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Kansas

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Susan Mosier, MD, Secretary | Department of Health & Environment | Sam Brownback, Governor

June 29, 2016

Mark Hague, Regional Administrator
USEPA Region VII
11201 Renner Blvd
Lenexa KS 66219

RE: Air characterization approaches for the Data Requirements Rule for the 2010 1-hour SO_2 primary NAAQS

Dear Administrator Hague:

On January 14, 2016, the Kansas Department of Health and Environment (KDHE) submitted to EPA Region VII the required list of SO_2 applicable sources, along with our recommendations for attainment designations for their corresponding Kansas counties, in conformance with 40 CFR 51.1203 (a) of the Data Requirements Rule (DRR). In your letter to Gov. Brownback, received February 16, 2016, you responded and informed us of your designations for the three counties under scrutiny: unclassifiable/attainment for Linn County (for KCP&L - La Cygne); and unclassifiable for Wyandotte County (for Kansas City BPU - Nearman) and Shawnee County (for Westar Energy - Tecumseh).

Section 51.1203 (b) through (e) of the DRR, which this letter addresses, requires KDHE to describe the approach to be taken to characterize peak 1-hour SO_2 concentrations for "each source area subject to requirements for air quality characterization." Since Linn County has been designated unclassifiable/attainment (i.e., its air quality has already been successfully characterized, based on modeling carried out pursuant to the Sierra Club consent order), this leaves two Kansas counties—Wyandotte and Shawnee—for discussion of air characterization approaches.

Wyandotte County, Kansas

The single large SO_2 source in Wyandotte County is the coal-fired boiler for Unit 1 at the Kansas City Board of Public Utilities' Nearman Creek Power Station (Kansas City BPU - Nearman). For this source, KDHE will characterize peak 1-hour SO_2 concentrations through ambient air quality modeling, according to § 51.1203 (d). The modeling protocol called for in that section of the DRR is presented in Appendix 1, "Modeling Protocol for Kansas City BPU - Nearman." Please note this protocol represents an amended version of earlier modeling carried out pursuant to the Sierra Club consent order. The current protocol has been amended to meet EPA Region VII staff comments and recommendations made in their document "Draft Technical Support Document: Kansas Area Designations for the 2010 SO_2 Primary National Ambient Air Quality Standard," received via e-mail February 16, 2016, particularly with respect to extending the modeling domain into Missouri.

Shawnee County, Kansas

Shawnee County no longer has an SO_2 source emitting more than 2,000 tons per year, since Westar Energy permanently closed Unit 8/10 at its Tecumseh facility December 31, 2015. The remaining coal-fired electric generating unit at the facility, Unit 7/9, emitted 1,246 tons SO_2 in 2015, and has not emitted more than 2,000 tons SO_2 for any year over the last 10 years. Therefore, in lieu of characterizing air quality for the county via modeling or monitoring, Westar

Energy has agreed to take a 2,000 ton per year limit for SO_2 at their Tecumseh facility according to § 51.1203 (e). Westar Energy's letter to KDHE, which sets out the company's intention to take this limit, can be found in Appendix 2, "Westar Energy's Notice of Intent to Comply." In order to make the limit federally enforceable, KDHE intends to memorialize the facility's SO_2 limit in a construction permit, to be issued before January 13, 2017.

An e-mailed electronic copy in exact duplicate of this hard copy has been sent to EPA Region VII Air Planning staff. Should you have questions regarding this submission, or require further information, please contact Douglas Watson, KDHE Bureau of Air Monitoring and Planning Section, at 785-296-0910 or at dwatson@kdheks.gov.

Sincerely,

William L Bider
for

John W. Mitchell
Director, Division of Environment

Cc:	David Peter	EPA Region VII
	Heather Hamilton	EPA Region VII
	Michael Jay	EPA Region VII
	Rick Brunetti	KDHE Bureau of Air
	Douglas Watson	KDHE Bureau of Air

Appendix 1: Modeling Protocol for Kansas City BPU - Nearman

KANSAS CITY BPU
THE POWER OF COMMUNITY

Mr. Doug Watson
Chief, Air Monitoring & Planning Section
Kansas Department of Health and Environment
Bureau of Air
1000 SW Jackson, Suite 310
Topeka, Kansas 66612-1366

June 6, 2016

Subject: **Kansas City Board of Public Utilities 1-hour SO2 NAAQS Designation Air Dispersion Modeling Protocol in accordance with EPA's SO2 Data Requirements Rule for 2010 1-hour SO2 NAAQS**

Dear Mr. Watson,

The Kansas City Board of Public Utilities is submitting the completed 1-hour SO2 National Ambient Air Quality Standard (NAAQS) designation air dispersion modeling protocol in accordance with EPA's SO2 Data Requirements Rule for the 2010 revisions to the primary NAAQS for SO2.

Please feel free to contact me with any questions or if you would like to discuss this further. I can be reached via email at isetzler@bpu.com or by phone at 913.573.9806.

I appreciate your assistance.

Sincerely,

Ingrid Setzler
Director Environmental Services
Kansas City Board of Public Utilities

Cc: D. Quach, J. Moe, T. Le

SO_2 DATA REQUIREMENTS RULE
1-HOUR SO_2 NAAQS DESIGNATION
AIR DISPERSION MODELING PROTOCOL

Kansas City Board of Public Utilities
Nearman Creek Station
Kansas City, KS

BPU
THE POWER OF COMMUNITY

Prepared By:
TRINITY CONSULTANTS
9777 Ridge Dr.
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Lenexa, Kansas 66219

June 2016

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

The U.S. Environmental Protection Agency (U.S. EPA) is currently going through a four phase designation process with respect to the 1-hour SO_2 NAAQS. The first two phases of designations have been completed and resulted in some areas of the country being designated as nonattainment. For areas of the country not designated nonattainment in the first two phases, the next two phases require states to utilize either a dispersion model or a monitor to characterize air quality surrounding sources that have SO_2 emissions greater than 2,000 tons per year.

Each state was required to submit a letter to the U.S. EPA in January of 2016 containing a list of sources that have SO_2 emissions greater than 2,000 tons per year. The Board of Public Utilities' (BPU's) Nearman Creek Power Station was included in the list for Kansas. Kansas intends to utilize air dispersion modeling to characterize the air quality surrounding Nearman Creek Power Station. This document provides a protocol for the dispersion modeling.

2. 1-HOUR SO_2 DESIGNATION MODELING - DATA AND PROCEDURES

2.1. MODELING OVERVIEW

Trinity Consultants will perform 1-hour SO_2 modeling using AERMOD version 15181 along with Trinity's *BREEZE™* AERMOD software. All regulatory default options will be used in the modeling. The pollutant ID will be set to SO_2 and the output options will be configured such that the model predicts an SO_2 design value based on the 3-year average of the 99th percentile of the annual distribution of the daily maximum 1-hour concentrations for comparison with the 1-hour SO_2 NAAQS of 196 ug/m^3.

Modeling will be conducted using the urban area option feature of AERMOD. Modeling performed recently by the Missouri Department of Natural Resources (MDNR) as part of the State Implementation Plan for compliance with the 2010 1-hour SO2 NAAQS for the Jackson County nonattainment area, which included BPU's Nearman Creek Station facility, utilized the urban option for Kansas City. Urban/rural determinations were made by implementing both land-use and population density procedures and the area was found to be largely urban. Following guidance in 40 CFR Part 51, Appendix W, subsection 7.2.3(f), each source was modeled under the urban option. Trinity has elected to maintain the urban area option, following MDNR's evaluation of the same area for recent modeling. A population of 2,343,000 for the Kansas City metro area will be used as the estimated total for the two state metropolitan region.

2.2. METEOROLOGICAL DATA

Trinity will process surface meteorological data for 2012, 2013, and 2014 collected at the Charles B. Wheeler Downtown Airport in Kansas City, Missouri. Upper air meteorological data will be collected for the same years at nearest U.S. National Weather Service (NWS) upper-air balloon station, located in Topeka, Kansas (TOP). A determination of whether the surface meteorological data from the Charles B. Wheeler Downtown Airport were appropriate for use in BPU's modeling analyses was considered by determining whether the data were representative of the site where the Nearman Creek Station plant is located. The extremely close proximity of the airport with respect to Nearman Creek Station (approximately 6 miles), in addition to the similarity in the climatology and topography (the airport is approximately 758 feet and Nearman Creek Station is approximately 753 feet) support that the meteorological conditions at the airport are representative of the meteorological conditions at Nearman Creek Station.

AERMOD-ready meteorological data will be prepared using the latest version of the U.S. EPA's AERMET meteorological processing utility (version 14134). Standard U.S. EPA meteorological data processing guidance will be used as outlined in a recent memorandum[1] and other documentation.

2.2.1. Surface Data

Raw hourly surface meteorological data will be obtained from the U.S. National Climactic Data Center (NCDC) for Charles B. Wheeler Downtown Airport in Kansas City, Missouri (KMKC, WMO ID: 724463) in the standard ISHD format. This data will be supplemented with TD-6405 (so-called "1-minute") wind data from KMKC. The 1-minute wind data will be processed using the latest version of the U.S. EPA AERMINUTE pre-processing tool (version 14337). The quality of the 1-minute data will be verified by comparison to the hourly ISHD data from

[1] Fox, Tyler, U.S. Environmental Protection Agency. 2013. "Use of ASOS Meteorological Data in AERMOD Dispersion Modeling." Available Online:
http://www.epa.gov/ttn/scram/guidance/clarification/20130308_Met_Data_Clarification.pdf

KMKC. The "Ice-Free Winds Group" AERMINUTE option will be selected due to the fact that a sonic anemometer has been used at KMKC since 2006.

2.2.2. Upper Air Data

In addition to surface meteorological data, AERMET requires the use of data from a sunrise-time upper air sounding to estimate daytime mixing heights. Upper air data from the nearest U.S. National Weather Service (NWS) upper-air balloon station, located in Topeka, KS (TOP), will be obtained from the National Oceanic and Atmospheric Administration (NOAA) in FSL format.

2.2.3. Land Use Analysis

Parameters derived from analysis of land use data (surface roughness, Bowen ratio, and albedo) are also required by AERMET. In accordance with U.S. EPA guidance, these values will be determined using the latest version of the U.S. EPA AERSURFACE tool (version 13016).[2] The AERSUFACE settings that will be used for processing are summarized in Table 2.1 below. The met station coordinates will be determined by visually identifying the met station using Google Earth. NLCD 1992 (CONUS) Land Cover data used in AERSURFACE processing will be obtained from the Multi-Resolution Land Use Consortium (MRLC).

U.S. EPA guidance dictates that on at least an annual basis, precipitation at a surface site should be classified as wet, dry, or average in comparison to the 30-year climatological record at the site. This determination is used to adjust the Bowen ratio estimated by AERSURFACE. To make the determination, annual precipitation in each modeled year (2012-2014) will be compared to the 1981-2010 climatological record for KMKC.[3] The 30th and 70th percentile values of the annual precipitation distribution from the most recent available 30-year period will be calculated. Per U.S. EPA guidance, each modeled year will be classified for AERSUFACE processing as "wet" if its annual precipitation is higher than the 70th percentile value, "dry" if its annual precipitation is lower than the 30th percentile value, and "average" if it is between the 30th and 70th percentile values.

Table 2-1. AERSURFACE Input Parameters

AERSURFACE Parameter	Value
Met Station Latitude	39.120963
Met Station Longitude	-94.597027
Datum	NAD 1983
Radius for surface roughness (km)	1.0
Vary by Sector?	Yes
Number of Sectors	12
Temporal Resolution	Seasonal
Continuous Winter Snow Cover?	No
Station Located at Airport?	Yes
Arid Region?	No
Surface Moisture Classification	Determined based on 30th and 70th percentile of climate normals

[2] U.S. Environmental Protection Agency. 2013. "AERSURFACE User's Guide." EPA-454/B-08-001, Revised 01/16/2013. Available Online: http://www.epa.gov/scram001/7thconf/aermod/aersurface_userguide.pdf

[3] National Climactic Data Center. 2010 Local Climatological Data (LCD), Charles B. Wheeler Airport (KMKC).

2.2.4. AERMET Processing Options

Standard AERMET processing options will be used.[4,5] The options that will be elected include the following:

- MODIFY keyword for upper air data
- THRESH_1MIN 0.5 keyword to provide a lower bound of 0.5 m/s for 1-minute wind data
- AUDIT keywords to provide additional QA/QC and diagnostic information
- ASOS1MIN keyword to incorporate 1-minute wind data
- NWS_HGT WIND 10 keyword to designate the anemometer height as 7.9 meters
- METHOD WIND_DIR RANDOM keyword to correct for any wind direction rounding in the raw ISHD data
- METHOD REFLEVEL SUBNWS keyword to allow use of airport surface station data
- Default substitution options for cloud cover and temperature data will not be overridden
- Default ASOS_ADJ option for correction of truncated wind speeds will not be overridden
- ADJ_U* beta option will not be used

2.3. COORDINATE SYSTEM

In all modeling input and output files, the locations of emission sources, structures, and receptors will be represented in Zone 15 of the Universal Transverse Mercator (UTM) coordinate system using datum World Geodetic System (WGS) 1984, which is comparable to the North American Datum 1983 (NAD83). Nearman Creek Station is approximately centered at UTM, Zone 15, coordinates 353,394 meters East and 4,337,135 meters North. The base elevation of the facility is approximately 230 meters above mean sea level.

2.4. RECEPTOR LOCATIONS

The model will include a receptor grid centered on BPU's Nearman Creek Station and the grid will expand 50 km in each direction, for a total grid of 100 km by 100 km. The grid will include the following receptor spacing centered on Nearman Creek Station:

- 100 meter spacing from 0 to 5 km
- 1,000 meter spacing from 5 to 25 km
- 5,000 meter spacing from 25 to 50 km

A receptor will also be placed at the location of the SO_2 "Troost monitor" in Missouri. Figure 2.1 shows a map of the receptor locations with respect to Nearman Creek Station.

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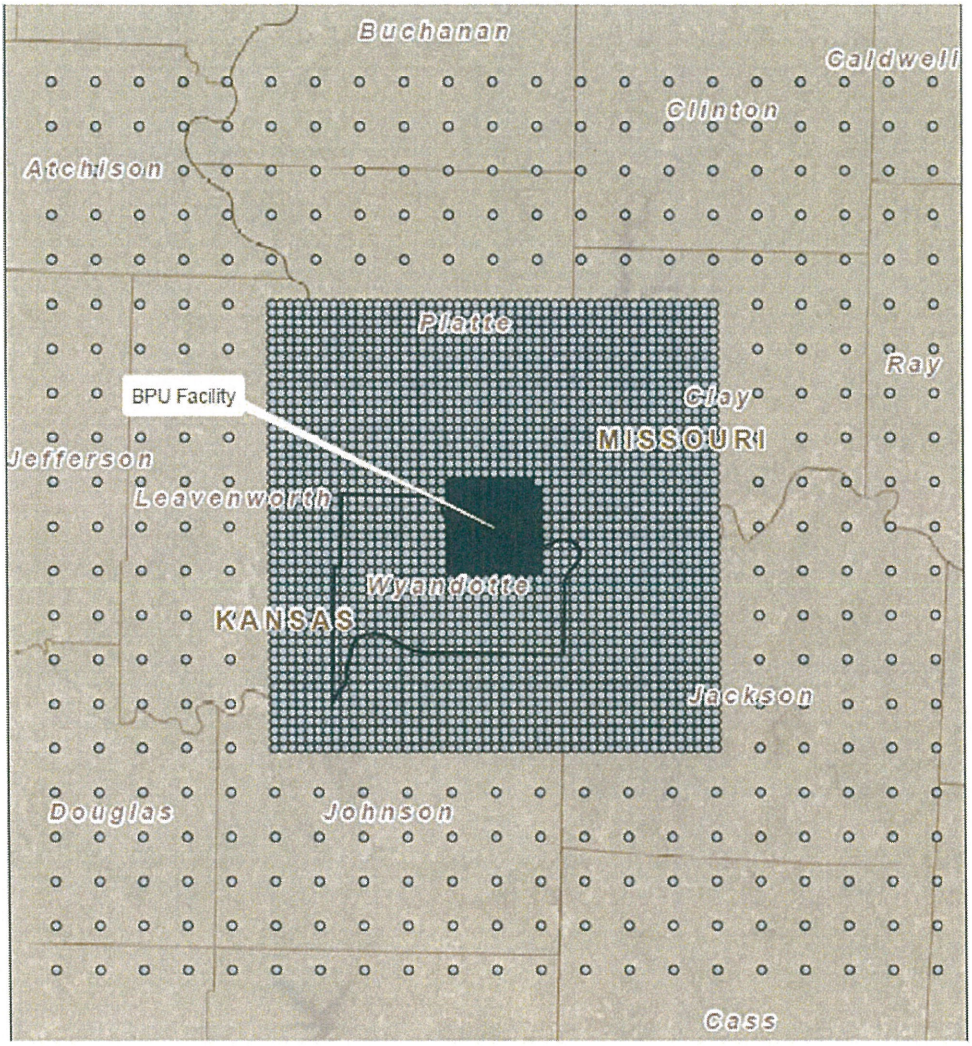
[4] Fox, Tyler, U.S. Environmental Protection Agency. 2013. "Use of ASOS Meteorological Data in AERMOD Dispersion Modeling." Available Online: http://www.epa.gov/ttn/scram/guidance/clarification/20130308_Met_Data_Clarification.pdf

[5] U.S. Environmental Protection Agency. 2014. "User's Guide for the AERMOD Meteorological Preprocessor (AERMET)". EPA-454/B-03-002, November 2004).

Figure 2-1. Map of Receptor Grid



2.5. TERRAIN ELEVATIONS

The terrain elevation for each receptor, building, and emission source will be determined using USGS 1/3 arc-second National Elevation Data (NED). The NED, which will be obtained from the USGS, will have terrain elevations at 10-meter intervals. Using the AERMOD terrain processor, AERMAP (version 11103), the terrain height for each receptor, building, and emission source included in the model will be determined by assigning the interpolated height from the digital terrain elevations surrounding each source.

In addition, AERMAP will be used to compute the hill height scales for each receptor. AERMAP searches all NED points for the terrain height and location that has the greatest influence on each receptor to determine the hill

height scale for that receptor. AERMOD then uses the hill height scale in order to select the correct critical dividing streamline and concentration algorithm for each receptor.

2.6. EMISSION SOURCES

2.6.1. Wyandotte County Emission Sources

The boiler located at Nearman Creek Station is currently the only significant source of SO_2 in Wyandotte County. Thus, this is the only source located in Wyandotte County that will be included in the model. Note that the two Quindaro Power Station boiler will not be included in the model because the boilers were converted to natural gas in April of 2015, and SO_2 emissions have fallen to below 5 tons/year.

The stack for the boiler at Nearman Creek Station will be modeled as a point source. The emission rates and stack parameters that will characterize the boiler are summarized in Table 2-2 below.

Table 2-2. Nearman Creek Station Model Inputs

X Coordinate (m)[1]	Y Coordinate (m)[1]	Stack Height (ft)	Stack Diameter (ft)	Exit Velocity (ft/s)	Flow Rate (acfm)	Exit Temp (F)	Emission Rate (lb/hr)
353394.7	4337135.7	400	20	2012-2014 CEMS	2012-2014 CEMS	2012-2014 CEMS	2012-2014 CEMS

[1]UTM Zone 15, NAD 83

2.6.2. Jackson County Sources

Portions of Jackson County were designated nonattainment for 1-hour SO_2 during Phase 1 of the designations under the EPA's Data Requirements Rule. Figure 2-2 shows the Jackson County nonattainment area.

Figure 2-2 Jackson County, Missouri 1-Hour SO_2 Nonattainment Area

The 100 km X 100 km grid centered on Nearman Creek Station will include sources in the nonattainment area. The MDNR developed a nonattainment SIP that addresses the nonattainment area. The SIP includes limits that result in modeled compliance with the NAAQS for several large sources within and near the nonattainment area.

Some of the limits contained in the SIP are higher than 2012 to 2014 actual emissions, as is the case for the Missouri City Independence Power & Light boilers 1 & 2 stack (EP5) and heating boiler stack (EP6). On the contrary, some of the SIP limits are less than 2012 to 2014 actual emissions, but higher than emissions occurring since the Boiler MACT compliance date of January 31, 2016, which is the case for Veolia Energy in Kansas City, Missouri. In 2015, Veolia switched to burning natural gas instead of coal in order to comply with the Boiler MACT. While Veolia is burning natural gas, BPU recognizes that there is no permit condition restricting Veolia from burning coal, and thus a coal restriction is not a federally enforceable requirement. However BPU also recognizes that Veolia could only start burning coal if emission controls were put in place that would allow the boilers to meet the emission limits in the Boiler MACT. Veolia has modified it's existing Title V operating permit to remove all references to coal, and it is reasonable to estimate actual emissions from the Boiler MACT compliance date of January 31, 2016 and forward based on the use of natural gas.

The fuel changes made by Veolia in 2015, along with other changes in the area, resulted in large reductions in SO_2 concentrations in the Jackson County nonattainment area. In 2016, the 99th percentile 1-hour SO2 concentration measured at the Troost monitor in Kansas City, Missouri is only 7 ppb, well below the NAAQS of 75 ppb and a large drop from previous years. This is evidence that recent changes are making a significant difference on SO_2 concentrations in the nonattainment area. Since a fuel change was implemented at Veolia in 2015, and the TAD suggests that actual emissions should be modeled, it is likely most appropriate to model emissions from Veolia reflective of natural gas combustion. That said, Trinity will rely upon the SO_2 limits in the MDNR's nonattainment SIP for Veolia, which are higher than the current actual emissions from Veolia, as a conservative approach for handling emissions from Veolia.

For purposes of the modeling, for sources without CEMS data, 2013 actual emissions will be modeled except for the case of Veolia where SIP limits will be modeled (MDNR's SIP limits will be federally enforceable as of January 1, 2017). This will be a conservative estimate of actual emissions since Veolia has already reduced emissions well below the SIP limit to comply with the Boiler MACT. Other Jackson County sources will be modeled using three years (2012-2014) of CEMS data where CEMS are available.

Table 2-3 below summarizes the sources in Jackson County, Missouri that will be included in the model.

Table 2-3. Jackson County Source Model Inputs[1]

Facility & Unit	X Coordinate (m)[2]	Y Coordinate (m)[2]	Stack Height (ft)	Stack Diameter (ft)	Exit Velocity (ft/s)	Flow Rate (acfm)	Exit Temp (F)	Emission Rate (lb/hr)
Independence Power & Light at Missouri City, Boilers 1 & 2 Stack (EP5)	4343248.6	387072.9	300	10.5	23.0	119,494.4	290	220.4
Independence Power & Light at Missouri City, Heating Boiler Stack (EP6)	4343248.6	387072.9	93	1.67	20.0	2,628.5	405	0.1
Independence Power & Light at Blue Valley, Unit 1 (EP3)	4327808.3	385311.9	153	5.5	47.1	67,104.9	323	193.4
Independence Power & Light at Blue Valley, Unit 2 (EP4)	4327821.1	385313.6	153	5.5	51.8	73,840.8	356	224.6
Independence Power & Light at Blue Valley, Unit 3 (EP5)	4327832.3	385329.9	250	6.75	97.86	210,113.5	320	340.3
Veolia Energy, Boiler 1A Stack (EP1)	4330417	363390.1	156	7.0	47.9	110,604.5	600	0.50
Veolia Energy, Boilers 6 & 8 Stack (EP2)	4330434.0	363376.5	282	16.75	5.96	78,798.3	253	351.8
Veolia Energy, Boiler 7 Stack (EP3)	4330428	363422.9	282	16.75	5.02	66,370.4	282	0.50
KCP&L GMO at Sibley, EP5A Stack	4337276.5	397714.9	696	13.5	2012-2014 CEMS	2012-2014 CEMS	2012-2014 CEMS	2012-2014 CEMS
KCP&L GMO at Sibley, EP5B Stack	4337276.5	397714.9	696	13.5	2012-2014 CEMS	2012-2014 CEMS	2012-2014 CEMS	2012-2014 CEMS
KCP&L GMO at Sibley, EP5C Stack	4337276.5	397714.9	696	13.5	2012-2014 CEMS	2012-2014 CEMS	2012-2014 CEMS	2012-2014 CEMS
KCP&L at Hawthorn, Unit 6/9 Stack (EP901)	4332321.2	372276.7	602	20.34	2012-2014 CEMS	2012-2014 CEMS	2012-2014 CEMS	2012-2014 CEMS

[1]Provided in a May 26, 2015 e-mail from Lynn Deahl of KDHE to BPU.
[2]UTM Zone 15, NAD 83.

2.7. BUILDING INFLUENCES

The U.S. EPA's Building Profile Input Program (BPIP) with Plume Rise Model Enhancements (PRIME) (version 04274), will be used to account for building downwash influences in the model. The purpose of a building downwash analysis is to determine if the plume discharged from a stack will become caught in the turbulent wake of a building (or other structure), resulting in downwash of the plume. The downwash of the plume can result in elevated ground-level concentrations.

2.8. BACKGROUND CONCENTRATION

KDHE requested that BPU use a 1-hour SO_2 background concentration of 13 parts per billion (ppb), or 33.57 $\mu g/m^3$, which KDHE feels is representative of the background concentration in the vicinity of Nearman Creek Station. Trinity will incorporate the requested background concentration into the modeling analysis.

Appendix 2: Westar Energy's Notice of Intent to Comply

Lynn Deahl

From: Dan Wilkus <Dan.Wilkus@westarenergy.com>
Sent: Wednesday, June 29, 2016 7:59 AM
To: Douglas Watson
Cc: Lynn Deahl
Subject: Data Requirements Rule SO2 Limitation

Doug, per your request, following is Westar's proposed SO2 emission limitation for Tecumseh Energy Center to satisfy the Data Requirements Rule requirements. Please let us know if you have any questions or need additional information.

Thanks,

Dan

"Beginning with calendar year 2017 and each calendar year thereafter, Unit 7/9 will not emit in excess of 2,000 tons per year of SO2 emissions on a calendar year basis.."

Daniel R. Wilkus, P.E.
Westar Energy
Director, Air Programs
Dan.Wilkus@WestarEnergy.com
O (785) 575-1614 **C** (785) 550-7995