

**NEARMAN CREEK POWER STATION
UNIT 1 LOW NO_x COMBUSTION SYSTEM**

KANSAS CITY BOARD OF PUBLIC UTILITIES

**PREVENTION OF SIGNIFICANT DETERIORATION
AIR PERMIT APPLICATION**

ADDENDUM 1

December 2010

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1.0 Introduction

On September 23, 2010, Kansas City Board of Public Utilities (BPU) submitted the Nearman Creek Power Station Unit 1 Prevention of Significant Deterioration (PSD) Air Permit Application for a Low NO_x Combustion System to the Kansas Department of Health and Environment (KDHE). On November 2, 2010, BPU met with KDHE for an overview of the submitted application. During this meeting, KDHE requested information in regards to the greenhouse gas (GHG) emissions associated with the Project (the Project is defined in the originally submitted PSD Air Permit Application). As such, BPU is submitting this Addendum 1 to the PSD Air Permit Application to the KDHE in regards to GHG emissions associated with the Project.

2.0 GHG Requirements

The following sections discuss the Project’s applicability to GHG air quality regulations.

2.1 GHG Tailoring Rule

On May 13, 2010, the U.S. Environmental Protection Agency (USEPA) issued a final rule (published in the Federal Register on June 3, 2010) that establishes an approach to addressing GHG emissions from stationary sources under the Clean Air Act (CAA) permitting programs. This final rule sets thresholds for GHG emissions that define when permits under the New Source Review Prevention of Significant Deterioration (PSD) and Title V Operating Permit programs are required for new and existing industrial facilities. The thresholds established are based on CO₂e for the aggregate sum of six greenhouse gases that constitute the pollutant that will be subject to regulation, which are referred to as GHGs. These gases are: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆).

This final rule “tailors” the requirements of these CAA permitting programs to limit which facilities will be required to obtain PSD and title V permits. USEPA will phase in the CAA permitting requirements for GHGs in two initial steps. Step 1 is effective from January 2, 2011, through June 30, 2011, while Step 2 is effective from July 1, 2011, through June 30, 2013. For Step 1, only sources currently subject to the PSD permitting program would be subject to permitting requirements for their GHG emissions under PSD. For these sources, only GHG increases of 75,000 tpy or more of total GHG, on a CO₂e basis, and greater than zero tpy on a mass basis would need to determine the Best Available Control Technology (BACT) for their GHG emissions. During Step 1’s time period, no sources would be subject to CAA permitting requirements due solely to GHG emissions. For Step 2, modifications at existing facilities that increase GHG emission by at least 75,000 tpy, on a CO₂e basis, will be subject to permitting requirements, even if they do not significantly increase emissions of any other pollutant.

Because the proposed Project is subject to PSD for CO (as previously submitted to KDHE), the Project must evaluate the applicability of the GHG regulations. That applicability analysis follows.

2.2 Project GHG Emissions

A modification project at an existing major source is considered to be a major modification, and thus subject to NSR/PSD review, if the projected emission increase (PEI) for a regulated (or in the case for GHG, subject to regulation) pollutant is significant. On December 31, 2002, the USEPA substantially reformed the NSR/PSD program, including the manner in which it is determined whether a project (such as the Project proposed herein) results in a significant emissions increase. The USEPA's revised rules, as incorporated by the KDHE, are used in this application as the basis for determining whether the NSR/PSD major modification thresholds are triggered.

A project's PEI is calculated as the difference between the projected actual emissions (PAE) and the baseline actual emissions (BAE), excluding those emission increases resulting from future business activity that the facility could otherwise accommodate. This NSR/PSD applicability test method is often referred to as the Actual-to-Projected Actual Applicability Test. Commensurate with the 2002 Reform Rules, the following five steps were utilized to determine this Project's PEI, and thus its NSR/PSD applicability. The GHG Tailoring Rule established that a stationary source will use the group of six constituent gases for permitting applicability, rather than treating each gas individually, since the air pollutant is defined as the aggregate sum of all six constituent gases. Therefore, emission calculations were performed for each applicable individual gas and then the aggregate sum determined the GHG baseline. A detailed emission calculation spreadsheet is included as Appendix A.

Step 1 - Baseline Actual Emissions (BAE)

Baseline actual emissions (BAE), as they relate to an Electric Utility Steam Generating Unit (EUSGU), are defined, per 40 CFR §52.21 as adopted by reference in K.A.R. 28-19-350, as the average rate, in ton per year (tpy), at which the emissions unit actually emitted the pollutant during any consecutive 24-month period selected by the owner or operator within the 5-year period immediately preceding the date that a complete permit application is received by KDHE.

For this analysis, the BAE was determined for Unit 1 using monthly CEMS data and USEPA approved emission factors.

The GHG BAE for the Project is presented in Table 2-1. While the regulations allow each pollutant (NO_x, SO₂, GHG, etc.) to use a different 24-month period to determine the BAE, each unit for a given pollutant must use the same 24-month period. Since the Project only pertains to Unit 1, the project total BAE was determined as the highest 24-month rolling annual average of the monthly sum of historical GHG emissions from Unit 1 over the most recent 5 years. The historical monthly GHG emissions were calculated as the aggregate sum of the CO₂, CH₄, and N₂O emissions.

Table 2-1 Baseline Actual Emissions Summary	
Pollutant	BAE (tpy) ^[a, b]
CO ₂	2,143,479
CH ₄	22.6
N ₂ O	17.0
GHG ^[c, d]	2,143,519
<p>^[a] Detailed emission calculations are contained in Appendix A.</p> <p>^[b] Includes emissions from the combustion of coal and fuel oil.</p> <p>^[c] GHG emissions are the aggregate of CO₂, CH₄, and N₂O emissions.</p> <p>^[d] Emissions are on a mass basis.</p>	

Step 2 - Projection Period

In order to determine the Project’s PAE (Step 3), it is necessary to first determine the duration of the projection period. The projection period begins on the date the affected facility resumes regular operation and typically encompasses the subsequent first 5 years of operation. Under certain circumstances (such as a design capacity or PTE increase), the projection period must be extended an additional 5 years, for a total of 10 years following the date the affected unit resumes normal operation. Since the proposed Project will increase the unit’s CO PTE, a 10 year projection period is utilized.

Step 3 - Projected Actual Emissions (PAE)

PAE are defined in 40 CFR §51.166(b)(40)(i) as, “the maximum annual rate, in TPY, at which an existing emissions unit is projected to emit a regulated NSR pollutant in any one of the 5 years (12-month period) following the date the unit resumes regular operation after the project, or in any one of the 10 years following that date, if the project involves increasing the emissions unit’s design capacity or its potential to emit that regulated NSR pollutant, and full utilization of the unit would result in a significant emissions increase, or a significant net emissions increase at the major stationary source”.

To calculate the PAE, it is necessary to account for the emissions associated with 1) the future business activity level (i.e., electrical demand growth in the case of EUSGU)

over the course of the projection period (in this case 10 years); and 2) any projected emissions change associated with the proposed Project itself.

First, to determine the projected increase associated with future business activity, BPU commissioned a dispatch and forecast load study. BPU and Black & Veatch performed a 10-year load projection study for Unit 1 at the Nearman facility based on the most recent dispatch and financial forecast analysis. In the study, it was assumed that Nearman Unit 1 will be dispatched to serve load, meet spinning reserve requirements, and make spot sales, if available. Additionally, both planned and unplanned unit outages were factored into the load projection forecast.

Table 2-2 presents the 5-year historical and 10-year annual generation projection for Nearman Unit 1. Compared with the historical maximum annual generation over the baseline period (2005-2009) of 1,632,510,000 kW-h, the load projection forecast indicates that future demand will not exceed historical demand over the projection period. As such, there is no predicted emission increases associated with future business activity (demand growth).

The second factor in calculating the PAE is to determine the projected emissions change associated with the proposed Project itself. As previously discussed in the Air Permit Application, the Project itself will result in a decrease in NO_x emissions and an increase in CO emissions. Since there are no emissions increases associated with demand growth, the GHG PAE for the projection period is equal to the BAE.

The PAE is simply an estimate of the post-project, actual annual emissions that Nearman Unit 1 is expected to have as the result of the LNC system installation and the natural capacity factor response of Nearman Unit 1 to anticipated load growth. The PAE for GHG for the Project is presented in Table 2-3.

Table 2-2 Nearman 10-year Annual Generation Projection	
Year	Annual Generation (Net) ^[a] (kW-h)
2005	1,478,198,000
2006	1,260,433,000
2007	1,632,510,000
2008	1,520,661,000
2009	1,329,849,000
Current Year	
2011	1,602,286,990
2012	1,388,703,250
2013	1,610,229,130
2014	1,612,247,560
2015	1,583,985,230
2016	1,593,226,320
2017	1,591,172,360
2018	1,590,691,160
2019	1,591,691,040
2020	1,591,312,500
2021	1,593,246,950
2022	1,580,519,410
^[a] 10-year projection of future business activity following completion of the Project and return to regular operation.	

Table 2-3 Projected Actual Emissions Summary	
Pollutant	PAE (tpy) ^[a]
CO ₂	2,143,479
CH ₄	22.6
N ₂ O	17.0
GHG ^[b, c]	2,143,519
<p>^[a] Detailed emission calculations are contained in Appendix A.</p> <p>^[b] GHG emissions are the aggregate of CO₂, CH₄, and N₂O emissions.</p> <p>^[c] Emissions are on a mass basis.</p>	

Step 4 - Excludable Emissions (EE)

Under the Actual-to-Projected-Actual Applicability Test for NSR/PSD applicability, emission increases that are not directly related to the proposed project or modification (such as future business activity in the form of electrical demand growth) may be excluded from the PEI formula. For the purpose of this application, these types of emission increases are referred to as excludable emissions (EE). The EE are those emissions that could have been accommodated during the baseline period by the pre-project (unmodified) unit, and that are also unrelated to the proposed Project modifications themselves.

Because the future demand growth is not forecasted to exceed the baseline levels over the projection period (discussed in Step 3), there are no excludable emissions to consider in the NSR/PSD emission increase determination.

Step 5 - Projected Emissions Increase (PEI)

The projected emissions increase (PEI) is calculated as the difference between the PAE and the BAE for each pollutant. The PEI is then compared with the PSD significant emission rate (SER) to determine PSD applicability on a pollutant-by-pollutant basis. Table 2-4 summarizes the entire 5-step PEI calculation and compares these values with the corresponding PSD SER for GHG to determine if the Project’s GHG emissions are subject to PSD review, as further discussed in Section 2.3.

Table 2-4 Comparison of the Projected Emissions Increase to the PSD Significant Emission Rates					
NSR Pollutant	PAE ^[a] (tpy)	BAE ^[b] (tpy)	PEI ^[c] (tpy)	PSD SER ^[d] (tpy)	PSD Review Required? (Yes/No)
CO ₂	2,143,479	2,143,479	0	NA	NA
CH ₄	22.6	22.6	0	NA	NA
N ₂ O	17.0	17.0	0	NA	NA
GHG ^[e, f]	2,143,519	2,143,519	0	0 ^[g]	No

NA – Not Applicable
^[a] PAE – Projected Actual Emissions – Step 3
^[b] BAE – Baseline Actual Emissions – Step 1
^[c] PEI – Projected Emissions Increase [PEI = PAE – BAE] – Step 5
^[d] PSD SER – PSD Significant Emissions Rate
^[e] GHG emissions are the aggregate of CO₂, CH₄, and N₂O emissions.
^[f] Emissions are on a mass basis.
^[g] USEPA has not defined a mass-based regulatory significance level for GHG; therefore, that level is treated as zero.
 Note: Detailed emission calculations are contained in Appendix A.

2.3 GHG New Source Review Applicability

Air quality permitting in Kansas is the jurisdiction of the Kansas Department of Health and Environment (KDHE). The USEPA has given the KDHE authority to implement and enforce the federal Clean Air Act (CAA) provisions and state air regulations under its approved State Implementation Plan (SIP). The KDHE has further given the Unified Government of Wyandotte County the authority to administer the CAA provisions for sources located within that county. However, the KDHE has requested direct involvement with any air permit application at Nearman and will thus be responsible for the review of this application and the issuance of an air permit to construct and operate the proposed modifications to Nearman Unit 1. The following paragraphs discuss the Project’s applicability to the GHG NSR program.

As discussed in the Air Permit Application submitted in October, 2010, the PSD program, as administered by the state of Kansas under K.A.R. 28-19-350, *Prevention of Significant Deterioration of Air Quality*, applies to the proposed Project and the Nearman facility is considered an existing major PSD source.

As the proposed Project will be located at an existing major stationary source, PSD applicability is determined on a pollutant-by-pollutant basis by using the 2002 NSR Reform Rules (discussed in detail in Section 2.2) which compares the PEI of each

pollutant against the individual PSD SERs. The PEI can be determined by comparing the pre-project (BAE) baseline emissions with the post-project potential to emit (PTE) emissions. Alternatively, as provided for in the NSR/PSD reform rules, electric utility steam generating units (EUSGUs) have the option of using projected actual emissions (PAE) instead of PTE, and excluding those emission increases associated with increased business activity in determining the PEI.

Step 1 of the Tailoring Rule phase-in, which begins on January 2, 2011, is applicable to this Project. With respect to the PSD program, GHG sources will become subject to PSD for their GHG emissions if they are undergoing PSD permitting anyway, either for new construction or for modification projects, based on emissions of non-GHG pollutants. In which case, they will also be subject to the PSD requirements for GHG if they increase GHG emissions by 75,000 tpy CO₂e or more and more than zero tpy on a mass basis. Under Step 1, only these sources, which are referred to as “anyway” PSD sources, can become subject to PSD for GHG; and no sources will become major sources for PSD purposes or be treated as undertaking modifications that trigger PSD based solely on their GHG emissions.

Therefore, existing or newly-constructed sources that are determined to be major sources based on non-GHG emissions are required to conduct a BACT review for their GHG emissions (from new construction) or emissions increases (from modifications), if they are subject to PSD due to their non-GHG emissions from construction or modification actions **and** each of the following conditions is met:

- (1) The GHG emissions increase and the net emissions increase due to the modification project, calculated as the sum of the six well-mixed GHGs on a CO₂e basis (GWPs applied) equal or exceed a value of 75,000 tpy CO₂e; **and**
- (2) The GHG emissions increase and the net emissions increase due to the modification project, calculated as the sum of the six well-mixed GHGs on a mass basis (no GWPs applied) exceed a value of 0 tpy.

The purpose of the second condition is to determine whether the GHG emissions or net emissions increase has resulted in an “increase in the amount” of an air pollutant as required by the Act. Because USEPA has not defined a mass-based regulatory significance level for GHGs, that level, in effect, is treated as zero. In practice, this means any amount of emission increase will exceed the mass based limit. USEPA, at this time, did not establish a significance level based on mass emissions, but instead established one based on CO₂e that addresses permitting burdens. The zero mass-based amount applies, but only as an initial screen to exclude sources or changes that have no mass increase of GHGs.

As shown in Table 2-4, the estimated mass-based PEI of GHG resulting from the Project does not exceed the PSD SER. Therefore, the Project’s emissions of GHG are not subject to PSD review.

**Appendix A
Emissions Calculations**