

AIR EMISSION SOURCE CONSTRUCTION PERMIT

Source ID No.: 1770030

Effective Date: DRAFT

Source Name: Westar Energy, Inc. - Tecumseh Energy Center

NAICS: 221112, Fossil fuel power generation

Site Location: 2nd & Dupont Road
Tecumseh, Kansas 66601

Site Owner/Operator Name: Westar Energy, Inc.

**Site Owner's/Operator's
Mailing Address:** 818 South Kansas Avenue
Topeka, Kansas 66612

**Contact Person for Site Owner/
Operator:** Mr. Daniel R. Wilkus, P.E. – Manager, Air Programs
Telephone Number (785) 575-1614

This permit is issued pursuant to K.S.A. 65-3008 as amended.

Description of Activity Subject to Air Pollution Control Regulations

Westar Energy, Inc. (Westar) is proposing to initiate a NO_x and particulate reduction project on Unit 7/9 (TEC7/9) and Unit 8/10 (TEC8/10) at the Tecumseh Energy Center. The project will include for each unit the addition of low-NO_x burners, separated overfire air (SOFA), and rebuilding of the electrostatic precipitator. This project will result in a decrease in nitrogen oxide (NO_x) emissions and an increase in carbon monoxide (CO) emissions as a result of installation of the low-NO_x burners and SOFA, and a decrease in the particulate matter (PM and PM₁₀) emissions as a result of the ESP rebuild.

The proposed modification will be subject to the requirements of 40 CFR 52.21, Prevention of Significant Deterioration (PSD) as adopted under K.A.R. 28-19-350 as a result of being a major modification of a major stationary source for at least one regulated pollutant emitted in excess of the PSD significant emission levels. TEC7/9 and TEC8/10 are affected sources subject to Title IV of the Federal Clean Air Act, Acid Deposition Control. The proposed project does not constitute a modification or reconstruction for the purpose of determining applicability of New

Source Performance Standard (NSPS) requirements.

Emissions of NO_x and CO were evaluated for this permit review. This project is subject to the provision of K.A.R. 28-19-300 (Construction permits and approvals; applicability) because the potential-to-emit of CO exceeds 100 tons per year.

An air dispersion modeling impact analysis, an additional impact analysis, and a Best Available Control Technology (BACT) determination were conducted as a part of the construction permit application process.

Significant Applicable Air Pollution Control Regulations

The following significant Kansas air quality regulations were determined to be applicable to this project:

K.A.R. 28-19-300 Construction permits and approvals; applicability

K.A.R. 28-19-350. Prevention of significant deterioration of air quality

Air Emission Unit Technical Specifications

The following equipment or equivalent is approved:

1. Installation of low-NO_x burners
2. Addition of separated overfire air (SOFA) capability
3. Rebuilding of the ESPs.

Air Emissions Estimates from the Proposed Activity

Pollutant Type	Change in Emissions (Tons per Year)
Nitrogen Oxides (NO _x)	-796
Carbon Monoxide (CO)	+3,078 ¹

Air Emission Limitations

¹ Emission estimates are based on new emission limit.

1. Coal-fired Boilers:
 - a. The thirty (30) day rolling average emission rate of carbon monoxide (CO) emissions shall not exceed 0.25 lb/mmBtu, excluding periods of startup, shutdown, and malfunction.
 - b. The purpose of this project is to reduce the NO_x emissions from TEC7/9 and TEC8/10. In the event difficulties are encountered demonstrating compliance with the CO limit while optimizing NO_x emissions, the owner or operator may request a revision to the CO limit.

Monitoring, Recordkeeping and Reporting

1. Compliance with the CO BACT limit shall be demonstrated with a continuous emission monitoring system (CEMS). The CO CEMS shall be installed, certified, operated, maintained, and quality assured according to 40 CFR 60, Appendix B, Performance Specification 4 (PS4) and 40 CFR 60, Appendix F (Quality Assurance/Quality Control) within 180 days after startup.
2. Provide a report of the CEMS certification within 30 days after certification is completed.
3. Reports of excess emissions shall be submitted semi-annually in accordance with the requirements in 60.7(c). The summary report referenced in 60.7(c) and defined in 60.7(d) applies to the CO CEMS downtime only and is not applicable to an exceedance of the CO limit established in this document.
4. Records shall be kept on site for 2 years in accordance with 60.7(f).

General Provisions

1. This document shall become void if installation of the project has not commenced within 18 months of the effective date of this permit, or if installation is interrupted for a period of 18 months or longer.
2. A construction permit or approval must be issued by KDHE prior to commencing any construction or modification of equipment or processes which result in an increase in potential-to-emit equal to or greater than the thresholds specified at K.A.R. 28-19-300.
3. Upon presentation of credentials and other documents as may be required by law, the permittee shall allow a representative of the KDHE (including authorized contractors of the KDHE) to:
 - (a) enter upon the permittee's premises where a regulated facility or activity is

located or conducted or where records must be kept under conditions of this document;

- (b) have access to and copy, at reasonable times, any records that must be kept under conditions of this document;
 - (c) inspect at reasonable times, any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under this document; and
 - (d) sample or monitor, at reasonable times, for the purposes of assuring compliance with this document or as otherwise authorized by the Secretary of the KDHE, any substances or parameters at any location.
4. The emission unit or stationary source which is the subject of this document shall be operated in compliance with all applicable requirements of the Kansas Air Quality Act and the Federal Clean Air Act.
 5. This document does not relieve the permittee of the obligation to obtain other approvals, permits, licenses or documents of sanction which may be required by other federal, state or local government agencies.
 6. Issuance of this document does not relieve the owner or operator of any requirement to obtain an air quality operating permit under any applicable provision of K.A.R. 28-19-500.

Permit Engineer

Rick Bolfing, P.E.
Environmental Engineer
Air Permits Section

Date Signed

RJB:
c: SCHA
C-7564

PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

PERMIT SUMMARY SHEET

Permit No.: 1770030

Source Name: Tecumseh Energy Center-Westar Energy, Inc.

Source Location: 2nd & Dupont Rd., Tecumseh, KS 66601

Area Designation:

K.A.R. 28-19-350, Prevention of significant deterioration of air quality, affects new major sources and major modifications to major sources in areas designated as "attainment" or "unclassifiable" under section 107 of the Clean Air Act (CAA) for any criteria pollutant. The State of Kansas is classified as attainment for the National Ambient Air Quality Standards (NAAQS) for all the criteria pollutants.

The Tecumseh area in Shawnee county, Kansas, where this modification is taking place, is in attainment for all the criteria pollutants.

Project description:

The Tecumseh Energy Center (TEC) is located in Tecumseh, Shawnee County, Kansas. The TEC plans to modify the Unit 7/9 and Unit 8/10 by installing low NO_x burners, separated overfire air (SOFA), and rebuild the electrostatic precipitators (ESP).

Significant Applicable Air Emission Regulations

This source is subject to Kansas Administrative Regulations relating to air pollution control. The application for this permit was reviewed and will be evaluated for compliance with the following applicable regulations:

1. K.A.R. 28-19-300. Construction Permits and Approvals. Requires "Any person who proposes to construct or modify a stationary source or emissions unit shall obtain a construction permit before commencing such construction or modification."
2. K.A.R. 28-19-350 Prevention of significant deterioration of air quality. "The provisions of K.A.R. 28-19-350 shall apply to the construction of major stationary sources and major modifications of major stationary sources in the areas of the state designated as an attainment area or an unclassified area for any pollutant under the procedures prescribed by section 107(d) of the federal clean air act (42 U.S.C. 7407 (d))."

Air Emissions from the Project:

The potential-to-emit of one of the PSD regulated pollutants from the existing Tecumseh Energy Center exceeds 100 tons per year. Hence, Tecumseh Energy Center is considered to be a major stationary source under provisions of K.A.R. 28-19-350.

The total projected actual from the proposed modification, i.e. from the Emission Reduction Project, are listed in Table 1-2 of Section 1 and detailed out in Appendix C Table C-4 of the application. Proposed potential-to-emit of NO_x and CO were compared with the Significant Emission Rates for PSD applicability for the criteria and non-criteria pollutants. The increase in potential-to-emit is above the PSD significance level for CO and will be reviewed under the PSD regulations. NO_x emissions were greatly reduced under this modification.

The proposed Emission Reduction Project is described in Section 2 of the application. The uncontrolled potential-to-emit used for BACT analysis of the project uses Alstom's (manufacturer's) calculations for a total of less than 300 ppm at 3% oxygen, which equates to approximately 0.25 lb/mmBtu for CO emissions increase after the modification. The manufacturer has guaranteed the project will reduce NO_x emissions from 0.40 lb/mmBtu (2002 and 2007 recorded data) to 0.18 lb/mmBtu or less. These values are shown in Appendix C, Table C-4 of the application.

Hence, this project will be a major modification of an existing major stationary source resulting in a net significant increase of CO. This project will be subject to the various aspects of K.A.R. 28-19-350 such as the use of best available control technology, ambient air quality analysis, and additional impacts upon soils, vegetation and visibility.

Best Available Control Technology (BACT)

BACT requirement applies to each new or modified affected emissions unit and pollutant emitting activity. Also, individual BACT determinations are performed for each pollutant emitted from the same emission unit. Consequently, the BACT determination must separately address, for each regulated pollutant with a significant emissions increase at the source, air pollution controls for each emissions unit or pollutant emitting activity subject to review. Westar Energy was required to prepare a BACT analysis for KDHE's review according to the process described in Attachment A. KDHE's evaluation of the BACT for the proposed Emission Reduction Project's analysis is presented in Attachment B.

In short KDHE has concurred with the Westar Energy for the following:

BACT for Carbon monoxide is 300 ppm at 3% O₂ at baseload which equates to approximately 0.25 lb/mmBtu.

Ambient Air Impact Analysis

The owner or operator of a proposed source or modification must demonstrate that allowable emission increases from the proposed modification, in conjunction with all other applicable emissions increases or reductions, would not cause or contribute to air pollution in violation of:

- 1) any national ambient air quality standard in any air quality control region;
or
- 2) any applicable maximum allowable increase over the baseline concentration in any area.

Westar Energy used EPA approved dispersion modeling guidelines (incorporated as Appendix W of 40 CFR 51) to predict the ambient air impacts. A work-plan for the Tecumseh Energy Center Emission Reduction Project Ambient Air Quality Impact Analysis was submitted to KDHE on November 1, 2007.

The AERMOD model was used to determine the maximum predicted ground-level concentration for each pollutant and applicable averaging period resulting from various operating loads. Conservative pollutant emission rates were selected from manufacturer's data contained in Table 6-12 thru 6-14 of the application to produce worst case dispersion conditions and highest model predicted concentrations (i.e. lowest exhaust temperature and exit velocity and, the highest emission rate). Table 6-12 thru 6-14 of the application shows the TEC Unit 7/9 and Unit 8/10 stack parameters used in the Ambient Air Quality Impact Analysis. The most recent five (5) years of meteorological data available for AERMOD 2002 to 2006 of surface and upper air was used in the modeling. See Table 6-15 and Table E-1 of Appendix E of the application where the predicted model concentrations for each pollutant for the applicable averaging period is compared with the PSD Class II (the whole State of Kansas is designated as a Class II area) significant impact levels. Concentrations were below the modeling significance levels for all averaging periods.

Increment consumption analysis was not required since there is no PSD increment level for CO.

Additional Impact Analysis:

Visibility Impairment Analysis

Westar Energy was required to provide an analysis of the impairment to visibility, and impacts on plants, soils and, vegetation that would occur as a result of this project and to what extent the emissions from the proposed modification impacts the general commercial, residential, industrial and other growth.

Westar Energy conducted a visibility degradation analysis for the NO_x emissions from the proposed modification. Westar Energy used the document "Workbook for

Plume Visual Impact Screening and Analysis", EPA 450/4-88-015, September 1988, and the EPA approved dispersion modeling procedure "VISCREEN" for guidance. A visibility analysis is performed for Class I (visibility-sensitive) areas located within 100 kilometers of a proposed facility. There are no Class I areas in Kansas. The nearest PSD Class I area is Hercules Glades which is located approximately 408 kilometers east-southeast of the TEC. In accordance with KDHE guidance memorandum dated July, 15, 1990, a visibility impairment analysis was conducted at the nearest sensitive area, Perry State Park located approximately 6.5 kilometers to the northeast of the plant and Clinton State Park located approximately 8.0 kilometers to the southeast.

A Level 1 VISCREEN visibility impairment analysis was performed for the Perry State Park and Clinton State Park. The composite worst case hourly emission rate over all modes of operation for NO_x from the NO_x Reduction Project were input into the model, along with the most conservative meteorological conditions. The results are shown in Table 7-2 for Perry State Park and Table 7-3 for Clinton State Park of the application. Perry State Park's and Clinton State Park's visibility both inside of the park and outside of the park was improved. According to the guidance memorandum a Level-2 visibility impairment screening analysis was not required.

Impacts on Vegetation and Soils

In accordance with the guidance memorandum, an impact analysis on plants and soils is required for pollutants exceeding the PSD significance levels. The document EPA 450/2-81-078 "A Screening Procedure for the Impacts of Air Pollution Sources on Plants and Soils" contains information about the effects the increased CO and associated decrease NO₂ (pollutant of concern) emissions would have on such receptors.

The effects of CO on vegetation have undergone only brief laboratory study, thus, its effects on vegetation are somewhat uncertain. Some research indicates that CO exposure may cause the production of internal ethylene in plant tissue at concentrations of greater than 100 ppm. Since the secondary ambient standards for the 1-hour and 8-hour averaging periods, 46 ppm (46,000 µg/m³) and 20 ppm (20,000 µg/m³) respectively, will not be exceeded by the project, this project should have negligible impacts on nearby soils and vegetation.

Growth In Commercial, Residential and Industrial activity

This modification at TEC plant will stimulate an increase in the local labor force during the construction phase in Tecumseh, but the increase will be temporary, short lived, and will not result in permanent/significant commercial and residential growth occurring in the vicinity of the TEC. No new permanent jobs will be created as a result of this modification. Therefore, no growth impacts on commercial, residential or industrial aspects will result.

Attachment A
KEY STEPS IN THE "TOP-DOWN" BACT ANALYSIS

STEP 1: IDENTIFY ALL POTENTIAL AVAILABLE CONTROL TECHNOLOGIES.

The first step in a "Top-Down" analysis is to identify, for the emission unit in question, "all available" control options. Available control options are those air pollution control technologies or techniques with a PRACTICAL POTENTIAL FOR APPLICATION to the emissions unit and the regulated pollutant under review. This includes technologies employed outside of the United States. Air pollution control technologies and techniques include the application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of the affected pollutant.

STEP 2: ELIMINATE TECHNICALLY INFEASIBLE OPTIONS.

The technical feasibility of the control options identified in Step 1 is evaluated with respect to the source-specific (or emissions unit specific) factors. In general, a demonstration of technical infeasibility should be clearly documented and should show, based on physical, chemical, and engineering principles, that difficulties would preclude the successful use of the control option on the emissions unit under review. Technically infeasible control options are then eliminated from further consideration in the BACT analysis.

STEP 3: RANK REMAINING CONTROL TECHNOLOGIES BY CONTROL EFFECTIVENESS.

All remaining control alternatives not eliminated in Step 2 are ranked and then listed in order of over-all control effectiveness for the pollutant under review, with the most effective control alternative at the top. A list should be prepared for each pollutant and for each emissions unit subject to a BACT analysis. The list should present the array of control technology alternatives and should include the following types of information:

- 1) control efficiencies;
- 2) expected emission rate;
- 3) expected emission reduction;
- 4) environmental impacts;
- 5) energy impacts; and
- 6) economic impacts.

STEP 4: EVALUATE MOST EFFECTIVE CONTROLS AND DOCUMENT RESULTS.

The applicant presents the analysis of the associated impacts of the control option in the listing. For each option, the applicant is responsible for presenting an objective evaluation of each impact. Both beneficial and adverse impacts should be discussed and,

where possible, quantified. In general, the BACT analysis should focus on the direct impact of the control alternative. The applicant proceeds to consider whether impacts of unregulated air pollutants or impacts in other media would justify selection of an alternative control option. In the event the top candidate is shown to be inappropriate, due to energy, environmental, or economic impacts, the rationale for this finding should be fully documented for the public record. Then the next most stringent alternative in the listing becomes the new control candidate and is similarly evaluated. This process continues until the technology cannot be eliminated.

STEP 5: SELECT BACT.

The most effective control option not eliminated in Step 4 is proposed as BACT for the emission unit to control the pollutant under review.

Attachment B
KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT'S EVALUATION
OF WESTAR ENERGY TECUMSEH ENERGY CENTER
PROPOSED BACT OPTIONS

Westar Energy evaluated the BACT analysis to control emissions from the Emission Reduction Project. The only significant emission increase from this project is carbon monoxide (CO).

CO BACT for the Emission Reduction Project

Carbon Monoxide (CO) controls consist of good combustion practices or oxidation catalyst. Good combustion practices can insure baseload limits of 300 ppm for combusting subbituminous coal. Catalytic oxidation is capable of reducing CO emissions by 90 percent in a coal fired boiler.

The PSD regulations require BACT, which requires the source to evaluate the control options for technical feasibility. Since the boiler's exhaust temperature will be approximately 300 to 350 degrees Fahrenheit, and catalytic oxidation requires temperature above 500 Degrees Fahrenheit, the use of a CO catalytic oxidation is determined technically infeasible.

Based on the technical constraints, the use of good combustion practices to meet a baseload emission levels of 300 ppm is proposed by Westar Energy as BACT.

Carbon monoxide is formed as a result of incomplete oxidation of carbon in the fuel. The concern is that by minimizing CO formation, NO_x emissions are inversely increased. A catalytic oxidizer could be used to minimize CO emissions. However, in the case of coal-fired boilers, the exhaust temperature is generally below the operation range for the oxidation catalyst. The exhaust temperature in the application will be approximately 300°F to 350°F, but oxidation catalysts require temperatures above 500°F in order to effectively reduce emissions. Therefore, catalytic oxidation is determined technically infeasible for this case.

Notice Concerning Proposed Kansas Air Quality Construction Permit and Public Hearing

Notice is hereby given that the Kansas Department of Health and Environment (KDHE) is soliciting comments regarding a proposed air quality construction permit. Westar Energy, Inc. (Westar) has applied for an air quality construction permit in accordance with the provisions of K.A.R. 28-19-300 to initiate an emission reduction project at its Tecumseh Energy Center in Tecumseh, Kansas. Emissions of oxides of nitrogen (NO_x) and carbon monoxide (CO) were evaluated during the permit review process.

The proposed permit is to be issued in accordance with the provisions of K.A.R. 28-19-350, *Prevention of Significant Deterioration* (PSD) which adopt the federal standards, procedures and requirements of 40 CFR 52.21 by reference. These air quality regulations apply to major stationary emission sources located in areas designated as “attainment” under the federal Clean Air Act (CAA). Attainment areas are areas where the air quality meets or is better than the national ambient air quality standards (NAAQS).

The PSD regulations require evaluation of emission reduction techniques to identify the best available control technology (BACT) for each pollutant for which the emission rate exceeds the PSD significant level. The purpose of BACT is to affect the maximum degree of reduction achievable, taking into account energy, environmental and economic impacts for each pollutant under review. Evaluation of the estimated emissions for the proposed Tecumseh Energy Center project indicates that the emission rate of carbon monoxide exceeds the significance levels. Westar conducted the required BACT analysis for CO. The department has reviewed Westar’s BACT analysis and concurs with its findings.

An ambient impact analysis was performed on the air emissions of CO from the Tecumseh Energy Center project. The analysis demonstrated no significant impact on ambient air quality.

An analysis of visibility was conducted for the two nearest Class II areas: Perry State Park and Clinton State Park. The VISCREEN model results indicate that visibility will be improved overall as a result of the project. No adverse impacts on soils and vegetation in the area are expected. Any federal land manager who has reason to believe they may have a Class I area adversely impacted by the emissions from the proposed project has the opportunity to present KDHE with a demonstration of the adverse impact on the air quality-related values of the federal Class I area during the comment period.

A public comment period has been established to allow citizens the opportunity to express any concerns they may have about this proposed permitting action. The public comment period is to begin on February 14, 2008 and end at 5:00 pm on March 17, 2008. All comments should be submitted in writing to Rick Bolfing, Bureau of Air and Radiation, 1000 SW Jackson, Suite 310, Topeka, KS 66612-1366 or presented at the public hearing.

Any member of the public may request to hold a public hearing to receive comments on the proposed issuance of the draft air quality construction permit. Written requests to hold a public hearing should be sent to the attention of Ms. Christy Thurman at the address listed above, or by FAX to (785) 291-3953, and must be received by noon on March 17, 2008. **If no requests to hold the public hearing are received by this date and time, the public hearing will be cancelled.** If a request is received, a public hearing is tentatively scheduled by the KDHE at Rice Community Center, 432 SE Norwood, Topeka, KS 66607 on March 18, 2008 at 6:00 pm.

Copies of the proposed permit, permit application, all supporting documentation, and all information relied upon during the permit application review process are available for public review for a period of 30 days from the date of publication during normal business hours (8:00 AM to 5:00 PM) at the KDHE, Bureau of Air and Radiation (BAR), 1000 SW Jackson, Suite 310, Topeka, KS 66612-1366. Also, a copy of the proposed permit only can be reviewed at the Shawnee County Health Agency, 1515 NW Saline, N. Annex, Ste. 101, Topeka, KS 66618. To obtain or review the proposed permit and supporting documentation, contact Rick Bolting, (785) 296-1576, at the central office of the KDHE. To review the proposed permit only, contact Tim Simons, (785) 291-2457, in the Shawnee County Health Agency. The standard departmental cost will be assessed for any copies requested.

Roderick L. Bremby, Secretary
Kansas Department of Health and Environment