taken based on this comment.

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**Topic No. 5: Ozone Production****Comment:**

Emissions from proposed site would be carried by the prevailing winds directly into Peculiar, Raymore and then Kansas City. The Kansas City metro area has been on the verge of losing its clean air status by the federal government due to high ozone levels at ground level most of the previous five summers.

**Air Pollution Control Program's Response:** The Kansas City metro area is an attainment area for ozone. Aquila will not emit more than 246.13 tons of NO<sub>x</sub> per year. The APCP believes that the contribution to the formation of ozone in Kansas City metro area from Aquila would be minimal given the relatively small quantity of NO<sub>x</sub> it would emit.

No action was taken based on this comment.

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**Topic No. 6: Formaldehyde**

**Comment:**

Why would APCP allow the elimination of compliance testing for formaldehyde in the event of de-listed NESHAP regulations? Wouldn't it be more prudent to continue to require the facility to demonstrate and comply with more stringent regulatory criteria? The review summary states that 10 CSR 10-6.060(9) 'is not applicable to this project since the conditions of this permit limit the formaldehyde emissions to a de minimis level and require emission testing as verification.' However, compliance testing for formaldehyde will not be required if formaldehyde is de-listed from NESHAP regulations. Wouldn't this very fact make the specified chapter of the Code of State regulations then applicable? The permit seems to contradict itself on this issue.

**Air Pollution Control Program's Response:** Please refer to the response to EPA's comment on Topic No. 4 concerning VOC and formaldehyde emissions. The Department agrees that testing for a formaldehyde emission factor is necessary and has revised the Special Condition. In addition, a revised modeling analysis will be required if testing shows that the emission factor used in the review is not valid.

The Department wishes to clarify that the NESHAP for combustion turbines is not currently applicable to the installation since potential emissions of HAP from the installation are below the 10/25 ton per year level for NESHAP applicability. References to the NESHAP in the permit have been revised to account for this change. Since the NESHAP does not apply, the Department does not have the authority to require its limits upon this installation.

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**Topic No. 7: Transmission Loss and Lines**

**Comment:**

The plant should be built in the area that needs power to reduce the transmission loss. This would result in reduced number of operating hours which equals less pollution introduced into the environment.

**Air Pollution Control Program's Response:** The Department does not possess the authority to dictate the location of any installation. Rather, the permit review assesses the ambient impact at the chosen location.

No action was taken based on this comment.

**Comment:**

The suspended lines will be a risk to people. An extensive study conducted by the CA Dept. of Health Sciences has concluded electromagnetic fields (EMFs)

can increase risk of childhood leukemia, adult brain cancer, Lou Gehrig's Disease, and miscarriage. It is also expected that EMFs increase risk of asthma, headaches, and depression. We can also expect health impacts on our livestock, wildlife, aquatic life, and domestic animals. If Aquila is allowed to proceed, they should be required to bury the high voltage lines rather than increase the negative impact of the EMF associated with the lines.

*Air Pollution Control Program's Response:* The Department is limited in scope to examining the ambient impact of regulated air pollutants. EMFs do not fall within this scope, therefore, the Department has no authority to dictate the burying of transmission lines.

No action was taken based on this comment.

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### **Topic No. 8: Alternative Fuel Usage**

#### Comment:

What is stopping Aquila from converting the plant to another type of fuel if the price of natural gas becomes prohibitive?

*Air Pollution Control Program's Response:* The first condition of the permit prohibits Aquila from burning any other type of fuel in the turbines. It further states that both a BACT analysis and an ambient air quality analysis would need to be revisited. Should the installation choose to burn another fuel without obtaining approval from the Air Pollution Control Program, Aquila would be subject to enforcement action.

No action was taken based on this comment.

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### **Topic No. 9: Compliance**

#### Comment:

How will MDNR monitor Aquila over the next 30 years? How often will they be required to adhere to new regulations in the future? What process must Aquila follow if, at a later date, it decides that it wants to apply for a change in the Special Conditions of this Permit? Or, what must they do if they decide to add additional turbines at this project site?

#### Comment:

I realize that during most of the time it's supposedly not operating. But, to my knowledge, there is nothing that's been legally put down in writing stopping them from going over that 5,000, approximately, operating hours per year, let alone adding an additional three other turbines to that facility.

#### Comment:

Aquila's position concerning Cass County's authority over zoning and permitting force us to question whether, if and when the proposed plant is completed, the

company will be compelled to adhere to all of the requirements stipulated by the PSC or DNR.

Comment:

I question whether Aquila has properly and honestly given all of the pertinent and correct data to the DNR when they applied for a permit.

Air Pollution Control Program's Response: Aquila will have regular site inspections performed by the Kansas City Regional Office. In addition, should the regional office or MDNR receive substantive complaint, the regional office may visit the site in order to investigate. Aquila will need to obtain a Part 70 operating permit from the state within one year of equipment startup that will identify all state and federal air regulations that pertain to the installation. The operating permit must be renewed every five years, and will incorporate any new regulations that apply to the facility at such time. All material included in the application is assumed to be valid. Should Aquila wish to modify their existing equipment or construct new equipment, a construction permit application will be required of the installation. Required recordkeeping must be kept up to date and available at all times. At any time that Aquila does not comply with the restrictions and limitations of their permit(s), or they are found to have included untruths in their application, they will be subject to State and Federal Enforcement action.

No action was taken based on these comments.

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**Topic No. 10: Environmental Impact Statement (EIS)/NEPA/Further Environmental Review**

Comment:

An Environmental Impact Statement (EIS) should be completed prior to permit issuance. MDNR should require Aquila to do further studies to consider the effects on the people, on children and elderly people in particular. MDNR should require a review of the whole environment, including an inventory of the animals and plants in the area and a detailed assessment of the environmental impacts to soils, and require that Aquila address the question of how to not adversely affect these things. The application from Aquila should contain a field determination by the U.S. Fish and Wildlife Service as to whether any Protected or Endangered Species are present in the general vicinity of the project site.

Comment:

The Neighbors respectfully request understanding of and status regarding the additional "Due Diligence Efforts" indicated by Aquila within their presentation to the City of Peculiar. We ask the MDNR or appropriate agencies to investigate the following: Acid Rain Permit, Wetland Delineation review, cultural resources review, NPDES, baseline noise study, Heritage Review Report.

*Air Pollution Control Program's Response:* The completion of an EIS is not a requirement for an applicant seeking a state air construction permit. An EIS is a requirement under the federal National Environmental Policy Act (NEPA). An EIS is required for a major federal action that significantly affects the quality of the human environment. Current state law does not give the Department the authority to require an EIS. Without a state law granting that authority, we can not require an EIS. The Department is obligated to follow Missouri law concerning substantive and procedural requirements. Likewise, the Department is unable to require completion of the additional items listed.

No action was taken based on this comment.

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### **Topic No. 11: Water Pollution**

#### Comment:

How is the water used to cool the turbines dealt with? What happens to the waste and how does it affect the ground water?

*Air Pollution Control Program's Response:* The wastewater-injection that can occur at the installation involves the insertion of drinking water into the turbines to increase combustion process efficiency. The water is cycled twice through the system and then to a tank. From the tank, the water is injected into the turbine stacks. The evaporated portion of the water leaves the stack, along with any entrained particulate matter. The wastewater contains all materials normally found in drinking water in a highly concentrated form. There should be no effect to the ground water in the area.

#### Comment:

We are concerned about the water pollution for the animals, especially the livestock - to the actual meat that there could be – the possibility of the meat being tainted from particulates being deposited in the water.

*Air Pollution Control Program's Response:* The ambient air quality impact analysis contained a segment concerning the effect of the installation on animals, evaluating the impact trace elements have on the dietary systems of animals and when dietary concentrations become toxic. None of the trace elements were found to surpass screening thresholds. No ill effects are expected.

No action was taken based on this comment.

#### Comment:

I have witnessed projects on my mother's property and my aunt's property right now where natural waterways, which I believe you have jurisdiction on, have

been degraded, dug, covered over, restricted, rerouted and to my knowledge, they have not applied to you for any permits in doing such.

*Air Pollution Control Program's Response:* Land moving activities are within the purview of the Water Pollution Control Program. The Department respectfully defers to the appropriate agency.

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**Topic No. 12: Zoning/Bonds**

Comment:

Your agency cannot afford to pass this compliance issue (zoning) onto a lower government and have it completely skirted; that scenario could easily open the door to the State's permit being contested. Missouri Statutes have gaping holes in them and need to be rewritten to address secondary and cumulative environmental issues. Based on conversations with some State regulators regarding applicability of NEPA, it appears to us that MDNR values the safety and well being of plants and animals more so than its citizens.

Comment:

The net financial benefit to Aquila resulting from contemplated tax abatement and Chapter 100 financing has, in our view, not been disclosed sufficiently.

Comment:

The city of Peculiar is trying to issue bonds for Aquila to build the plant when the property is located in Cass County, not Peculiar.

*Air Pollution Control Program's Response:* Bond, zoning and tax abatement issues are beyond the purview of the Department. The Department respectfully defers to the appropriate agencies.

No action was taken based on this comment.

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**Topic No. 13: Wildlife**

Comment:

Local residents have reported to the U.S. Fish and Wildlife Service and Missouri Department of Conservation the frequent sighting, near the project location, of six different Protected Species, including a golden eagle. The MDNR should consider the effects of the pollutants on the animals.

*Air Pollution Control Program's Response:* Please refer to the response to comment on Topic No. 11.

No action was taken based on this comment.

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**Topic No. 14: Noise**

Comment:

The permit should not be issued to Aquila since operation of the equipment will increase noise levels in the area. Its immediate effects on the nervous system of humans and animals are serious; it can cause sleep loss, high blood pressure and increase stress levels of persons exposed. A comprehensive literature search on the effects of continuous low-level noise on the psyche and physical well-being of the 250 households within a two-mile radius of the plant should be conducted.

*Air Pollution Control Program's Response:* Noise pollution is not within the authority of the Department. The Department respectfully defers to the appropriate authorities.

No action was taken based on this comment.

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**Topic No. 15: Visual Effects**

Comment:

It will be unsightly. It will emit a plume. There will be smog. The reports on file with MDNR indicate that the plume will be seen about four miles away. The smokestacks will tower above the trees with a smoke trail that can be seen for miles; it will be out of character to the surrounding area.

*Air Pollution Control Program's Response:* The effect on aesthetics of the physical structures of the installation are not within the purview of the Department. The height of the smokestacks (55 feet) is well within the guidelines. Please refer to response to comment on Topic No. 2 Modeling Issues for additional information.

No action was taken based on this comment.

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**Topic No. 16: Property Values/Proximity of Plant to Rural, Residential Area**

Comment:

I have very strong concerns for the property value of my house. Can Aquila guarantee that I will be able to sell my house? Can Aquila guarantee that I will be able to realize the same value now in 2 years? What about the potential lost future tax revenue for the county from residential development? Why would MDNR even consider a power plant of this type in a residential community?

Comment:

The plant needs to be placed in an industrial zoned area. The MDNR should require that the plant be on a larger tract of land. The Neighbors contend that environmental policy would be better served by locating these turbines at an established generating station in the area. There are four major generating stations located within approximately 50 miles of the center of Aquila's electrical load. Each of these stations have one or more coal-fired units that may need NOx control in the near future to reduce the area-wide and wind-blown NOx

concentrations. Under the Neighbor's alternate established site plan, Aquila's pollution control investment, which the Neighbors' consider to be BACT, could be applied to NOx controls on an existing coal-fired unit. The new turbines could add less NOx than removed by the coal unit pollution controls, reducing the net emissions from the site even with the increased generation. The Neighbors contend that an alternate established generating station site is more consistent with the intent of MDNR and Federal EPA policy.

*Air Pollution Control Program's Response:* The Department reiterates that we do not possess the authority to dictate the location of any installation. The Department respectfully defers to the appropriate authorities.

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**Topic No. 17: Financial Stability of Aquila**

*Comment:*

Their financial situation is questionable. Why are they building anything? Why have they lost money on the Pleasant Hill Plant? Why are they building another plant when that one has not run at capacity since they built it? Why don't they enlarge the ones they have?

*Comment:*

Aquila's recent Form 10-Q filing showed numerous asset sales, including dispositions of interests in power operations and turbines. Asset sales do not seem consistent with an expressed need to have additional power generation capacity by June 2005.

*Air Pollution Control Program's Response:* The Department's authority does not extend to financial matters. The Department is unable to comment.

No action was taken based on this comment.

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**Topic No. 18: Public Notice**

*Comment:*

The Administrative Record is very sparse, incomplete and, at a minimum needs to include design documents that are available for the public to comment upon. These design documents should include, but not be limited to, plans and specifications, diagrams of waste streams, quantities of wastewater to be used in the process, etc. It is also the citizen's right to review noise controls, landscaping, lighting plans, etc. that are included within the Concept Design Plan or other similar architectural and engineering drawings. Aquila's Concept Design Plan has recently been acquired through a Sunshine Request and it is readily apparent that this document should have been included in the Administrative Record at the public library. These omissions from the Record are unacceptable and the comment period needs to be, at a minimum, extended for another thirty days in order to facilitate review by concerned citizens.

*Air Pollution Control Program's Response:* All items required for permit review were included in the original and revised Applications for Authority to Construct from the applicant. The Department does not review noise controls, landscaping, lighting plans, nor Concept Design Plans. These items were not included, nor were they required.

No action was taken based on this comment.

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**Topic No. 19: Infrastructure**

*Comment:*

Besides the peaking station there is a proposed substation on 55 acres to the north just south of 203<sup>rd</sup> Street. There's also a switching station in a residential area that they're talking about condemnation of the property to obtain a lot in the middle of the subdivision. I would like for DNR to look closely and ask Aquila for full disclosure of the complete infrastructure that it's going to take for this power plant.

*Air Pollution Control Program's Response:* The Department views an installation as including all emission sources common to the making of an end product by a company. Were the switching stations air emission sources, they would have been included in the review of this project. Since they do not emit air pollutants, they do not fall within the purview of this Department.

No action was taken based on this comment.

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