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

September 9, 2015

Mark Hague
Acting Regional Administrator
USEPA, Region VII
901 N. 5th Street
Kansas City, KS 66101

Dear Mr. Hague:

This letter is being submitted to the Environmental Protection Agency (EPA) to recommend area designations for the 1-hour National Ambient Air Quality Standard (NAAQS) for sulfur dioxide (SO_2) per the March 2, 2015, consent decree. In the EPA's "Updated Guidance" memorandum issued on March 20, 2015, states are required to identify areas as attainment, nonattainment, and unclassifiable on the basis of current available information. The KDHE submits the following recommendations per this guidance:

Attainment:	Linn County
Unclassifiable/Attainment:	Wyandotte County
Unclassifiable:	Shawnee County

The designation recommendations are based upon the Kansas Department of Health and Environment (KDHE) Bureau of Air analysis of monitoring data, dispersion modeling results, and proactive actions taken by the affected facilities. Based upon the factors specified in EPA's January 20, 2015, memo, the three Kansas facilities subject to the consent decree do not significantly cause or contribute to violations of the Clean Air Act. Furthermore, KDHE will provide additional information to the EPA regarding any proposed facility changes in these Unclassifiable areas as it becomes available.

Feel free to contact Tom Gross, KDHE Bureau of Air Planning Section at 785-296-1692 or Tgross@kdheks.gov if you have any questions regarding these recommendations or the analyses upon which the recommendations are made.

Sincerely,

Susan Mosier, MD
Secretary, Kansas Department of Health and Environment

Attachment:
Technical Support Document and appendices

Kansas Department of Health and Environment
Proposed Area Designations for the Environmental Protection Agency's
2010 Primary Sulfur Dioxide National Ambient Air Quality Standards
Technical Support Document

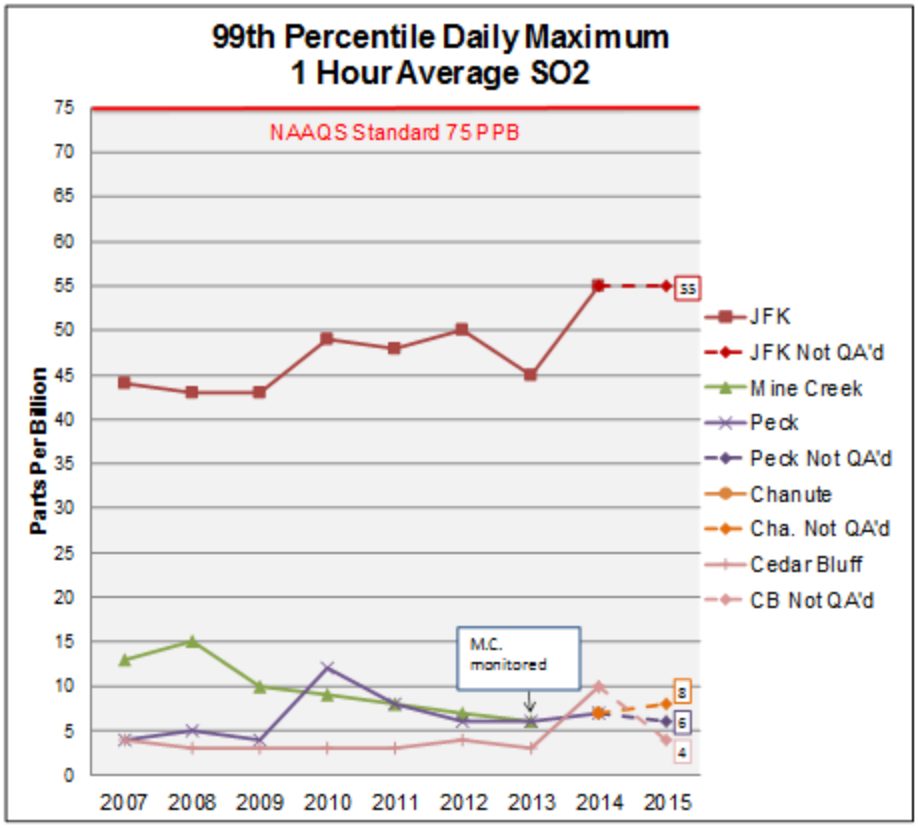
In 2010, the Environmental Protection Agency (EPA) revised the primary sulfur dioxide (SO_2) National Ambient Air Quality Standard (NAAQS) (75 FR 35520): monitored three-year average of the 99th percentile of daily maximum 1-hour concentrations to not exceed 75 ppb. On August, 5, 2013, the EPA published a notice announcing designations of 29 areas in 16 states as nonattainment for the 2010 SO_2 standard. Following these designations, three lawsuits were filed against the EPA in different U.S. District Courts, alleging the EPA had not completed the designation process in the timeframe set by the Clean Air Act (CAA). On March 2, 2015, the Court entered a consent decree and issued an enforceable order for the EPA to complete the area designations according to the consent decree schedule.

In the designations to be completed by July 2, 2016 (16 months from the Court order), the EPA specified three Kansas facilities required to model for NAAQS attainment in accordance with the consent decree. The determining thresholds for selection were: (a) facilities not announced for retirement that according to EPA's Air Markets Database emitted in 2012, (b) emitting more than 16,000 tons of SO_2, or (c) emitting more than 2,600 tons of SO_2 with an average emission rate of at least 0.45 lbs SO_2/MMBtu. The three Kansas facilities which fall under those criteria are listed in Table 1.

Table 1. Kansas air facilities requiring modeling under the March 2015 consent decree

County	Facility Name	2012 SO_2 Emissions (Tons)	2012 Average SO_2 Emissions Rate (lbs/MMBtu)
Linn	KCP&L - La Cygne Generating Station	16,235	0.36
Shawnee	Westar Energy - Tecumseh Energy Center	3,979	0.58
Wyandotte	Kansas City BPU – Nearman Creek Power Station	4,612	0.64

The chart below illustrates the monitored data for five air quality monitoring stations in Kansas in relation to the 99th percentile daily maximum 1-hour average SO_2 concentrations. Note: all data shown in solid line color have been quality assured; the data show as dotted lines have not. It is also noteworthy to mention the JFK NCore monitoring site is located 5 miles southeast of the Kansas City BPU – Nearman site and emissions are well-below the NAAQS standard.



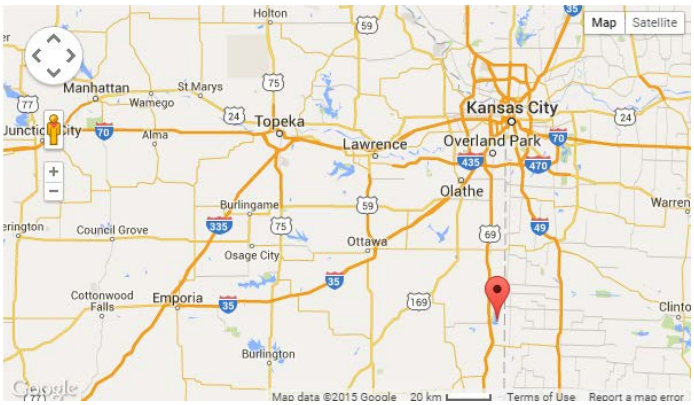
The following text outlines the technical analyses for the three facilities identified by the March 2015 consent decree as exceeding emission thresholds. Each facility is considerably different and will be addressed separately.

KCP&L - La Cygne Generating Station

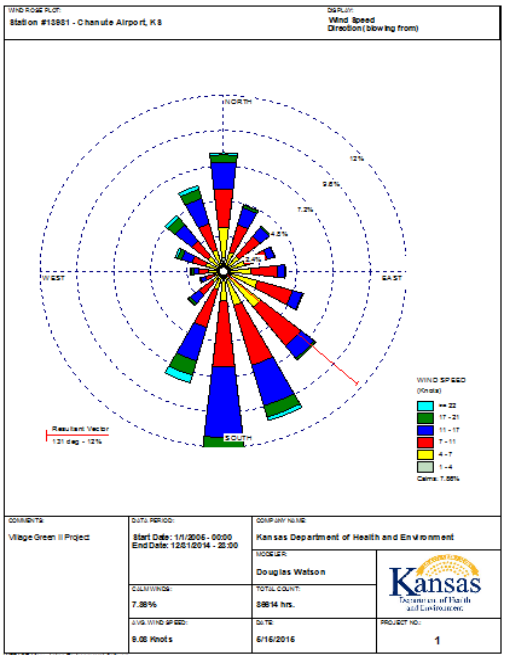
Purpose for designation determination:
La Cygne Generating Station ("LCGS") was identified by the EPA for emitting 16,235 tons of SO_2 in 2012, which exceeds the consent decree limit of 16,000 tons.

Description of location and surrounding topography:
LCGS is located approximately five miles due east of the city of La Cygne (2014 population estimate: 1,116[1]) in Linn County, Kansas. The topography is relatively flat. At LCGS, approximately 5,000 acres, including 2,400 acres of the adjoining cooling lake, are devoted to a Wildlife Management Area under the Kansas Wildlife and Parks Department.

[1] http://www.census.gov/popest/data/cities/totals/2014/files/SUB-EST2014_20.csv



Regional meteorology:
The wind rose plot (below) shows the wind frequencies from the closest representative meteorological station, Chanute, Kansas Municipal Airport. The frequencies in the wind rose represent the direction in which the wind is coming from. Based upon the data it can be concluded that the wind primarily originates from the south-southeast, with a secondary maximum from the north-northwest.



Justification for proposed designation:
LCGS made significant environmental installations and upgrades to its emission control equipment to comply with the Best Available Retrofit Technology (BART) standards under the Clean Air Visibility Rule (Unit 1 – 2015; Unit 2 – 2014). The La Cygne Generating Station Environmental Retrofit Project includes the installation of two Hitachi wet flue gas desulfurization (FGD) scrubbers and new Hamon fabric filters on Unit 1 and Unit 2; and a selective catalytic reduction (SCR) system, low-NOx burners and over-fire air system on Unit 2 of the facility. With these controls in place and operational, the LCGS is expected to achieve an SO2 emissions removal efficiency of over 98 percent.

Trinity Consultants, Inc., was contracted to conduct modeling to characterize the 1-hour SO_2 rates for the facility. The first scenario was modeled using the high load emission rate, temperature and flow rate. The highest concentration from both units combined was 108 $\mu g/m^3$ (41 ppb). Adding a background concentration of 18 $\mu g/m^3$ (converted from 7 ppb) gave a total of 126 $\mu g/m^3$ (49 ppb). The second scenario was essentially a worst-case scenario. Trinity modeled the high load emission rate with the low load temperature and flow rate. The high concentration from both units combined was 120 $\mu g/m^3$ (46 ppb). Adding the background of 18 $\mu g/m^3$ gave a total of 138 $\mu g/m^3$ (53 ppb). <u>All modeled results are well below the current NAAQS of SO_2 1-hour NAAQS</u> of 75 ppb (196 $\mu g/m^3$).

The current actual 1-hr SO_2 actual emission rates for LCGS Units 1 and 2 for the month of June 2015 at http://ampd.epa.gov/ampd/ were as follows (lb/MMBtu):

La Cygne Unit 1: avg = 0.035; max = 0.061
La Cygne Unit 2: avg = 0.009; max = 0.030

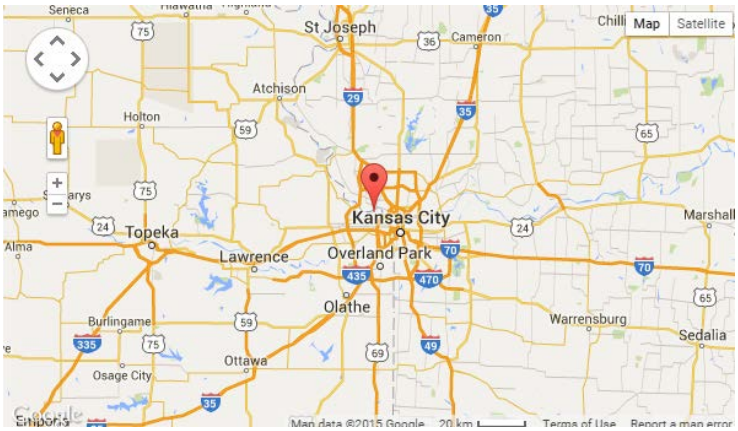
The improvements to the two La Cygne units have not been in place long enough to provide three years of data at this time. The values measured to date at LCGS demonstrate that the emission rates are demonstrably lower than the 2010 1-hour SO_2 NAAQS.

KDHE recommends that Linn County, in which LCGS resides, be designated as Unclassifiable/Attainment.

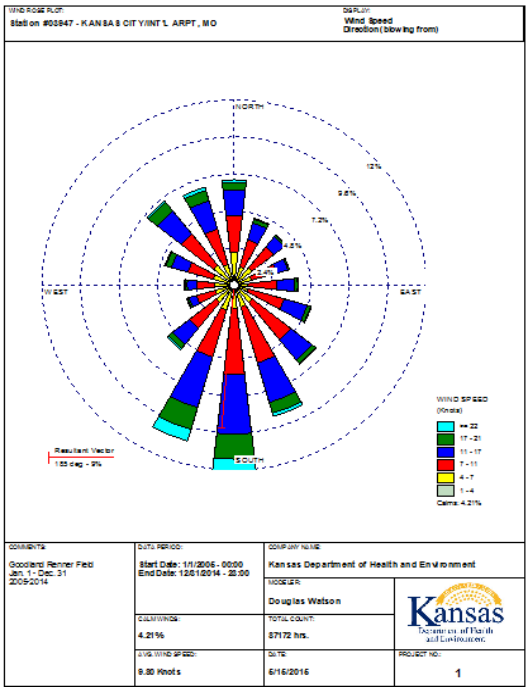
Kansas City BPU - Nearman

Purpose for designation determination:
Nearman Creek Power Station ("Nearman") was identified by the EPA for emitting 0.58 lbs SO_2/MMBtu in 2012, which exceeds the limit of average SO_2 emissions rate 0.45 lbs SO_2/MMBtu as specified in the consent decree.

Description of location and surrounding topography:
Nearman is located in Wyandotte County, Kansas, in a relatively unpopulated area directly adjacent to the Missouri River. The topography is very flat as would be expected of a region in a river basin.



Regional meteorology:
The wind rose plot (below) shows the wind frequencies from the closest representative meteorological station, the Kansas City International Airport. Based upon the data it can be concluded that the wind primarily originates from the south, with a secondary maximum from the north-northwest.



Justification for proposed designation:
The Kansas City Board of Public Utilities (BPU) has taken the following steps to reduce SO_2 emissions from the Nearman plant in the recent years.

- Obtained a construction approval to restrict ultra-low diesel fuel oil sulfur content to 15 ppb for the simple cycle turbine at the Nearman facility on July 9, 2015.
- Obtained a construction permit that restricts operation of the Nearman Auxiliary Boiler to a 10% annual capacity factor, through a restriction on total annual amount of fuel oil burned. The compliance period for this restriction begins January 31, 2016.
- BPU commenced construction on the following emission controls on Nearman unit 1: Selective catalytic reduction system for NO_x removal; powdered activated carbon injection system for Hg removal; circulating dry scrubber for SO_2 and acid gas removal; and a pulse-jet fabric filter for particulate removal.

Trinity Consultants, Inc., was contracted to conduct modeling to characterize the 1-hour SO_2 rates for the facility. The modeling included nearby facilities emitting SO_2 located in Kansas City, Missouri. Missouri DNR is in the final stages of implementing rules to reduce SO_2 emissions from sources in Kansas City, Missouri through a rulemaking developed for a first round SO_2 non-attainment designation. The most recent update of the Missouri Air Conservation

Commission's Rules in Progress[2] for the Missouri Department of Natural Resources (DNR) indicates the SO_2 control rule (10 CSR 10-6.261 Control of Sulfur Dioxide Emission[3]) will take effect on January 1, 2017. Using the allowable rates contained in the MDNR SO_2 control rule for nearby sources on the Missouri side and the actual rates from Nearman Unit 1, the highest concentration of modeled SO_2 results was 160 $\mu g/m^3$ (61 ppb). All modeling protocols and results are provided in the appendix. Furthermore, KDHE will provide additional information to the EPA regarding any proposed facility changes in this Unclassifiable area as it becomes available.

A change in progress at BPU's most significant nearby source, Veolia Energy in Kansas City, Missouri, further supports BPU's demonstration. Veolia submitted to Missouri Department of Natural Resources an application for a Part 70 operating permit significant modification on December 26, 2014. This permit application was found to be complete as of February 3, 2015. In this application, Veolia commits to switching its two coal-fired boilers to using natural gas as primary fuel with fuel oil as backup to be classified as "units designed to burn gas 1 fuels" under the "Boiler MACT" (i.e., 40 CFR Part 63, Subpart DDDDD). This fuel switch is scheduled to be finalized as of January 31, 2016, and is anticipated to contribute towards attainment of the 1-hour SO_2 NAAQS.

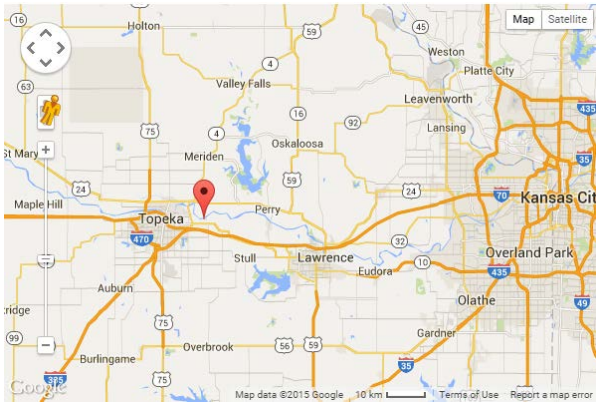
KDHE recommends that Wyandotte County, in which Nearman resides, be designated as Unclassifiable/Attainment.

Westar Energy - Tecumseh

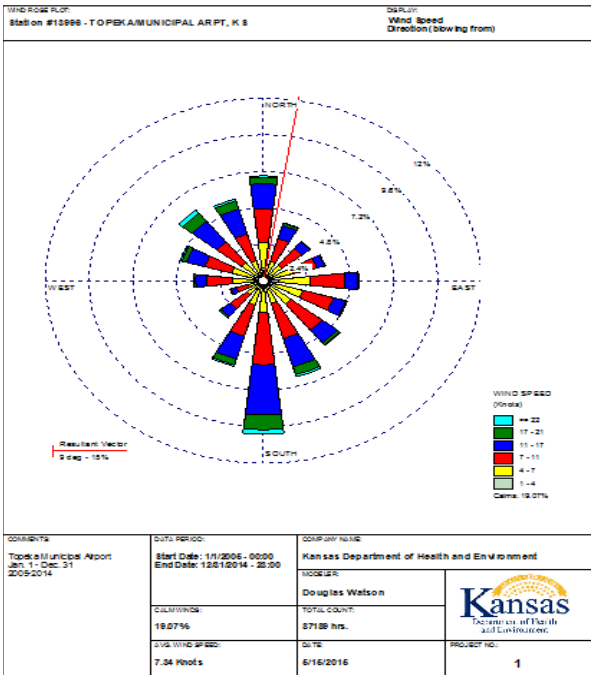
Purpose for designation determination:
Westar Energy's Tecumseh Energy Center ("TEC") was identified by the EPA for emitting 0.64 lbs SO_2/MMBtu in 2012, which exceeds the limit of average SO_2 emissions rate 0.45 lbs SO_2/MMBtu as specified in the consent decree.

Description of location and surrounding topography:
TEC is located east of Topeka, Kansas, in an unincorporated community, Tecumseh. The Tecumseh is sited directly south of the Kansas River. The topography is very flat as would be expected of a river basin.

[2] http://dnr.mo.gov/env/apcp/docs/planningreport-march2015.pdf
[3] http://dnr.mo.gov/env/apcp/docs/drft6.261.pdf



The wind rose plot shows the wind frequencies from the closest representative meteorological station, the Topeka Municipal Airport. The frequencies in the wind rose represent the direction in which the wind is coming from. Based upon the data it can be concluded that the wind primarily originates from the south, with a secondary maximum from the north-northwest.



Justification for proposed designation:
Westar and Innovia Films, a cellophane plant located adjacent to TEC, have taken a number of actions to comply with the 1-hour SO_2 NAAQS. Westar secured an outside consultant to conduct dispersion modeling to determine the plant's impacts on the ambient air in the TEC area. The emission inventory used to conduct this modeling included Innovia Films as a nearby SO_2 source. The preliminary air dispersion modeling assessment indicated impacts above the 1-hour SO_2 NAAQS. The modeling analysis showed that Innovia Films significantly contributed to the modeled SO_2 concentrations and that Westar would be unable to model compliance with the 1-hour SO_2 NAAQS without emission reductions from Innovia Films. Additionally, Westar has evaluated various options to reduce the SO_2 ambient concentrations in the TEC area. These

options include installation of dry sorbent inject (DSI), switching to natural gas and increasing unit stack heights.

KDHE has met with both Westar and Innovia to evaluate steps toward achieving a joint solution. In addition, Westar and Innovia have met to review emissions inputs and discuss how to move forward once modeling is complete. Westar has taken the lead in conducting dispersion modeling and will perform additional modeling runs once CEMS data is provided by Innovia. Innovia is in the process of installing and obtaining data from a CEMS prior to the flare that is the source of SO_2 emissions at the plant. The CEMS will provide more accurate data for input into the dispersion model. Innovia is also in the process of evaluating alternate technical solutions to reduce their SO_2 from the flare. Upon completion of the dispersion modeling with the revised emissions data from Innovia, KDHE will meet with both Westar and Innovia to review compliance options and determine a path forward towards meeting the 1-hour SO_2 NAAQS.

KDHE will provide additional information to the EPA regarding any proposed facility changes in this Unclassifiable area as it becomes available.

KDHE recommends that Shawnee County, in which TEC resides, be designated as Unclassifiable.

APPENDIX A

AIR DISPERSION MODELING PROTOCOL IN SUPPORT OF 1-HOUR SO_2 NAAQS DESIGNATION

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

Prepared By:
TRINITY CONSULTANTS
9777 Ridge Dr.
Suite 380
Lenexa, Kansas 66219

June 2015

Environmental solutions delivered uncommonly well

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1. INTRODUCTION

The U.S. Environmental Protection Agency (U.S. EPA) is currently going through a multi-phase designation process with respect to the 1-hour SO_2 NAAQS. An initial phase of designations has been completed and resulted in some areas of the country being designated as nonattainment. There are three more phases still to come. Two of the next three phases were the subject of the U.S EPA's proposed Data Requirements Rule, published in May 2014.

Following the U.S EPA's May 2014 publication of the proposed Data Requirements Rule, the U.S. EPA was sued for "failing to undertake a certain nondiscretionary duty under the Clean Air Act ("CAA"), 42 U.S.C. §§ 7401-7671q, and that such alleged failure is actionable under section 304(a)(2) of the CAA, 42 U.S.C. § 7604(a)(2)". The lawsuit resulted in a Consent Decree that was entered on March 2, 2015 in the U.S. District Court for the Northern District of California. As a result of the Consent Decree, an additional designation phase was added to the two designation phases that were already included in the U.S. EPA's May 2014 proposed Data Requirements Rule. The additional phase affects areas with stationary sources that meet specific emission criteria laid out in the Consent Decree. The U.S. EPA released a memorandum on March 20, 2015 to the Regional Directors clarifying the path forward for states with sources affected by the Consent Decree.

The Consent Decree requires the U.S. EPA to complete a round of SO_2 designations for the areas affected by the Consent Decree by July 2, 2016. The U.S. EPA is expected to release a final version of the Data Requirements Rule around September 2015. It is expected that the Data Requirements Rule will address all three remaining phases of the designation process.

The Board of Public Utilities' (BPU's) Nearman Creek Power Station (Nearman), located in Wyandotte County, Kansas, meets the emissions criteria laid out in in the Consent Decree. Thus, the U.S. EPA is required to designate the area surrounding Nearman by July 2, 2016. Because the Consent Decree does not allow sufficient time to commission representative ambient air monitors, an air dispersion model must be used to determine attainment status. Therefore, in line with the EPA's May 2014 proposed Data Requirements Rule, an SO_2 designation for the area surrounding Nearman will be based on the predictions of an air dispersion model.

The EPA published a draft Technical Assistance Document (TAD) in December 2013 describing a suggested approach that could be considered when conducting dispersion modeling in support of a 1-hour SO_2 NAAQS designation (referred to herein as the Modeling TAD). Among other things, the Modeling TAD indicates that actual hourly emission rates should be included in the model. However, based on discussions with KDHE and EPA Region 7, BPU understands that for purposes of the final designations to be made by July 2, 2016, as required by the Consent Decree, future allowable emissions rates that will be effective by July 2, 2016 and that are lower than historical actual emission rates can be substituted for actual emission rates.

Trinity is planning to conduct dispersion modeling on behalf of BPU to determine the SO_2 concentrations in the area surrounding Nearman, which will include all of Wyandotte County. The remainder of this protocol summarizes the data and procedures that will be used in the modeling.

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

2.1. MODEL SELECTION

Trinity will perform 1-hour SO_2 modeling using AERMOD version 14134 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 will predict 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 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 use processed 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 plant is located. The extremely close proximity of the airport with respect to Nearman (approximately 6 miles), in addition to the similarity in the climatology and topography (the airport is approximately 758 feet and Nearman is approximately 753 feet) support that the meteorological conditions at the airport are representative of the meteorological conditions at Nearman.

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 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.

[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

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 were determined by visually identifying the met station using Google Earth. NLCD 1992 (CONUS) Land Cover data used in AERSURFACE processing was 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 was higher than the 70th percentile value, "dry" if its annual precipitation was lower than the 30th percentile value, and "average" if it was 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 elected will include:

- 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 were not overridden
- Default ASOS_ADJ option for correction of truncated wind speeds was not overridden
- ADJ_U* beta option was not 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 is approximately centered at UTM, Zone 15, coordinates 353,376 meters East and 4,337,059 meters North. The base elevation of the facility is approximately 230 meters above mean sea level.

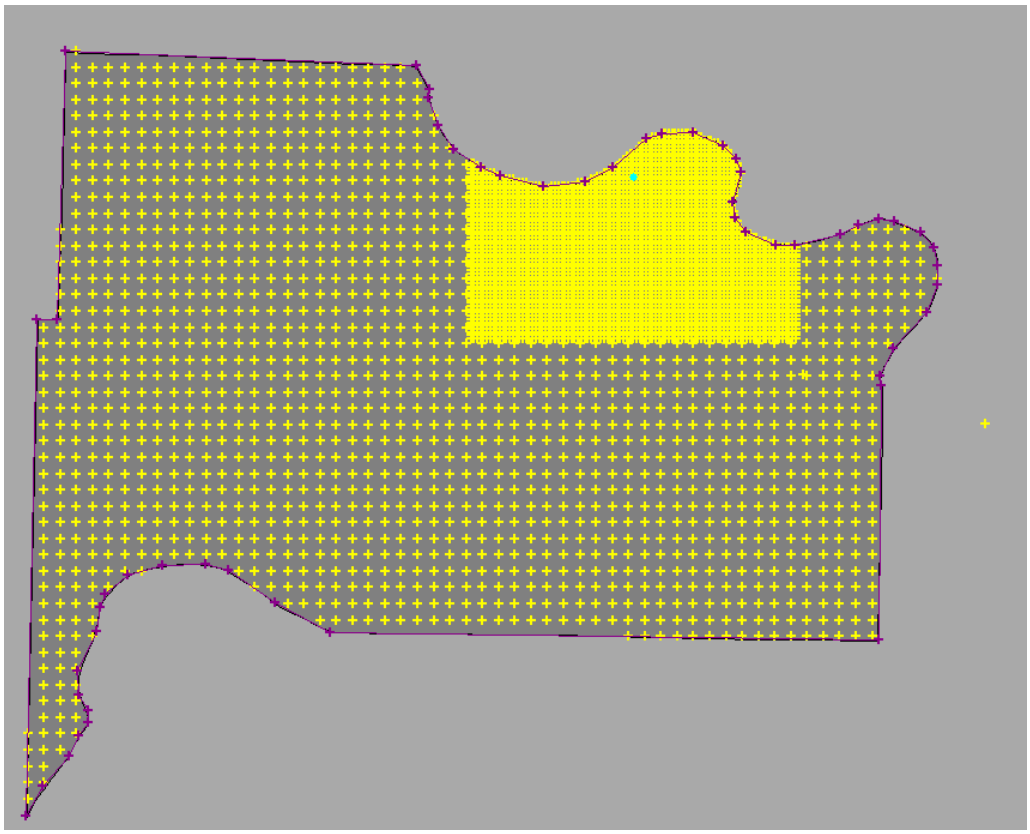
2.4. RECEPTOR LOCATIONS

The modeling will evaluate SO_2 concentrations throughout all of Wyandotte County. The modeling will use a receptor grid centered on Nearman. The grid will include receptors at 100 meter spacing within 5 km of Nearman and 500 meter spacing throughout the remainder of Wyandotte County, Kansas. 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 Nearman facility and the placement of each receptor.

[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, obtained from the USGS, has 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

Trinity will include SO_2 emission sources in the model that are located in both Wyandotte and Jackson counties and that have been identified by KDHE, in consultation with MDNR, as needing to be included in the model.

2.6.1. Wyandotte County Emission Sources

The only source located in Wyandotte County that KDHE has indicated should be included in the model is the one boiler at BPU's Nearman Station. The stack for the boiler will be modeled as a point source. The emission rates and stack parameters that will be used to characterize the boiler are summarized in Table 2-2 below.

Table 2-2. Nearman 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)
Nearman Unit 1	353409.7	4337123.1	400	20	CEMS	CEMS	CEMS	CEMS

[1]Lynn Deahl at KDHE confirmed in an e-mail to BPU on May 19, 2015 that BPU's Quindaro facility did not need to be included in modeling due to the switch to natural gas in its boilers in April of 2015.
[2]UTM Zone 15, NAD 83

2.6.2. Jackson County Sources

Table 2-3 below summarizes the sources in Jackson County that KDHE, in consultation with MDNR, have indicated should be included in the model. Note, the emission rate for the boiler at Veolia that is specified in Table 2-3 as EP02 reflects a different emission rate than what was provided by the KDHE/MDNR. In recognition of the fact that Veolia's EP02 boiler is subject to the Industrial Boiler MACT and that Veolia is switching from combusting coal to combusting natural gas to comply with the MACT, a new emission rate reflecting the combustion of natural gas was calculated using the maximum heat input to the boiler and the AP-42 SO_2 emission factor of 0.6 lb/MMscf. Veolia's switch to natural gas will be in place prior to the July 2, 2016 designation date. Thus, the use of an emission rate reflective of natural gas combustion is appropriate.

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	119,494.4	290	220.4
Independence Power & Light at Missouri City, Heating Boiler Stack (EP6)	4343248.6	387072.9	93	1.67	20	2,628.5	405	0.1
Veolia Energy, Boilers 6 & 8 Stack (EP2)	4330434.0	363376.5	282	16.75	5.96	78,798.3	253	0.58
KCP&L GMO at Sibley, EP5A,5B,5C Stack	4337276.5	397714.9	696	13.5	CEMS	CEMS	CEMS	CEMS
Independence Power & Light at Blue Valley, Unit 1 Stack (EP3)	4327808.3	385311.9	153	5.5	47.1	67,140.9	323	196.4
Independence Power & Light at Blue Valley, Unit 2 Stack (EP4)	4327821.1	385313.6	153	5.5	51.8	73,840.8	356	224.6
Independence Power & Light at Blue Valley, Unit 3 Stack (EP5)	4327832.3	385329.9	250	6.75	97.86	210,113.5	320	340.3
KCP&L at Hawthorn, Unit 5 Stack (EP6)	4332321.2	372276.7	602	20.35	CEMS	CEMS	CEMS	CEMS
KCP&L at Hawthorn, Unit 7 Stack (EP701)	4332321.2	372276.7	56	14.76	159	1,632,341	783	0.0052
KCP&L at Hawthorn, Unit 8 Stack (EP801)	4332321.2	372276.7	56	14.76	159	1,632,341	783	0.0062
KCP&L at Hawthorn, Unit 6/9 Stack (EP901)	4332321.2	372276.7	204	20	60	1,130,973	364	0.0473

[1]Provided in a May 20, 2015 e-mail from Lynn Deahl of KDHE to BPU

[2]UTM Zone 15, NAD 83

2.8. 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.

2.9. SOURCE CONTRIBUTIONS

Trinity will run the model using the "MAXDCONT" option. The use of MAXDCONT tells the model to generate output that allows both the cumulative concentrations as well as individual contributions from each of the sources to be analyzed. As needed, MAXDCONT data will be analyzed to show events where the combined impact from all facilities, and individual impacts are over the NAAQS. If Nearman is found to be a large contributor, BPU will consider modeling possible future reduction fixes to bring concentrations below NAAQS.

2.10. BACKGROUND CONCENTRATION

KDHE would like BPU to 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. BPU will incorporate the agreed upon background concentration in the model.

APPENDIX B

KANSAS CITY BPU
THE POWER OF COMMUNITY

August 18, 2015

Attn: Tom Gross
Air Monitoring and Planning Chief
Bureau of Air
Kansas Department of Health and Environment
1000 SW Jackson, Suite 310
Topeka, KS 66612-1367

Re: "Attainment" Modeling Results – SO2 1-Hour NAAQS
Nearman Creek Power Station (Source ID No.: 2090008)
Kansas City Board of Public Utilities (BPU)

Dear Mr. Gross:

The Kansas City Board of Public Utilities is submitting results of 1-hour SO2 modeling conducted to evaluate SO2 concentrations in the area surrounding Nearman Creek Power Station as required under EPA's Data Requirements Rule for 1-hour SO2.

Actual hourly emission rates were used for BPU-Nearman N1 along with permitted limits or rates include in Missouri's State Implementation Plan (SIP) for the nearby sources. The attached table shows BPU modeled concentrations are under the 1-hour SO2 NAAQS and in combination with nearby sources shows the entire area surrounding Nearman remains under the NAAQS and therefore should be designated as "attainment" to the 1-hour SO2 NAAQS.

Please feel free to contact me with any questions. I can be reached via email at isetzler@bpu.com or by phone at 913-573-9806.

Sincerely,

Ingrid Setzler
Director - Environmental Services Department
KCBPU Environmental Services
300 N 65th Street
Kansas City, KS 66102

Attainment Modeling Results

Source	Modeled Emission Rate (lb/hr)	Highest Concentration[1] ($\mu g/m^3$)
BPU - Nearman N1	3 Year CEMS	159
Veolia Energy - EP1	0.5	0
Veolia Energy - EP2	351.8	75
Veolia Energy - EP3	0.5	0
Independence Power & Light - Missouri City EP5	681.9	10
Independence Power & Light - Missouri City EP6	0.3	0
KCP&L GMO - Sibley EP5A	2,018.69	11
KCP&L GMO - Sibley EP5B	1,989.44	11
KCP&L GMO - Sibley EP5C	13,964.01	74
KCP&L - Hawthorn EP6	1,529.88	31
Missouri Sources	--	118
Combined Sources	--	160

[1]Background concentration = 33.57 ug/m3 and is not added in here.

APPENDIX C

Lynn Deahl

From: Courtney Stephen <Stephen.Courtney@kcpl.com>
Sent: Friday, September 04, 2015 4:44 PM
To: Lynn Deahl
Cc: Ling Paul
Subject: SO2 NAAQS, La Cygne Modeling
Attachments: KCPL 1-Hour SO2_v0.1.ami; KCPL 1-Hour SO2_v0.1.aml; KCPL 1-Hour SO2_v0.2.ami; KCPL 1-Hour SO2_v0.2.aml; TOPTOP1214.PFL; TOPTOP1214.SFC; KCPL 1-Hour SO2 Modeling Report_v1.0.pdf

Hello Lynn,

Attached is the report and files in the format you requested.

Let me know if you need anything else.

Thank You,

Steve Courtney
(816) 556-2642
Kansas City Power & Light Company (KCP&L)

From: Courtney Stephen
Sent: Tuesday, August 25, 2015 04:15 PM
To: ldeahl@kdheks.gov
Cc: Ling Paul
Subject: SO2 NAAQS, La Cygne Modeling

Hello Lynn,

I recall you said yesterday you may be out today and left you a voicemail message.

KCP&L wanted to give you the results of the worst case model run you requested in the protocol (below).

It appears with the agreed inputs, the worst case maximum receptor comes in at 70% of the standard or 138 ug/m^3.

Please let us know the next steps you require in this matter.

Thank You,

Steve Courtney
(816) 556-2642
Kansas City Power & Light Company (KCP&L)

From: Sarah Teefey [mailto:steefey@trinityconsultants.com]
Sent: Tuesday, August 25, 2015 08:50 AM
To: Courtney Stephen
Cc: Kasi Dubbs
Subject: RE: SO2 NAAQS, La Cygne Modeling Protocol

Steve,

We ran two model scenarios and La Cygne modeled below the 1-hour SO2 NAAQS of 196 ug/m3 both times.

The first scenario was modeled using the high load emission rate, temperature and flow rate. The highest concentration from both units combined was 108 ug/m3. Adding a background concentration of 18 ug/m3 (converted from 7 ppb) gave a total of only 126 ug/m3.

The second scenario was more of a worst-case scenario. We modeled the high load emission rate with the low load temperature and flow rate. The high concentration from both units combined was 120 ug/m3. Adding the background of 18 ug/m3 gave a total of 138 ug/m3.

We can run the third scenario today using the high load emission rate and medium load temperature and flow rate, which will also model below the NAAQS given the results of the worst-case scenario.

What format would you like to see the results in for the purpose of presenting them to KDHE?

.....

Sarah Teefey
Consultant
Meteorologist

Trinity Consultants
9777 Ridge Drive, Suite 380 | Lenexa, KS 66219

Office: **913-894-4500**
Email: steefey@trinityconsultants.com

From: Courtney Stephen
Sent: Monday, August 24, 2015 12:48 PM
To: ldeahl@kdheks.gov
Cc: Ling Paul
Subject: SO2 NAAQS, La Cygne Modeling Protocol

Hello Lynn,

As we discussed, KCPL LaCygne will be conducting 1-hour SO_2 modeling in response to your request. Below is an outline of how KCPL plans to conduct the modeling.

Model Selection
Modeling for the LyCygne plant will be performed by Trinity Consultants. Trinity will use AERMOD version 15181, along with Trinity's BREEZE AERMOD software. The pollutant ID will be set to SO_2. All regulatory default options will be used.

Meteorological Data
Trinity will use processed surface and upper air meteorological data for 2012, 2013, and 2014 collected at the National Weather Service ASOS meteorological station located at the Philip Billard Municipal Airport in Topeka, Kansas.

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.

Receptor Locations & Terrain Elevations

Trinity will use the receptor placement and terrain elevations previously determined in the 2010/2011 modeling that was conducted for the new stack construction project. An image of the receptor placement is below. Note, there is no fenceline included in the model. This is due to the fact that the stacks are very tall, and thus the highest impacts are not expected to occur on site.

This variable density grid has the following spacing:

- 100 meter spacing from facility center to 1,000 meters distance
- 250 meter spacing from facility center to 2,500 meters distance
- 500 meter spacing from facility center to 5,000 meters distance
- 1,000 meter spacing from facility center to 10,000 meters distance

Emission Sources

There are two boilers at the LaCygne plant that will be included in the modeling. The stacks for the boilers will be modeled as point sources. The table below summarizes the emission rate, temperature and flow parameters that will be used in the three requested scenarios for each boiler.

Unit	SO_2 Emission Rate (lb/hr)	Emission Rate Source	Temperature (F)	Temperature Source	Flow Rate (ft^3/min)	Flow Rate Source
Boiler 1	H-1,780 ~~M-1,464~~ ~~L-1,356~~	Permitted Limits See Attached Excel Sheets	H - 132.3 M – 131.1 L – 129.4	From RATA conducted on 04/17/2015	H - 2,220,219 wscfm M – 1,826,629 wscfm L – 1,691,246 wscfm	From RATA conducted on 04/17/2015
Boiler 2	H-1,548 ~~M-1,418~~ ~~L-1,294~~	Permitted Limits	H - 125.3 M – 122.7 L – 119.8	From RATA conducted on 02/13/2015	H - 1,762,604 wscfm M – 1,614,485 wscfm L – 1,473,172 wscfm	From RATA conducted on 02/13/2015

Background Concentration

KCPL will use a background concentration of 7 ppb as provided by KDHE.

Please let us know if you have any questions or concerns regarding the procedures outlined above.

Thank You,

Steve Courtney
(816) 556-2642
Kansas City Power & Light Company (KCP&L)

taking of any action in reliance upon, this information by persons or entities other than the intended recipient is prohibited. If you received this in error, please contact the sender and delete the material from any computer.

APPENDIX D

AIR DISPERSION MODELING REPORT IN SUPPORT OF 1-HOUR SO_2 NAAQS DESIGNATION

Kansas City Power & Light
La Cygne Generating Station
La Cygne, KS

Prepared By:
TRINITY CONSULTANTS
9777 Ridge Dr.
Suite 380
Lenexa, Kansas 66219

September 2015

Trinity Consultants

Environmental solutions delivered uncommonly well

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1. INTRODUCTION

The U.S. Environmental Protection Agency (U.S. EPA) is currently going through a multi-phase designation process with respect to the 1-hour SO_2 NAAQS. An initial phase of designations has been completed and resulted in some areas of the country being designated as nonattainment. There are three more phases still to come. The next three phases are the subject of the U.S EPA's proposed Data Requirements Rule (DRR), which was published in the Federal Register in August 2015. As a result of the DRR, the U.S. EPA is required to designate the area surrounding Kansas City Power and Light's (KCP&L's) La Cygne Generating Station by July 1, 2016. Since the DRR does not allow sufficient time to conduct SO_2 monitoring to support the designations required by July 1, 2016, an SO_2 designation for the area surrounding La Cygne should be based on the predictions of an air dispersion model.

Trinity conducted dispersion modeling on behalf of KCP&L to determine the SO_2 concentrations in the area surrounding La Cygne. The remainder of this report summarizes the data and procedures that were used in the modeling and presents the modeled concentrations.

2.1. MODEL SELECTION

Trinity performed 1-hour SO_2 modeling using AERMOD version 15181 along with Trinity's *BREEZE™* AERMOD software. All regulatory default options were used in the modeling. The pollutant ID was set to SO_2 and the output options were configured such that the model predicted an SO_2 concentration 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 **µ**g/m^3.

2.2. METEOROLOGICAL DATA

Trinity used processed surface meteorological data for 2012, 2013, and 2014 collected at the National Weather Service ASOS meteorological station located at the Philip Billard Municipal Airport in Topeka, Kansas. Trinity used upper air meteorological data for the same years that was also collected at the Philip Billard Municipal Airport in Topeka, Kansas.

AERMOD-ready meteorological data was prepared using the U.S. EPA's AERMET meteorological processor (version 14134). Standard U.S. EPA meteorological data processing guidance was used as outlined in a recent memorandum[1].

2.3. COORDINATE SYSTEM

In all modeling input and output files, the locations of emission sources, structures, and receptors were 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). KCP&L is approximately centered at UTM, Zone 15, coordinates 356,342 meters East and 4,245,710 meters North. The base elevation of the facility is approximately 259 meters above mean sea level.

2.4. RECEPTOR LOCATIONS

This variable density grid has the following spacing:

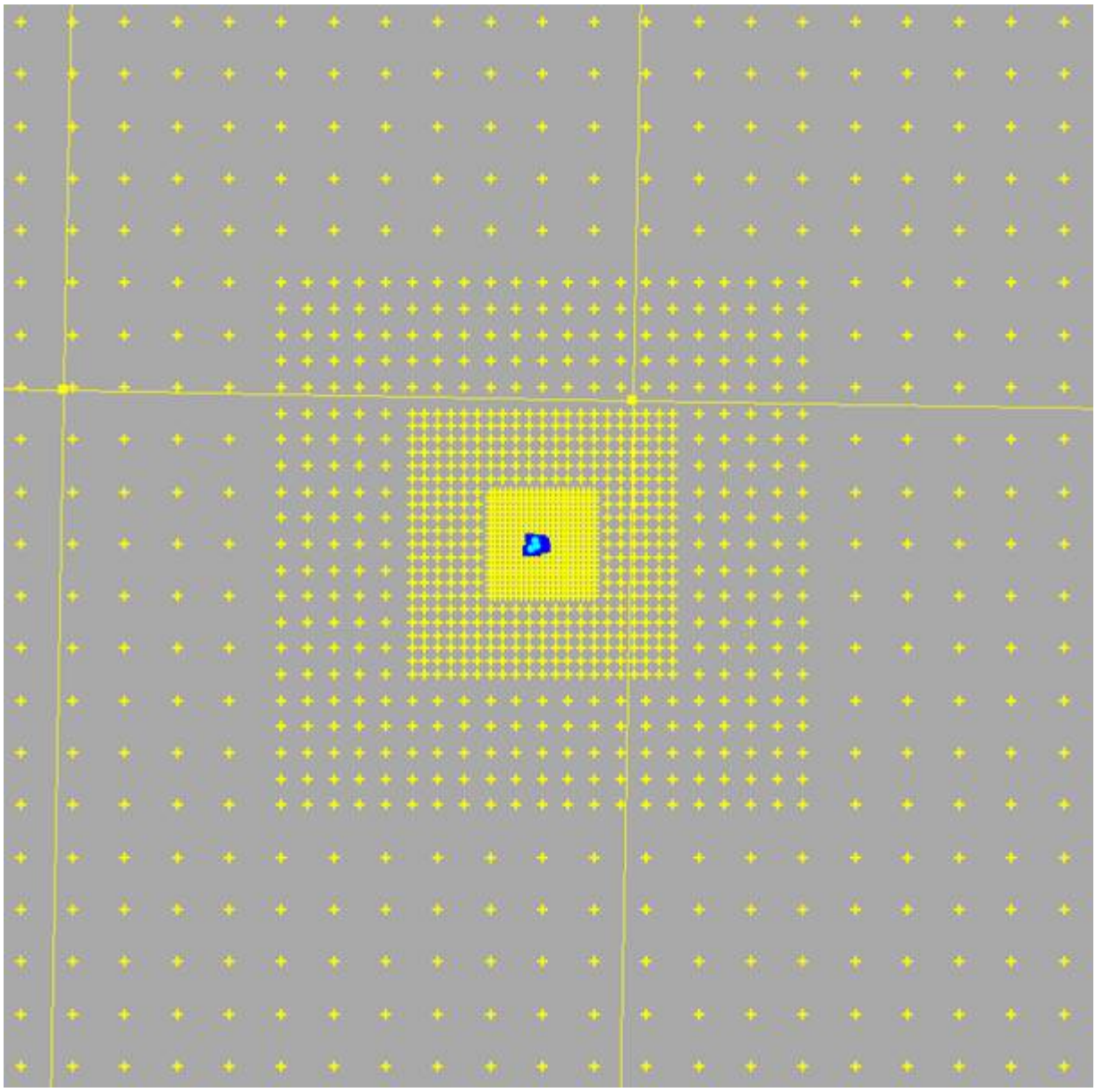
- 100 meter spacing from facility center to 1,000 meters distance
- 250 meter spacing from facility center to 2,500 meters distance
- 500 meter spacing from facility center to 5,000 meters distance
- 1,000 meter spacing from facility center to 10,000 meters distance

Note, there is no fenceline included in the model. This is due to the fact that the stacks are very tall, and the highest impacts do not occur on site.

The receptor grid applied to the model can be seen in Figure 2-1 below:

[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

Figure 2-1. Map of Receptor Grid



2.5. TERRAIN ELEVATIONS

Trinity used USGS 1/3 arc-second National Elevation Data (NED) with elevations that ranged from 231-316 meters. The NED, obtained from the USGS, has terrain elevations at 10-meter intervals.

2.6. EMISSION SOURCES

The two boilers at the La Cygne plant were both included in the modeling. The boilers each duct to a dedicated flue and the two flues are contained inside a common stack. Each of the flues for the boilers were modeled as point sources. Tables 2-1 and 2-2 summarize the emission rates, temperatures and flow parameters that were

modeled. Note that the modeling considered both a high load scenario and a low load worst case scenario. Both scenario relies on SO_2 emissions rates for the boilers that are equal to the permit limits for SO_2.

Table 2-1. Summary of Modeled Parameters

Unit	Modeled SO_2 Rate* (lb/hr)	Stack Height (ft)	Temperature (F)	Flow Rate** (acfm)	Stack Diameter (ft)
High Load Scenario					
Boiler 1	1,780	600	132.3	2,673,141	32.25
Boiler 2	1,548	600	125.3	2,097,079	28.50
Low Load Scenario					
Boiler 1	1,780	600	129.4	2,026,283	32.25
Boiler 2	1,548	600	119.8	1,736,244	28.50

*The modeled emission rates represent the SO_2 permit limits

**The temperatures and flow rates for Boiler 1 were determined from the RATA testing conducted in April 2015. The temperatures and flow rates for Boiler 2 were determined from the RATA testing conducted in February 2015

2.7. BUILDING INFLUENCES

The U.S. EPA's Building Profile Input Program (BPIP) with Plume Rise Model Enhancements (PRIME) (version 04274) from 2010, was 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

Trinity used a 1-hour SO_2 background concentration of 7 parts per billion (ppb), or 18.01 µg/m3, as provided by KDHE.

Table 3-1 provides a summary of the modeled 1-hour SO_2 concentrations in the form of the 1-hour SO_2 NAAQS .

Table 3-1. Summary of Model Results

	Modeled Concentration (ug/m^3)	Background Concentration (ug/m^3)	**Combined Modeled Concentration+ Background (µg/m^3)**	**NAAQS (ug/m^3)**
High Load Scenario	108.49	18.01	**126.05**	**196**
Low Load Scenario	119.81	18.01	**137.82**	**196**

Table 3-1 demonstrates that the ambient air impacts surrounding the La Cygne Generating Station are below the NAAQS.

APPENDIX E

Westar Energy
Taking energy to heart.

April 30, 2015

Tom Gross
Air Monitoring and Planning Chief
Kansas Department of Health and Environment
Bureau of Air
1000 SW Jackson, Suite 310
Topeka, KS 66612-1366

RE: Westar Energy -Tecumseh Energy Center
Source ID: 1770030
1-Hour SO_2 Modeling Protocol

Dear Mr. Gross:

Please find enclosed a protocol for conducting air dispersion modeling to determine 1-hour SO_2 concentrations in the area surrounding Westar Energy's Tecumseh Energy Center (TEC). The modeling is being conducted to support the designation process required by the Consent Decree that was entered on March 2, 2015 in the U.S. District Court for the Northern District of California.

If you have any questions, please contact me at (785) 575-1614 or Dan.Wilkus@westarenergy.com.

Sincerely,

WESTAR ENERGY, INC.

Daniel R. Wilkus, P.E.
Director, Air Programs

Enclosures

AIR DISPERSION MODELING PROTOCOL IN SUPPORT OF 1-HOUR SO_2 NAAQS DESIGNATION

Westar Energy, Inc.
Tecumseh Energy Center, Tecumseh, KS

Westar Energy®

Prepared By:
TRINITY CONSULTANTS
9777 Ridge Dr.
Suite 380
Lenexa, Kansas 66219

April 2015

Trinity Consultants

Environmental solutions delivered uncommonly well

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1. INTRODUCTION

The U.S. Environmental Protection Agency (U.S. EPA) is currently going through a multi-phase designation process with respect to the 1-hour SO_2 NAAQS. An initial phase of designations has been completed and resulted in some areas of the country being designated as nonattainment. There are three more phases still to come. Two of the next three phases were the subject of the U.S EPA's proposed Data Requirements Rule, published in May 2014.

Following the U.S EPA's May 2014 publication of the proposed Data Requirements Rule, the U.S. EPA was sued for "failing to undertake a certain nondiscretionary duty under the Clean Air Act ("CAA"), 42 U.S.C. §§ 7401-7671q, and that such alleged failure is actionable under section 304(a)(2) of the CAA, 42 U.S.C. § 7604(a)(2)". The lawsuit resulted in a Consent Decree that was entered on March 2, 2015 in the U.S. District Court for the Northern District of California. As a result of the Consent Decree, an additional designation phase was added to the two designation phases that were already included in the U.S. EPA's May 2014 proposed Data Requirements Rule. The additional phase affects areas with stationary sources that meet specific emission criteria laid out in the Consent Decree. The U.S. EPA released a memorandum on March 20, 2015 (referred to herein as the 2015 SO_2 Area Designation Guidance) to the Regional Directors clarifying the path forward for states with sources affected by the decree.

The Consent Decree requires the U.S. EPA to complete a round of SO_2 designations for the areas affected by the Consent Decree by July 2, 2016. The U.S. EPA is expected to release a final version of the Data Requirements Rule around September 2015. It is expected that the Data Requirements Rule will address all three remaining phases of the designation process.

Westar Energy, Inc.'s (Westar's) Tecumseh Energy Center (TEC) meets the emissions criteria laid out in in the Consent Decree. Thus, the U.S. EPA is required to designate the area surrounding TEC by July 2, 2016. Because the Consent Decree does not provide sufficient time to commission representative ambient air monitors, Westar is left with no other options other than utilization of an air dispersion model to determine attainment status. Therefore, in line with the EPA's May 2014 proposed Data Requirements Rule, an SO_2 designation for the area surrounding TEC will be based on the predictions of an air dispersion model. The EPA published a draft Technical Assistance Document (TAD) in December 2013 describing the approach that should be considered when conducting dispersion modeling in support of a 1-hour SO_2 NAAQS designation (referred to herein as the 2013 SO_2 NAAQS Modeling TAD). Among other things, the TAD indicates that actual hourly emission rates should be included in the model. For sources with SO_2 Continuous Emission Monitoring Systems (CEMS), the CEMS data should be used to characterize emissions.

Trinity is planning to conduct dispersion modeling on behalf of Westar to determine the SO_2 concentrations in the area surrounding TEC. Initially, modeling will be performed in line with the 2013 SO_2 NAAQS Modeling TAD. That said, Westar recognizes that modeling in line with the 2013 SO_2 NAAQS Modeling TAD could result in model predictions that are over the 1-hour SO_2 NAAQS. Westar has been discussing the designation process for the area surrounding TEC with the Kansas Department of Health and Environment (KDHE). The discussions have focused on the possibility that the initial modeling of the area surrounding TEC may show concentrations in excess of the NAAQS and what could be done in this situation to avoid a nonattainment designation.

In April 2014, the U.S. EPA released guidance to the EPA Regional Air Division Directors related to 1-Hour SO_2 nonattainment area SIP submissions (referred to herein as the 2014 SIP Guidance). In general, the 2014 SIP guidance, along with the recent 2015 SO_2 Area Designation Guidance, indicate that a dispersion model could be used to determine options for reducing 1-hour SO_2 concentrations to less than the NAAQS.

Should the initial modeling of the area surrounding TEC, as conducted in line with the 2013 SO_2 Modeling TAD, show concentrations in excess of the NAAQS, Westar may consider changes at TEC that allow the area around TEC to show modeled compliance with the NAAQS. Thus, Trinity anticipates conducting modeling of post-change scenarios to assess compliance with the NAAQS.

The remainder of this protocol summarizes the data and procedures that will be used in the modeling described above.

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

2.1. MODEL SELECTION

Trinity will perform 1-hour SO_2 modeling using AERMOD version 14134 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 will predict 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.

2.2. METEOROLOGICAL DATA

Trinity will use processed surface and upper air meteorological data for 2012, 2013, and 2014 (consistent with the three years of actual emissions data that will be relied upon for TEC) collected at the National Weather Service (NWS) ASOS meteorological station located at the Philip Billard Municipal Airport in Topeka, Kansas. A determination of whether the meteorological data from the Philip Billard Municipal Airport were appropriate for use in TEC's modeling analyses was considered by determining whether the data were representative of the site where the TEC plant is located. The extremely close proximity of the airport with respect to the plant (less than 3 miles distance), in addition to the similarity in the climatology and topography (the airport is approximately 879 feet and TEC is approximately 878 feet) support that the meteorological conditions at the airport are representative of the meteorological conditions at the TEC.

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 Philip Billard Airport in Topeka, Kansas (KTOP, WMO ID: 724560) in the standard ISHD format. This data will be supplemented with TD-6405 (so-called "1-minute") wind data from KTOP. 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 KTOP. The "Ice-Free Winds Group" AERMINUTE option will be selected due to the fact that a sonic anemometer has been used at KTOP during the last several years.

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.

---

[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

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 1 below. The met station coordinates were determined by visually identifying the met station using Google Earth. NLCD 1992 (CONUS) Land Cover data used in AERSURFACE processing was 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 KTOP.[3] The 30th and 70th percentile values of the annual precipitation distribution from 1981-2010 will be calculated. Per U.S. EPA guidance, each modeled year will be classified for AERSUFACE processing as "wet" if its annual precipitation was higher than the 70th percentile value, "dry" if its annual precipitation was lower than the 30th percentile value, and "average" if it was between the 30th and 70th percentile values. The values to be used in this case are summarized in Table 2-1.

Table 2-1. AERSURFACE Input Parameters

AERSURFACE Parameter	Value
Met Station Latitude	39.072458
Met Station Longitude	-95.626012
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

2.2.4. AERMET Processing Options

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

- MODIFY keyword for upper air data

[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), Topeka, Kansas (KTOP).
[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).

- 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 10 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 were not overridden
- Default ASOS_ADJ option for correction of truncated wind speeds was not overridden
- ADJ_U* beta option was not 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). TEC is approximately centered at UTM, Zone 15, coordinates 277,912 meters East and 4,325,837 meters North. The base elevation of the facility is approximately 267 meters above mean sea level.

2.4. RECEPTOR LOCATIONS

The dispersion modeling will use a combination of a Cartesian grid system centered on TEC and discrete receptor points along the TEC fence line. Receptors will be placed at 25 meter intervals along the fence line, 100 meter intervals out to a distance of 2.5 kilometers (km) and at 500 meter intervals out to either 10 km or further if need to encompass areas modeling above the 1-hour SO_2 Significant Impact Level (SIL) of 7.5 ug/m^3. Based on the 2013 SO_2 NAAQS Modeling TAD and the 2015 SO_2 Area Designation Guidance, the receptor grid will be adjusted to include only those locations where it is feasible to place a monitor.

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, obtained from the USGS, has 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. TEC EMISSION SOURCES

There are two boilers at TEC that will be included in the modeling. The stacks for the boilers will be modeled as point sources. Table 2-2 below summarizes the existing stack parameters for both TEC boilers. The existing stack parameters will be modeled in the initial modeling conducted in line with the 2013 SO_2 Modeling TAD. If the initial modeling does not demonstrate compliance with the NAAQS, revised stack parameters may be incorporated into modeling to demonstrate attainment conducted in line with the 2014 SIP Guidance.

Table 2-2. TEC Model Inputs

Boiler	X Coordinate (m)*	Y Coordinate (m)*	Stack Height (ft)	Stack Diameter (ft)	Exit Velocity (ft/s)	Flow Rate (acfm)	Exit Temperature (F)	Emission Rate (lb/hr)
Unit 7/9	277,723	4,325,860	211	11.5	CEMS	CEMS	CEMS	CEMS
Unit 8/10	277,752	4,325,861	211	11.5	CEMS	CEMS	CEMS	CEMS

*UTM Zone 15, NAD 83

2.7. INTERACTIVE SOURCE INVENTORY

Other sources of SO_2 emissions in the area surrounding TEC will be included in the model. KDHE provided Westar with a list of surrounding facilities to consider including in the model. The list included any facility within 20 km of TEC that had greater than or equal to 5 tons of SO_2 emissions in 2013. The list only included two plants: Innovia Films and the Rolling Meadows Landfill. Trinity has evaluated this list and is planning to include Innovia Films, but not the Rolling Meadows Landfill, in the model. Trinity is relying on the "20D Rule"[6] as the basis for excluding the landfill from the model.

The 20D rule is such that if "Q / d" < 20, a source does not need to be included in the model, where

Q = Source emissions in tons/year
d = Distance from TEC in kilometers

Evaluation of Rolling Meadows Landfill:
Q = 15.13 tons in 2013
d = 19.3 km

15.13 / 19.3 = 0.78

Figure 2-1 below shows the location of TEC with respect to Innovia Films.

[6] North Carolina Department of Environment and Natural Resources, Division of Air Quality. "North Carolina PSD Modeling Guidance." Available Online: http://daq.state.nc.us/permits/mets/psd_guidance.pdf.

Figure 2-1. Location of 1-hour SO_2 Modeling Sources

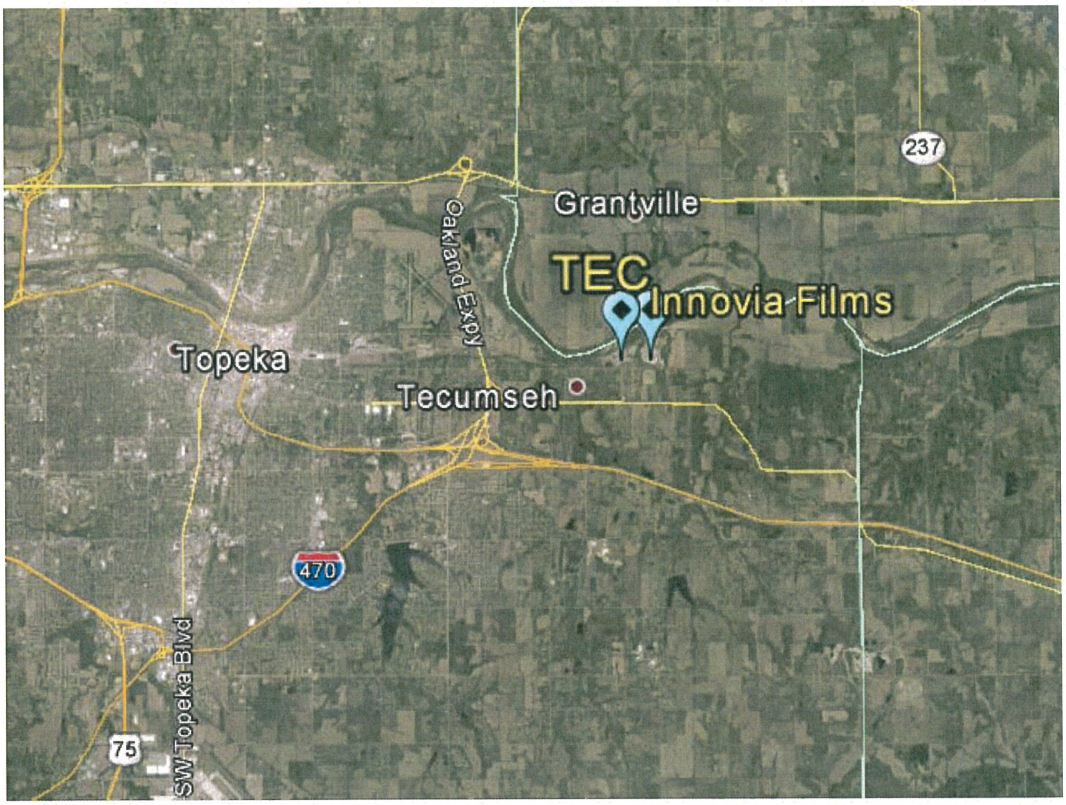

Table 2-3 summarizes the model inputs for Innovia Films, as provided by KDHE. As calculated by KDHE, the hourly emission rate for the Gross Film (Cellophane) unit at Innovia Films is based on the 2010 SO_2 annual emission rate (the maximum SO_2 annual emission rate in the last 5 years) and 8760 hours/year of operation.

Table 2-3. Innovia Films Model Inputs

Boiler	Source	X Coordinate (m)*	Y Coordinate (m)*	Stack Height (ft)	Stack Diameter (ft)	Exit Velocity (ft/s)	Flow Rate (acfm)	Exit Temperature (F)	Emission Rate (lb/hr)
Innovia	Gross Film (Cellophane)	278,618	4,325,824	60	0.33	58.5	300	750	272.8

*UTM Zone 15, NAD 83

2.8. 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 TEC 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. At this time, Trinity is not planning to include any buildings from Innovia Films in the model.

2.9. SOURCE CONTRIBUTIONS AND TEC BOILER REFINEMENTS

Trinity will run the model using the "MAXDCONT" option. The use of MAXDCONT tells the model to generate output that allows both the cumulative concentrations as well as individual contributions from TEC and Innovia Films to be analyzed. If initial modeling shows concentrations above the 1-hours SO_2 NAAQS, additional modeling of various compliance scenarios specific to TEC sources will be conducted. Steps that will be considered in the modeling scenarios are as follows:

1. Initially, the output from the MAXDCONT processing will be filtered to show each event where the combined impact from both TEC and Innovia Films is over the NAAQS.
2. Each event found to be over the NAAQS will then be will be analyzed further to determine the impacts attributable to TEC and the impacts attributable to Innovia Films.
3. If TEC is found to individually model over the NAAQS, Westar will focus on a strategy to reduce its own impact below the NAAQS. Westar does not intend to "do more than their share" to reduce SO_2 concentrations in the area surrounding TEC.

2.10. BACKGROUND CONCENTRATION

Westar will work with KDHE to develop a 1-hour SO_2 background concentration that is representative of the background concentration in the vicinity of TEC. Westar will incorporate the agreed upon background concentration in the model.