Permit Summary Sheet

Abengoa Bioenergy Biomass of Kansas (ABBK)

Proposed Air Quality Construction Permit

Source ID No. 1890231
C-11396

Kansas
Department of Health
and Environment

Bureau of Air

Permitting Section

May 27, 2014

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PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

PERMIT SUMMARY SHEET

Permit No.: 1890231, C-11396

Source Name: Abengoa Bioenergy Biomass of Kansas (ABBK)

Source Location: Stevens County, Township 33 South, Range 37 West, Section 18
Hugoton, Kansas 67951

I. Area Designation

K.A.R. 28-19-350, Prevention of significant deterioration of air quality, affects new major sources and major modifications to major sources in areas designated as "attainment" or "unclassifiable" under section 107 of the Clean Air Act (CAA) for any criteria pollutant.

Stevens County, Kansas, where this modification is taking place, is currently in attainment or unclassifiable for all pollutants. As such, the PSD program, as administered by the State of Kansas under K.A.R. 28-19-350, will apply to the proposed project.

II. Project Description

Abengoa Bioenergy Biomass of Kansas, LLC (ABBK) intends to install and operate a biomass-to-ethanol and biomass-to-energy production facility near Hugoton, Kansas. The biomass-to-ethanol manufacturing facility, employing an enzymatic hydrolysis alcohol production process, will utilize cellulosic feedstock (biomass) such as wheat straw, milo (sorghum) stubble, corn stover, switchgrass, and opportunity feedstocks that are locally available. The cogeneration plant will consist of one (1) steam turbine electrical generator nominally rated up to a total of 22 Megawatts (MW). Electrical power will be supplied exclusively to ABBK. Steam will be generated from one (1) water-cooled vibrating grate stoker boiler that will use solid biomass feedstocks, enzymatic hydrolysis residuals, particles collected during biomass grinding, non-condensable gases (NCG) vent streams from plant processes, wastewater treatment sludge, biogas and natural gas as fuel. Natural gas will be used during boiler start-up periods as required per manufacturer recommendations.

Nominal production for the enzymatic hydrolysis alcohol production process is based on a designed production rate of 23,300,000 gallons per year (23.3 MGPY) anhydrous ethanol. The anhydrous ethanol is then denatured prior to shipment offsite, resulting in a total denatured nominal production rate of 23.8 MGPY. By implementing a 20 percent increase in plant efficiency and operating on 365 days per year production schedule, a maximum potential anhydrous production rate of 30.0 MGPY and a denatured potential production rate of 31.6 MGPY can be realized.

III. Significant Applicable Air Emission Regulations

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

A. K.A.R. 28-19-11, Exceptions Due to Breakdown or Scheduled Maintenance, as applied only to State Regulations K.A.R. 28-19-30 through K.A.R. 28-19-32, and K.A.R. 28-19-650

B. K.A.R. 28-19-275, Special Provisions, Acid Rain Deposition

C. K.A.R. 28-19-300, Construction Permits and Approvals; Applicability

D. K.A.R. 28-19-350, Prevention of Significant Deterioration of Air Quality adopting by reference 40 CFR Part 52.21, Prevention of Significant Deterioration (PSD)

E. K.A.R. 28-19-20, Particulate Matter Emission Limitations

F. K.A.R. 28-19-650, Emission Opacity Limits

G. K.A.R. 28-19-30 through K.A.R. 28-19-32, Indirect Heating Equipment Emissions

H. K.A.R. 28-19-720, New Source Performance Standards, adopting by reference the following:

   1. 40 CFR Part 60 Subpart A, *Standards of Performance for New Stationary Sources – General Provisions*

   2. 40 CFR Part 60 Subpart Db, *Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units.*

   3. 40 CFR Part 60 Subpart Kb, *Standards if Performance for Volatile Organic Liquid (VOL) Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced after July 23, 1984*

   4. 40 CFR Part 60 Subpart VVa, *Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006*

I. 40 CFR Part 60 Subpart IIII, *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines*

J. 40 CFR Part 60 Subpart JJJJ, *Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*

K. K.A.R. 28-19-750, Hazardous Air Pollutants, Maximum Achievable Control Technology, adopting by reference the following:

1. 40 CFR Part 63 Subpart A, *National Emissions Standards for Hazardous Air Pollutants for Source Categories – General Provisions*

2. 40 CFR Part 63 Subpart FFFF, *National Emission Standard for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing*

L. 40 CFR Part 63 Subpart ZZZZ, *National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*

M. 40 CFR Part 63 Subpart DDDDD, *National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial and Institutional Boilers and Process Heaters*

N. 40 CFR Part 72 Subpart A, *Acid Rain Program General Provisions*

IV. Air Emissions from the Project

The potential-to-emit from the new biomass to ethanol manufacturing and biomass to power cogeneration facility is listed in the table below and detailed in the *Conforming Prevention of Significant Deterioration, Air Quality Construction Permit Modification Application* dated January, 2014. Proposed potential-to-emit of CO_2e, NO_x, SO_2, CO, $PM/PM_{10}/PM_{2.5}$ and VOC were compared with the Significant Emission Rates for PSD applicability for the criteria and non-criteria pollutants. The potential-to-emit of CO_2e, NO_x, SO_2, $PM/PM_{10}/PM_{2.5}$, CO, VOC and ozone (O_3) is due to more than 40 tpy of VOC and NO_x are above the PSD significance levels and will be reviewed under the PSD regulations.

Therefore, this project will be classified as a major stationary source. This project will be subject to the various aspects of K.A.R. 28-19-350, such as the use of best available control technology, ambient air quality analysis, and additional impacts upon soils, vegetation and visibility.

The source has the potential to emit greater than 25 tons for the combination of HAPs, and, therefore, is a major source of HAPs for Title V purposes. The largest single HAP, Hydrogen Chloride (HCl), is an amount less than the major source threshold for any single HAP of 10 tpy.

Table 1. Estimated Operating Emissions

Pollutant	Potential to Emit Emissions[1] (tons per year)	
	Pre- Permit	Post-Permit
Particulate Matter (PM)	>250	138.8
Particulate Matter less than or equal to 10 microns (PM_{10})	>250	109.5
Particulate Matter less than or equal to 2.5 microns ($PM_{2.5}$)	>250	76.5
Oxides of Nitrogen (NO_x)	>250	701.9
Carbon Monoxide (CO)	>250	594.0
Sulfur Dioxide (SO_2)	>250	504.4
Volatile Organic Compounds (VOC)	>250	47.9
Lead (Pb)	0.11	0.11
Sulfuric Acid (H_2SO_4)	67.7	6.9[2]
Hydrogen Chloride (HCl)	574.6	7.2
Hydrogen Fluoride (HF)	0.66	0.01
Carbon Dioxide equivalents (CO_2e)	>100,000	626,000
Total HAPs	>25	27.7
Largest Single HAP • Hydrogen Chloride	>10	7.2

V. Historical and Technical Considerations for the ABBK Hugoton Project

The original PSD air quality construction permit application was submitted to KDHE on July 21, 2008 for a traditional grain-to-ethanol production process, enzymatic hydrolysis (EH) ethanol production process and gasification process (syngas production). Between that date and the present, the project changed several times. A bubbling fluidized bed boiler had been proposed in the previous projects. The latest redesign was proposed in April, 2011 for a 22 MW stoker boiler and the 30 MGPY enzymatic hydrolysis alcohol process.

The main changes affecting the biomass boiler system were the size reduction of the cogeneration which allows for the use of one 22 MW boiler; and the change in the fuel composition due to the lower power generation need. The proposed boiler must be capable of burning a combination of raw biomass (consisting of corn stover, wheat straw, milo (sorghum) stubble, corn stover, switchgrass, and other opportunity feedstocks that are available), enzymatic hydrolysis residuals (including lignin-rich stillage cake and thin

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1. Potential-to-emit means the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable.

2. Emissions are projected to be 3.6 tons per year. The source has elected to take a limit of 6.9 tons per consecutive 12 month period to remain below the major source threshold for H_2SO_4.

stillage syrup), particles collected during biomass grinding, NCG vent streams, wastewater treatment sludge and biogas. Burning the cellulosic ethanol process residuals would provide significant boiler fuel needs and reduce the amount of additional corn stover or other fuels. The fundamental consequence of this change was to increase the alkali content of the boiler fuel.

ABBK provided documentation showing high concentrations of alkaline metals in biomass boiler fuel have been determined to be responsible for boiler slagging and fouling problems during combustion. These problems are foreseen as the major causes of boiler down time. The alkali content in ABBK's boiler fuel is expected to be about 3 times higher than recommended levels to prevent BFB boiler slagging and fouling problems.

ABBK has discussed with both stoker-type boiler vendors and fluidized bed combustion (FBC) boiler vendors and has decided that due to the inherent high alkalinity, the ash content of the fuel, and use of enzymatic hydrolysis residuals consisting of lignin-rich stillage cake and thin stillage syrup as the primary boiler fuel, that the stoker-type boiler poses the lowest overall risk to the success of the project. The technical issue that has driven the decision to select a stoker boiler versus a BFB has been to minimize fouling and slagging, and avoid agglomeration risks inherent to a BFB boiler and the intended fuel blend.

On September 16, 2011, the KDHE issued a PSD Air Emission Source Construction Permit (C-9600) to ABBK for the installation and operation of a biomass to ethanol and biomass-to-energy production facility near Hugoton, Kansas. Since issuance of the September 16, 2011 Air Emission Source Construction Permit, ABBK was issued an Air Emission Source Construction Permit on January 22, 2013 (C-10550) that was an appended PSD Air Emission Source Construction Permit to the September 16, 2011 permit for the addition of four (4) emergency spark ignition internal combustion generator engines to the construction project.

The purpose and scope of PSD Air Emission Source Construction Permit C-11396 is to correct and clarify existing regulatory requirements; to authorize two (2) spark ignition internal combustion generator engines permitted as emergency generators in the January 22, 2013 permit to operate in an unrestricted, nonemergency manner; to incorporate air emission limitations and requirements for new equipment to be installed; to incorporate regulations applicable to Major Sources of Hazardous Air Pollutants (HAPs); and to incorporate a Best Achievable Control Technology (BACT) for Volatile Organic Compounds (VOCs) emitting units.

Changes that are reflected in this PSD permit modification are as follows:

A. The addition of a 25 MMBtu/hr Boiler Reheat Burner to the Biomass-fired Stoker Boiler. The reheat burner is installed in the boiler flue gas train downstream of the stoker boiler baghouse (DC-20001) to correct flue gas temperatures for proper operation of the Selective Catalytic Reduction (SCR) system and the Oxidation Catalyst (OC). The boiler reheat burner will be exhausted through the same stack as the biomass-fired stoker boiler. The SCR and OC will control the NO_x and VOC from the boiler reheat burner. The addition of this burner has not altered the

BACT controls previously permitted in the September 16, 2011 for the Biomass Stoker Boiler however there are combined emission changes made as a result of the Boiler Reheat Burner addition.

B. BACT for the two (2) natural gas fired engines which will operate as nonemergency are new requirements, as these two (2) engines were permitted as emergency only in the January 22, 2013 appended PSD permit.

C. The two (2) natural gas fired engines, previously permitted by the January 22, 2013 appended PSD permit, will continue to operate as emergency, but the BACT emission limits have been updated for this modified permit to reflect a corrected rated heat input for the engines.

D. The September 16, 2011 PSD permit listed a 460 HP diesel fired Fire Pump engine. The source has decided to install a 617 HP diesel fired Fire Pump engine. Revised BACT emission limits and requirements have been included in this modified permit.

E. The September 16, 2011 PSD permit listed a single high voltage circuit breaker. This modified permit includes updated BACT for one (1) high voltage breaker with a dual voltage rating of 115 kV and 69 kV.

F. The September 16, 2011 PSD permit listed a single flare to manage the emissions from the ethanol product loadout and the biogas/NCG Process Vent (EP-09001). EP-09001 is the existing thermal oxidizer rated at 51 MMBtu/hr. It will serve as the control for biogas only.

G. This permit incorporates the installation of a second thermal oxidizer. This thermal oxidizer is rated at 12 MMBtu/hr. It will serve as control for the ethanol product loadout vapors.

H. This permit incorporates the addition of one (1) Methanol Tank (T-02109) having a normal capacity of 41,000 gallons (maximum capacity of 52,876).

I. The September 16, 2011 PSD permit listed one (1) Cellulase Tank (T-01940) having a capacity of 50,400 gallons. This permit incorporates (2) additional Cellulase Tanks (T-01941 and T-01942), having a capacity of 50,400 and 6,500 gallons, respectively.

J. This permit corrects storage tank capacities for tanks listed in the September 16, 2011 PSD permit.

K. This permit incorporates the addition of one (1) Sodium Hydroxide Tank (T-01911), having a capacity of 13,500 gallons.

L. This permit incorporates the addition of a Facility Berm (EP-10002).

M. This permit incorporates numerous changes to the previously permitted Biomass-Fired Stoker Boiler Materials Handling systems that include fly ash handling, fly ash offloading, bottoms ash handling, and bottoms ash offloading. Several baghouses approved for installation under the BACT requirements of the September 16, 2011 PSD permit are not being installed. A water conditioning system is being installed.

N. This permit incorporates changes to the biomass receiving and storage areas. A storage area of 150 acre unpaved biomass storage field (west) has been added. This large storage field is to ensure continuity of biomass in case of short-term disruption of biomass delivery from offsite locations. The 150 acre storage field will store approximately 28,800 tons of biomass bales.

O. This permit incorporates the addition of a Wet Cake Conveyor, Emergency Pad and Reclaim Conveyors (FUG_WCP and FUG_WCE).

P. This permit incorporates changes to the Biomass Receiving, Grinding, and Conveyance.

Q. This permit incorporates emission unit identification changes for the previously identified BACT controls permitted in the September 16, 2011 PSD permit:

- EP-11120 Floor Sweep System DC changed to EP-11700 Floor Sweep System DC;
- EP-11170 Classifier Cyclone #1 DC changed to EP-11100 EH Storage Bin #1 DC;
- EP-11270 Classifier Cyclone #2 DC changed to EP-11200 EH Storage Bin #2 DC; and
- EP-11711 Boiler Feed System DC changed to EP-11500 Boiler Feed System DC

R. This permit incorporates changes to the Global Warming Potentials (GWP). The source will comply with the GWP contained in Greenhouse Gas Regulations, 40 CFR Part 98, Subpart A, Table A-1, effective January 1, 2014. Previous GHG BACT emission limitations and the source's GHG PTE was based on the GWP contained in Greenhouse Gas Regulations, 40 CFR Part 98, Subpart A, Table A-1, as published on October 30, 2009.

The emission units subject to GHG BACT requirements are as follows:

- One (1) high voltage circuit breaker (EP-08000)
- One (1) biomass-fired stoker boiler (EP-20001) and boiler reheat burner (EP-20002)
- One (1) enzymatic hydrolysis CO_2 scrubber (EP-18185)
- One (1) ethanol product loadout thermal oxidizer (EP-02100)
- One (1) biogas thermal oxidizer (EP-09001)
- One (1) diesel fire pump engine (EU-06001)
- Four (4) natural gas fired generator engines (EP-20010, EP-20020, EP-20030, and EP-20040)

This PSD air quality construction permit, C-11396, will supersede the PSD Air Emission Source Construction Permits dated September 16, 2011(C-9600) and January 22, 2013 (C-10550).

The *Conforming Prevention of Significant Deterioration, Air Quality Construction Permit Modification Application* dated January, 2014 is an addendum to the May 19, 2011 Updated Facility Design, Prevention of Significant Deterioration, Air Quality Construction Permit Application and the October 15, 2012 Appended PSD Air Quality Construction Permit Application.

VI. Best Available Control Technology (BACT)

The BACT requirement applies to new affected emissions units and pollutant emitting activity. Individual BACT determinations are performed for each pollutant emitted from the same emission unit. Consequently, the BACT determination must separately address, for each regulated pollutant with a significant emissions increase at the source, air pollution controls for each missions unit or pollutant emitting activity subject to review. ABBK was required to prepare a BACT analysis for KDHE's review according to the process described in Attachment A of this permit summary. KDHE's evaluation of the BACT for ABBK is presented in Attachment B.

A summary of BACT requirements are found in the following Table 2.

Table 2. Summary of BACT Requirements

Stack ID	Equipment/ Process	Pollutant	Proposed BACT Emission Limit(s) (* Denotes that the emission rate is an estimate from the permit application only. BACT limit is an operational or work practice standard.)	BACT Device(s) or Operational Limitation(s)
EP-11700	Floor Sweep System Baghouse	PM/PM_{10}	0.011 lb/hr	Fabric Filter Baghouse
		$PM_{2.5}$	0.002 lb/hr	
EP-11200	EH Storage Bin # 2 DC	PM/PM_{10}	0.72 lb/hr	Fabric Filter Baghouse
		$PM_{2.5}$	0.120 lb/hr	
EP-11500	Boiler Feed System DC	PM/PM_{10}	0.044 lb/hr	Fabric Filter Baghouse
		$PM_{2.5}$	0.008 lb/hr	
EP-11510	Boiler Feed System DC	PM/PM_{10}	0.044 lb/hr	Fabric Filter Baghouse
		$PM_{2.5}$	0.008 lb/hr.	
EP-20512	Lime Handling DC #1	PM/PM_{10}	0.11 lb/hr	Fabric Filter Baghouse
		$PM_{2.5}$	0.06 lb/hr	
EP-18185	EH Fermentation CO_2 Scrubber	Condensable PM	0.10 lb/hr	Wet Scrubber
		NO_2	0.07 lb/hr	Wet Scrubber
		VOC	2.71 lb/hr	Wet Scrubber

Stack ID	Equipment/ Process	Pollutant	Proposed BACT Emission Limit(s) (* Denotes that the emission rate is an estimate from the permit application only. BACT limit is an operational or work practice standard.)	BACT Device(s) or Operational Limitation(s)
EP-18180	EH Distillation Vent Scrubber	Ducted to EH Fermentation CO_2 Scrubber, EP-18185 for additional control. See EP-18185.		
EP-20001 and EP-20002	Biomass-Fired Stoker Boiler and Boiler Reheat Burner	Total PM	0.032 lb/MMBtu	Fabric Filter Baghouse
		Total PM_{10}	0.032 lb/MMBtu	Fabric Filter Baghouse
		Total $PM_{2.5}$	0.030 lb/MMBtu	Fabric Filter Baghouse
		Condensable PM_{10}	0.017 lb/MMBtu	Fabric Filter Baghouse
		Condensable $PM_{2.5}$	0.017 lb/MMBtu	Fabric Filter Baghouse
		Filterable PM_{10}	0.015 lb/MMBtu	Fabric Filter Baghouse
		Filterable $PM_{2.5}$	0.015 lb/MMBtu	Fabric Filter Baghouse
		NOx (Including Start-up/ Shutdown/Malfunction)	0.30 lb/MMBtu (30-day rolling)	Selective Catalytic Reduction (SCR), Over Fire Air (OFA), Good Combustion Practices (GCP)
		NOx (Including Start-up/Shutdown, Excluding Malfunction)	157.5 lb/hr (1-hour average)	SCR, OFA, GCP
		SO_2 (Including Start-up/ Shutdown/Malfunction)	0.21 lb/MMBtu (30-day rolling)	Injection of sorbent (lime) in combination with a dry flue gas desulfurization (FGD) system.
		SO_2 (Including Start-up/ Shutdown, Excluding Malfunction)	110.25 lb/hr (maximum 1-hour)	Injection of sorbent (lime) in combination with a dry flue gas desulfurization (FGD) system.
		CO	260 ppmv @3%O_2, or 115.5 lb/hr	Oxidation Catalyst (OC), GCP

Stack ID	Equipment/ Process	Pollutant	Proposed BACT Emission Limit(s) (* Denotes that the emission rate is an estimate from the permit application only. BACT limit is an operational or work practice standard.)	BACT Device(s) or Operational Limitation(s)
		VOC	0.005 lb/MMBtu (2.55 lb/hr)	OC, GCP
		CO_2e	0.35 lb/lb steam produced	Restriction of fuels to biomass, Energy efficiency, Cogeneration, Process integration, Combustion of co-products, Heat recovery, Operational and maintenance monitoring
EP-04001	Cooling Water Tower	$PM/PM_{10}/PM_{2.5}$	1,575 ppm TDS	Drift Eliminator with 0.0005% Drift Rate
EP-09001	Biogas Flare	$PM/PM_{10}/PM_{2.5}$	None	Smokeless Design
		NOx	0.33 lb/hr* 0.12 ton/yr*	Low NOx Burner
		SO_2	Less than 100 ppm Sulfur by Weight	Treated Biogas and Pipeline Grade Natural Gas Only
		CO	1.76 lb/hr* 0.48 ton/yr*	Good Combustion Practices
		VOC	0.14 lb/hr*	Good Combustion Practices

Stack ID	Equipment/ Process	Pollutant	Proposed BACT Emission Limit(s) (* Denotes that the emission rate is an estimate from the permit application only. BACT limit is an operational or work practice standard.)	BACT Device(s) or Operational Limitation(s)
		CO_2e	20,166 short tons CO_2e/yr during any twelve (12) consecutive month period Limited to no more than 3,960 hours per consecutive 12 month period.	Energy-efficient design, Incorporate a fuel efficient thermal oxidizer pilot; Develop and implement a written Leak Detection and Repair (LDAR) program
EP-06001 (EMG)	Diesel Fire Pump Engine	$PM/PM_{10}/PM_{2.5}$	0.09 g/hp-hr (0.0002 lb/hp-hr)	EPA Certified Engine – Tier 3
		NOx	2.60 g/hp-hr (0.006 lb/hp-hr)	EPA Certified Engine – Tier 3
		SO_2	0.27 g/hp-hr (0.00059 lb/hp-hr)	Ultra Low Sulfur Diesel Fuel
		CO	0.50 g/hp-hr (0.0011 lb/hp-hr)	EPA Certified Engine – Tier 3
		VOC	0.10 g/hp-hr (0.0002 lb/hp-hr)	EPA Certified Engine – Tier 3
		CO_2e	34.43 tons per yr (163.6 lb/MMBtu)	EPA Certified Engine – Tier 3
EP-01000FUG	Paved Haul Roads	$PM/PM_{10}/PM_{2.5}$	148 Trucks/ Day 7-Day Rolling Average (44 Trucks 6pm-6am	Truck traffic fugitive control strategy and monitoring plan, including sweeping and speed limits
EP-01050FUG	Biomass Laydown Roads	$PM/PM_{10}/PM_{2.5}$	109 Trucks per Day 7-Day Rolling Average	Truck traffic fugitive control strategy and monitoring plan, including sweeping and speed limits
EP-02100	Ethanol Loadout Thermal Oxidizer	$PM/PM_{10}/PM_{2.5}$	0.0004 lb/hr*	Smokeless Design
		NOx	0.55 lb/hr*	GCP

Stack ID	Equipment/ Process	Pollutant	Proposed BACT Emission Limit(s) (* Denotes that the emission rate is an estimate from the permit application only. BACT limit is an operational or work practice standard.)	BACT Device(s) or Operational Limitation(s)
		SO_2	1.17 E-07 lb/hr*	Propane as fuel for pilot GCP
		CO	1.35 lb/hr*	GCP
		VOC	7.95 lb/hr*	Develop and implement a written Leak Detection and Repair (LDAR) program GCP
		CO_2e	1,356 tons per each consecutive 12 month period. Limited to no more than 1,500 hours per consecutive 12 month period.	Energy-efficient design, Incorporate a fuel efficient thermal oxidizer pilot; Develop and implement a written Leak Detection and Repair (LDAR) program
EP-10002	Facility Berm	PM	0.148 lb/hr* No greater than 132 linear feet of unstabilized berm at any given time.	Wet suppression, Fugitive dust plan
		PM_{10}	0.074 lb/hr* No greater than 132 linear feet of unstabilized berm at any given time.	Wet suppression, Fugitive dust plan
		$PM_{2.5}$	0.011 lb/hr* No greater than 132 linear feet of unstabilized berm at any	Wet suppression, Fugitive dust plan

Stack ID	Equipment/ Process	Pollutant	Proposed BACT Emission Limit(s) (* Denotes that the emission rate is an estimate from the permit application only. BACT limit is an operational or work practice standard.)	BACT Device(s) or Operational Limitation(s)
			given time.	
EP-11000	Biomass Storage	$PM/PM_{10}/PM_{2.5}$	66.10 tpy* Limited to 15 storage divisions of 2,400 tons each in the west and east biomass storage area	Tightly compacted bales, Fugitive dust management plan
EP-20010	Natural gas Fired Generator Set # 1	$PM/PM_{10}/PM_{2.5}$	0.160 lb/hr,	Natural Gas Lean Burn Engine Low Ash Fuel/Firing Pipeline Quality Natural Gas Only GCP
		NOx	0.05 g/bhp-hr or 0.29 lb/hr	Natural Gas Fired Lean Burn Engine SCR
		SO_2	0.01 lb/hr or 0.0006 lb/MMBtu	Natural Gas Lean Burn Engine Low Sulfur Fuel/Firing Pipeline Quality Natural Gas Only
		CO	0.50 g/bhp-hr or 2.73 lb/hr	OC GCP
		VOC	0.25 g/bhp-hr or 1.36 lb/hr	OC GCP
		CO_2e	2,489.7 lb/hr or 116.98 lb/MMBtu	Natural Gas Lean Burn Engine Low Ash Fuel/Firing Pipeline Quality Natural Gas Only Engine Efficiency through Maintenance

Stack ID	Equipment/ Process	Pollutant	Proposed BACT Emission Limit(s) (* Denotes that the emission rate is an estimate from the permit application only. BACT limit is an operational or work practice standard.)	BACT Device(s) or Operational Limitation(s)
EP-20020	Natural gas Fired Generator Set # 2	PM/PM_{10}/$PM_{2.5}$	0.160 lb/hr	Natural Gas Lean Burn Engine Low Ash Fuel/Firing Pipeline Quality Natural Gas Only GCP
		NOx	0.05 g/bhp-hr or 0.29 lb/hr	Natural Gas Fired Lean Burn Engine SCR
		SO_2	0.01 lb/hr or 0.0006 lb/MMBtu	Natural Gas Lean Burn Engine Low Ash Fuel/Firing Pipeline Quality Natural Gas Only
		CO	0.50 g/bhp-hr or 2.73 lb/hr	OC GCP
		VOC	0.25 g/bhp-hr or 1.36 lb/hr	OC GCP
		CO_2e	2,489.7 lb/hr or 116.98 lb/MMBtu	Natural Gas Lean Burn Engine Low Ash Fuel/Firing Pipeline Quality Natural Gas Only Engine Efficiency through Maintenance
EP-20030	Natural gas Fired Emergency Generator Set # 1	PM/PM_{10}/$PM_{2.5}$	0.16 lb/hr	Natural Gas Lean Burn Engine Firing Pipeline Quality Natural Gas Only GCP

Stack ID	Equipment/ Process	Pollutant	Proposed BACT Emission Limit(s) (* Denotes that the emission rate is an estimate from the permit application only. BACT limit is an operational or work practice standard.)	BACT Device(s) or Operational Limitation(s)
		NOx	0.88 g/hp-hr	Natural Gas Lean Burn Engine Firing Pipeline Quality Natural Gas Only GCP
		SO_2	0.01 lb/hr	Natural Gas Lean Burn Engine Firing Pipeline Quality Natural Gas Only GCP
		CO	2.88 g/hp-hr	Natural Gas Lean Burn Engine Firing Pipeline Quality Natural Gas Only GCP
		VOC	0.40 g/hp-hr	Natural Gas Lean Burn Engine Firing Pipeline Quality Natural Gas Only GCP
		CO_2e	2,489.7 lb/hr	Natural Gas Lean Burn Engine Firing Pipeline Quality Natural Gas Only GCP

Stack ID	Equipment/ Process	Pollutant	Proposed BACT Emission Limit(s) (* Denotes that the emission rate is an estimate from the permit application only. BACT limit is an operational or work practice standard.)	BACT Device(s) or Operational Limitation(s)
EP-20040	Natural gas Fired Emergency Generator Set # 2	$PM/PM_{10}/PM_{2.5}$	0.16 lb/hr	Natural Gas Lean Burn Engine Firing Pipeline Quality Natural Gas Only GCP
		NOx	0.88 g/hp-hr	Natural Gas Lean Burn Engine Firing Pipeline Quality Natural Gas Only GCP
		SO_2	0.01 lb/hr	Natural Gas Lean Burn Engine Firing Pipeline Quality Natural Gas Only GCP
		CO	2.88 g/hp-hr	Natural Gas Lean Burn Engine Firing Pipeline Quality Natural Gas Only GCP
		VOC	0.40 g/hp-hr	Natural Gas Lean Burn Engine Firing Pipeline Quality Natural Gas Only GCP

Stack ID	Equipment/ Process	Pollutant	Proposed BACT Emission Limit(s) (* Denotes that the emission rate is an estimate from the permit application only. BACT limit is an operational or work practice standard.)	BACT Device(s) or Operational Limitation(s)
		CO_2e	2,390.83 lb/hr	Natural Gas Lean Burn Engine Firing Pipeline Quality Natural Gas Only GCP
T-02101	Ethanol Product Storage Shift Tank	VOC	301 lb/hr*	Fixed roof with internal floating roof Complying with NSPS Kb
T-02108	Ethanol Product Storage Shift Tank	VOC	301 lb/hr*	Fixed roof with internal floating roof Complying with NSPS Kb
T-02102	Ethanol Product Storage Tank	VOC	431 lb/hr*	Fixed roof with internal floating roof Complying with NSPS Kb
T-02112	Ethanol Product Storage Tank	VOC	431 lb/hr.*	Fixed roof with internal floating roof Complying with NSPS Kb
T-02105	Denaturant Storage Tank	VOC	3,534 lb/hr*	Fixed roof with internal floating roof Complying with NSPS Kb
T-02109	Methanol Storage Tank	VOC	230 lb/yr*	Fixed roof with internal floating roof Submerged Fill Pipe Complying with NSPS Kb
EP-02000	Fugitive Leaks	VOC	1.69 tpy*	LDAR Program

Stack ID	Equipment/ Process	Pollutant	Proposed BACT Emission Limit(s) (* Denotes that the emission rate is an estimate from the permit application only. BACT limit is an operational or work practice standard.)	BACT Device(s) or Operational Limitation(s)
EP-02100FUG	Ethanol Loading Loses	VOC	0.75 tpy*	LDAR Program
EP-19001FUG	Lignin-Rich Stillage Storage	VOC	1.29 tpy*	Storage at ambient temperature
EP-20143	Fly Ash Silo Bin Vent	PM	0.004 gr/dscf (0.0057 lb/hr)	Fabric Filter Baghouse
		PM_{10}	0.004 gr/dscf (0.0057 lb/hr)	Fabric Filter Baghouse
		$PM_{2.5}$	0.002 gr/dscf (0.0029 lb/hr)	Fabric Filter Baghouse
EP-20111-1	Fly Ash Truck Load-out Slide Gate #1	PM	0.0025 lb/hr*	Water Conditioning and Fugitive Dust Management Plan
		PM_{10}	0.0012 lb/hr*	
		$PM_{2.5}$	0.0002 lb/hr*	
EP-20111-2	Fly Ash Rail Load-out Slide Gate #1	PM	0.0025 lb/hr*	Water Conditioning and Fugitive Dust Management Plan
		PM_{10}	0.0012 lb/hr*	
		$PM_{2.5}$	0.0002 lb/hr*	
EP-20111-3	Fly Ash Rail Load-out Slide Gate #2	PM	0.0025 lb/hr*	Water Conditioning and Fugitive Dust Management Plan
		PM_{10}	0.0012 lb/hr*	
		$PM_{2.5}$	0.0002 lb/hr*	
EP-20119	Bottoms Ash Load-out	PM	0.00005 lb/hr*	Water Conditioning and Fugitive Dust Management Plan
		PM_{10}	0.00002 lb/hr*	
		$PM_{2.5}$	0.000003 lb/hr*	
FUG_WCP	Wet Cake Production	PM	0.0101 lb/hr*	Water Conditioning and Fugitive Dust Management Plan
		PM_{10}	0.0048 lb/hr*	
		$PM_{2.5}$	0.0007 lb/hr*	
FUG_WCE	Wet Cake Emergency Pad and Reclaim	PM	0.0051 lb/hr*	Water Conditioning and Fugitive Dust Management Plan
		PM_{10}	0.0024 lb/hr*	
		$PM_{2.5}$	0.0004 lb/hr*	
FUG_WSL	Washed Sand	PM	0.0012 lb/hr*	Water Conditioning and Fugitive Dust Management Plan
		PM_{10}	0.0006 lb/hr*	
		$PM_{2.5}$	0.0001 lb/hr*	
FUG_DP	Dirt Production	PM	0.0038 lb/hr*	Water Conditioning and Fugitive Dust Management Plan
		PM_{10}	0.0018 lb/hr*	
		$PM_{2.5}$	0.0003 lb/hr*	
FUG_DO	Dirt Offloading	PM	0.0281 lb/hr*	Water Conditioning and Fugitive Dust Management Plan
		PM_{10}	0.0133 lb/hr*	
		$PM_{2.5}$	0.0020 lb/hr*	

Stack ID	Equipment/ Process	Pollutant	Proposed BACT Emission Limit(s) (* Denotes that the emission rate is an estimate from the permit application only. BACT limit is an operational or work practice standard.)	BACT Device(s) or Operational Limitation(s)
EP-10507	Dirt/Fines Silo Vent	PM/PM_{10}	0.01 lb/hr	Fabric Filter Baghouse
		$PM_{2.5}$	0.002 lb/hr	Fabric Filter Baghouse
EP-11400	Biomass Boiler Storage Bin Baghouse	PM/PM_{10}	0.72 lb/hr	Fabric Filter Baghouse
		$PM_{2.5}$	0.122` lb/hr	Fabric Filter Baghouse
EP-11600	Dust Collection System DC # 1	PM/PM_{10}	0.625 lb/hr	Fabric Filter Baghouse
		$PM_{2.5}$	0.11 lb/hr	Fabric Filter Baghouse
EP-11610	Dust Collection System DC # 2	PM/PM_{10}	0.625 lb/hr	Fabric Filter Baghouse
		$PM_{2.5}$	0.11 lb/hr	Fabric Filter Baghouse
EP-11100	EH Storage Bin #1 DC	PM/PM_{10}	0.72 lb/hr	Fabric Filter Baghouse
		$PM_{2.5}$	0.12 lb/hr	Fabric Filter Baghouse

KDHE has concurred with ABBK for the following BACT emission limits and operational conditions:

A. Biomass-Fired Stoker Boiler and Boiler Reheat Burner (EP-20001 and EP-20002) BACT

1. The stoker biomass boiler shall burn a combination of wheat straw, milo (sorghum) stubble, corn stover, switchgrass, other opportunity feedstocks that are available, enzymatic hydrolysis residuals (including lignin-rich stillage cake and thin stillage syrup), particles collected during biomass grinding, NCG vent streams, wastewater treatment sludge and biogas.

   Natural gas will be used during startup periods as required per manufacturer recommendations.

2. The boiler reheat burner (EP-20002) shall fire natural gas or biogas only.

3. The BACT NO_x emission limitations and controls for the biomass-fired stoker boiler (EP-20001) and boiler reheat burner (EP-20002) are as follows:

   a. The owner or operator shall not emit or cause to be emitted any gases that contain NO_x emissions in excess of the BACT emission limit of 0.30 lb/MMBtu on a 30 day rolling average including periods of startup, shutdown, or malfunction.

   b. The owner or operator shall not emit or cause to be emitted any gases that contain NO_x emissions in excess of the BACT emission limit of 157.5 pounds per hour (lbs/hr) on a 1-hour average, including periods of startup and shutdown, and excluding malfunction.

   c. The NO_X emissions from the biomass-fired stoker boiler shall be controlled with the installation of a Selective Catalytic Reduction System (SCR). The NO_x emissions from the biomass-fired stoker boiler shall also be controlled with the implementation of over-fire air (OFA) and good combustion practices (GCP). The owner or operator must operate and maintain the SCR system to assure proper, effective and optimal NO_x control. If the emission rate results from the initial performance test are less than the limit described above and deemed consistently achievable, the emission rate determined during the performance test will be the limit imposed.

   d. Emissions during startup of the biomass-fired boiler shall be controlled by burning only natural gas via low NO_x burners and an operational over-fire air system. No other fuels shall be combusted until the SCR is operational.

   e. Emissions during shutdown shall be controlled by keeping the SCR operational until the boiler load is significantly reduced and all solid/liquid fuels are removed from the boiler.

4. The BACT SO_2 emission limitations and controls for the biomass-fired stoker boiler (EP-20001) and boiler reheat burner (EP-20002) are as follows:

   a. The owner or operator shall not emit or cause to be emitted any gases that contain SO_2 emissions in excess of the BACT emission limit of 0.21 lb/MMBtu on a 30 day rolling average including periods of startup, shutdown, and malfunction.

b. The owner or operator shall not emit or cause to be emitted any gases that contain SO_2 emissions in excess of the BACT emission limit of 110.25 lbs/hr on a 1-hour average including periods of startup and shutdown and excluding malfunction.

c. The SO_2 emissions from the biomass-fired stoker boiler shall be controlled with the injection of sorbent, {trona (sodium sesquicarbonate) or lime} in combination with a dry FGD system. The owner or operator must operate and maintain the FGD system to assure proper, effective and optimal SO_2 control. The system shall achieve at least 90% control efficiency except when inlet SO_2 concentrations are below 2.4 lb/MMBtu. If the emission rate results from the initial performance test are less than the limit described above and deemed consistently achievable, the emission rate determined during the performance test will be the limit imposed.

d. Emissions of SO_2 during startup of the biomass-fired boiler shall be controlled by burning only natural gas. No other fuels shall be combusted until the FGD is operational.

e. Emissions of SO_2 during shutdown shall be controlled by keeping the FGD operational until the boiler load is significantly reduced and all solid/liquid fuels are removed from the boiler.

f. Compliance with the BACT SO_2 emissions from the boiler reheat burner (EP-20002) is established by the BACT analysis and emissions calculations submitted with the permit application, as well as meeting the Hydrogen Sulfide (H_2S) limitation to less than 100 ppm for the biogas and the sampling requirements contained in **Section V. M.7** of the PSD permit.

5. The BACT CO emission limitations and controls for the biomass-fired stoker boiler (EP-20001) and boiler reheat burner (EP-20002) are as follows:

a. The owner or operator shall not emit or cause to be emitted any gases that contain CO emissions in excess of the BACT emission limits of 0.22 lb/MMBtu (260 ppmv @ 3% O_2 or 115.5 lb/hr) on a 30 day rolling average, including periods of startup, shutdown, and malfunction.

b. This BACT limit is based upon the installation of an oxidation catalyst and implementation of good combustion practices (GCP). If the emission rate results from the initial performance test are less than the limit described above and deemed consistently achievable, the emission rate determined during the performance test will be the limit imposed.

6. The BACT PM emissions limitation and controls for the biomass-fired stoker boiler (EP-20001) and boiler reheat burner (EP-20002) are as follows:

   a. The owner or operator shall not emit or cause to be emitted any gases that contain total PM in excess of the BACT emission limit of 0.032 lb/MMBtu (16.8 lb/hr) on a 30 day rolling average including periods of startup, shutdown, and malfunction.

   b. The PM emissions from the biomass-fired stoker boiler shall be controlled with the installation of a baghouse (DC-20001) equipped with fabric filter bags.

   c. The BACT PM emissions from the boiler reheat burner (EP-20002) shall be controlled by the firing of natural gas or biogas only.

   d. Compliance with the BACT PM emissions from the boiler reheat burner (EP-20002) is established by the BACT analysis and emissions calculations submitted with the permit application.

7. The BACT PM_{10} and $PM_{2.5}$ emission limitations and controls for the biomass-fired stoker boiler (EP-20001) and boiler reheat burner (EP-20002) are as follows:

   a. The owner or operator shall not emit or cause to be emitted any gases that contain total PM_{10} emissions in excess of the BACT emission limit of 0.032 lb/MMBtu (16.80 lb/hr).

   b. The owner or operator shall not emit or cause to be emitted any gases that contain condensable PM_{10} emissions in excess of the BACT emission limit of 0.017 lb/MMBtu (8.93 lb/hr).

   c. The owner or operator shall not emit or cause to be emitted any gases that contain filterable PM_{10} emissions in excess of the BACT emission limit of 0.015 lb/MMBtu (7.87 lb/hr).

   d. The owner or operator shall not emit or cause to be emitted any gases that contain total $PM_{2.5}$ emissions in excess of the BACT emission limit of 0.030 lb/MMBtu (15.75 lb/hr).

   e. The owner or operator shall not emit or cause to be emitted any gases that contain condensable $PM_{2.5}$ emissions in excess of the BACT emission limit of 0.017 lb/MMBtu (8.93 lb/hr).

   f. The owner or operator shall not emit or cause to be emitted any gases that contain filterable $PM_{2.5}$ emissions in excess of the BACT emission limit of 0.013 lb/MMBtu (6.82 lb/hr).

g. The $PM_{10}/PM_{2.5}$ emissions from the biomass-fired stoker boiler shall be controlled with the installation of a baghouse (DC-20001) equipped with fabric filter bags.

h. The $PM_{10}/PM_{2.5}$ emissions from the boiler reheat burner (EP-20002) shall be controlled by the firing of natural gas or biogass only.

i. Compliance with the BACT $PM_{10}/PM_{2.5}$ emissions from the boiler reheat burner (EP-20002) is established by the BACT analysis and emissions calculations submitted with the permit application.

8. The BACT VOC emission limitations and controls for the biomass-fired stoker boiler (EP-20001) and boiler reheat burner (EP-20002) are as follows:

a. The owner or operator shall not emit or cause to be emitted any gases that contain VOC emissions in excess of the BACT emission limit of 0.005 lb/MMBtu (2.55 lb/hr).

b. This BACT limit is based upon the installation of an oxidation catalyst and implementation of good combustion practices (GCP). If the emission rate results from the initial performance test are less than the limit described above and deemed consistently achievable, the emission rate determined during the performance test will be the limit imposed.

9. The BACT CO_2e emission limitations and controls for the biomass-fired stoker boiler (EP-20001) and the boiler reheat burner (EP-20002) are as follows:

a. For the biomass-fired stoker boiler: a restriction of the fuel type to biomass that is otherwise considered to have low to no economic value or benefit (i.e. crop residuals); and/or is a lower impacting crops (i.e. mixed warm season grasses such as switchgrass);

b. For the boiler reheat burner: a restriction of the fuel type to natural gas or biogas only.

c. Energy efficient design, incorporating cogeneration, process integration, combustion of co-products, heat recovery and operational and maintenance monitoring.

d. The BACT limit for the biomass-fired stoker boiler and boiler reheat burner shall be 0.35 lb CO_2e/lb of steam produced averaged over 30 day rolling periods including periods of startup and shut-down.

B. The Flue Gas Desulfurization System BACT (EP-20512)

1. The BACT PM, PM_{10} and $PM_{2.5}$ Emission Limitations and Controls for FGD System

The emissions from the hydrated lime handling conveyors shall be controlled by the lime handling baghouse #1 (EP-20512).

a. The BACT emissions of PM/PM_{10} are limited to 0.11 lb/hr.

b. The BACT emissions of $PM_{2.5}$ are limited to 0.06 lb/hr.

C. Biomass-Fired Stoker Boiler Materials Handling Systems BACT

1. The BACT emissions for the fly ash silo bin (T-20110) shall be controlled with bin vent fabric filter (EP-20143):

a. The BACT emissions for PM/PM_{10} shall be limited to 0.004 gr/dscf (0.0057 lb/hr), including periods of startup, shutdown and malfunction.

b. The BACT emissions for $PM_{2.5}$ shall be limited to 0.002 gr/dscf (0.0029 lb/hr), including periods of startup, shutdown and malfunction.

2. The fly ash load-out operations emissions shall be designed to use the water conditioning pug mill to control BACT PM, PM_{10}, and $PM_{2.5}$ emissions. The fly ash load-out operations BACT limitations are based on the source maintaining moisture content of the fly ash at 20% or greater. The fly ash load-out operations shall consist of a single enclosed screw conveyor with three (3) slide gate valves for discharge of fly ash to one truck loadout slide gate (EP-20111-1) and to two (2) rail loadout slide gates (EP-20111-2 and EP-20111-3).

3. The BACT emission limitations for the fly ash truck loadout slide gate (EP-20111-1):

a. The owner or operator shall continuously operate the water conditioning pug mill at all times fly ash is transferred to truck loadout.

b. The owner or operator shall operate and maintain the water conditioning pug mill according to the manufacturer's guidelines and in a manner consistent with safety, good engineering and air pollution control practices for minimizing emissions.

c. The owner or operator shall continuously operate the water the water conditioning pug mill at all times fly ash is transferred to the truck loadout slide gate.

d. The owner or operator shall maintain the moisture content of the fly ash at 20% or greater and shall develop a monthly record of amount of fly ash produced. A sample of fly ash will be taken at the beginning of each loadout operation on a monthly basis to ensure sufficient water is used to maintain an average of no less than 20% moisture in each twelve consecutive month period.

e. A monthly moisture percentage average shall be calculated. Beginning the 12th month of operation and thereafter, the owner or operator shall calculate the 12 month consecutive moisture percentage. The owner shall maintain a record of the moisture analysis for five years from the date of record.

f. The owner or operator shall implement a written preventive maintenance program. The owner or operator shall provide construction specifications, operation and maintenance records, water flow rate and fly ash feed rate records, and other record keeping documents to KDHE upon request to demonstrate compliance with BACT.

4. The BACT emission limitations for the two (2) fly ash rail loadout slide gates, # 1 and # 2 (EP-20111-2 and EP-20111-3):

a. The owner or operator shall continuously operate the water conditioning pug mill at all times fly ash is transferred to rail loadout slide gates.

b. The owner or operator shall operate and maintain the water conditioning system and pug mill according to the manufacturer's guidelines and in a manner consistent with safety, good engineering and air pollution control practices for minimizing emissions.

c. The owner or operator shall continuously operate the water the water conditioning pug mill at all times fly ash is transferred to the truck loadout slide gate.

d. The owner or operator shall maintain the moisture content of the fly ash at 20% or greater and shall develop a monthly record of the amount of fly ash produced. A sample of fly ash will be taken at the beginning of each loadout operation on a monthly to ensure sufficient water is used to maintain an average of no less than 20% moisture in each twelve consecutive month period.

e. A monthly moisture percentage average shall be calculated. Beginning the 12th month of operation and thereafter, the owner or operator shall calculate the 12 month consecutive moisture percentage. The owner shall maintain a record of the moisture analysis for five years from the date of record.

f. The owner or operator shall implement a written preventive maintenance program. The owner or operator shall provide construction specifications, operation and maintenance records, water flow rate and fly ash feed rate records, and other record keeping documents to KDHE upon request to demonstrate compliance with BACT.

5. The BACT emission limitations for the bottoms ash loadout (EP-20119):

The bottoms ash load-out operations will consist of a single submerged drag conveyor that drops wet bottoms ash into a roll-off dumpster. The bottoms ash collection system shall use water submersion and a water spray system to control PM, PM_{10} and $PM_{2.5}$ emissions.

a. The owner or operator shall operate and maintain the water submersion and water spray system according to the manufacturer's guidelines and in a manner consistent with safety, good engineering and air pollution control practices for minimizing emissions.

b. The owner or operator shall continuously operate the water submersion and water spray system at all times bottoms ash is transferred out of the biomass-fired stoker boiler to slide gates.

c. Bottoms ash is transferred to a water quench tank and discharged using a drag conveyor. The bottoms ash contains at least 20% water for dust control. The water levels in the quench tank are controlled by use of a low and high level switch on the tank.

d. The owner or operator shall maintain the moisture content of the bottoms ash at 20% or greater and shall develop a monthly record of the amount of bottoms ash produced. A sample of bottoms ash will be taken at the beginning of each loadout operation to ensure sufficient water is used to maintain an average of no less than 20% moisture in each twelve consecutive month period.

e. The owner or operator shall use the biomass-fired stoker boiler hours of operation to determine the hours of operation for the bottoms ash loadout each month for use in calculating the monthly lb/hr average water usage.

f. The owner or operator shall implement a written preventive maintenance program. The owner or operator shall provide construction specifications, operation and maintenance records, water flow rate and fly ash feed rate records, and other record keeping documents to KDHE upon request to demonstrate compliance with BACT.

D. Biomass Receiving, Grinding and Storage Operations BACT

1. The BACT for the biomass receiving, handling, grinding and silo storage operation is a work place standard requiring a closed system except for the module grinding conveyor lines which will be open at the loading end due to the large size of the biomass modules.

2. The BACT emissions of PM/PM_{10} from the following baghouses are limited to 0.004 gr/dscf based on the average of at least three test runs conducted at each baghouse.

3. The BACT emissions of $PM_{2.5}$ from the following baghouses are limited to 0.0007 gr/dscf based on the average of at least three test runs conducted at each baghouse.

   a. Dust Collection System DC#1 (EP-11600) – emissions of PM/PM_{10} are limited to 0.625 lb/hr and emissions of $PM_{2.5}$ are limited to 0.11 lb/hr.

   b. Dust Collection System DC#2 (EP-11610) – emissions of PM/PM_{10} are limited to 0.625 lb/hr and emissions of $PM_{2.5}$ are limited to 0.11 lb/hr.

   c. Floor Sweep System Baghouse (EP-11700) – emissions of PM/PM_{10} are limited to 0.011 lb/hr and emissions of $PM_{2.5}$ are limited to 0.002 lb/hr.

   d. EH Storage Bin # 1 DC (EP-11100) – emissions of PM/PM_{10} are limited to 0.72 lb/hr and emissions of $PM_{2.5}$ are limited to 0.12 lb/hr.

   e. EH Storage Bin # 2 DC (EP-11200) – emissions of PM/PM_{10} are limited to 0.72 lb/hr and emissions of $PM_{2.5}$ are limited to 0.12 lb/hr.

   f. Boiler Feed System DC (EP-11500) – emissions of PM/PM_{10} are limited to 0.044 lb/hr and emissions of $PM_{2.5}$ are limited to 0.008 lb/hr.

   g. Boiler Feed System DC (EP-11510) – emissions of PM/PM_{10} are limited to 0.044 lb/hr and emissions of $PM_{2.5}$ are limited to 0.008 lb/hr.

   h. Dirt/Fines Silo fabric filter dust collector (EP-10507) – emissions of PM/PM_{10} are limited to 0.01 lb/hr and emissions of $PM_{2.5}$ are limited to 0.002 lb/hr.

   i. Biomass Boiler Storage Bin (T-11130 and T-11230) DC (EP-11400) – emissions of PM/PM10 are limited to 0.72 lb/hr and emissions of $PM_{2.5}$ are limited to 0.122 lb/hr.

2. The BACT for fugitive emissions from washed sand (FUG_WSL), dirt production (FUG_DP) and dirt offloading (FUG_DO) is a work place requiring a closed system and water spray suppression, and development of a Fugitive Dust Management Plant.

3. The BACT for fugitive emissions from wet cake production (FUG_WCP) and wet cake emergency pad and reclaim (FUG_WCE) is a work place requiring a closed system and water spray suppression, and development of a Fugitive Dust Management Plant.

4. The owner or operator shall prepare, submit, maintain and follow a Fugitive Dust Management Plan for control of fugitive particulate matter emissions from washed sand (FUG_WSL), dirt production (FUG_DP), dirt offloading (FUG_DO), wet cake production (FUG_WCP) and wet cake emergency pad and reclaim (FUG_WCE) operations.

5. The owner or operator shall enclose the vibrating screens and conveyors on the dirt production process (FUG_DP).

6. The owner or operator shall enclose all transfer conveyors from the wet cake emergency pad to the biomass-fired boiler in the wet cake production (FUG_WCP) and wet cake emergency pad and reclaim (FUG_WCE) operations.

7. The owner or operator shall follow the dust management plan at all times washed sand (FUG_WSL), dirt production (FUG_DP) and dirt offloading (FUG_DO) operations are performed.

8. The owner or operator shall develop an operations log which documents startup, shutdown, and malfunction conditions for the washed sand (FUG_WSL), dirt production (FUG_DP), dirt offloading (FUG_DO), wet cake production (FUG_WCP) and wet cake emergency pad and reclaim (FUG_WCE) operations.

9. Biomass storage is limited to 15 storage divisions of 2,400 tons each in the west and east biomass storage area. BACT is compaction of material and development of a Fugitive Dust Management Plan.

10. Continuous compliance with the BACT emissions limits from the west and east biomass storage areas, washed sand (FUG_WSL), dirt production (FUG_DP), dirt offloading (FUG_DO), wet cake production (FUG_WCP) and wet cake emergency pad and reclaim (FUG_WCE) operations are established by the BACT analysis and emissions calculations submitted with the permit application.

E. Enzymatic Hydrolysis (EH) Ethanol Manufacturing Plant BACT (EP-18185)

1. The VOC and CO_2 generated from the biomass co-fermentation process (Area 16000) shall be routed through the EH fermentation CO_2 scrubber (EP-18185). The CO_2 generated from the biomass ethanol recovery process (Area 18000) shall be routed through the EH distillation vent scrubber (EP-18180). The distillation scrubber vent feeds into the enzymatic hydrolysis fermentation CO_2 scrubber (EP-18185) for further control efficiency.

2. The non-condensable generated in areas 12000, 16000, and 19000 from the biomass process vents will be routed to the biomass-fired stoker boiler for destruction.

3. The BACT emissions of condensable PM and NO_2 from the enzymatic hydrolysis CO_2 scrubber (EP-18185) based on the average of at least three test runs are:

   a. EH fermentation CO_2 scrubber (EP-18185) – BACT emissions of condensable PM are limited to 0.10 lb/hr, as determined by Reference Method 202 (Part 51, Appendix M).

   b. EH fermentation CO_2 scrubber (EP-18185) – BACT emissions of NO_2 are limited to 0.07 lb/hr.

4. GHG BACT for the enzymatic hydrolysis CO_2 scrubber (EP-18185) is the installation/implementation of an efficient design, incorporating energy efficient heat integration, water recycling, and co-product production that make the overall process efficient and economical.

5. The BACT limit for the enzymatic hydrolysis CO_2 scrubber shall be 5.89 lb CO_2e/gal anhydrous ethanol produced for the enzymatic hydrolysis fermentation CO_2 scrubber stack (EP-18185), averaged over a 30-day rolling period. The enzymatic hydrolysis CO_2 scrubber emissions shall be continuously monitored with a CO_2 CEMS.

6. The VOC BACT limit for the enzymatic hydrolysis CO_2 scrubber shall be 2.71 lb/hr of VOC emissions.

F. Cooling Water Tower System for Cogeneration and Enzymatic Hydrolysis BACT (EP-04001)

The BACT emissions of $PM/PM_{10}/PM_{2.5}$ for the cooling water tower (EP-04001) is the installation of high efficiency mist eliminators that will limit drift to 0.0005% and a maximum total dissolved solids (TDS) limit of 1,575 ppm by volume. Compliance with this requirement is demonstrated by maintaining records of the vendor-guaranteed maximum total liquid drift. Total dissolved solids in the circulating water shall not exceed 1,575 ppm by volume. The method of demonstrating compliance with the PM emission limit is limiting the TDS content of the cooling water. This results in a PM BACT limit of 0.20 lb/hr, PM_{10} BACT limit of 0.14 lb/hr and a $PM_{2.5}$ BACT limit of 0.09 lb/hr.

G. Lignin Storage and Loadout BACT (EP-19001FUG)

The BACT emission of VOC for lignin storage and loadout is controlled by maintaining the lignin-rich stillage storage at ambient temperature and is limited to less than or equal to 1.29 tons per year in each consecutive 12 month period.

H. Biogas Thermal Oxidizer BACT (EP-09001)

BACT for the thermal oxidizer consists of design and workplace standards since there is no currently feasible method to measure emissions exiting the thermal oxidizer. BACT is using a thermal oxidizer design that meets the requirements of the New Source Performance Standards Subpart A, Section 60.18 (40 CFR 60.18). Workplace standards include continuously monitoring the pilot flame with infrared sensors, maintaining a natural gas purge so that the heating value of gases to the thermal oxidizer is not less than 300 Btu/scf and smokeless operation. The hours of operation for the thermal oxidizer shall be limited to no more than 3,960 hours per consecutive 12 month period. The pilot fuel shall be limited to exclusively natural gas and the biogas shall be treated to remove sulfur to a maximum value of 100 ppm. The thermal oxidizer shall consist of a low NO_x burner. Emissions shall be controlled by good combustion practices.

1. The BACT emission of CO_2e for the biogas vent thermal oxidizer shall be limited to 20,166 short tons CO_2e/yr during any twelve (12) consecutive month period. The hours of thermal oxidizer operation shall be limited to no more than 3,960 hours per consecutive 12 month period.

2. GHG BACT for the product load-out vapor recovery/biogas thermal oxidizer (EP-09001) is the installation/implementation of:

    a. Use of lower GHG-emitting processes and practices through an energy-efficient design, incorporating a fuel efficient thermal oxidizer pilot.

    b. Develop and implement a written Leak Detection and Repair (LDAR) program.

3. The owner or operator shall demonstrate compliance with the BACT limit by recording fuel usage each month and using approved emissions factors to determine resulting CO_2e emissions.

    a. The owner or operator shall monitor and record the hours of operation of the biogas thermal oxidizer on a monthly basis and calculate the consecutive 12 month total of hours of operation on a monthly basis. These records shall be maintained for two years from the date of record.

b. The owner or operator shall monitor and record the value of monthly thermal oxidizer fuel usage and resulting CO_2e emissions as specified in this permit. All records shall reflect totals for the most recent 12 month period.

c. Records for the combined total shall be updated monthly, no later than the last day of the following calendar month.

4. The owner or operator shall provide construction specifications, operation and maintenance records, and fuel usage records to KDHE upon request to demonstrate compliance with BACT.

5. The biogas shall be sampled no less than every 30 days to ensure the maximum Hydrogen Sulfide concentration is less than 100 ppm (0.0132 % sulfur by weight). A record shall be maintained of the sampling for two years from the date of record.

6. Continuous compliance with the BACT emissions limits for NO_x, CO, $PM/PM_{10}/PM_{2.5}$, VOC, SO_2, and CO_2e is established by the BACT analysis and emissions calculations submitted with the permit application.

I. Ethanol Loadout Thermal Oxidizer Limitations (EP-02100)

BACT for the thermal oxidizer consists of design, combustion control, good combustion practices and workplace standards since there is no currently feasible method to measure emissions exiting the thermal oxidizer. BACT is using a thermal oxidizer design that meets the requirements of the New Source Performance Standards Subpart A, Section 60.18 (40 CFR 60.18). Workplace standards include continuously monitoring the pilot flame with infrared sensors, maintaining a natural gas purge so that the heating value of gases to the thermal oxidizers is not less than 300 Btu/scf and smokeless operation. The hours of operation for the thermal oxidizer shall be limited to no more than 1,500 hours per consecutive 12 month period, natural gas for the pilot flame and primary fuel is ethanol.

1. The BACT emission of CO_2e for the ethanol loadout thermal oxidizer is limited to 1,356 tons per each consecutive 12 month period.

2. The owner or operator shall monitor and record the number of hour of operations of the thermal oxidizer on a daily basis and maintain a monthly record of the total hours of operation each month.

3. The hours of operation for the thermal oxidizer shall be limited to no more than 1,500 hours per consecutive 12 month period.

4. The owner or operator shall calculate on a monthly basis the annual CO_2e emissions by multiplying the hours of operation of the thermal oxidizer times the CO_2e emission rate of 1,808 lb/hr.

5. GHG BACT for the ethanol loadout thermal oxidizer is the installation/implementation of:

   a. Use of lower GHG-emitting processes and practices through an energy-efficient design, incorporating a fuel efficient thermal oxidizer pilot; and
   b. Develop and implement a written Leak Detection and Repair (LDAR) program.

6. The owner or operator shall demonstrate compliance with the BACT limits by recording fuel usage each month and using approved emissions factors to determine resulting NO_x, CO, $PM/PM_{10}/PM_{2.5}$, VOC, SO_2, and CO_2e emissions.

   a. The owner or operator shall monitor and record the value of monthly thermal oxidizer fuel usage and resulting emissions as specified in this permit. All records shall reflect totals for the most recent 12 month period.

   b. Records for the combined total shall be updated monthly, no later than the last day of the following calendar month.

7. The owner or operator shall provide construction specifications, operation and maintenance records, and fuel usage records to KDHE upon request to demonstrate compliance with BACT.

8. Continuous compliance with the BACT emissions limits for NO_x, CO, $PM/PM_{10}/PM_{2.5}$, VOC, SO_2, and CO_2e is established by the BACT analysis and emissions calculations submitted with the permit application.

J. Emergency Fire Pump Diesel Engine BACT (EP-06001)

1. BACT emissions for the diesel fire pump engine are being established as good combustion practices, firing low sulfur fuels and purchase of a Certified Engine meeting the emission limits in 40 CFR Part 60, NSPS Subpart IIII.

2. The BACT emission of NO_x for the diesel fire pump engine is 2.60 g/hp-hr. including periods of startup, shutdown, and malfunction. [K.A.R. 28-19-302(a)]

3. The BACT emission of CO for the diesel fire pump engine is 0.50 g/hp-hr including periods of startup, shutdown, and malfunction. [K.A.R. 28-19-302(a)]

4. The BACT emission of $PM/PM_{10}/PM_{2.5}$ for the diesel fire pump engine is 0.09 g/hp-hr including periods of startup, shutdown, and malfunction. [K.A.R. 28-19-302(a)]

5. The BACT emission of VOC for the diesel fire pump engine is 0.10 g/hp-hr including periods of startup, shutdown, and malfunction.

6. The BACT emission of SO_2 for the diesel fire pump engine is 0.27 g/hp-hr and a work place diesel fuel standard that meets the fuel sulfur standard of 0.0015 % sulfur by weight.

7. The BACT emission of CO_2e for the diesel fire pump engine is 34.43 tons per year in any twelve (12) month consecutive period.

K. Two (2) Natural Gas Fired Power Generation Engines BACT (EP-20010 and EP-20020)

1. Engines EP-20010 and EP-20020 will be equipped with a Harco Manufacturing, Model EnviCat-5314-33.5x3.5x1 Selective Catalytic Reduction systems (SCR) for the reduction of NO_x.

   a. The BACT emission of NO_x for each engine is 0.29 lb/hr (0.05 g/hp-hr) on a 1-hr averaging period, including periods of startup, shutdown, and malfunction.

2. The engines shall be equipped with an Oxidation Catalyst for reduction of CO and VOC.

   a. The BACT emission of CO for each engine is 2.73 lb/hr (0.50 g/hp-hr) on a 1-hr averaging period, including periods of startup, shutdown, and malfunction.

   b. The BACT emission of VOC for each engine is 1.36 lb/hr (0.25 g/hp-hr) on a 1-hr averaging period, including periods of startup, shutdown, and malfunction.

3. The owner or operator shall fire the engines on low sulfur pipeline quality natural gas.

   The BACT emission of SO_2 for each engine is 0.01 lb/hr (0.0006 lb/MMbtu) on a 1-hr averaging period, including periods of startup, shutdown, and malfunction.

4. The BACT emission of $PM/PM_{10}/PM_{2.5}$ for each engine is 0.16 lb/hr on a 24-hr averaging period, including periods of startup, shutdown, and malfunction.

5. The BACT emissions of CO_2e for each engine are limited to 10,905 tons (2,489.7 lb/hr) per any consecutive 12 month period. This includes the GHG individual BACT limits as follows:

a. The BACT emissions of CO_2 for each engine are limited to 8,192.64 tons (1,870.47 lb/hr) per any consecutive 12 month period.

b. The BACT emissions of CH_4 for each engine are limited to 108 tons (24.7 lb/hr) per any consecutive 12 month period.

c. The BACT emissions of N_2O for each engine are limited to 0.015 tons (0.0035 lb/hr) per any consecutive 12 month period.

L. Two (2) Natural Gas Fired Emergency Power Generation Engines BACT (EP-20030 and EP-20040)

1. The BACT emission of NO_x for each engine is 0.88 g/hp-hr, including periods of startup, shutdown, and malfunction. [K.A.R. 28-19-302(a)]

2. The BACT emission of CO for each engine is 2.88 g/hp-hr, including periods of startup, shutdown, and malfunction. [K.A.R. 28-19-302(a)]

3. The BACT emission of VOC for each engine is 0.40 g/hp-hr, including periods of startup, shutdown, and malfunction. [K.A.R. 28-19-302(a)]

4. The BACT emission of $PM/PM_{10}/PM_{2.5}$ for each engine is 0.16 lb/hr, including periods of startup, shutdown, and malfunction. [K.A.R. 28-19-302(a)]

5. The BACT emission of SO_2 for each engine is 0.01 lb/hr, including periods of startup, shutdown, and malfunction. [K.A.R. 28-19-302(a)]

6. The BACT emissions of CO_2e for each engine are limited to 124.48 tons (2, 489.7 lb/hr) per any consecutive 12 month period. This includes the GHG individual BACT limits as follows:

a. The BACT emissions of CO_2 for each engine are limited to 93.52 tons (1,870 lb/hr) per any consecutive 12 month period.

b. The BACT emissions of CH_4 for each engine are limited to 1.2 tons (24.73 lb/hr) per any consecutive 12 month period.

c. The BACT emissions of N_2O for each engine are limited to 0.0002 tons (0.0035 lb/hr) per any consecutive 12 month period.

M. Plant Haul Roads BACT

1. In Plant Haul Roads Limitations (EP-01000FUG)

a. The number of trucks entering onsite for shipping and receiving operations in the plant shall not exceed 148 trucks per day averaged over a rolling 7-day period.

b. The number of trucks entering onsite for shipping and receiving operations in the plant shall not exceed 44 trucks per night between the hours of 6:00 PM and 6:00 AM averaged over a rolling 7 night period.

c. The number of trucks entering onsite for shipping and receiving operations in the plant shall not exceed 47,852 trucks per year over a rolling 365 day period.

d. The number of trucks entering onsite for shipping and receiving operations in the plant shall not exceed 14,356 trucks between the hours of 6:00 PM and 6:00 AM averaged over a rolling 365 day period.

e. BACT for emissions of $PM/PM_{10}/PM_{2.5}$ is a work place practice to pave all in plant haul roads and to post and enforce a maximum speed limit of 15 mph at all times. The owner or operator shall perform frequent washing, vacuuming, and sweeping, and enforce a speed limit to reduce fugitive emissions from the paved plant haul roads.

f. The owner or operator shall prepare, submit, maintain and follow a Fugitive Dust Management Plan for control of fugitive particulate matter emissions from the in-plant haul roads.

2. In Plant Biomass Laydown Roads and Unpaved Staging Area Limitations (EP-01050FUG)

a. The number of trucks hauling feedstock and materials into the biomass laydown roads and unpaved staging area shall not exceed 109 trucks per day averaged over a rolling 7-day period.

b. BACT for $PM/PM_{10}/PM_{2.5}$ for the in-plant unpaved biomass laydown roads and unpaved staging area (EP-01050FUG) is a work place practice to perform frequent water and/or chemical dust suppressant applications and to post and enforce at all times a maximum speed limit of 15 mph.

c. The owner or operator shall prepare, submit, maintain and follow a Fugitive Dust Management Plan for control of fugitive particulate matter emissions from the plant biomass laydown roads.

N. Facility Berm BACT (EP-10002)

1. The BACT emissions of $PM/PM_{10}/PM_{2.5}$ shall be controlled by the following work practices and operations:

a. Application of wet suppression to maintain moisture content of no less than 20% in the berm during its construction;

b. Permanently seal the developed portions of the berm through compaction and the planting of grasses or other stabilization methods. The owner or operator shall not allow greater than 132 linear foot of unstabilized berm at any one time; and

c. The owner or operator shall prepare, submit, maintain and follow a Fugitive Dust Management Plan for operation and maintenance of the berm.

O. Synthetic Organic Chemical Manufacturing Industry Equipment (EP-02000) and Loading Losses BACT (EP-02100FUG)

1. The BACT emission of VOC shall be controlled by best management practices, prompt detection and repair of leaks, and the development of a LDAR program.

2. The owner or operator shall comply with the applicable requirements of 40 CFR Part 60 Subpart VVa upon startup.

P. Organic Liquid and Chemical Storage Tanks BACT (T-02101, T-02108, T-02109, T-02102, T-02105, T-02112)

1. For VOC BACT control, the owner or operator shall install fixed roof tanks with internal floating roofs and submerge fill capabilities to reduce VOC emissions from the organic liquid tanks and comply with the applicable requirements of 40 CFR Part 60 Subpart Kb.

2. Continuous compliance with the BACT emissions limits VOC is established by the BACT analysis and emissions calculations submitted with the permit application.

3. The owner or operator shall comply with the applicable requirements of 40 CFR Part 60 Subpart Kb upon startup.

VII. <u>Ambient Air Impact Analysis</u>

A. Air Quality Impact Analysis (AQIA) Applicability

1. The proposed facility is a major source as defined by K.A.R. 28-19-350, Prevention of Significant Deterioration (PSD). Major sources with pollutant emissions exceeding significant emission rates must undergo PSD review. The owner or operator must demonstrate that allowable emission increases from the proposed facility would not cause or contribute to air pollution in violation of:

- any National Ambient Air Quality Standard (NAAQS) in any air quality control region; or

- any applicable maximum allowable increase (PSD increment) over the baseline concentration in any area.

2. Emissions from the proposed project and significant emission rate (SER) thresholds are listed in Table 3 below.

Table 3. Total Facility Emissions After Permitting of the Proposed Project and PSD Significant Emission Rates (SER)

Pollutant [a]	**Project Emissions with Controls (tpy)**	**PSD Significant Emission Rate (tpy)**	**Exceeds Significant Emission Rate?**
NO_x	**701.9**	40	**Yes**
SO_2	**504.4**	40	**Yes**
CO	**594.00**	100	**Yes**
PM[b]	**138.8**	25	**Yes**
PM_{10} [b]	**109.5**	15	**Yes**
$PM_{2.5}$ [b]	**76.5**	10	**Yes**
VOC	**47.9**	40	**Yes**
Lead	0.11	0.6	No
H_2SO_4 Mist	3.6	7	No
CO_2e	**626,000**	75,000	**Yes**
Ozone	N/A	40 tpy VOC or 40 tpy NO_x	**Yes**

[a] NOx = Nitrogen oxides; SO_2 =Sulfur dioxide; CO = Carbon monoxide; PM = Total particulate matter; PM_{10} = Particulate matter less than 10 micrometers (μm) in diameter; $PM_{2.5}$ = Particulate matter less than 2.5 μm in diameter; VOC = Volatile organic compounds; H_2SO_4 = sulfuric acid; and CO_2e = carbon dioxide equivalent.
[b] Filterable plus condensable.

B. Model Selection

1. A dispersion model is a computer simulation that uses mathematical equations to predict air pollution concentrations based on weather, topography, and emissions data. AERMOD is the current model preferred by EPA for use in near-field regulatory applications, per 40 CFR Part 51 Appendix W, Section 3.1.2, and Appendix A to Appendix W:

"AERMOD is a steady-state plume dispersion model for assessment of pollutant concentrations from a variety of sources. AERMOD simulates transport and dispersion from multiple sources based on an up-to-date characterization of the atmospheric boundary layer. AERMOD is appropriate for: point, volume, and area sources; surface, near-surface, and elevated releases; rural or urban areas; simple and complex terrain; transport distances over which steady-state assumptions are appropriate, up to 50 km; 1-hour to annual averaging times; and continuous toxic air emissions."

2. AERMOD modeling system Version 12345 was used to evaluate the impacts of the following pollutant and averaging times from the proposed project:

   a. 1-hour and annual NO_2;
   b. 1-hour and 8-hour CO;
   c. 24-hour and annual PM_{10};
   d. 24-hour and annual $PM_{2.5}$;
   e. 1-hour, 3-hour, 24-hour and annual SO_2

3. AERMINUTE Version 11325 was used to process 1-minute ASOS wind data to generate hourly average winds for input to AERMET. AERMET Version 12345 was used to prepare meteorological data for the years 2008-2012.

4. AERMOD Version 13350 was released on December 24, 2013, after modeling was conducted for the permit application. Updates were such that an increase in predicted impacts was not expected. To support this, modeling for a subset of the original annual NO_2 modeling was conducted by the facility's consultant using both AERMOD Version 12345 and Version 13350 and was received by KDHE on January 17, 2014. The comparison showed no increase in predicted impacts.

5. ABBK remodeled PM_{10} and PM_{25} in April 2014 to address EPA's comments. Some details of the remodeling were described in a separate document referred to as Responsiveness Summary, which is a document that contains the KDHE response to EPA comments).

C. Model Inputs

1. Source Data

   a. Input data used in the dispersion modeling such as emission rates and stack parameters were based on the data supplied in Section 7.0 of the updated PSD permit application received by KDHE on October 31, 2013 and updated January 3, 2014.

   b. Emission rates used in the dispersion modeling were based on the results of the BACT analysis.

   c. The proposed project was modeled by the facility using the operating scenarios approved in the original modeling. For details, please refer to the September 13, 2011 Air Quality Impact Analysis (AQIA) Review by KDHE.

d. The Tier 3 (Ozone Limiting Method or OLM) approach was used to determine the 1-hour NO_2 impacts. A formal request to use the Tier 3 (OLM) analysis was submitted to EPA Region 7 by the facility. The in-stack ratios used in 1-hour NO_2 modeling is tabulated in Table 7-6 of the updated PSD permit application.

2. The following are the major modifications to ABBK's 2011 and 2013 dispersion modeling:

   a. Two (2) of the four (4) natural gas-fired emergency generators approved in the 2013 construction permit will be used as non-emergency generators and will be operated 8,760 hours per year.

   b. The size of the emergency fire pump will be increased to 617 hp from 460 hp.

   c. A thermal oxidizer will be added for ethanol load-out (the existing thermal oxidizer will be exclusive to the biogas waste treatment plant).

   d. A 25 MMBtu/hr natural gas-fired reheat burner will be added to the biomass boiler.

   e. The ash handling system will be reconfigured. Details are described in the document "Revised Potential Emission Calculations and Best Available Control Technology Analysis for Ash Collection Systems" dated July 2013. According to the document, the two (2) ash collection systems for bottoms ash and fly ash have been significantly changed. The previously permitted ash collection systems included enclosures and/or baghouses for control of particulate emissions. The proposed ash collection systems incorporated into the final engineering design use water suppression systems for control of particulate emissions.

   f. Miscellaneous material handling fugitive emissions:

      i. Onsite berms will be built and will be made out of fly ash, bottom ash, dirt, and sand. Details of the berm are described in Section 3.1.1.8, Section 4.2.9 and in Appendix C (Emission Calculations) of the updated PSD permit application.

      ii. Capacity of ground biomass storage will be increased. Details of the biomass storage are described in Section 7.2.3 (for both the east and west biomass storage piles) and in Appendix C (Emission Calculations) of the updated PSD permit application.

iii. New haul roads will be added on the west side of the facility for traffic around the added west biomass storage piles. Details of the haul roads are described in Section 7.2.2 and in Appendix C (Emission Calculations) of the updated PSD permit application. The haul roads were laid out and modeled using the guidance and recommendations from the March 2, 2012 EPA's Haul Road Workgroup Final Report.

iv. Addition of miscellaneous transfer points for material handling. Section 3.1.1.6 listed the eight (8) additional transfer points for material handling.

3. Center of the facility

The center of the proposed project is located at the following:
Zone: 14
Easting: 288,300 meters
Northing: 4,117,630 meters

4. Urban or Rural

A review of the United States Geological Survey (USGS) National Land Cover Data (NLCD) for 1992 for the site and a surrounding three (3) kilometer radius was conducted to determine if rural or urban classification should be used for modeling. The area was deemed rural for air dispersion modeling purposes.

5. Terrain

The proposed project was modeled using the elevated terrain option. AERMAP processor Version 11103 was used to process the National Elevation Data (NED) files from the USGS to interpolate elevations at each receptor.

6. Meteorological Data

KDHE supplied to the facility five (5) consecutive years (2008 through 2012) of meteorological data. The surface data was obtained from the Garden City Regional Airport (GCK) meteorological station in Kansas. The upper air data was obtained from the Dodge City Regional Airport (DDC) meteorological station in Kansas. Table 4 shows additional information about the representative meteorological stations.

Figure 1 shows the wind rose (localized winds patterns) for the cumulative 5-year meteorological data, showing that prevailing wind originates mainly from the south. Figure 2 shows a map that includes the proposed ABBK facility, the GCK and the DDC airport meteorological stations.

Table 4. Meteorological Data Sites

Station Type	Station Name	WBAN #	Latitude/ Longitude	Elevation (m)	Years of Data
Surface Air Station	Garden City Regional Airport (GCK), KS	23064	37.9221/ -100.7242	878.4	2008-2012
Upper Air Station	Dodge City Regional Airport (DDC), KS	13985	37.7711/ -99.9692	787.0	2008-2012

7. Building Downwash

a. Good Engineering Practice (GEP) stack height for stacks constructed after January 12, 1979 is defined as the greater of

i. 65 meters, measured from the ground-level elevation at the base of the stack, and

ii. Stack height calculated from the following EPA's refined formula:

$$H_g = H + 1.5L$$

where,

H_g = GEP stack height, measured from the ground-level elevation at the base of the stack

H = height of nearby structure(s) measured from the ground-level elevation at the base of the stack

L = lesser of the Building Height (BH) or Projected Building Width (PBW); PBW is the greatest crosswind distance of a building also known as maximum projected width.

b. Emissions released at stack heights greater than GEP are modeled at GEP stack height. Emissions released at or below GEP are modeled at their true release height.

c. Building downwash was calculated using the Building Profile Input Program (BPIP) with plume rise model enhancements (PRIME).

8. Receptors

a. AERMOD estimates ambient concentrations using a network of points, called receptors, throughout the region of interest. Model receptors are typically placed at locations that reflect the public's exposure to the pollutant.

b. The minimum receptor spacing used in the dispersion modeling for the proposed project consisted of a multi-tiered grid is shown in Table 5.

c. Receptors along the facility's fence line were placed at 50 meter spacing.

Table 5. Receptor spacing used in dispersion modeling of the proposed project

Distance From Facility Boundary (meters)	**Receptor Spacing (meters)**
Facility Center to 1000	50
1000 to 2,000	100
2,000 to 10,000	250
10,000 to 50,000	1000

9. Modeling domain

Preliminary modeling analysis establishes the distance (from the center of the facility) to the farthest receptor with modeled concentration greater than the significant impact level (SIL) thresholds. This area is often referred to as the significant impact area (SIA).

The SIA is a circular area with radius extending from the proposed project to (1) the most distant point where approved dispersion modeling predicts a significant ambient impact will occur, or (2) a modeling receptor distance of 50 km, whichever is less.

Initially, for each pollutant subject to review the SIA is determined for every averaging time. The SIA used for the refined (cumulative) modeling analysis of a particular pollutant is the largest of the SIAs determined for that pollutant.

Refined (cumulative) modeling analysis includes the facility's total emissions along with emissions from other nearby sources. The modeling domain for refined modeling can be up to SIA or up 50 km using AERMOD.

D. Preliminary Modeling Analysis

1. In order to determine if a refined (cumulative) impact modeling analysis and/or ambient air monitoring is necessary, a preliminary modeling analysis is first conducted.

2. The preliminary modeling analysis only included the proposed project's emission sources to determine if the highest, first-highest (HIH) modeled impact (or concentration) will exceed the SIL thresholds.

3. For each pollutant and averaging time that the modeled HIH concentration is below the SIL threshold, no further analysis is necessary for that particular pollutant and averaging time. KDHE considers this to be a sufficient demonstration that the project does not cause or contribute to a violation of the NAAQS or PSD increment.

4. The preliminary modeling results of the worse-case operating scenario from the dispersion modeling runs conducted by the facility are shown in Table 6.

5. The modeled H1H impacts of annual NO_2, 1-hour NO_2, annual PM_{10}, 24-hour PM_{10}, annual $PM_{2.5}$, 24-hour $PM_{2.5}$, annual SO_2, 24-hour SO_2, 3-hour SO_2, and 1-hour SO_2 exceed the SIL thresholds. Therefore, refined (cumulative) modeling analyses are required for these pollutants and averaging times.

6. The modeled H1H impacts of 1-hour CO and 8-hour CO fall below SIL thresholds. Therefore, refined (cumulative) modeling analyses are not required for these pollutants and averaging times.

7. Table 6 also shows that the pre-application monitoring threshold was exceeded for 24-hour PM_{10} and 24-hour $PM_{2.5}$, therefore, pre-application monitoring for PM_{10} and $PM_{2.5}$ is required. Also, since the proposed project would emit more than 40 tons per year of VOCs and 40 tons of per year of NOx (precursors of ozone) as shown in Table 3, pre-application monitoring for ozone is also required. ABBK requests that preconstruction monitoring be fulfilled with existing KDHE monitors, specifically, the Dodge City (20-057-0002) monitor be used for PM_{10} and the Cedar Bluff (20-195-0001) monitors be used for $PM_{2.5}$ and ozone. Section 7.11 of the updated PSD application discussed the reasons why the existing KDHE monitors are representative monitors for PM_{10}, $PM_{2.5}$ and ozone. KDHE has approved the use of existing monitors in said stations for 24-hour PM_{10}, 24-hour $PM_{2.5}$ and ozone monitoring.

8. Figures 3 and 4 show the SIL dispersion modeling isopleths as verified by KDHE for annual NO_2 and 1-hour NO_2, respectively.

Table 6. Preliminary/Significance Modeling Results

Pollutant	Averaging Period	Modeled Year(s) of met data	UTM Coordinates		Modeled Concentration [a] (Highest, First-Highest, H1H) (μg/m3)	Modeling Significant Impact Level (SIL) ($\mu g/m^3$)	Pre-application Monitoring Threshold Concentration ($\mu g/m^3$)
			Easting (meters)	Northing (meters)			
NO_2	Annual	2010	288050.0	4118150.0	**2.90**	**1**	14
	1-hour	NA	288119.2	4118004.7	**69.80**	**10** [b]	--
CO	1-hour	2012	288119.2	4118004.7	242.25	2000	--
	8-hour	2011	288119.2	4118004.7	167.31	500	575
PM_{10}	Annual	2012	288265.3	4117998.5	**7.41**	**1**	--
	24-hour	2008	288411.4	4117992.3	**40.89**	**5**	**10**
$PM_{2.5}$	Annual	2012	288265.3	4117998.5	**1.61**	**0.3**	--
	24-hour	2010	288350.0	4118000.0	**7.58**	**1.2** [c]	**0** [d]
SO_2	Annual	2010	288200.0	4118400.0	**1.47**	**1**	--
	24-hour	2009	287829.6	4116810.9	**12.03**	**5**	13
	3-hour	2012	287827.1	4118017.1	**27.78**	**25**	--
	1-hour	2010	286500.0	4117800.0	**35.98**	**10**	--

[a] From dispersion modeling conducted by the facility
[b] Interim SIL established by KDHE until EPA publishes a final SIL. The current EPA recommended SIL is 7.5 $\mu g/m^3$.
[c] The $PM_{2.5}$ Significant Impact Levels are addressed in K.A.R. 28-19-350(f).
[d] From http://www.epa.gov/nsr/documents/20131127fr.pdf. The Significant Monitoring Concentration threshold for $PM_{2.5}$ 24-hour averaging period was vacated on January 22, 2013.

E. NAAQS Modeling Analysis

1. Refined (cumulative) modeling was conducted to demonstrate compliance with the NAAQS for each pollutant and averaging period for which the SIL was exceeded. Evaluation of compliance with the NAAQS requires that the refined modeling accounts for the combined impact of the proposed project, nearby sources, and background concentrations.

2. The refined modeling results for NAAQS compliance demonstration of the worse-case operating scenario from the dispersion modeling conducted by the facility are shown in Table 7.

3. The MAXDCONT option on AERMOD was used to determine the contribution of each user-defined source group to any modeled violation to the NAAQS, paired in time and space. The MAXDCONT option in AERMOD is only applicable for 1-hour NO_2, 24-hour $PM_{2.5}$ and 1-hour SO_2. The MAXDCONT option will not work with separate meteorological data files for each year (*Addendum: User's Guide for AMS/EPA Regulatory Model-AERMOD, EPA-454/B-03-001, September 2004*).

4. The proposed project's contributions were compared to the SIL to determine whether the project causes or contributes to any of the modeled violations of the NAAQS (*Memorandum: Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard, March 1, 2011).*

5. Table 8 shows the receptor grid size, number of ABBK sources and nearby sources and radius (km) used for the selection of nearby sources for NAAQS and PSD increment modeling analysis.

6. Table 12 shows ABBK emission sources used in the dispersion modeling.

Table 7. NAAQS Modeling Results

Pollutant	Averaging Period	Modeled year(s) of met data	UTM Coordinates		Modeled Concentration (μg/m³) [a, b]		Background concentration (μg/m³) [c]	Total concentration (μg/m³)	NAAQS Standard (μg/m³)	Highest Contribution from ABBK at Exceeding Receptors (μg/m³)
			Easting (meters)	Northing (meters)						
NO_2	Annual	2010	293250.0	4120250.0	182.69	H1H	7.50	**190.19**	**100.00**	**0.11**
	1-hour	2008-2012	293250.0	4115500.0	2,038.67	H8H	52.7	**2,091.37**	**188.70**	**6.41**
PM_{10}	Annual	Revoked [d]								
	24-hour	2008-2012	288265.0	4117999.0	29.23	H6H	98.0	127.23	150.00	NA
$PM_{2.5}$	Annual	2010	293250.0	4115500.0	2.87	H1H	7.00	9.87	12.00	NA
	24-hour	2008-2012	293250.0	4115000.0	24.90	H1H	17.00	**41.90**	**35.00**	**0.01**
SO_2	Annual	2010	288200.0	4118350.0	1.92	H1H	2.2	4.12	80	NA
	24-hour	2011	288650.0	4116100.0	16.39	H2H	6.6	22.99	365	NA
	3-hour	2010	288650.0	4116100.0	25.02	H2H	7.9	32.92	1306	NA
	1-hour	2008-2012	288700.0	4116100.0	27.11	H4H	7.9	35.01	196	NA

[a] From dispersion modeling conducted by the facility

[b] Ambient Ratio Method (ARM) of 0.75 was applied to annual NO_2 modeled concentration; H1H = Highest, First-Highest; H8H = Highest, Eight-Highest; H6H = Highest, Sixth-Highest; H2H = Highest, Second Highest; H4H = Highest, Fourth-Highest

[c] Background concentrations provided by KDHE

[d] Annual PM_{10} NAAQS of 50 μg/m³ was revoked on October 17, 2006

Table 8. Receptor grid size, number of ABBK sources and nearby sources and radius used for the selection of nearby sources for NAAQS and PSD increment modeling analysis

Pollutant	Averaging Period	Receptor grid size	Number of ABBK sources	Number of nearby sources	Radius (km) used for selection of nearby sources (from facility center)
NO_2	Annual	10 km by 10 km grid	11 point sources	280 point sources	50
	1-hour	50 km by 50 km grid	8 point sources	93 point sources	20
PM_{10}	24-hour	10 km by 10 km grid	25 point sources 17 area sources 1407 volume sources	42 point sources	20
$PM_{2.5}$	Annual	10 km by 10 km grid	25 point sources 17 area sources 1407 volume sources	77 point sources	50
	24-hour	10 km by 10 km grid	25 point sources 17 area sources 1407 volume sources	42 point sources	20
SO_2	Annual	10 km by 10 km grid	10 area sources	11 point sources	50
	24-hour	10 km by 10 km grid	10 area sources	3 point sources	20
	3-hour	10 km by 10 km grid	10 area sources	3 point sources	20
	1-hour	50 km by 50 km grid	9 area sources	3 point sources	20

7. For annual NO_2 impacts:

   a. The Tier 2 approach was used to determine the annual NO_2 impacts. This was done was multiplying Tier 1 (assume a total conversion of NO to NO_2) estimate(s) by an empirically derived NO_2/NO_X value of 0.75 (annual national default).

   b. Figure 5 shows the isopleths of annual NO_2 refined/NAAQS modeling as verified by KDHE based on H1H modeled impact.

   c. In KDHE dispersion modeling verification, there are 10 receptors with modeled impacts that exceed the annual NO_2 NAAQS. The contributions of the proposed project to the exceedances are below the annual NO_2 SIL of 1.0 $\mu g/m^3$. Therefore, the proposed project of ABBK does not cause or significantly contribute to a violation of annual NO_2 NAAQS.

8. For 1-hour NO_2 impacts:

   a. The Tier 3 (OLM) approach was used to determine the 1-hour NO_2 impacts.

   b. Figure 6 shows the isopleths of 1-hour NO_2 refined/NAAQS modeling as verified by KDHE based on the Highest, Eight-Highest (H8H) modeled impact.

   c. In KDHE dispersion modeling verification, there are about 15,232 receptors with modeled impacts that exceed the 1-hour NO_2 NAAQS. The contributions of the proposed project to the exceedances are below EPA's 1-hour NO_2 SIL of 7.5 $\mu g/m^3$ and KDHE's 1-hour NO_2 SIL of 10 $\mu g/m^3$. Therefore, the proposed project of ABBK does not cause or significantly contribute to a violation of 1-hour NO_2 NAAQS.

9. For 24-hour PM_{10} impacts:

   There are no modeled exceedances for the 24-hour PM_{10} NAAQS.

10. For annual $PM_{2.5}$ impacts:

    There are no modeled exceedances for the annual $PM_{2.5}$ NAAQS.

11. For 24-hour $PM_{2.5}$ impacts:

    a. Figure 7 shows the isopleths of 24-hour $PM_{2.5}$ refined/NAAQS modeling as verified by KDHE based on the H1H modeled impact.

    b. In KDHE dispersion modeling verification, there are three (3) receptors with modeled impacts that exceed the 24-hour $PM_{2.5}$

NAAQS. The contributions of the proposed project to the exceedances are below the 1-hour SIL 24-hour $PM_{2.5}$ of 1.2 µg/m^3. Therefore, the proposed project of ABBK does not cause or significantly contribute to a violation of 24-hour $PM_{2.5}$ NAAQS.

12. For annual, 24-hour, 3-hour and 1-hour SO_2 impacts:

    There are no modeled exceedances for the annual, 24-hour, 3-hour and 1-hour SO_2 NAAQS.

F. PSD Increment Modeling Analysis

1. PSD increment is the maximum allowable increase in concentration that is allowed to occur above a baseline concentration for a pollutant. Table 9 shows the PSD increment for NO_2, PM_{10}, SO_2 and $PM_{2.5}$ for Class II areas. Significant deterioration in air quality is said to occur when the amount of new pollution would exceed the applicable PSD increment. Table 10 shows the major source and trigger dates for NO_2, PM_{10}, SO_2 and $PM_{2.5}$.

Table 9. PSD increment (maximum allowable increase) for Class II areas

Pollutant	Averaging period	PSD increment (maximum allowable increase) for Class II area (µg/m^3)
NO_2	Annual	25
PM_{10}	24-hour	30
	Annual	17
$PM_{2.5}$	24-hour	9
	Annual	4
SO_2	Annual	20
	24-hour	91
	3-hour	512

Table 10. Major source baseline date and trigger dates for NO_2, PM_{10}, SO_2 and $PM_{2.5}$

Pollutant	Major Source Baseline Date [a]	Trigger Date [a]
NO_2	February 8, 1988	February 8, 1988
PM_{10} and SO_2	January 6, 1975	August 7, 1977
$PM_{2.5}$	October 20, 2010	October 20, 2011

[a] The major source baseline date is the date after which actual emissions associated with construction at a major stationary source affect the available PSD increment. The trigger date is the date after which the minor source baseline date may be established. (*October 1990 Draft New Source Review (NSR) Workshop Manual for PSD and Nonattainment Area Permitting*).

2. To determine the PSD increment consumption (or expansion) in a PSD area, a PSD increment inventory is needed for increment dispersion modeling analysis. The PSD increment inventory is not yet available/completed in Kansas, thus, the NAAQS nearby source inventory was used to determine compliance with PSD increment for a Class II area for annual NO_2, annual PM_{10}, 24-hour PM_{10}, annual $PM_{2.5}$, 24-hour $PM_{2.5}$, annual SO_2, 24-hour SO_2 and 3-hour SO_2.

3. The ABBK facility established the minor source baseline dates for NO_2, PM_{10}, and SO_2 (the significant ambient impact of 1.0 $\mu g/m^3$ was exceeded) on **August 11, 2011** (first day of the public comment period and the date the application was deemed complete) and will be the first NO_2, PM_{10}, and SO_2 PSD increment consuming source in **Stevens County**. During the addition of four (4) emergency generators in 2012, the ABBK facility established the minor source baseline date for $PM_{2.5}$ (the significant ambient impact of 0.3 $\mu g/m^3$ was exceeded) on **December 20, 2012** (first day of the public comment period and the date the application was deemed complete) and will be the first $PM_{2.5}$ PSD increment consuming source in **Stevens County and Morton County**. Both ABBK and Mid-Kansas Electric, LLC established the minor source baseline date in **Grant County** for $PM_{2.5}$ on **December 20, 2012** (first day of the public comment period and the date the two applications were deemed complete). The minor source baseline date marks the point in time after which actual emissions changes from all sources affect the amount of available increment (regardless of whether the emissions changes are a result of construction) *(October 1990 Draft New Source Review (NSR) Workshop Manual for PSD and Nonattainment Area Permitting).*

4. Table 11 shows the PSD increment modeling results and increment consumption from the proposed project. EPA has not established a 1-hour Class II maximum allowable increment for NO_2 or CO. Therefore, no calculation of the potential consumption of such increment is possible.

Table 11. PSD Increment Modeling Results

Pollutant	Averaging Period	Modeled year(s) of met data	UTM Coordinates		Modeled Concentration ($\mu g/m^3$)[a, b]		PSD increment for Class II areas ($\mu g/m^3$)	Exceeds PSD Increment?	Increment Consumption of the Proposed ABBK Project (%)
			Easting (meters)	Northing (meters)					
NO_2	Annual	2010	293250.0	4120250.0	**182.69**	H1H	**25**	**Yes**	**1.3**
	1-hour	No available PSD increment							
PM_{10}	Annual	2007	288265.0	4117999.0	8.26	H1H	17	No	46.8
	24-hour	2010	288550.0	4116750.0	29.84[c]	H2H	30	No	99.5
$PM_{2.5}$	Annual	2010	293250.0	4115500.0	2.87	H1H	4	No	40.4
	24-hour	2011	293250.0	4115000.0	**23.50**	H2H	**9**	**Yes**	**6.6**
SO_2	Annual	2010	288200.0	4118350.0	1.92	H1H	20	No	7.4
	24-hour	2011	288650.0	4116100.0	16.39	H2H	91	No	13.2
	3-hour	2010	288650.0	4116200.0	25.02	H2H	512	No	5.4

[a] From dispersion modeling conducted by the facility

[b] Ambient Ratio Method (ARM) of 0.75 was applied to annual NO_2 modeled concentration; H1H = Highest, First-Highest; H2H = Highest, Second-Highest

[c] In KDHE increment modeling verification (ran with five (5) single-year meteorological data), the H2H modeled impact is 30.27$\mu g/m^3$ and is located on one of the nearby sources (Easting: 288,550 meters; Northing: 4,116,730 meters); ABBK's contribution to the exceedance is 0.01 ug/m^3.

5. Allowable increment consumption was exceeded for 24-hour $PM_{2.5}$. However, ABBK's contribution to receptors exceeding allowable increment was less than the SIL. Therefore, ABBK does not cause or contribute to any increment exceedances.

6. Allowable increment consumption was exceeded for annual NO_2. However, ABBK's contribution to receptors exceeding allowable increment was less than the SIL. Therefore, ABBK does not cause or contribute to any increment exceedances.

G. Analysis of Secondary $PM_{2.5}$ Formation

Please refer to Section 7.9 of the PSD permit application to review an analysis of the secondary $PM_{2.5}$ formation from the proposed project.

KDHE generally follows the March 23, 2010 Stephen Page memo, Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS.

H. Additional Impact Analysis

The owner or operator of the proposed facility shall provide an analysis of impairment to visibility, soils and vegetation that would occur as a result of the source or modification. The owner or operator shall provide an analysis of the air quality impact projected for the area as a result of general commercial, residential, industrial and other growth associated with the source or modification (40 CFR 51.166 and 40 CFR 52.21).

The proposed project will not have a significant adverse impact on the air quality, soils, vegetation, visibility, and or growth in the surrounding area. For details and references/sources of information for the additional impact analysis, please refer to Section 8.0 of the updated PSD permit application.

1. Section 8.1 for Construction Impacts:

Construction at the proposed project has the potential for short-term adverse effects on air quality in the immediate area around the site. Diesel fumes from construction vehicles and dust from site preparation and construction vehicle operation can affect local air quality during certain meteorological conditions. However, these instances are limited in time and area of effect.

The Stevens County area is in attainment or is unclassified for all criteria pollutants. Low sulfur fuel will be used for construction vehicles that use diesel fuel. Operation of these vehicles is not expected to significantly affect ambient air quality. Emissions will be minimized as much as practicable by reducing engine idling, operating vehicles as little as possible and employing vehicles with highly efficient engines. Fugitive dust will be minimized through the application of water to on-site roads used by construction equipment.

2. Section 8.2 for Vegetation Impacts:

This section includes Section 8.2.1 for the effects of nitrogen oxides, Section 2.2.2 for the synergistic effects of pollutants, Section 8.2.3 for the effects of particulate matter, Section 8.2.3 for the effects of carbon monoxide, Section 8.2.4 for the effects of carbon monoxide, and Section 8.2.5 for the effect of carbon dioxide on vegetation.

The general land use in the vicinity of the Project is irrigated row cropland and dry-land farming. Common crops produced in this area include wheat (*Triticum aestivum*), corn (*Zea mays*), grain sorghum (*Sorghum bicolor*), alfalfa (*Medicago sativa*), sunflowers (*Helianthus annuus)*, soybeans (*Glycine max*), cotton (*Gossypium* sp.), and a minor amount of potatoes (*Solanum tuberosum*). Trees are generally uncommon but may occur in hedgerows and along riparian corridors. These species include Siberian elm (*Ulmus pumila*), Ponderosa pine (*Pinus ponderosa*), eastern red cedar (*Juniperus virginiana*), cottonwood (*Populus deltoides*), mulberry (*Morus* sp.) and Osage orange (*Maclura pomifera*). Remnants of native shortgrass prairie may occur near the Project. Common grasses in this community include blue-grama (*Bouteloua gracilis*), buffalograss (*Bouteloua dactyloides*), alkali sacaton (*Sporobolus airoides*), and western wheatgrass (*Pascopyrum smithii*).

The maximum annual and 1-hour NO_2 modeled values for the proposed project are 2.9 and 69.8 $\mu g/m^3$, respectively. These levels are low, so it is highly unlikely that NO_2 emissions will impact vegetation adjacent to or surrounding the proposed project.

The maximum PM_{10} and $PM_{2.5}$ 24-hour modeled values for the proposed project are 35.69 $\mu g/m^3$ and 6.84 $\mu g/m^3$, respectively. This level is low, so it is highly unlikely that PM_{10} and $PM_{2.5}$ emissions will impact vegetation adjacent to the proposed project.

CO and CO_2 are not known to injure plants.

3. Section 8.3 for Soil Impacts:

Four (4) soil types are mapped at, or in the immediate vicinity of, the proposed project site.

They include:

i. Vorhees fine sandy loam, 1 to 3 percent slopes
ii. Canina loam, 0 to 1 percent slopes
iii. Belfon loam, 0 to 1 percent slopes
iv. Dalhart-Eva loamy fine sand, 3 to 8 percent slopes

Sulfates and nitrates resulting from SO_2 and NO_2 deposition on soil can be both beneficial and detrimental to soils depending on their composition. However, given the low expected deposition from the engines, operation of the RICE should not materially affect the soils on-site or in the immediate vicinity.

4. Section 8.4 for Industrial, Residential, and Commercial Growth Impacts:

The project is expected to increase employment in the area. The building phase will last approximately three years. Construction employment is expected to peak at approximately 750 skilled construction jobs. Projected employment, reflecting full-time jobs directly tied to the operation of ABBK facility, is estimated to be 62 people at the facility. This will result in moderate amounts of secondary employment being created by the economic activity of the facility. In the immediate vicinity of the facility and as a result of the Project at ABBK facility, increased vehicular traffic is expected. However, these activities are at such a low level that they would not significantly impact air quality.

The construction work at ABBK facility may temporarily increase the number of people residing in the area. After construction is completed, many of the new employees are expected to already live in the area. However, some new employees are expected to move into the area, with only a slight increase in the residential growth in the area. Even if all full-time employees moved into the area, this small increase in new residences is not expected to have an impact on the air quality in the area.

Adding additional electricity to the grid in this area may increase industrial growth. However, it is unknown how increasing available electrical power in this area may affect future industrial growth.

5. Section 8.5 for Visibility and Deposition Analysis:

For details of information for visibility and deposition analysis, please refer to Sections 8.5 of the updated PSD permit application.

i. Section 8.5.1 for Class I Area Analysis:

The nearest Federal Class I Area is the Great Sand Dunes in southeastern Colorado, located approximately 370 km (230 miles) west of the proposed facility location. There is one potential Class II area of concern within 50 km (31 miles) to the proposed facility. The Cimarron National Grasslands is located within Morton and Stevens Counties in southwestern Kansas, approximately 24 km (15 miles) west of the proposed facility location. All sources at the proposed facility will maintain compliance with applicable opacity restrictions; however, KDHE requested that a visibility analysis be performed on the Class II area to demonstrate that no significant deterioration of visibility will result from the operation of the proposed facility. In addition to the Class II area, KDHE also identified one sensitive area, Hugoton Municipal Airport, to be included in the visibility analysis.

ii. Section 8.5.2 for Visual Impairment Screening Assessment:

A Class II visual impairment screening analysis was conducted on the Cimarron National Grasslands to provide a conservative indication of the perceptibility of plumes from the proposed facility. This analysis was performed in accordance with the EPA's workbook, Workbook for Plume Visual Impact Screening and Analysis, using the VISCREEN model. It should be noted that the visibility impairment analysis and model VISCREEN are typical for assessments in Federal Class I areas where visibility preservation is a factor in the permit approval process. However, since an applicable Class II visibility model is not available, this model and methodology for Class I areas as outlined in the EPA workbook were used.

iii. Section 8.5.2.1 for Level 1 VISCREEN Input Requirements and Methodology

Because it was known from previous visibility analyses that the Level 1 VISCREEN results would indicate potential adverse visibility impacts to the Class II and sensitive areas analyzed, the emissions from the proposed facility were analyzed using the more refined Level 2 VISCREEN analysis.

iv. Section 8.5.2.2 for Level 2 VISCREEN Input Requirements and Methodology

Sections 8.5.2.2.1 through 8.5.2.2.6 discussed the details of Level 2 VISCREEN analysis conducted for ABBK facility.

There are no established criteria for Class II areas. Based on the analysis provided, it is concluded that there will be minimal visibility impacts at Hugoton Municipal Airport, and no adverse impacts on Cimarron National Grasslands.

I. Summary and Conclusions for the Ambient Air Impact Analysis

1. The modeled H1H impacts of annual NO_2, 1-hour NO_2, annual PM_{10}, 24-hour PM_{10}, annual $PM_{2.5}$, 24-hour $PM_{2.5}$, annual SO_2, 24-hour SO_2, 3-hour SO_2, and 1-hour SO_2 exceed the SIL thresholds as shown in Table 6. Therefore, refined (cumulative) modeling analyses are required for these pollutants and averaging times. The modeled H1H impacts of 1-hour CO and 8-hour CO fall below SIL thresholds. Therefore, refined (cumulative) modeling analyses are not required for these pollutants and averaging times.

2. Table 6 also shows that the pre-application monitoring threshold was exceeded for 24-hour PM_{10} and 24-hour $PM_{2.5}$, therefore, pre-application monitoring for PM_{10} and $PM_{2.5}$ is required. Also, since the proposed

project would emit more than 40 tons per year of VOCs and 40 tons of per year of NOx (precursors of ozone) as shown in Table 3, pre-application monitoring for ozone is also required. ABBK requests that preconstruction monitoring be fulfilled with existing KDHE monitors, specifically the Dodge City (20-057-0002) monitors be used for PM_{10} and the Cedar Bluff (20-195-0001) monitors be used for $PM_{2.5}$ and ozone. KDHE has approved the use of existing monitors in the region for 24-hour PM_{10}, 24-hour $PM_{2.5}$ and ozone monitoring.

3. Table 7 shows NAAQS modeling results. There are receptors with modeled impacts that exceed the NAAQS for annual NO_2, 1-hour NO_2, and 24-hour $PM_{2.5}$, however, the contributions of the proposed project to the exceedances are below the SIL thresholds. Therefore, the proposed project of ABBK does not cause or significantly contribute to a violation of annual NO_2, 1 hour NO_2, or 24-hour $PM_{2.5}$ NAAQS.

4. There are no modeled impacts that exceed the NAAQS for annual PM_{10}, 24-hour PM_{10}, annual $PM_{2.5}$ and for annual, 24-hour, 3-hour and 1-hour SO_2.

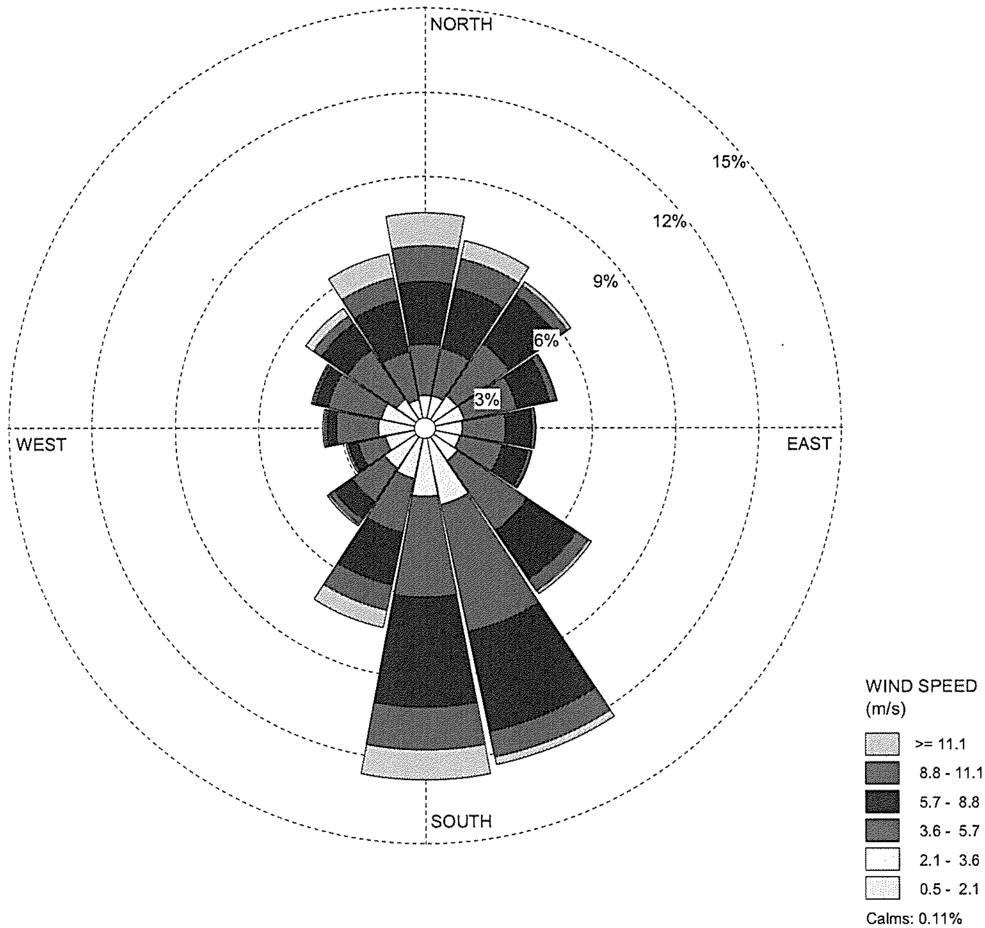
5. Table 11 shows the results for increment consumption modeling. The PSD increment for Class II areas that are expected to be consumed is as follows: 1.3 % of the annual NO_2 Class II allowable increment; 46.8 % of the annual PM_{10} Class II allowable increment; 99.5 % of the 24-hour PM_{10} Class II allowable increment; 40.4 % of the annual $PM_{2.5}$ Class II allowable increment; 6.6 % of the 24-hour $PM_{2.5}$ Class II allowable increment; 7.4 % of the annual SO_2 Class II allowable increment; 13.2 % of the 24-hour SO_2 Class II allowable increment; and 5.4 % of the 1-hour SO_2 Class II allowable increment.

6. There are receptors with modeled impacts that exceed allowable increment for annual NO_2 and 24-hour $PM_{2.5}$. However, the contributions of the proposed project to the exceedances are below the SIL thresholds. Therefore, the proposed project does not cause or contribute to any increment exceedances.

7. The proposed project will not have a significant adverse impact on the air quality, soils, vegetation, visibility, and or growth in the surrounding area. The proposed project did not significantly contribute to any exceedances of the NAAQS or increment.

WIND ROSE PLOT:
Station #23064

DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:
Start Date: 1/1/2008 - 00:00
End Date: 12/31/2012 - 18:00

COMPANY NAME:

MODELER:

CALM WINDS:
0.11%

TOTAL COUNT:
43704 hrs.

AVG. WIND SPEED:
5.69 m/s

DATE:
11/4/2013

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Figure 1. Wind Rose for Years 2008 to 2012

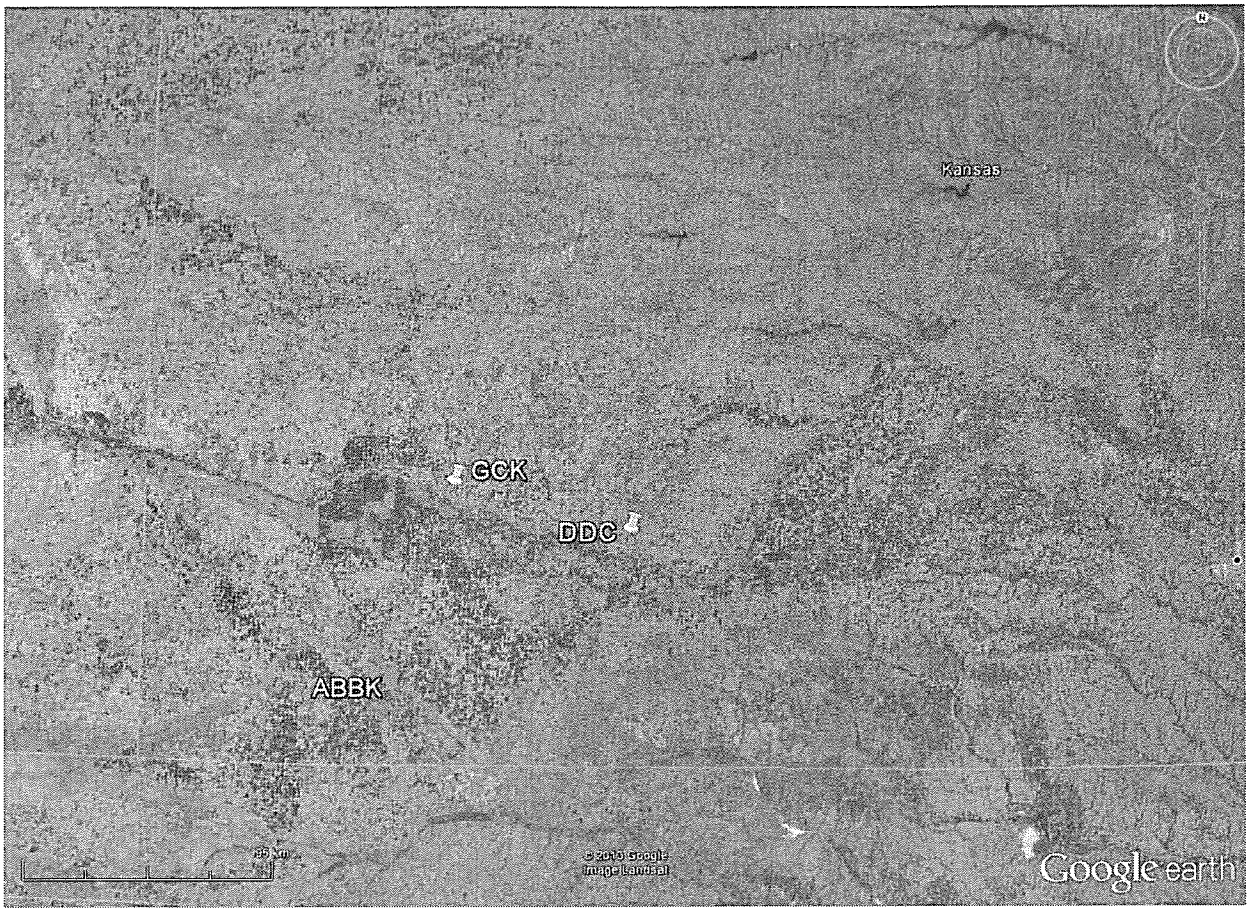
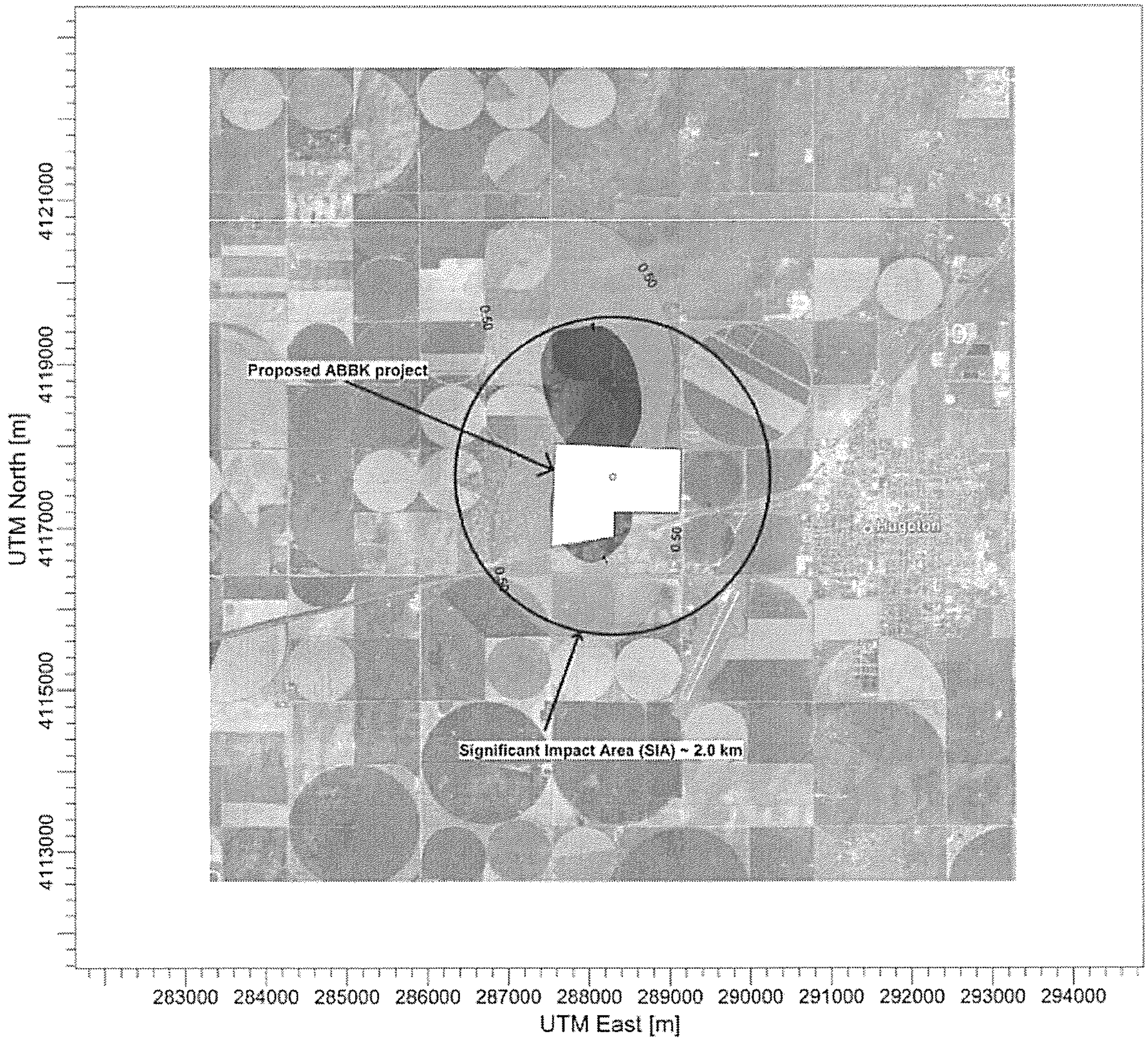


Figure 2. Map showing the ABBK Facility in Stevens County in Kansas, the Garden City Regional Airport (GCK) and the Dodge City Regional Airport (DDC) meteorological stations in Kansas.

PROJECT TITLE:

KDHE SIL modeling - Annual NO_2 (5 years meteorological data, worse-case operating scenario)
Abengoa Bioenergy Biomass of Kansas (ABBK)



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: FWP471 ug/m^3

0.50 1.00

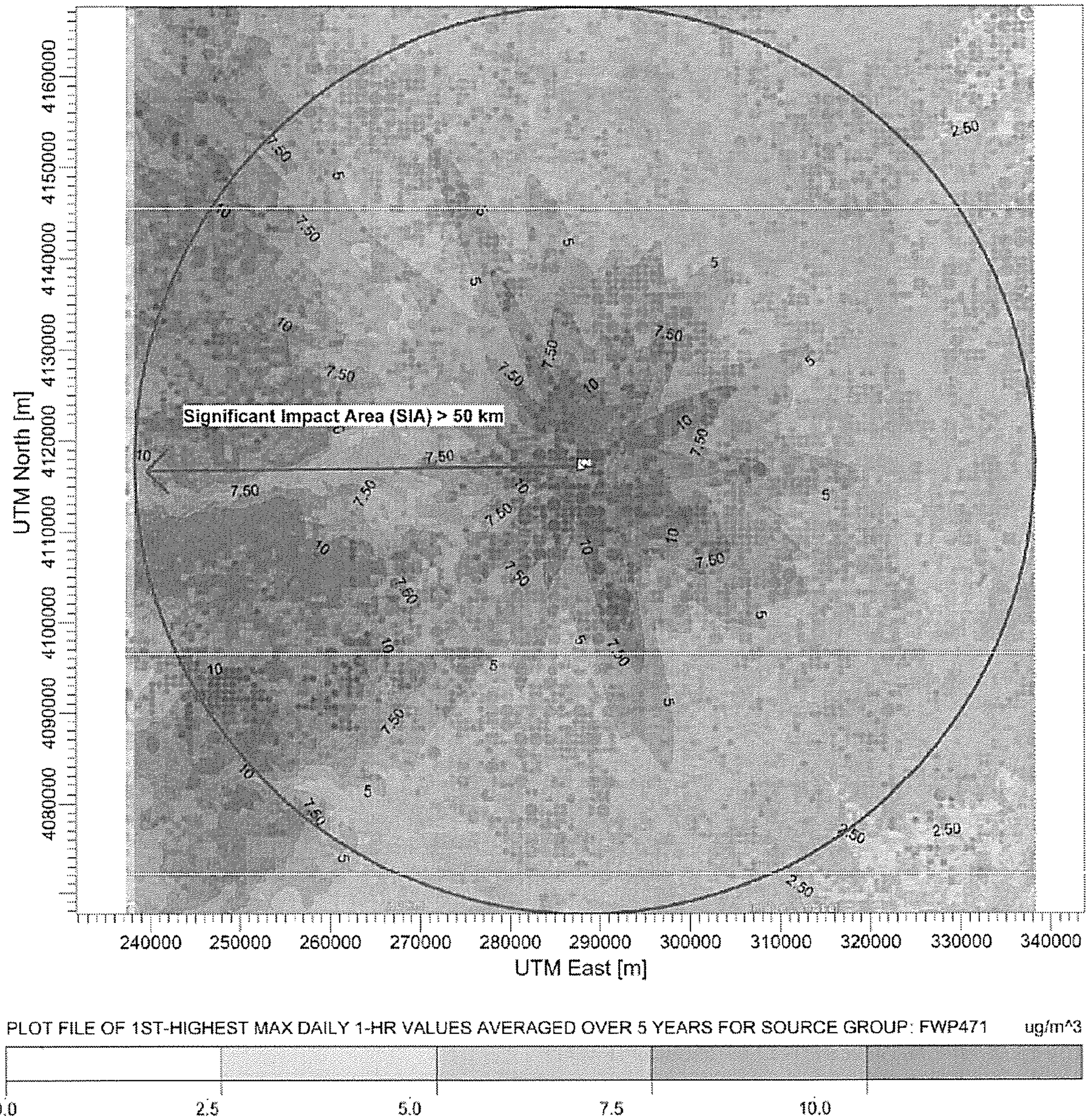
COMMENTS:	SOURCES:	COMPANY NAME:	
	11	**KDHE**	
	RECEPTORS: **25191**	MODELER: **KDHE**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:83,260 (0 — 3 km)	
	MAX: **3.44917 μg/m^3**	DATE: **11/15/2013**	PROJECT NO.:

AERMOD View - Lakes Environmental Software

Figure 3. SIL Modeling Isopleths for Annual NO_2

PROJECT TITLE:

KDHE SIL modeling – 1 hour NO_2 (5 years meteorological data, worse-case operating scenario)
Abengoa Bioenergy Biomass of Kansas (ABBK)



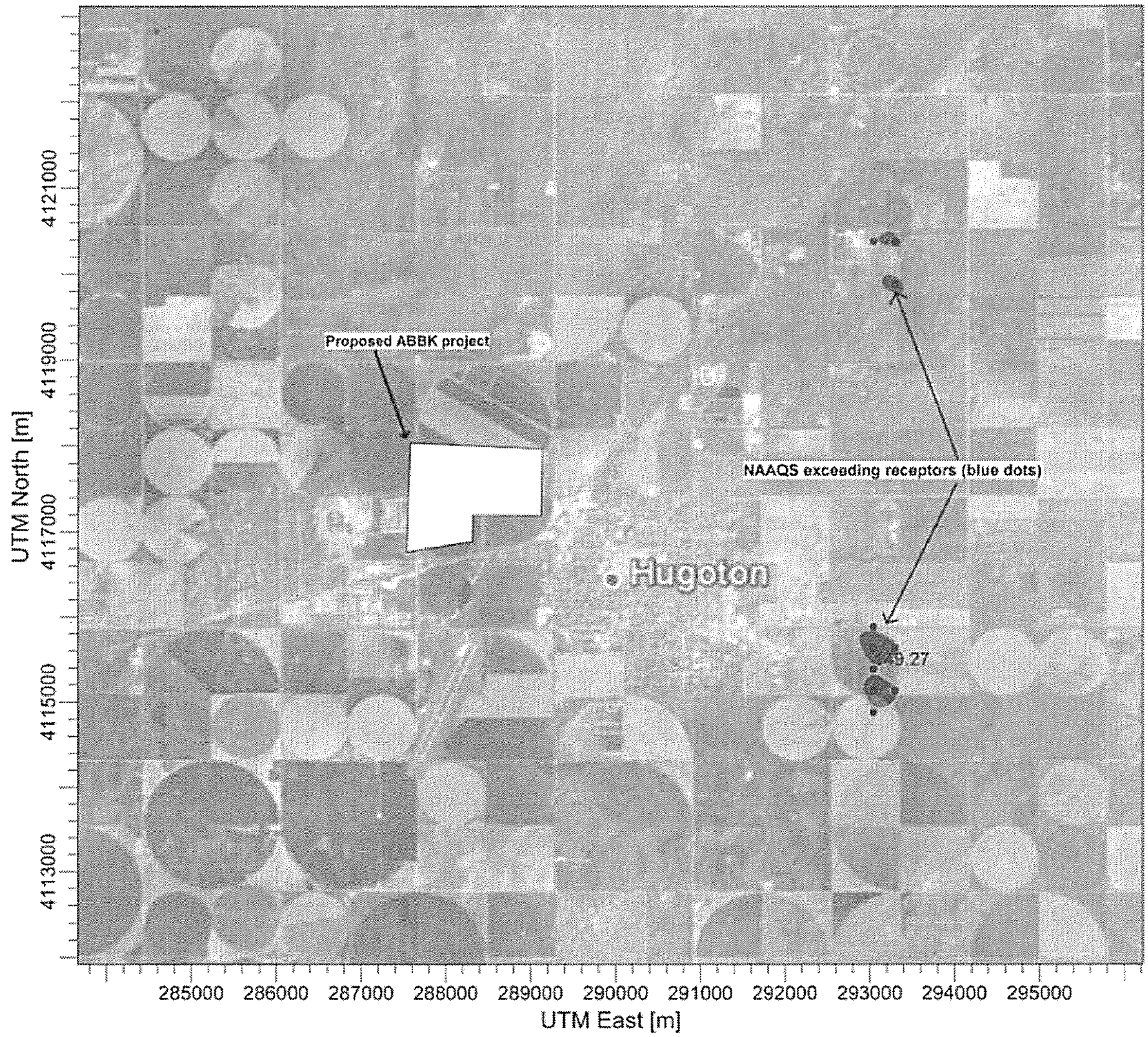
COMMENTS:	SOURCES:	COMPANY NAME:	
	11	KDHE	
	RECEPTORS: 25191	MODELER: KDHE	
	OUTPUT TYPE: Concentration	SCALE: 1:704,715 0 — 20 km	
	MAX: 69.37889 μg/m^3	DATE: 11/15/2013	PROJECT NO.:

AERMOD View - Lakes Environmental Software

Figure 4. SIL Modeling Isopleths for 1-hour NO_2

PROJECT TITLE:

KDHE NAAQS modeling - Annual NO_2 (5 years meteorological data, worse-case operating scenario)
Abengoa Bioenergy Biomass of Kansas (ABBK)



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: NAQ471 ug/m^3

1 93 100

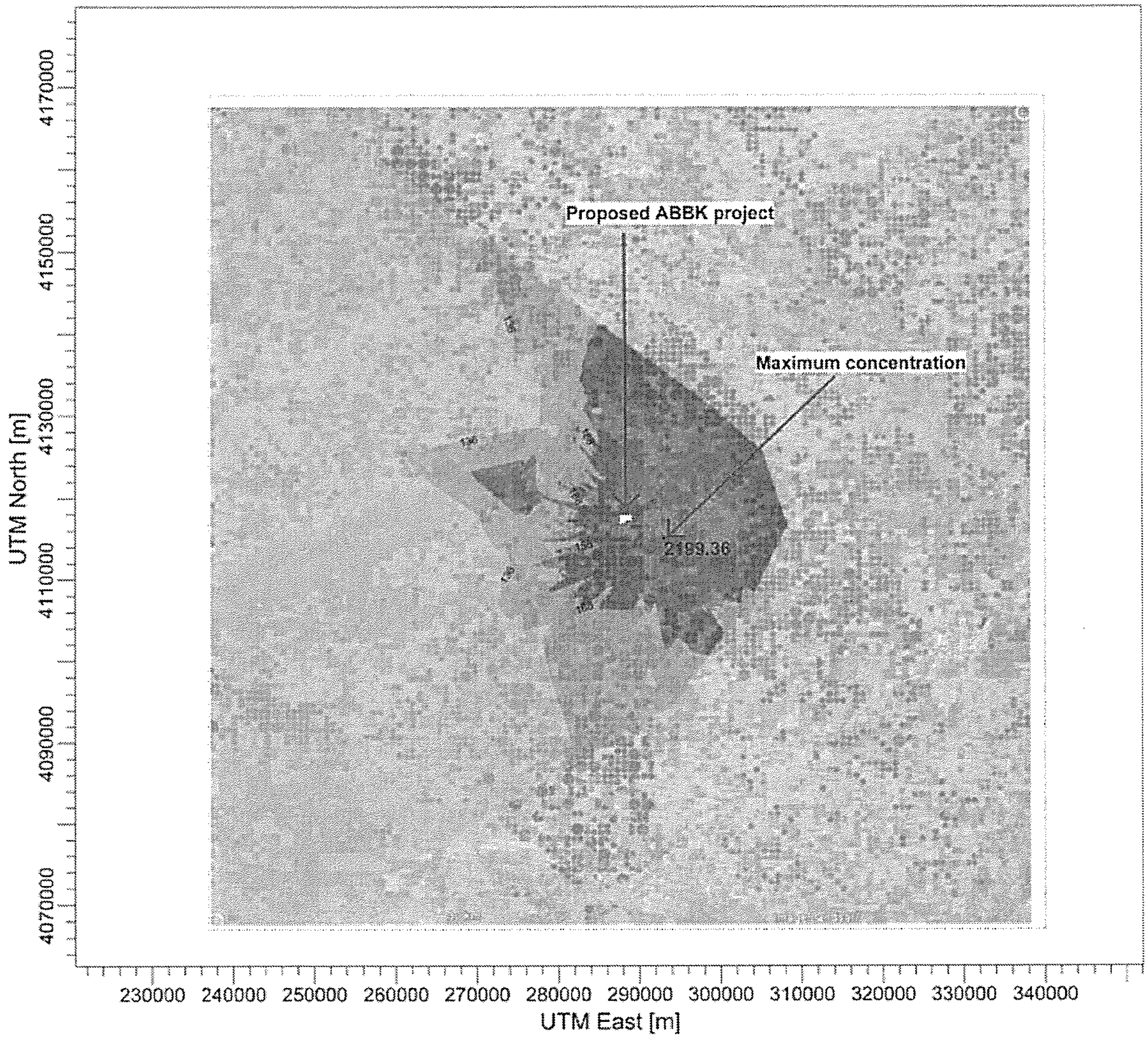
COMMENTS:	SOURCES:	COMPANY NAME:	
	291	**KDHE**	
	RECEPTORS: **15405**	MODELER: **KDHE**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:79,016 (0 – 3 km)	
	MAX: **149.26549 µg/m^3**	DATE: **11/15/2013**	PROJECT NO.:

AERMOD View - Lakes Environmental Software

Figure 5. NAAQS Modeling Isopleths for Annual NO_2

PROJECT TITLE:

KDHE NAAQS modeling – 1 hour NO_2 (5 years meteorological data, worse-case operating scenario)
Abengoa Bioenergy Biomass of Kansas (ABBK)



PLOT FILE OF 8TH-HIGHEST MAX DAILY 1-HR VALUES AVERAGED OVER 5 YEARS FOR SOURCE GROUP: ABBK+NEA ug/m^3

7 136 188

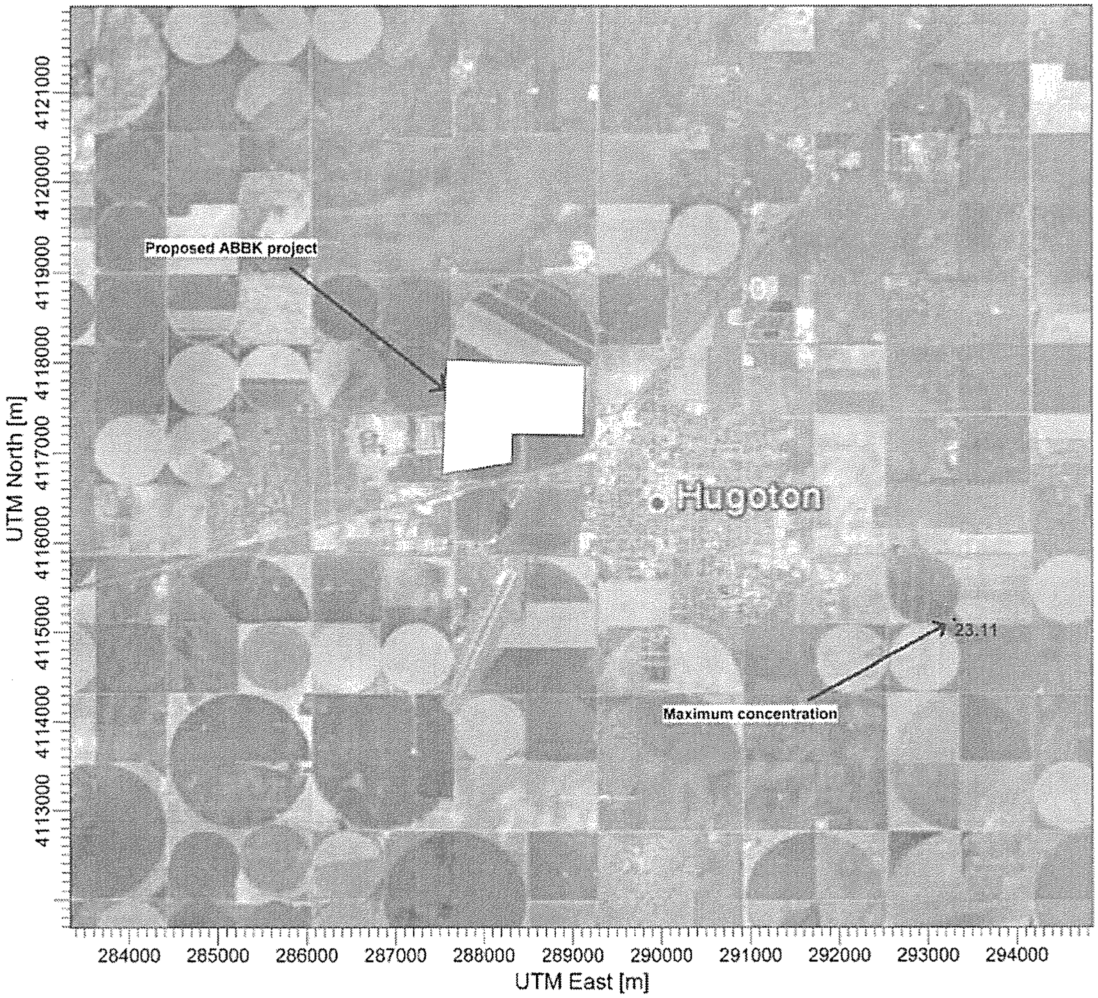
COMMENTS:	SOURCES:	COMPANY NAME:	
	101	**KDHE**	
	RECEPTORS: **15340**	MODELER: **KDHE**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:826,567 (0 — 30 km)	
	MAX: **2199.36176 µg/m^3**	DATE: **11/15/2013**	PROJECT NO.:

AERMOD View - Lakes Environmental Software

Figure 6. NAAQS Modeling Isopleths for 1-hour NO_2

PROJECT TITLE:

KDHE NAAQS modeling – 24 hour $PM_{2.5}$ (5 years meteorological data, worse-case operating scenario)
Abengoa Bioenergy Biomass of Kansas (ABBK)



PLOT FILE OF 1ST-HIGHEST MAX DAILY 24-HR VALUES AVERAGED OVER 5 YEARS FOR SOURCE GROUP: NAQ471 ug/m^3

0.0 18.0 23.1

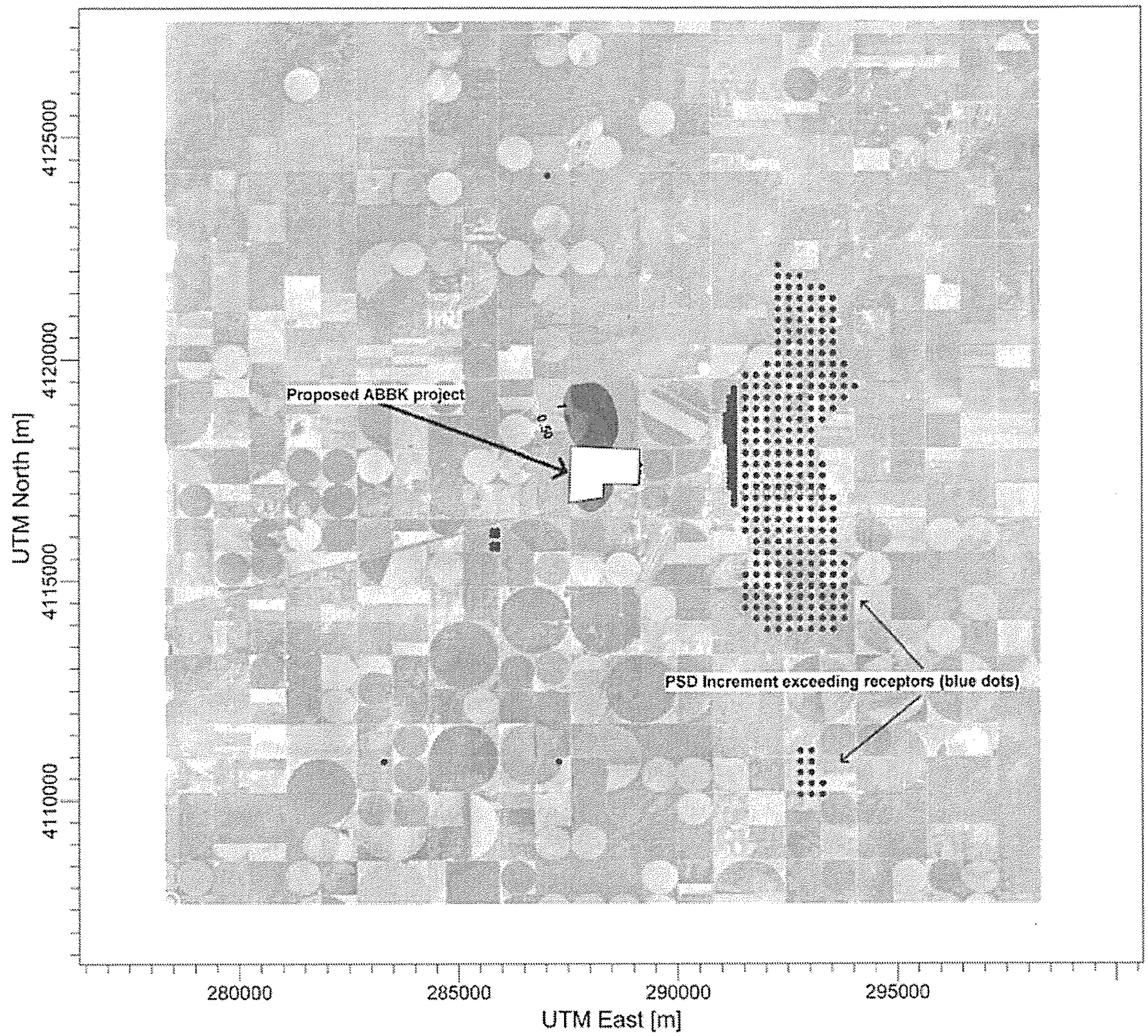
COMMENTS:	SOURCES:	COMPANY NAME:	
	1491	KDHE	
	RECEPTORS: 10132	MODELER: KDHE	
	OUTPUT TYPE: Concentration	SCALE: 1:72,429 (0 – 2 km)	
	MAX: 23.10844 µg/m^3	DATE: 11/15/2013	PROJECT NO.:

AERMOD View - Lakes Environmental Software

Figure 7. NAAQS Modeling Isopleths for 24-hour $PM_{2.5}$

PROJECT TITLE:

KDHE PSD Increment modeling - Annual NO_2 (5 years meteorological data, worse-case operating scenario)
Abengoa Bioenergy Biomass of Kansas (ABBK)



PLOT FILE OF ANNUAL VALUES FOR SOURCE GROUP: FWP471 ug/m^3

0.50 1.00

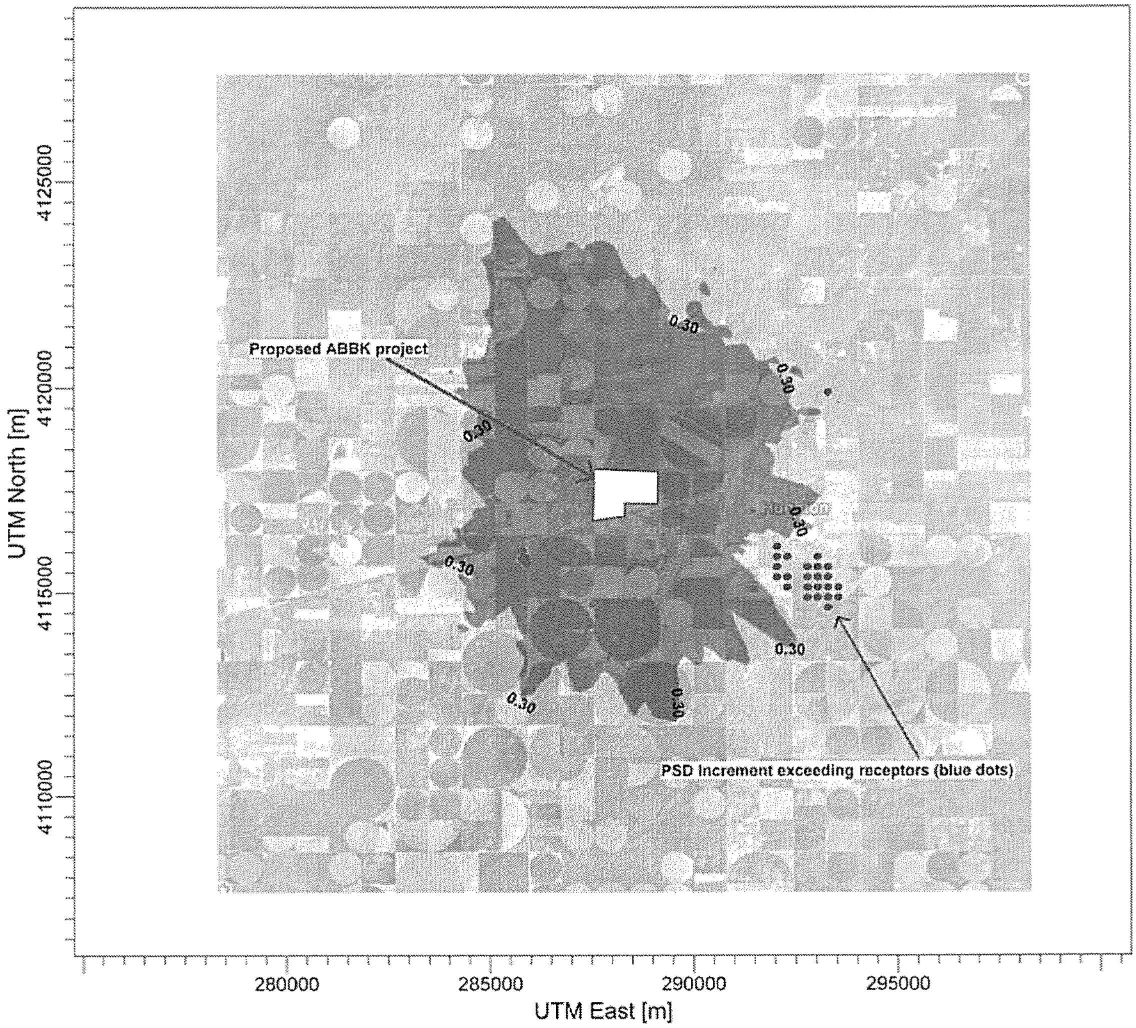
COMMENTS:	SOURCES: **291**	COMPANY NAME: **KDHE**	
	RECEPTORS: **15405**	MODELER: **KDHE**	
	OUTPUT TYPE: **Concentration**	SCALE: 1:152,617 (0 – 5 km)	
	MAX: **3.4472 µg/m^3**	DATE: **11/15/2013**	PROJECT NO.:

AERMOD View - Lakes Environmental Software

Figure 8. PSD Increment Modeling Isopleths for Annual NO_2

PROJECT TITLE:

KDHE PSD Increment modeling - 24 hour $PM_{2.5}$ (5 years meteorological data, worse-case operating scenario)
Abengoa Bioenergy Biomass of Kansas (ABBK)



PLOT FILE OF HIGH 2ND HIGH 24-HR VALUES FOR SOURCE GROUP: FWP471 ug/m^3

0.00 0.30

COMMENTS:	SOURCES: 1491	COMPANY NAME: KDHE	
	RECEPTORS: 10132	MODELER: KDHE	
	OUTPUT TYPE: Concentration	SCALE: 1:163,340 (0 — 5 km)	
	MAX: 6.19753 µg/m^3	DATE: 11/15/2013	PROJECT NO.:

AERMOD View - Lakes Environmental Software

Figure 9. PSD Increment Modeling Isopleths for 24-hour $PM_{2.5}$

Table 12. ABBK emission sources used in the dispersion modeling

Pollutant Averaging Period	ABBK emission sources
NO_2 (Annual and 1-hour averaging periods)	**11 Point Sources for Annual NO_2** **8 Point Sources for 1-hour NO_2** 1. EP02100 (Ethanol Loadout Flare) 2. EP07001 or EP-06001 (Firewater Pump Engine) ***(not included in 1-hour NO_2 modeling)*** 3. EP09001A (Flare-Pilot Only) 4. EP09001B (Flare) 5. EP18185 (EH Fermentation CO_2 Scrubber) 6. EP20001 (Biomass-Fired Boiler #1) 7. EP2002 (Biomass Boiler Reheat Burner) 8. EP-20010 or GEN1 (Non-emergency engine) 9. EP-20020 or GEN2 (Non-emergency engine) 10. EP-20030 or GEN3 (Emergency Engine) ***(not included in 1-hour NO_2 modeling)*** 11. EP-20040 or GEN4 (Emergency Engine) ***(not included in 1-hour NO_2 modeling)***
24-hour PM_{10} and $PM_{2.5}$ (Annual and 24-hour averaging periods)	**25 Point Sources** 1. EP02100 (Ethanol Loadout Flare/Thermal Oxidizer) 2. EP04001A (Cooling Water Tower Cell 1) 3. EP04001B (Cooling Water Tower Cell 2) 4. EP04001C (Cooling Water Tower Cell 3) 5. EP07001 or EP-06001 (Firewater Pump Engine) 6. EP09001A (Flare-Pilot Only) 7. EP09001B (Flare) 8. EP10507 (Dirt/Fines Silo Vent) 9. EP11100 (EH Storage Bin #1 DC) 10. EP11200 (EH Storage Bin #2 DC) 11. EP11400 (Biomass Boiler Storage Bin DC) 12. EP11500 (Boiler Feed System DC#1) 13. EP11510 (Boiler Feed System DC#2) 14. EP11600 (Dust Collection System DC#1) 15. EP11610 (Dust Collection System DC#2) 16. EP11700 (Floor Sweep System DC) 17. EP18185 (EH Fermentation CO2 Scrubber) 18. EP20001 (Biomass-Fired Boiler #1) 19. EP20002 (Biomass Boiler Reheat Burner) ***(not included in April 2014 remodeling)*** 20. EP20143 (Bulk Fly Ash Loadout Silo) 21. EP20512 (Lime Handling DC#1) 22. EP-20010 or GEN1 (Non-emergency engine) 23. EP-20020 or GEN2 (Non-emergency engine) 24. EP-20030 or GEN3 (Emergency Engine) 25. EP-20040 or GEN4 (Emergency Engine) **17 Area Sources** - Consisted of 15 biomass storage piles (STORAGE1 through 15); one (1) Paved haul roads entrance (PHR001); and one (1) berm (BERM) **1407 Volume Sources** - Consisted of 290 paved haul roads (PHR003 through PHR292); 480 unpaved biomass haul roads on the east side of the facility (BRD001 through BRD480); 625 unpaved biomass haul roads on the west side of the facility (HRW001 through HRW0625); and 12 fugitives sources, namely: 1. 19001FUG (Wet Cake Emergency Pad and Reclaim conveyors) 2. EP11110F (Crops Receiving, Grinding and Conveying) 3. EP201111 (Fly Ash Truck Load-Out Slide Gate) 4. EP201112 (Fly Ash Rail Load-Out Slide Gate #1) 5. EP20113 (Fly Ash Rail Load-Out Slide Gate #2) 6. EP20119 (Bottom Ash load-out) 7. FUG_DO (Dirt Offloading truck offload station) 8. FUG_DP (Dirt Production grinding lines) 9. FUG_FAO (Fly Ash Offloading) ***(not included in April 2014 remodeling)*** 10. FUG_FAP (Fly Ash Production silo entrance) ***(not included in April 2014 remodeling)*** 11. FUG_WCP (Wet Cake Production filter press and conveyor) 12. FUG_WSL (Washed Sand load-out roll-off dumpster)
SO_2 (Annual, 24-hour, 3-hour and 1-hour averaging periods)	**10 Area Sources for Annual, 24-hour and 3-hour SO_2** **9 Area Sources for 1-hour SO_2** 1. EP02100 (Ethanol Loadout Flare) 2. EP07001 or EP-06001 (Firewater Pump Engine) ***(not included in 1-hour SO_2 modeling)*** 3. EP09001A (Flare-Pilot Only) 4. EP09001B (Flare) 5. EP20001 (Biomass-Fired Boiler #1) 6. EP2002 (Biomass Boiler Reheat Burner) 7. EP-20010 or GEN1 (Non-emergency engine) 8. EP-20020 or GEN2 (Non-emergency engine) 9. EP-20030 or GEN3 (Emergency Engine) 10. EP-20040 or GEN4 (Emergency Engine)