

217/782-2113

CONSTRUCTION PERMIT - PSD APPROVAL - NSPS SOURCE

PERMITTEE

Ameren CIPS
Attention: Tom E. Siedhoff
1901 Chouteau Avenue
P.O. Box 66149 MC 602
St. Louis, MO 63166-6149

Application No: 99080101 I.D. No.: 077806AAA
Applicants Designation: GTCCCT Date Received: August 30, 1999
Subject: Grand Tower Power Station - Turbine project
Date Issued: February 25, 2000
Location: 1820 Power Plant road, Grand Tower, Jackson County

Permit is hereby granted to the above-designated Permittee to CONSTRUCT emission source(s) and/or air pollution control equipment consisting of two combustion turbines/heat recovery steam generators with duct burners (CT/HRSG), equipped with Selective Catalytic Reduction systems for control of NO_x and ancillary operations, to replace the existing coal-fired boilers, as described in the above referenced application and summarized in Attachment A. This Permit is granted based upon and subject to the findings and special conditions which follow:

In conjunction with this permit, approval is given with respect to the Prevention of Significant Deterioration of Air Quality Regulations (PSD) to construct the above referenced project, in that the Illinois Environmental Protection Agency (Agency) finds that the application fulfills all applicable requirements of 40 CFR 52.21. This approval is issued pursuant to the Clean Air Act, as amended, 42 U.S.C. 7401 et. seq., the Federal regulations promulgated thereunder at 40 CFR 52.21 for Prevention of Significant Deterioration of Air Quality (PSD), and a Delegation of Authority agreement between the United States Environmental Protection Agency and the Illinois EPA for the administration of the PSD Program. This approval becomes effective in accordance with the provisions of 40 CFR 124.15 and may be appealed in accordance with the provisions of 40 CFR 124.19. This approval is also based upon and subject to the following findings and conditions, which follow:

Findings

1. Ameren CIPS (Ameren) has requested a permit to replace the coal fired boilers at its existing electric generation facility (Grand Tower Power Station) with two "combined cycle" combustion turbines (CT) equipped with supplementary-fired heat recovery steam generators (HRSG). The

facility would be fired on natural gas only and have the ability to generate up to about 600 MW of electricity. This project will substantially reduce total emissions from the facility, as the facility would no longer fire coal. In addition, the project will facilitate future reduction in NO_x emissions as required by regulatory programs now being developed to reduce NO_x emissions from fossil fuel fired electric power plants as related to ozone air quality.

2. The Grand Tower Power Station is located approximately 9 miles north of Grand Tower, in Jackson County. The area is designated as attainment for all criteria pollutants.
- 3a. The proposed replacement project has the potential to emit major amounts of Carbon Monoxide (CO), and Volatile Organic Material (VOM), as shown in Table 1(A). The project is therefore subject to PSD review for CO, and VOM.
 - b. The proposed project is not subject to PSD review for Sulfur Dioxide (SO₂), Nitrogen Oxide (NO_x), and Particulate Matter (PM) emissions because of the net change in emission is not significant, as shown in Table 3.
4. After reviewing the materials submitted by Ameren, the Illinois EPA has determined that the project will (i) comply with applicable Board emission standards (ii) comply with applicable federal emission standards, and (iii) utilize Best Available Control Technology (BACT) on emissions of CO and VOM.
5. The combustion turbines and heat recovery steam generators are affected units under the Acid Rain Deposition Control Program pursuant to Title IV of the Clean Air Act and are subject to certain control requirements and emissions monitoring requirements pursuant to 40 CFR Parts 72, 73 and 75. As affected units under the Acid Rain Program, these units must be covered by an Acid Rain Permit before commencing operation.
6. The air quality analysis submitted by Ameren shows that the proposed project will not cause violations of the ambient air quality standard for CO or ozone.
7. The Illinois EPA has determined that the proposed project complies with all applicable Illinois Air Pollution Board Regulations and the federal Prevention of Significant Deterioration of Air Quality Regulations (PSD), 40 CFR 52.21.
8. A copy of the application, the project summary and a draft of this permit were placed in a location in the vicinity of the project, and the public was given notice and an opportunity to examine this material and to submit comments and to request a public hearing on this matter.

The Illinois EPA is issuing approval to construct the proposed project subject to the following special conditions and consistent with the specifications and data included in the application. Any departure from the conditions of this

approval or terms expressed in the application would need to receive prior written authorization by Illinois EPA.

Conditions

1. Standard conditions for issuance of construction permits, attached hereto and incorporated herein by reference, shall apply to this project, unless superseded by the following special conditions.
- 2a. Each CT/HRSRG system shall use good combustion practices to reduce emissions of CO and VOM, which practices shall include routine operating practices, maintenance and repair practices, and other periodic assessments of the combustion performance of the turbine to reasonably minimize emission of CO and VOM.
 - b. The emissions of CO and VOM from each CT/HRSRG system shall not exceed the hourly limits specified in Table 1A of the attachment A, on an hourly average for the normal load range (75 - 100 percent load), except during malfunction as addressed by Condition 3.
- 3a. Each CT shall be operated in a manner consistent with good air pollution control practice to minimize emissions of CO and VOM during startup, malfunction, and shutdown including:
 - i. Operation in accordance with the manufacturers written instructions or other written instructions developed by the Permittee; and
 - ii. Review of operating parameters of a CT/HRSRG during startup, malfunction, and breakdown, or shutdown as necessary to make adjustments to reduce or eliminate excess emissions.
- b. Consistent with the above, if the Permittee has maintained and operated a CT/HRSRG so that malfunctions are sudden, infrequent, not caused by poor maintenance or careless operation, and in general are not reasonably preventable, the Permittee shall begin shutdown of the CT/HRSRG system within 90 minutes, unless the malfunction is expected to be repaired in 120 minutes or such shutdown could threaten the stability of the regional electrical power system. In such case, shutdown of the CT/HRSRG system shall be undertaken when it is apparent that repair will not be accomplished within 120 minutes or shutdown would not endanger the regional power system. In no case shall shutdown of a CT/HRSRG be delayed solely for the economic benefit of the Permittee.

Conditions 2, and 3 represent the application of the Best Available Control Technology for CO and VOM emissions from this project, as required by PSD.

- 4a. The combustion turbines (CT) are subject to the New Source Performance Standard (NSPS) for Stationary Gas Turbines, 40 CFR 60, Subpart A and GG. The Illinois EPA is administrating NSPS in Illinois on behalf of the United States EPA under a delegation agreement.

- b. i. The NO_x emissions from each CT shall not exceed the limit established by the NSPS, pursuant to 40 CFR 60.332 (a)(1).
 - ii. The emission from each CT shall not contain SO₂ in excess of 0.015 percent by volume at 15 % O₂ on a dry basis or the CT shall not burn any fuel which contains sulfur in excess of 0.8 percent by weight, pursuant to 40 CFR 60.333 (a) and (b).
 - c. At all times, the Permittee shall maintain and operate each CT in a manner consistent with good air pollution control practice for minimizing emissions, pursuant to the NSPS, 40 CFR 60.11(d).
- 5a. The duct burners in the heat recovery steam generators (HRSG) are subject to the New Source Performance Standard (NSPS) for Electric Utility Steam Generating Units, 40 CFR 60, Subpart A and Da. The Illinois EPA is administrating NSPS in Illinois on behalf of the United States EPA under a delegation agreement.
- b. i. The NO_x emissions from each HRSG shall not exceed the limit established by the NSPS, pursuant to 40 CFR 60.44a(d)(1).
 - ii. The SO₂ emissions from each HRSG shall not exceed 0.20 lb/mmBtu, pursuant to 40 CFR 60.43a(b)(2).
 - iii. The PM emission from each HRSG shall not exceed 0.03 lb/mmBtu, pursuant to 40 CFR 60.42a(a)(1).
- Note: These provisions are not intended to prevent the Illinois EPA from developing streamlined approaches for compliance of the CT and HRSG, which function in series with the exhaust through the HRSG, with Subpart GG and Da of the NSPS respectively.
- c. At all times, the Permittee shall maintain and operate each HRSG in a manner consistent with good air pollution control practice for minimizing emissions, pursuant to the NSPS, 40 CFR 60.11(d).
- 6a. When the duct burner in a HRSG is not being fired, The emission of smoke or other particulate matter from the CT/HRSG system shall not have an opacity greater than 30 percent, pursuant to 35 IAC 212.123(a), except as allowed by 35 IAC 201.149, 212.123(b) or 212.124.
- b. When the duct burner in a HRSG is being fired, the emission of smoke or other particulate matter from the CT/HRSG system shall not have an opacity greater than 20 percent, pursuant to 40 CFR 60.42a(b) and 35 IAC 212.122(a), except for one 6-minute period per hour of not more than 27 percent opacity, as further allowed by 40 CFR 60.42a(b).
7. The only fuels fired in the CT/HRSG shall be natural gas as defined at 40 CFR 60.41c.

- 8a. Emissions from each CT/HRSRG shall not exceed the limits in Table 1. Compliance with the hourly limits shall be determined as a 3-hour rolling average for all pollutants consistent with testing and monitoring as required by Conditions 10,11,12, and 13. It should be noted that the limits for NO_x emission reflect operation of CT/HRSRG system without the SCR control system in use.
- b. The Permittee shall permanently shutdown the existing coal-fired boilers that are being replaced by a CT/HRSRG when the CT/HRSRG becomes operational, i.e., begins to generate useful electricity.
- 9a. Under this permit, each CT/HRSRG may be operated for a period that ends 180 days after it first generates electricity to allow for equipment shakedown and emissions testing. This period may be extended by the Illinois EPA upon request of the Permittee if additional time is needed to complete startup or perform emission testing.
- b. Upon successful completion of emission testing demonstrating compliance with applicable limitations, the Permittee may continue to operate the facility as allowed by Section 39.5 (5) of the Environmental Protection Act.
10. Within 60 days after operating a CT/HRSRG at the greatest load at which it will normally be operated but not later than 180 days after it first generates electricity or steam, the Permittee shall perform emissions tests as follows. These tests shall be used to verify compliance with the limits and conditions set in this permit.
- a. Emissions shall be measured by an approved testing service at the loads and for the pollutants listed in the table below.

CT Load	Duct Burner Load	Pollutant				Opacity
		NO _x	CO	VOM	PM	
Full	Full	X	X	X	X	X
Full	Off	X	X	X		X
Partial1*	Off	X				
Partial2*	Off	X				
Minimum**	Off	X	X	X		

* See also Condition 10 (c)(iii)

** Minimum load in the normal operating range of the CT

- b. The following USEPA methods and procedures shall be used for testing of emissions, unless another USEPA method is approved or specified by the Illinois EPA. For each turbine, measurement of NO_x emissions shall be conducted and data collected in accordance with the test methods and procedures specified in 40 CFR 60.335.

Location of Sample Points	USEPA Method 1
Gas Flow and Velocity	USEPA Method 2
Flue Gas Weight	USEPA Method 3 or 3A
Moisture	USEPA Method 4
Particulate Matter	USEPA Method 5
Nitrogen Oxides	USEPA Method 20 or 7 or 7E
Opacity	USEPA Method 9
Carbon Monoxide	USEPA Method 10
Volatile Organic Material	USEPA Method 18 or 25A
PM10	USEPA Method 201 or 201A (40 CFR 51, Appendix M)

The Permittee may report all PM emissions measured by USEPA Method 5 as PM₁₀, including back half condensable particulate. If the Permittee reports USEPA Method 5 PM emissions as PM₁₀, testing using USEPA method 201 or 201A need not be performed.

- c. At least 60 days prior to the actual date of testing, a written test plan shall be submitted to the Agency for review. This plan shall describe the specific procedures for testing and shall include as a minimum:
 - i. The person(s) who will be performing sampling and analysis and their experience with similar tests.
 - ii. The specific conditions under which testing shall be performed including a discussion of why these conditions will be representative of maximum emissions and the means by which the operating parameters for the CT/HRSG system will be tracked and recorded.
 - iii. The specific determinations of emissions that are intended to be made, including sampling and monitoring locations. As part of this plan, the Permittee may set forth an alternative strategy for performing emission testing in the normal load range of the CT/HRSG.
 - iv. The test method(s) that will be used, with the specific analysis method, if the method can be used with different analysis methods.
- d. The Agency shall be notified prior to these tests to enable the Agency to observe these tests. Notification for the expected date of testing shall be submitted a minimum of 30 days prior to the expected date. Notification of the actual date and expected time of testing shall be submitted a minimum of 5 working days prior to the actual date of the test. The Agency may at its discretion accept notifications with shorter advance notice provided that the Agency will not accept such notifications if it interferes with the Agency's ability to observe testing.
- e. Three copies of the Final Reports for these emission tests shall be forwarded to the Compliance Section in Springfield within 30 days after

the test results are compiled and finalized. The final report from testing shall contain a minimum:

- i. A summary of results;
 - ii. General information;
 - iii. Description of test method(s), including a description of sampling points, sampling train, analysis equipment, and test schedule;
 - iv. Detailed description of test conditions, including:
 - A. Fuel consumption (standard ft³) ;
 - B. Turbine firing rate (million Btu/hr);
 - C. Turbine/Generator output rate (MWe);
 - D. Duct burner firing rate (million Btu/hr); and
 - E. Steam production and Steam Turbine/Generator output (MWe), if applicable.
 - v. Data and calculations, including copies of all raw data sheets and records of laboratory analysis, sample calculations, and data on equipment calibration.
11. The Permittee shall install, operate, and maintain monitors to measure and record fuel consumption by each CT and HRSG.
- 12a.
- i. To demonstrate compliance with the NO_x limits of this permit, the Permittee shall install, operate, and maintain a Continuous Emissions Monitoring (CEM) system on each CT/HRSG system to measure emissions of NO_x. The applicable procedures under 40 CFR 60.13, 60.47a(c) and 75.12 shall be followed for the installation, evaluation, and operation of this NO_x CEM system.
 - ii. At least 30 days prior to initial startup of a CT/HRSG, the Permittee shall submit to the Agency for review and comment a detailed monitoring plan. This plan shall describe the configuration and operation of the NO_x CEM system for each CT/HRSG.
 - iii. These monitoring systems shall be operated and collect data in accordance with the applicable provisions of the Acid Rain Program.
- b.
- i. If annual CO emissions of a CT/HRSG exceed 570 tons/year in any calendar year or 470 tons/year on a three year rolling average, as determined based on emission rates measured during testing and actual fuel consumption of the CT/HRSG, the Permittee shall install, operate and maintain a CO continuous emission monitoring

system on the CT/HRSRG. The System shall be in place by December 31 the following year.

- ii. At least 30 days prior to installing a CO CEM system, the Permittee shall submit to the Illinois EPA for review and comment a detailed monitoring plan. This plan shall describe the configuration and operation of the CO CEM system for each CT/HRSRG.
 - c. Notwithstanding the above conditions of the permit specifying monitoring practices, other credible evidence may be used to establish compliance or noncompliance with applicable emission limits.
- 13a. The Permittee shall monitor sulfur content of the gas fired in the turbines pursuant to the applicable provisions in 40 CFR Part 75, Appendix D, Section 2.3 for pipeline natural gas combustion.
- b. Monitoring of fuel nitrogen content is not required, as natural gas is the only fuel fired in the turbines.
 - c. The above provisions establish a custom schedule for determination of sulfur content and nitrogen content of fuel in accordance with 40 CFR 60.334 (b)(2) and USEPA's Custom Fuel Monitoring Document dated August 14, 1987, subject to case-specific approval by USEPA pursuant to 40 CFR 60.13(i).
- 14a. The Permittee shall maintain a file of the following items:
- i. The written instructions being followed by the Permittee as good combustion practices and good air pollution control practice to minimize emission in accordance with Condition 2(a) and 3(a)
 - ii. The heat content each of the fuel fired in the CTs or HRSGs (Btu/standard ft³); and
 - iii. The sulfur and nitrogen content of each fuel, as determined in accordance with Condition 13.
- b. The Permittee shall keep record of the following items pertaining to SCR system*:
 - i. Whether the SCR control system is in operation or not;
 - ii. Type of reagent in use if SCR control is in use; and
 - iii. Flow setting of the reagent, if applicable.
 - c. The Permittee shall maintain the following daily records
 - i. The quantity of fuel consumed for each CT (standard ft³);
 - ii. The quantity of fuel consumed for each HRSG (duct burner) (standard ft³);

- iii. Steam production for all HRSG units; and
 - iv. Each period when the duct burner in a HRSG was fired;
- d. The Permittee shall keep inspection, maintenance, and repair logs with dates and nature of such activities for the following:
- i. Each CT;
 - ii. Each HRSG, including the duct burner;
 - iii. Each SCR system*;
 - iv. The SCR reagent storage system*; and
- e. The Permittee shall maintain following records related to startup, malfunction, breakdown, and shutdown of each CT/HRSG, including the SCR system*:
- i. The time and date of startup, malfunction or breakdown, and shutdown and confirmation that standard practices were followed; and
 - ii. Each incident when operation of a CT/HRSG continued during malfunction or breakdown with excess emissions, including the following information:
 - A. Date and duration of malfunction or breakdown;
 - B. A description of the malfunction or breakdown;
 - C. The reason continued operation was necessary, including supporting documentation; and
 - D. The corrective actions used to reduce the quantity of emissions and the duration of the incident.
- f. The Permittee shall keep the following records with regards to emissions:
- i. NO_x emissions from each CT/HRSG recorded hourly, quarterly, and annual (in lb/mmBtu) by combining the NO_x concentration (in ppm) and diluent concentration (in percent O₂ or CO₂) measurements according to the procedures in 40 CFR 75 Appendix F;
 - ii. Monthly emissions of NO_x, CO, SO₂, VOM, and PM from each CT/HRSG (ton/month). NO_x emissions shall be based on data from the CEM. All other emissions shall be calculated based on fuel consumption, relevant factors developed from emission test data and fuel composition, with supporting calculations; and

iii. Annual facility emissions of NO_x, CO, SO₂, VOM, and PM, based on monthly emission totals.

* These requirements which are applicable to the SCR systems, shall only become effective upon starting of the SCR control use on a long-term basis.

15. All records required by this permit shall be retained on site for a period of at least 3 years and shall be readily available for inspection and copying by the Illinois EPA upon request.

16a. The Permittee shall furnish the Illinois EPA with written notification pursuant to the NSPS as follows:

i. The date construction of each turbine commenced, postmarked no later than 30 days after such date, pursuant to 40 CFR 60.7(a)(1);

ii. The anticipated date of initial startup of the turbines, postmarked not more than 60 days nor less than 30 days prior to such date, pursuant to 40 CFR 60.7(a)(2); and

iii. The actual date of initial startup of the turbine, postmarked within 15 days after such date, pursuant to 40 CFR 60.7(a)(3).

b. The Permittee shall furnish the Illinois EPA with written notification with regard to the SCR control systems as follows:

i. The Permittee shall notify the Illinois EPA of anticipated and actual start date of SCR control system when using for evaluation purpose;

ii. The Permittee shall submit evaluation report of the SCR system after completing the trial period; and

iii. Notifications of the "long-term" use start date for the SCR systems.

c. The Permittee shall notify the Illinois EPA within 15 days of shutdown of each of the existing coal-fired boilers on a permanent basis.

17a. The Permittee shall fulfill applicable reporting requirements in the NSPS, 40 CFR 60.7(c) and 60.49a for the CT/HRSG. For this purpose, the quarterly reports shall be submitted no later than 30 days after the end of the calendar quarter.

Note: These provisions are not intended to prevent the Illinois EPA from developing streamlined approaches for compliance of the CT and HRSG, which function in series, with the NSPS.

b. If there is any other exceedance of the requirements of Condition 2 through 8 of this permit, the Permittee shall submit a report to the Illinois EPA's Compliance Unit in Springfield, Illinois within 30 days

after the exceedance. The report shall include a description of the exceedance, a copy of relevant records, and a description of the exceedance or violation and efforts to reduce emissions and future occurrences.

- c. In conjunction with the Annual Emission Report required by 35 IAC Part 254, the Permittee shall provide:

The amount of fuel and hours of operation for each HRSG duct burner.

- d. The Permittee shall comply with applicable reporting requirements under the Acid Rain Program. In addition to reporting to USEPA, copies of such reports shall also be provided to the Illinois EPA, upon request.

- 18a. Any required reports and notifications concerning equipment operation, emissions testing, or a monitoring system shall be sent to the Agency at the following address unless otherwise indicated:

Illinois Environmental Protection Agency
Division of Air Pollution Control, Compliance Unit (#40)
P.O. Box 19276
Springfield, Illinois 62794-9276

Phone: 217/782-5811 Fax: 217/782-6348

- b. A copy of all reports and notifications, as required above, except the Annual Emission Report required by 35 Ill. Adm. Code 254, shall also be sent to the Illinois EPA at the following address:

Illinois Environmental Protection Agency
Division of Air Pollution Control
2009 Mall Street
Collinsville, Illinois 62234

Phone: 618/346-5120 Fax: 618/346-5155

- 19. The approval for the above referenced project does not relieve the Permittee of the responsibility to comply with all Local, State and Federal Regulations which are part of the applicable Illinois State Implementation Plan, as well as all other applicable Federal, State, and Local requirements.

If you have any questions concerning this, please contact Manish Patel at 217/782-2113.

Donald E. Sutton, P.E.
Manager, Permit Section
Division of Air Pollution Control

DES:MNP

Attachments

CC: Region 3
CASM
USEPA

Attachment A

Significant Emission Units

<u>Unit ID</u>	<u>Description</u>	<u>Number</u>	<u>Rated Heat Input¹ (mmBtu/hr)</u>	<u>Control</u>
CT 01 - 02	Combustion turbine	2	2,050	SCR, Low NOX combustors and Good combustion practices
HRSG - 01	Supplementary-fired Heat Recovery Steam Generator	1	297	SCR, Low NOX combustors and Good combustion practices
HRSG - 02	Supplementary-fired Heat Recovery Steam Generator	1	333	SCR, Low NOX combustors and Good combustion practices
IH - 01	Indirect Heater	1	5.5	Good combustion practices

1. Nominal capacity ratings are per unit.

Table - 1 (A)

CO and VOM Emission Limits for CT/HRSG systems

<u>Unit ID / Pollutant</u>	<u>lb/mmBtu¹</u>	<u>lb/hr²</u>	<u>ton/yr³</u>
<u>Unit 01</u>			
CO	0.0604	141.8	621.1
VOM	0.0060	14.0	61.3
<u>Unit 02</u>			
CO	0.0607	144.6	633.3
VOM	0.0062	14.8	64.8

Table - 1 (B)PM, NO_x, and SO₂ Emission Limits for CT/HRSG systems

<u>Unit ID / Pollutant</u>	<u>lb/hr</u>	<u>ton/yr³</u>
<u>Unit 01</u>		
NO _x	216.8	949.6
PM/PM ₁₀	11.9	52.1
SO ₂	2.0	8.8
<u>Unit 02</u>		
NO _x	219.6	961.9
PM/PM ₁₀	12.2	53.4
SO ₂	2.0	8.8

1. Based on vendor/manufacture data and information provided in the permit application

2. Based on modeling data and information provided in the permit application
3. Ton/yr based on 8760 hours of operation

Table 2

Facility Allowable Emissions (ton/yr)

<u>Unit</u>	<u>NO_x</u> <u>(ton/yr)</u>	<u>CO</u> <u>(ton/yr)</u>	<u>PM</u> <u>(ton/yr)</u>	<u>VOM</u> <u>(ton/yr)</u>	<u>SO₂</u> <u>(ton/yr)</u>
CT/HRSGs	1911.5	1254.4	105.5	126.1	17.6
Indirect Heater	1.9	1.9	0.3	0.5	0.4
Totals:	1913.4	1256.3	105.8	126.6	18.0

Table 3

Net Change in PM, NO_x and SO₂ Emissions

<u>Pollutant</u>	<u>Historical</u> <u>Actual</u> <u>Emissions</u>	<u>Future</u> <u>Permitted</u> <u>Emissions</u>	<u>Net Change</u>
PM	271	106	-165
NO _x	2,719	1,913	-806
SO ₂	20,474	18	-20,456

Table 4

Historical Plant Emissions (GT7, GT8 and GT9 units)

<u>Pollutant</u>	<u>1997</u>	<u>1998</u>	<u>Two Year</u> <u>Average</u>
PM	346	196	271
CO	111	67	89
NO _x	3,359	2,079	2,719
VOM	15	9	12
SO ₂	25,925	15,023	20,474